PIONEER DESIGN GROUP, INC.
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P 503.643.8286 www.pd-grp.com
9020 SW Washington Square Rd Suite 170
Portland, Oregon 97223

January 15, 2020

Joy Chang
City of Sherwood
22560 SW Pine Street155
Sherwood, Oregon 97140

RE: Supplemental Information Letter, Sub 19-02, The Reserve at Cedar Creek.
Pioneer Project No.: 359-003

Dear Joy:

This letter is intended to provide supplemental information based on our coordination and discussions with the City and County primarily related to Brookman Road and constructible improvements therein. Along with this letter you will also find the Technical Memorandum dated December 31st, 2019 and supporting exhibits provided to the City and County to coordinate final improvements to Brookman at this time as it has been recognized by the City, County and Applicant that the conditions of the current roadway don't allow for complete half street improvements to arterial standards.

I've also included a couple of other items of clarification to help the Planning Commission fully understand the proposed project.

BROOKMAN ROAD

Due to existing vertical and horizontal alignment of SW Brookman Road, completion of a 5-lane arterial section would result in significant safety and constructability concerns. The details of the issue are described in the December 31, 2019 Technical Memorandum and associated exhibits which have been included within the submittal documents under the tab labeled Brookman Road.

In short, the applicant has revised the plans to demonstrate construction of curb and sidewalk returns at the intersection of Brookman Road and Robin Hood place with added tapers to match existing pavement.

It is understood that any improvements that are not possible at this time will have a fee-in-lieu requirement and that those, along with the proposed improvements are 100% creditable.

COMMUNITY TRAIL

The community trail on the north side of Cedar Creek has been re-routed to avoid conflicts with the Middlebrook Subdivision approval.

The Community Trail along Brookman Road in accordance with coordination with the City and County for Brookman Road Improvements will be deferred for construction at a later date when a more comprehensive public project can be completed for this stretch of Brookman. Anything constructed at this time would simply have to be torn out completely.

CLEAN WATER SERVICES SANITARY TRUNK MAIN

The City Engineer requested that we coordinate with Clean Water Service regarding the location of the future trunk main and how that would affect the location of SW Yamel Terrace on the northwestern edge of the site. The concern was that the alignment was going to be closer to the western boundary and that it may require moving SW Yamel Terrace further to the east.

The applicant's representative had a meeting with Clean Water Service regarding the location of the trunk main. They assured that the trunk main would follow the future trail location to the east adjacent to the Vegetated Corridor. The reason for this decision is that if they constructed the main where the City Engineer feared they might, Clean Water Service would have to buy the entirety of the neighboring property instead of just an easement because the location would render the property undevelopable.

Should you have any further needs or require any additional information, please contact me at our office.

Sincerely,
Pioneer Design Group, Inc.

Matthew L. Sprague
Principal

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TECHNICAL MEMORANDUM

To: Joy Chang
Bob Galati, P.E.
City of Sherwood

From: Wayne Hayson
Pioneer Design Group, Inc.

Project: **The Reserve at Cedar Creek – SUB 19-02**
PDG No. 359-003

Date: 12/31/2019

RE: Reserve at Cedar Creek – SW Brookman Road Improvements

Please find attached preliminary engineering plans showing both an interim 3-lane design and the future 5-lane build-out of the SW Brookman Road frontage with the Reserve at Cedar Creek development, and in particular the intersection of internal Street "B" and SW Brookman Road. Also included are typical street sections and profiles for both designs.

As discussed with City and County staff, due to the existing horizontal and vertical alignment of SW Brookman Road, the design of the future 5-lane arterial section at a 35mph design speed would result in an approximately 4.3' cut at the intersection with Street B, resulting in significant safety and constructability concerns. Accordingly, during these joint discussions it has been determined that construction of SW Brookman Road to the future 5-lane arterial standard will need to be achieved through a comprehensive capital improvement project, including adequate ROW dedication by others to allow for a safe and functioning road.

As shown on the 3-Lane Interim Design drawings, the applicant proposes to construct appropriate corner returns at the Street B intersection within the development, with standard tapers back to the existing roadway. The applicant also proposes appropriate ROW dedication to meet the future 5-Lane arterial standard, as shown. It is understood that both the ROW dedication and any required fee-in-lieu payment will be eligible for 100% Transportation Development Tax credits. Interim stormwater conveyance will be located within the proposed roadside ditch within the dedicated ROW.

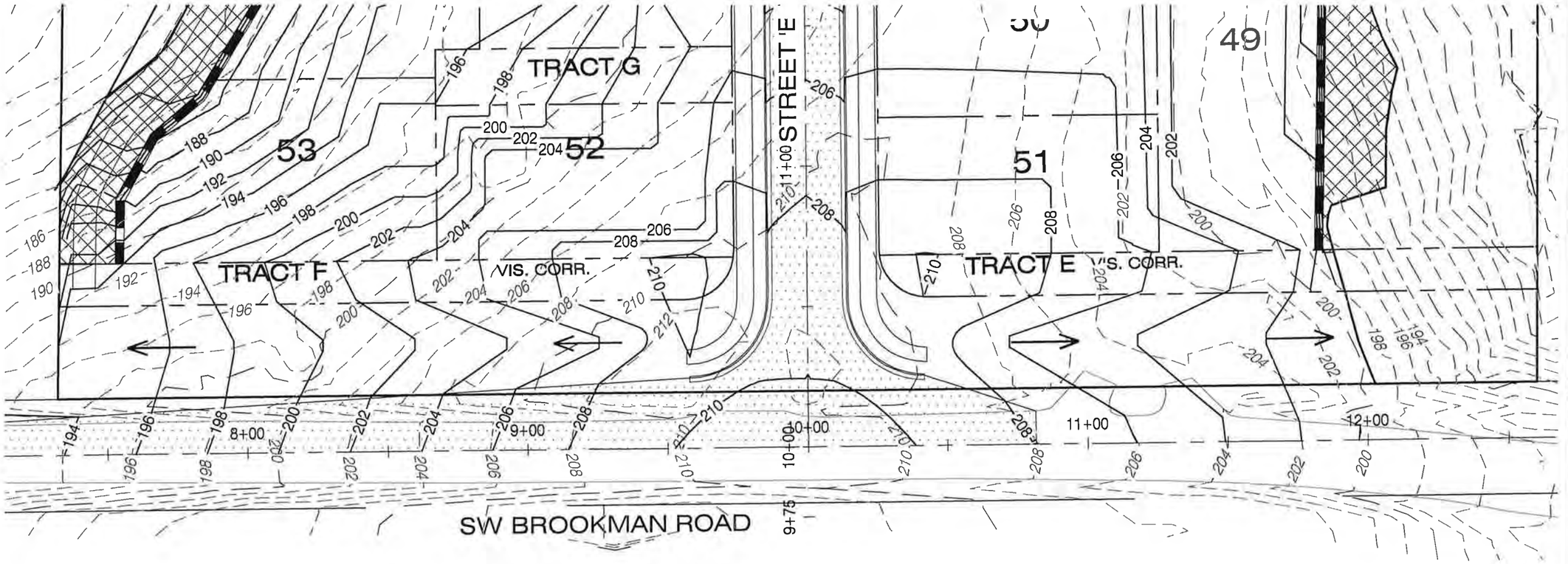
As shown on the 5-Lane Improvement drawings, the applicant has provided appropriate ROW dedication to accommodate construction of the future facility. In addition, street sections and profiles show the Street B intersection has been designed to minimize reconstruction as much as practicable, while avoiding impacts to the proposed dwellings within the Reserve at Cedar Creek Development. Future stormwater management

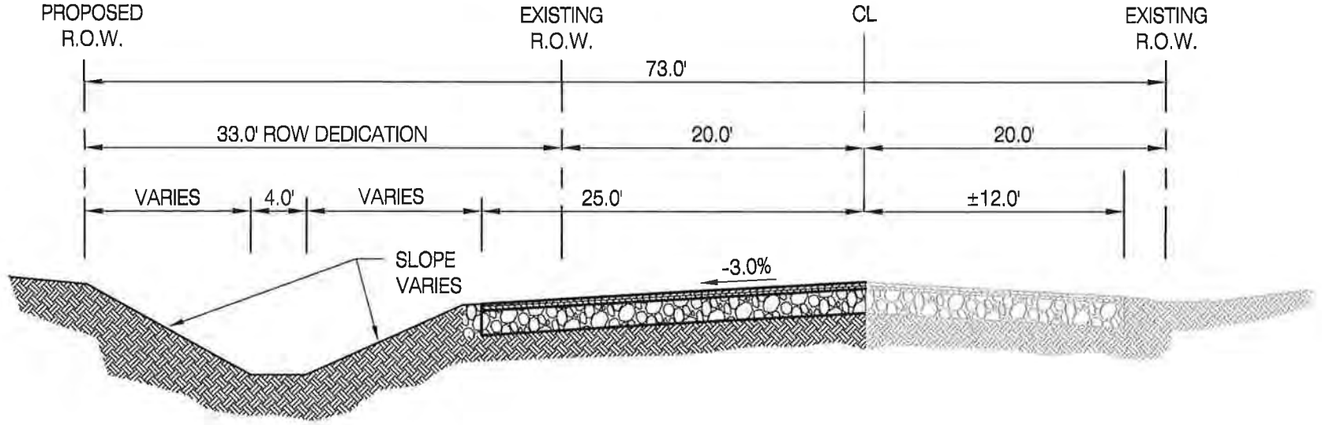
facilities can be built to current Clean Water Services (CWS) standards within the required 15' wide visual corridor located behind the proposed ROW, with the provision of appropriate easements. The visual corridor is not included in the City's required open space calculations for the site, therefore provision of open space within the Reserve at Cedar Creek is not impacted. Further, City visual corridor requirements do not prohibit the placement of such facilities, provided compliance with street tree and landscaping requirements can be achieved. City of Sherwood street tree standards include appropriate street trees species to meet both CWS and City landscaping requirements.

It is PDG's opinion that all provisions for future and interim improvements are identified within the attached exhibits, and should any questions arise regarding the above, that you will contact PDG staff directly.

3 LANE INTERIM DESIGN

THE RESERVE AT CEDAR CREEK





TYPICAL BROOKMAN STREET SECTION

N.T.S.

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Designed by Date
Drawn by Date
Reviewed by Date
Project No. 359-003 REF.
Horiz. Scale: 1"=40'
Vert. Scale: N/A

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Project
RESERVE CEDAR CREEK

No.
359-003

Type
PLANNING

Sheet
1 of 6

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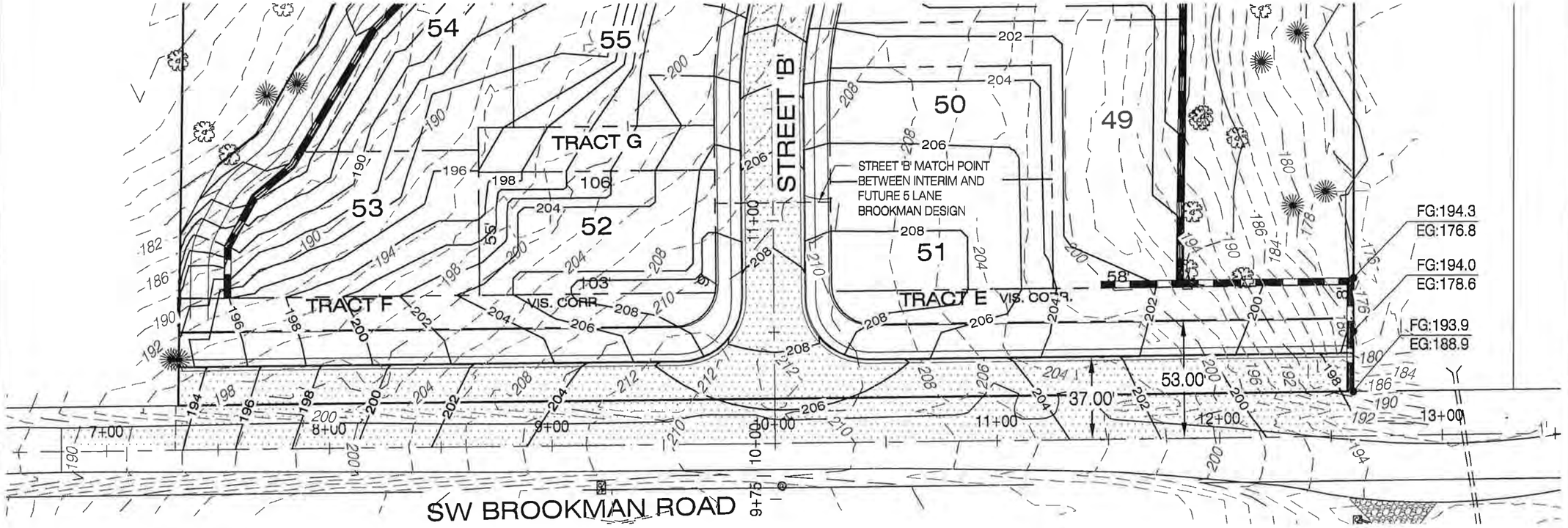
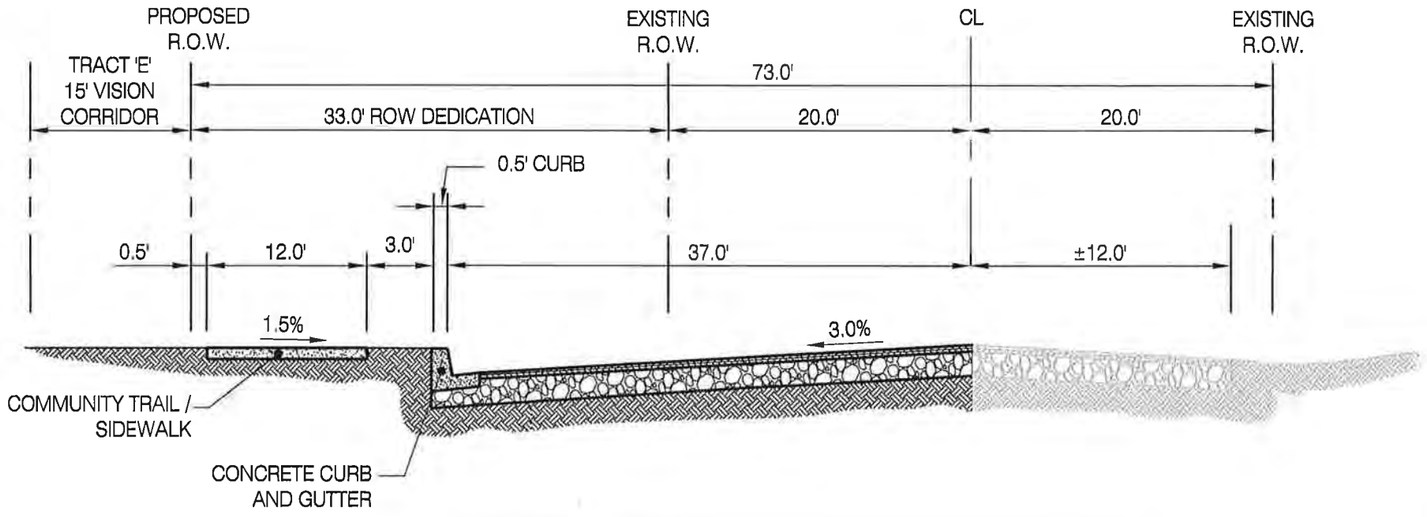
SW BROOKMAN ROAD - 5 LANE IMPROVEMENTS - 35 MPH

THE RESERVE AT CEDAR CREEK





TYPICAL BROOKMAN STREET SECTION

N.T.S.

SCALE

50 0 25 50

1 INCH = 50 FEET

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Date

Date

Date

REF.

Designed by

Drawn by

Reviewed by

Project No. 359-003

Horiz. Scale: 1"=50'

Vert. Scale: N/A

3593-5-lane_exhibit.dwg

Project
RESERVE AT CEDAR CREEK

No.
359-003

Type
PLANNING

Sheet
2 of 6

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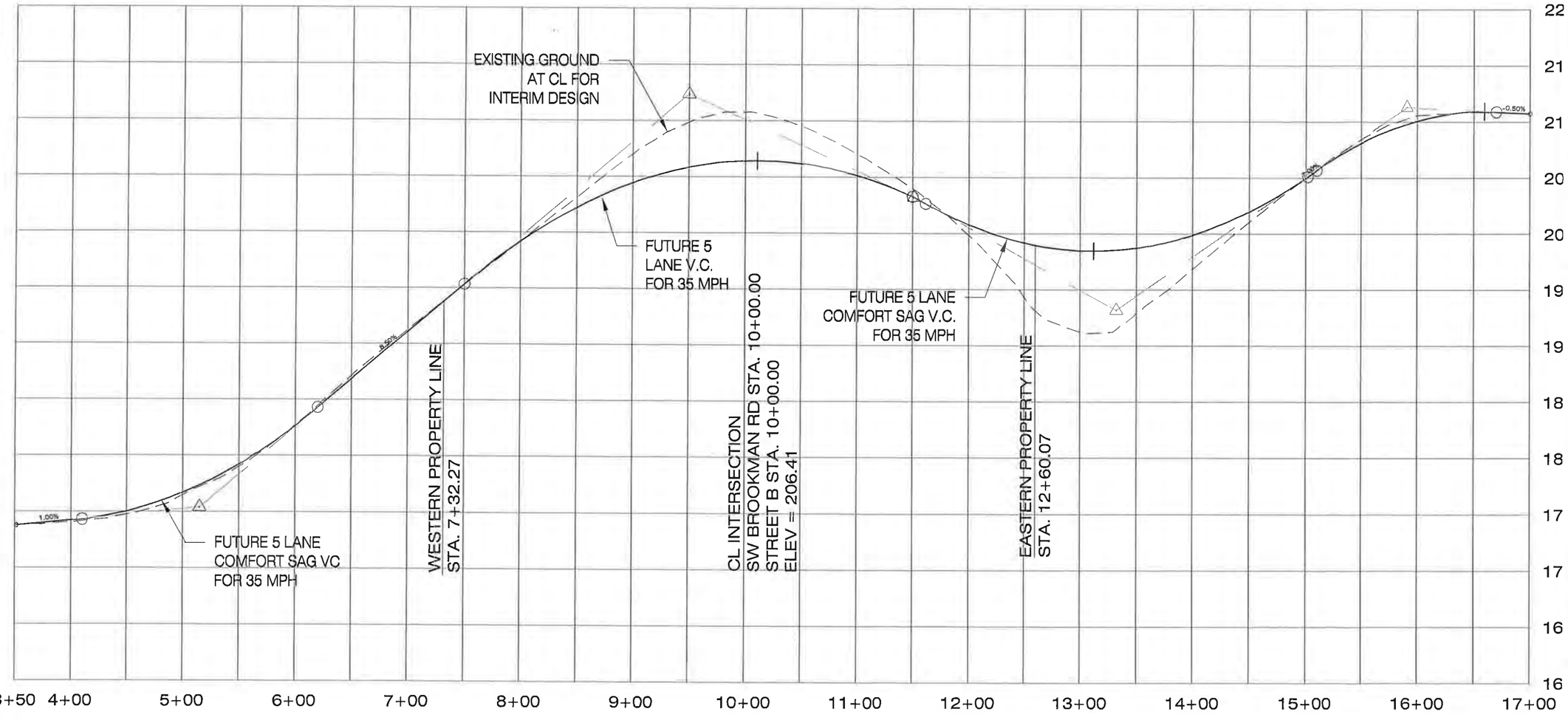
3 LANE INTERIM DESIGN - SW BROOKMAN ROAD PROFILE

THE RESERVE AT CEDAR CREEK



SW BROOKMAN ROAD (PUBLIC) PROFILE

SCALE: 1"=100' (H); 1"=10' (V)

SCALE
100 0 50 100
1 INCH = 100 FEET

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Reviewed by Date
Project No. 359-003 REF.
Horiz. Scale: AS NOTED
Vert. Scale: AS NOTED

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Project
RESERVE AT CEDAR CREEK

No.
359-003

Type
PLANNING

Sheet
3 of 6

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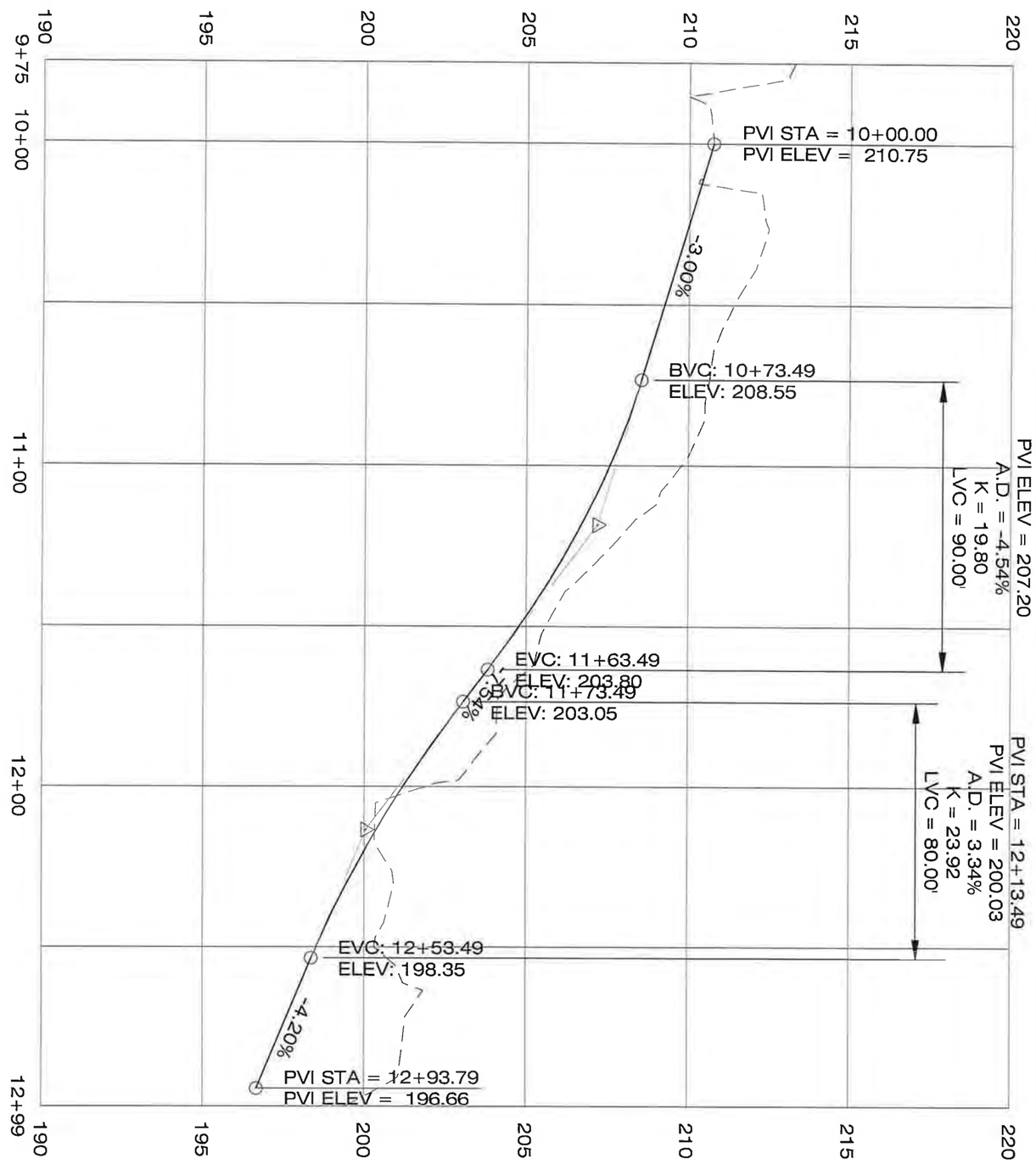
STREET B PROFILE - BROOKMAN 3 LANE INTERIM DESIGN

THE RESERVE AT CEDAR CREEK



STREET B (PUBLIC) PROFILE

SCALE: 1"=40' (H); 1"=4' (V)

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No. 359-003		**Drawn by**	**Date**
Type ENGINEERING		**Reviewed by**	**Date**
Sheet 4 of 6		**Project No.** 359-003	**REF.**
		Horiz. Scale: 1"=40'	
		Vert. Scale: 1"=4'	

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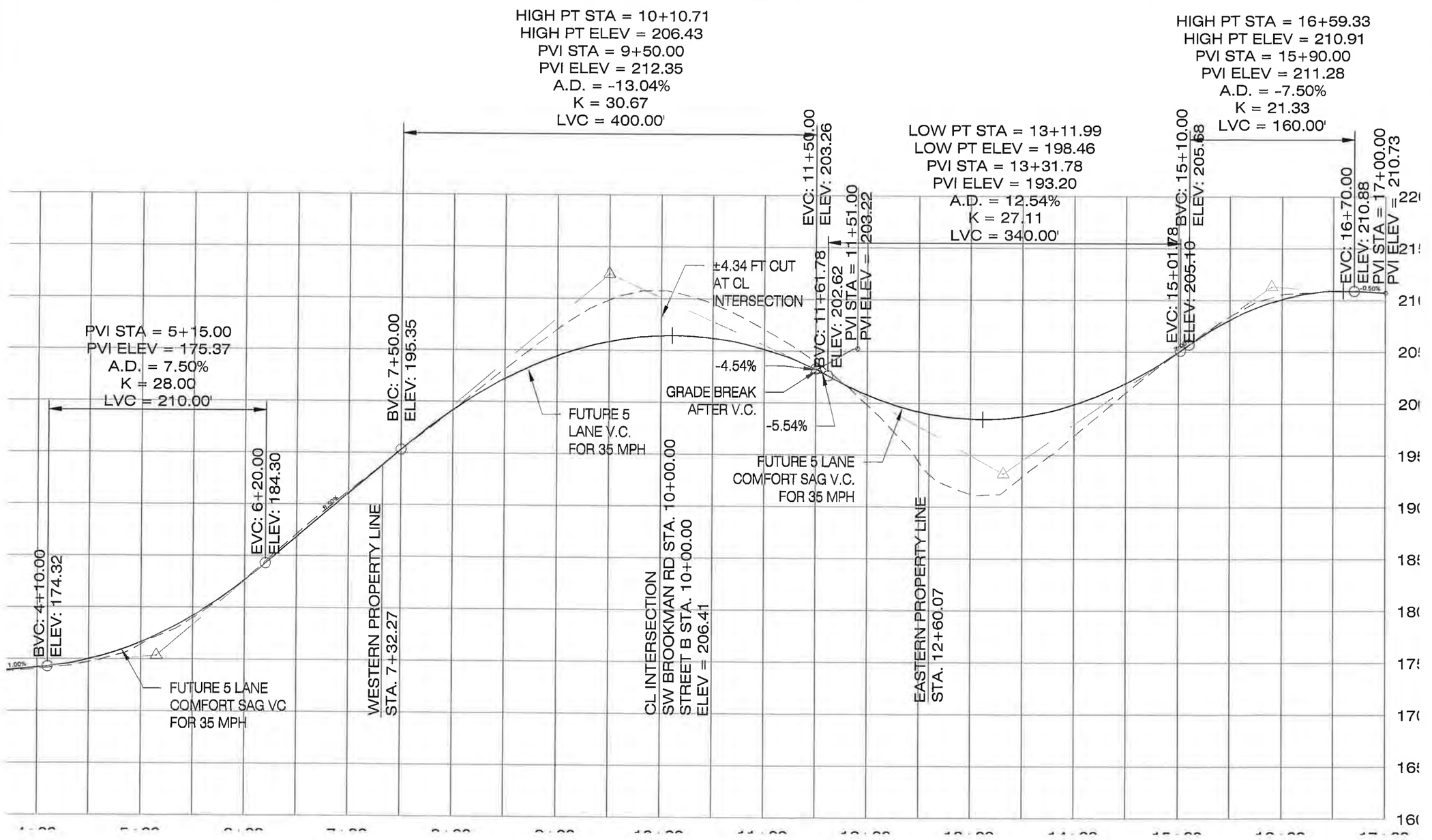
FUTURE 5 LANE SW BROOKMAN ROAD PROFILE - 35 MPH

THE RESERVE AT CEDAR CREEK



SW BROOKMAN ROAD (PUBLIC) PROFILE

SCALE: 1"=100' (H); 1"=10' (V)

SCALE
100 0 50 100
1 INCH = 100 FEET

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Designed by Date
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Reviewed by Date
Project No. 359-003 REF.
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Vert. Scale: 1"=4'

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Project
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No.
359-003

Type
ENGINEERING

Sheet
5 of 6

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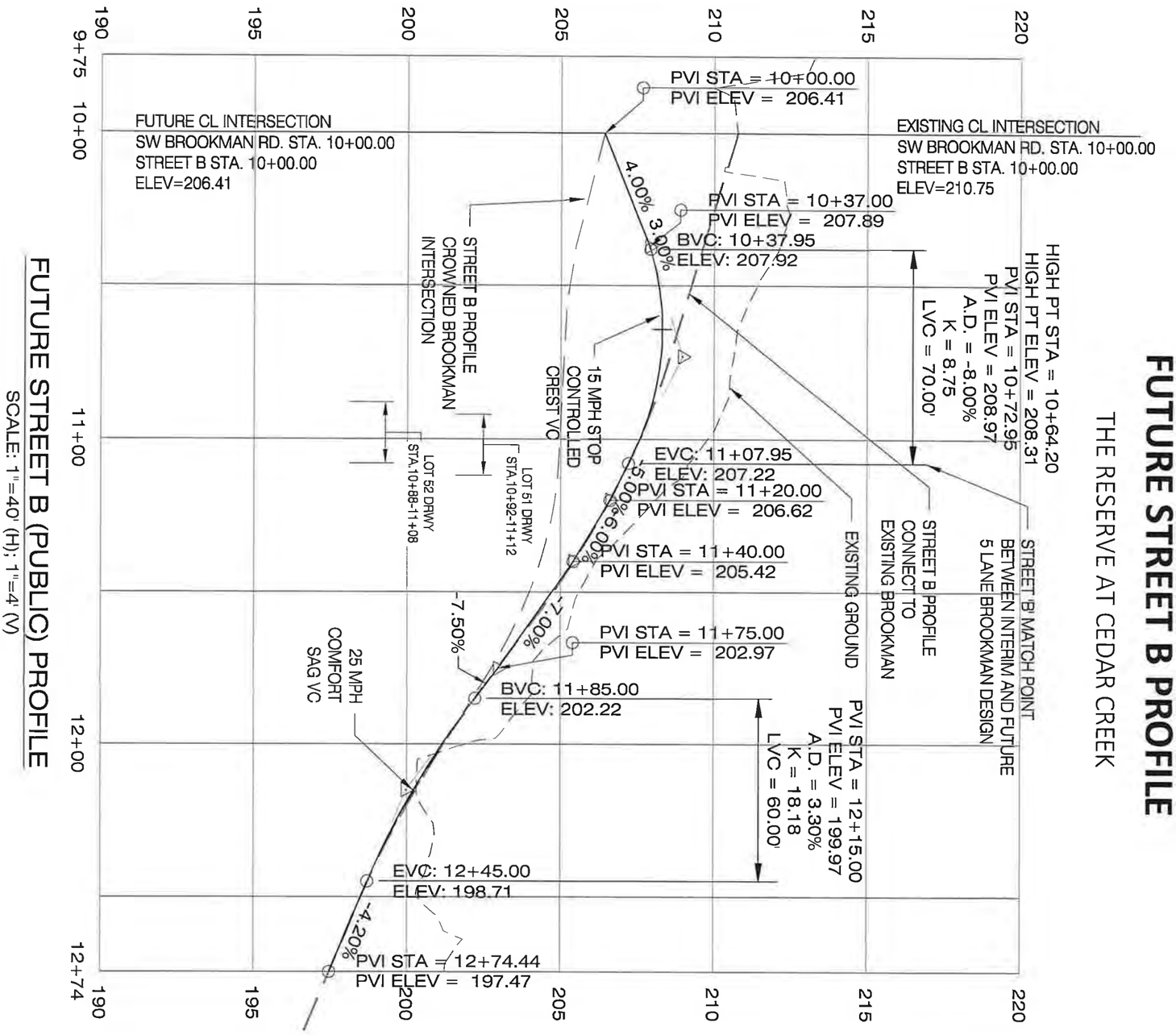
FUTURE STREET B PROFILE

THE RESERVE AT CEDAR CREEK



FUTURE STREET B (PUBLIC) PROFILE

SCALE: 1"=40' (H); 1"=4' (V)

SCALE
1 INCH = 40 FEET
40 0 20 40

Project RESERVE AT CEDAR CREEK	3593-profiles_exhibit.dwg	**Designed by**	**Date**
No. 359-003		**Drawn by**	**Date**
Type PLANNING		**Reviewed by**	**Date**
Sheet 6 of 6		**Project No.** 359-003	**REF.**
		Horiz. Scale: 1"=40'	
		Vert. Scale: 1"=4'	

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9020 SW Washington Square Rd Suite 170
Portland, Oregon 97223

October 2, 2019

Joy Chang
City of Sherwood
22560 SW Pine Street155
Sherwood, Oregon 97140

RE: Notice of Incomplete Application, Sub 19-02, The Reserve at Cedar Creek.
Pioneer Project No.: 359-003

Dear Joy:

This letter and supplemental information provided with it are intended to address the Notice of Incomplete dated May 9, 2019, for a proposed 59-Lot subdivision, "The Reserve at Cedar Creek", located at 17045 and 17117 SW Brookman Road. Please find responses to specific items below.

SHERWOOD PLANNING COMMENTS

1. *This development is contingent on the final approval of the Middlebrook Subdivision SP 18-02. Currently Middlebrook Subdivision preliminary proposal is tentatively scheduled for a Planning Commission hearing on June 25, 2019.*

RESPONSE: The Land Use Review and Approval for The Reserve at Cedar Creek was contingent upon Land Use Approval of the Middlebrook Subdivision by the Planning Commission. The Planning Commission approved the Middlebrook Subdivision prior to submittal of the completeness items for the Reserve at Cedar Creek. Therefore, this item is no longer applicable

2. *The following reports were not included as a part of the application materials.*
   - *Traffic Impact Analysis*
   - *Geotechnical Report*
   - *Site Assessment by Environmental Science and Assessment*
   - *Arborist Report*
   - *DSL Wetland Report*

RESPONSE: The applicant has included a Traffic Impact Analysis, Geotechnical Report, Site Assessment, Arborist Report and DSL Wetland Concurrence Letter within the re-submitted application.

3. *Modification to SZCDC 16-106.040.E.1 (cul-de-sac length) requires a Variance Review under 16.84 since the standard is within the Community Development Code*

RESPONSE: This incompleteness item requires application for a variance to modify the cul-de-sac length of SW Robin Hood Place from 200 feet to 260 feet, in accordance with the requirements of SZCDC 16.84. However, Section 16.84.020, in conjunction with SZCDC 16.106.020.E, provides for code standards to be modified without approval of a variance where the code expressly provides for such modifications. Specifically, Section 16.84.020 states:

16.84.020 – Applicability

A. Exceptions and Modifications versus Variances

A code standard or approval criterion may be modified without approval of a variance if the applicable code section expressly allows exceptions or modifications. If the code provision does not expressly provide for exceptions or modifications then a variance is required to modify that code section and the provisions of Chapter 16.84 apply.

In looking at the provisions of Section 16.106 – Transportation Facilities, Section 16.106.020.E states:

E. Transportation Facilities Modifications

1. A modification to a standard contained within this Chapter and Section 16.58.010 and the standard cross sections contained in Chapter 8 of the adopted TSP may be granted in accordance with the procedures and criteria set out in this section.

2. A modification request concerns a deviation from the general design standards for public facilities, in this Chapter, Section 16.58.010, or Chapter 8 in the adopted Transportation System Plan. The standards that may be modified include but are not limited to:

a. Reduced sight distances.
b. Vertical alignment.
c. Horizontal alignment.
d. Geometric design (length, width, bulb radius, etc.).
e. Design speed.
f. Crossroads.
g. Access policy.
h. A proposed alternative design which provides a plan superior to these standards.
i. Low impact development.
j. Access Management Plans

Section 16.106.40.E.1 subsequently requires that a cul-de-sac not be more than two hundred (200) feet in length, which is a general design standard (geometric design) which may be modified in accordance with Section 16.106.020.E.2.d. above

Accordingly, subject to compliance with the remainder of SZCDC 16.106 as is described in the revised narrative, a modification to the cul-de-sac length of SW Robin Hood Place may

be permitted as a Type II procedure, in conjunction with the subdivision application, without need for to request a variance. Please see the response to SZCDC 16.106 for additional findings.

4. *Clean Water Services, Service Provider Letter 19-001036 must be updated to include Tax Lot 101.*

RESPONSE: An amended Clean Water Services, Service Provider letter has been included in this resubmittal and includes Tax Lot 101.

5. *Need future refinement of sensitive areas for TL 101*

RESPONSE: The flood plain elevation through tax lot 101 is now shown in the plans and Environmental Science and Assessment has completed a sensitive lands review for tax lot 101 as well. An amended Service Provider Letter from CWS is included within this resubmittal.

6. *The required multi-use path along Brookman Road is not reflected in the plans. The path must meet City Engineering Standards*

RESPONSE: The required multi-use path along Brookman Road was reflected in the plans however was 2 feet narrower than City Standards. This pathway has now been widened to City standards and designed in a way in which it is curvilinear in nature, meandering within the right-of-way of Brookman Road and the Visual Corridor along Brookman Road to create a better and more attractive pedestrian/bicycle environment, as well as street scape for the proposed roadway.

7. *All Engineering Completeness Review Comments Dated May 7, 2019, attached.*

RESPONSE: Please see below within this letter where responses to engineering comments are provided.

While not specifically a completeness issue, the following must be addressed to comply with City requirements:

a. *Documentation of Service District Annexation to Metro Service District.*

RESPONSE: Documentation of Service District Annexation to the Metro Service District will be provided prior to permit issuance for any site work as required. Annexation into the district is not required until urban services are going to be provided which is at the permit issuance stage. Annexation will occur prior to that.

b. *Documentation of Service District Annexation to Clean Water Services Service District.*

RESPONSE: Documentation of Service District Annexation to Clean Water Service's District will be provided prior to permit issuance for any site work as required. Annexation

into the district is not required until urban services are going to be provided which is at the permit issuance stage. Annexation will occur prior to that.

c. *Lot 44 on Sheet P3 does not have direct access to a roadway.*

RESPONSE: Lot 44 has direct road frontage and access onto SW Kalapuya Lane.

d. *Street names for Street A and B must meet SZCDC 16.106.010.B.1*

RESPONSE: The street names chosen for Streets A (SW Yamel Terrace) and B (SW Robin Hood Place) are now in compliance with SZCDC-16.106.010. B.1 as shown on the plans.

SHERWOOD ENGINEERING COMMENTS

Transportation

A Traffic Impact Analysis (TIA) has not been provided with the submitted documents.

The proposed subdivision plans for the norther development area show future street development plans based on extension of public streets, which are not yet currently in existence. The public ROW of adjacent subdivision has not been established, dedicated, recorded, constructed or accepted by the City. As such, the proposed site development plans for the northern development area cannot be reviewed for completeness as no connection to existing public transportation facilities can be established.

The southern development area has direct access to Brookman Road, however the plans fail to show the proximity of existing roads (Oberst Road). SW Brookman Road is listed as an arterial road, which has access spacing standards. The plans do not show how the proposed development meets the standards for arterial road access.

CONCLUSION: The submittal is incomplete based on the above listed transportation deficit items.

RESPONSE: A Traffic Impact Analysis (TIA) is included within this resubmittal. A meeting and subsequent emails between the applicant, applicant's representative and the City of Sherwood have occurred regarding timing of Land Use Review and Engineering Review for this project. In summary, Land Use Review is not reliant upon construction and finalization of the adjacent Middlebrook subdivision however Land Use Review is contingent upon Land Use Approval of the Middlebrook Subdivision which has been completed. Engineering Review can occur in a timely manner after land use review however, issuance of permits for construction of this project are contingent upon the City accepting the improvements of the Middlebrook Subdivision. Should additional documentation of the meeting and correspondence be needed, it can be provided. In turn, the applicant understands and accepts risks associated with moving their project forward based upon the provision of some public services from the adjacent subdivision. The

applicant will carefully evaluate their options throughout the process and make decisions on timing based upon those evaluations.

Within the applicant's TIA (Kittelson and Associates) findings are made on page 43 as follows:

"The proposed new east site access on SW Brookman Road can comply with the Washington County Community Development Code minimum access spacing requirements."

It was found in their analysis that there are no public accesses serving more than a single house is located within 600 feet of the proposed access to Brookman for southern development area. Sheet 7 within the plan set demonstrates the proposed access location as compared to other accesses to Brookman to go along with the materials in the TIA.

Storm Water System

The proposed subdivision submittal has provided a preliminary storm water report. The incompleteness of the transportation portion of the submittal creates a situation whereby the storm water system report becomes incomplete.

The subdivision submittal includes a Service Provider Letter (SPL) issued by Clean Water Services (CWS) File no. 19-001036. Conditions are provided as part of the SPL, including need for a Geotechnical Report. A geotechnical Report has not been included with this submittal.

CONCLUSION: The submittal is incomplete based on the above listed storm water system deficit items.

RESPONSE: As noted above, with this resubmittal, the applicant has demonstrated compliance with the transportation portion of the submittal and thereby satisfies compliance with the storm water system comments above.

A letter from the geo-technical engineer along with the geo-technical report being submitted, demonstrate compliance with Clean Water Services standards for slope setbacks as well as all other requirements.

Water and Sanitary Sewer Systems

The proposed subdivision submittal shows that service for these facilities will be based on the extension of the existing public facilities constructed by the adjacent subdivision. The existence of the public facilities from the adjacent subdivision have not been constructed or accepted by the City. As such, the proposed site development plans for the proposed subdivision cannot be reviewed for completes as availability of existing public facilities can be established.

CONCLUSION: The submittal is incomplete based on the above listed water and sanitary sewer system deficit items.

RESPONSE: A meeting and subsequent emails between the applicant, applicant's representative and the City of Sherwood have occurred regarding timing of Land Use Review and Engineering Review for this project. In summary, Land Use Review is not reliant upon construction and finalization of the adjacent Middlebrook subdivision however Land Use Review is contingent upon Land Use Approval of the Middlebrook Subdivision which has been completed. Engineering Review can occur in a timely manner after land use review however, issuance of permits for construction of this project are contingent upon the City accepting the improvements of the Middlebrook Subdivision. In turn, the applicant understands and accepts risks associated with moving their project forward based upon the provision of some public services from the adjacent subdivision. The applicant will carefully evaluate their options throughout the process and make decisions on timing based upon those evaluations.

I trust that with this information, and the associated revisions to the submitted materials included with this letter, the application can be accepted as complete for review.

Sincerely,
Pioneer Design Group, Inc.

Matthew L. Sprague
Principal

City of Sherwood Oregon

Home of the Tualatin River National Wildlife Refuge

Case No. _____
Fee _____
Receipt # _____
Date _____
TYPE _____

City of Sherwood
Application for Land Use Action

Type of Land Use Action Requested: (check all that apply)

- ☐ Annexation
- ☐ Plan Amendment (Proposed Zone _____)
- ☐ Planned Unit Development
- ☐ Site Plan (square footage of building and parking area)
- ☐ Variance (list standards to be varied in description)
- ☐ Conditional Use
- ☐ Partition (# of lots _____)
- ☒ Subdivision (# of lots 59 Lots)
- ☐ Other: _____

By submitting this form the Owner, or Owner's authorized agent/ representative, acknowledges and agrees that City of Sherwood employees, and appointed or elected City Officials, have authority to enter the project site at all reasonable times for the purpose of inspecting project site conditions and gathering information related specifically to the project site.

Note: See City of Sherwood current Fee Schedule, which includes the "Publication/Distribution of Notice" fee, at **www.sherwoodoregon.gov.** Click on Government/Finance/Fee Schedule.

Owner/Applicant Information:

Applicant: David Weekly Homes — Phone: _____
Applicant Address: 1930 Thoreau Dr., Suite 160, Scheumburg, IL — Email: _____
Owner: Gerald & Liz Ouellette — Phone: _____
Owner Address: 17045 SW Brookman Rd., Sherwood — Email: _____
Contact for Additional Information: Matt Sprague, Pioneer Design Group 503-643-8286 msprague@pd-grp.com

Property Information:

Street Location: 17045 SW Brookman Rd., Sherwood
Tax Lot and Map No: 3S16-00100
Existing Structures/Use: 1Home
Existing Plan/Zone Designation: Medium Density Residential Low - MDRL
Size of Property(ies) 9.90 Acres

Proposed Action:

Purpose and Description of Proposed Action:

Proposed Use: 59-Lot Subdivision

Proposed No. of Phases (one year each): _____

Continued on Reverse

LAND USE APPLICATION FORM

Authorizing Signatures:

I am the owner/authorized agent of the owner empowered to submit this application and affirm that the information submitted with this application is correct to the best of my knowledge.

I further acknowledge that I have read the applicable standards for review of the land use action I am requesting and understand that I must demonstrate to the City review authorities compliance with these standards prior to approval of my request.

~~Applicant's~~ Signature — Date: 4/15/19

owners
Liz Ouellette
~~Owner's~~ Signature — Date: 4/15/19

The following materials must be submitted with your application or it will not be accepted at the counter. Once taken at the counter, the City has up to 30 days to review the materials submitted to determine if we have everything we need to complete the review. Applicant can verify submittal includes specific materials necessary for the application per checklist.

■ **3 Copies of Application Form*** completely filled out and signed by the property owner (or person with authority to make decisions on the property.

■ **Copy of Deed** to verify ownership, easements, etc.

■ **At least 3 folded** sets of plans*

■ **At least 3 copies** of narrative addressing application criteria*

■ **Fee** (along with calculations utilized to determine fee if applicable)

■ **Neighborhood Meeting Verification** including affidavit, sign-in sheet and meeting summary (required for Type III, IV and V projects)

* **Note** that the required numbers of copies identified on the checklist are required for completeness; however, upon initial submittal applicants are encouraged to submit only 3 copies for completeness review. Prior to completeness, the required number of copies identified on the checklist and one full electronic copy will be required to be submitted.

LAND USE APPLICATION FORM

Authorizing Signatures:

I am the owner/authorized agent of the owner empowered to submit this application and affirm that the information submitted with this application is correct to the best of my knowledge.

I further acknowledge that I have read the applicable standards for review of the land use action I am requesting and understand that I must demonstrate to the City review authorities compliance with these standards prior to approval of my request.

Applicant's Signature — Date: 4-17-19

Owner's Signature: Bonnie J David — Date: 4/16/19

The following materials must be submitted with your application or it will not be accepted at the counter. Once taken at the counter, the City has up to 30 days to review the materials submitted to determine if we have everything we need to complete the review. Applicant can verify submittal includes specific materials necessary for the application per checklist.

■ **3 Copies of Application Form*** completely filled out and signed by the property owner (or person with authority to make decisions on the property.

■ **Copy of Deed** to verify ownership, easements, etc.

■ **At least 3 folded** sets of plans*

■ **At least 3 copies** of narrative addressing application criteria*

■ **Fee** (along with calculations utilized to determine fee if applicable)

■ **Neighborhood Meeting Verification** including affidavit, sign-in sheet and meeting summary (required for Type III, IV and V projects)

* **Note** that the required numbers of copies identified on the checklist are required for completeness; however, upon initial submittal applicants are encouraged to submit only 3 copies for completeness review. Prior to completeness, the required number of copies identified on the checklist and one full electronic copy will be required to be submitted.

APPLICATION MATERIALS REQUIRED FOR

SUBDIVISION PLAT

Submit the following to the City of Sherwood Planning Department, 22560 SW Pine St., Sherwood, OR 97140: (503) 925-2308.

It is strongly suggested that you have a pre-application meeting with the City prior to submitting for a Subdivision. (See *Pre-application Process* form for information.)

Note: The Clean Water Services (CWS) requires a pre-screening to determine if water quality sensitive areas exist on the property. If these sensitive areas exist, a Site Assessment and Service Provider Letter is required prior to submitting for a subdivision or minor land partition or undertaking any development. **This application will not be accepted without a completed Pre-Screening Form and if required a Service Provider Letter.** Please contact CWS at (503) 681-3600.

If the proposal is next to a Washington County roadway, the applicant must submit an Access Report (Traffic Study) to Washington County Department of Land Use and Transportation (503) 846-8761. **This application will not be accepted until an Access Report (Traffic Study) is submitted to Washington County and the Access Report is deemed complete by the County; or written verification from Washington County that an Access Report is not required is provided.**

I. **Fee -** See City of Sherwood current Fee Schedule, which includes the "Publication/Distribution of Notice" fee, at **www.sherwoodoregon.gov.** Click on Departments/Planning/ Fee Schedule.

Note: The above fee is required at the time you submit for a subdivision. Additional fees will be charged for building permit, system development charges, impact fees and other fees applicable to the development. These fees will be charged when you make application for building permit. Building permit application will not be accepted until the final plat is recorded.

II. **BACKGROUND INFORMATION** (all materials collated and folded (not rolled) to create fifteen (15) sets)

*Note that the *final* application must contain fifteen (15) folded sets of the above, however, upon initial submittal of the application and prior to completeness review, the applicant may submit three (3) complete folded sets with the application in lieu of fifteen (15), with the understanding that fifteen (15) complete sets of the application materials will be required before the application is deemed complete and scheduled for review.

☑ **Application Form –** One original and fourteen (14) copies of a completed **City of Sherwood Application for Land Use Action** form. Original signatures from all owners must be on the application form.

☑ **Documentation of Neighborhood Meeting** - Affidavits of mailing, sign-in sheets and a summary of the meeting notes shall be included with the application.

☑ **Tax Map** - Fifteen (15) copies of the latest Tax Map available from the Washington County Assessor's Office showing property within at least 300 feet with scale (1"=100' or 1"= 200') north point, date and legend.

☑ **Mailing Labels –** Two (2) sets of mailing labels for property owners within 1,000 feet of the subject site, including a map of the area showing the properties to receive notice. Mailing labels are available from the Washington County Assessors office or a private title insurance company. . Ownership records shall be based on the most current available information from the Tax Assessor's office. *It is the applicant's responsibility to provide mailing labels that accurately reflect all property owners that reside within 1,000 feet of the subject site.*

☑ **Vicinity Map –** Fifteen (15) copies of a vicinity map. A photocopy of the Thomas Guide is adequate, showing the City limits and the Urban Growth Boundary.

☑ **Narrative –** Fifteen (15) copies and **an electronic copy** of a narrative explaining the proposal in detail and a response to the Required Findings for Subdivision, located in Chapter 16 of the Municipal Code/Zoning & Development, Section 16.120. The Municipal Code/Zoning & Development is available online at www.sherwoodoregon.gov, City Government/Records.

☑ **Electronic Copy –** An electronic copy of the entire application packet. This should include all submittal materials (narrative, vicinity map, mailing labels, site plan, preliminary plat, etc.).

III. REQUIRED PLANS

Submit fifteen (15) sets of the following folded full-size plans and **an electronic copy in PDF format**. Plans must have:

1) The proposed name of the development. If a proposed project name is the same as or similar to other existing projects in the City of Sherwood, the applicant may be required to modify the project name.
2) The name, address and phone of the owner, developer, applicant and plan producer.
3) North arrow,
4) Legend,
5) Date plans were prepared and date of any revisions
6) Scale clearly shown. Other than architectural elevations, all plans must be drawn to an engineer scale.
7) All dimensions clearly shown.

☑ **Existing Conditions Plan** - Existing conditions plan drawn to scale showing: property lines and dimensions, existing structures and other improvements such as streets and utilities, existing vegetation including trees, any floodplains or wetlands and any easements on the property. The existing conditions plan shall also include the slope of the site at 5-foot contour intervals

Preliminary Development Plans- Plans must be sufficient for the Hearing Authority to determine compliance with applicable standards. The following information is typically needed for adequate review:

1. The subject parcel(s), its dimensions and area and the buildable area of each lot.

2. The location and dimensions of proposed development, including the following:

Transportation

a. Public and private streets with proposed frontage improvements including curb, gutters, sidewalks, planter strip, street lighting, distances to street centerline, pavement width, right-of-way width, bike lanes and driveway drops.
b. Public and private access easements, width and location.
c. General circulation plan showing location, widths and direction of existing and proposed streets, bicycle and pedestrian ways and transit routes and facilities.
d. Show the location and distance to neighboring driveways and the width and locations of driveways located across the street.
e. The location and size of accesses, sight distance and any fixed objects on collectors or arterial streets.
f. Emergency accesses.

Grading and Erosion Control

g. Indicate the proposed grade at two (2)-foot contour intervals.
h. Indicate the proposed erosion control measures to CWS standards (refer to CWS R&O 07-20).
i. Show areas of cut and fill with areas of structural fill.
j. Show the location of all retaining walls, the type of material to be used, the height of the retaining wall from the bottom of the footing to the top of the wall and the exposed height of the wall.

Utilities

k. Utilities must be shown after proposed grade with 2-foot contour intervals.
l. Map location, purpose, dimensions and ownership of easements.
m. Fire hydrant locations and fire flows.
n. Water, sewer and stormwater line locations, types and sizes.
o. Clearly indicate the private and public portions of the system.
p. Above-ground utilities and manhole locations

Preliminary Stormwater Plan

q. Show location, size and slope of water quality facility.
r. Preliminary calculations justifying size of facility.
s. The total square footage of the new and existing impervious area.
t. Indicate a stormwater facility to CWS standards (CWS R&O 07-20).

Sensitive Areas

u. Show any and all streams, ponds, wetlands and drainage ways.
v. Indicate the vegetative corridor for sensitive areas to CWS standards. (R&O 07-20).
w. Indicate measures to avoid environmental degradation that meet CWS, DSL and Army Corp requirements.
x. Flood elevation.
y. Wetland delineation and buffering proposed.

Land Use

z. The square footage of each building and a break down of square footage by use. (i.e. retail, office, industrial, residential, etc.).
aa. Net buildable acres. (The land remaining after unbuildable areas are taken out, such as the floodplain and wetland areas.)
bb. Net density calculation for residential use.
cc. Existing trees proposed to remain and trees to be removed and the drip-lines of trees proposed to remain.
dd. Street tree location, size and type. (refer to Ch. 8, Section 8.304.06 of the Community Development Code).
ee. Location, size and height of proposed free-standing signs.
ff. Location, height and type of fencing and walls.
gg. For each lot indicated the building envelope.

☑ **Reduced - Proposed Development Plans** – One (1) reduced copy of the Proposed Development Plans on 8 1/2" by 11" sheets and fifteen (15) reduced copies on 11" by 17" sheets.

N/A ☐ **Lighting Plan** – Photometric lighting plan indicating foot candle power on and along the perimeter of the site. Proposed locations, height and size of lights. (If outdoor lighting is proposed).

☑ **Surrounding Land Uses** – Existing land use including nature, size and location of existing structures within 300 feet. .

IV. DOCUMENTS REQUIRED

☑ **Title Report** – Two (2) copies of a current preliminary title report available from a private title insurance company.

☑ **CWS Service Provider Letter** – Four (4) copies of the CWS service provider letter.

N/A ☐ **Soils Analysis and/or Geotechnical Report** – Four (4) copies completed by a registered Soils Engineer or Geologist including measures to protect natural hazards. (If required by the City Engineer).

☑ **Traffic Study** – Four (4) copies of a traffic study. (If required by the City Engineer

V. ADDITIONAL DOCUMENTS THAT MAY BE REQUIRED

☑ **Army Corps and DSL wetland applications and/or permits** – Four (4) copies of required Divisions of State Lands and/or Army Corp of Engineers permits and/or permit applications if applicable.

☑ **Trip Analysis** - verifying compliance with the Capacity Allocation Program, if required per 16.108.070.

☑ **Tree Report** – Two (2) copies of a tree report prepared by an arborist, forester, landscape architect, botanist or other qualified professional. (If trees are on-site).

☑ **Natural Resource Assessment –** If required by Clean Water Services (CWS). The CWS Pre-Screening indicates as to whether this report is required or not.

☑ **Wetland Delineation Study –** if required by Oregon Division of State Lands (DSL) or the Army Corps of Engineers.

N/A ☐ **Other Special Studies and/or Reports –** if required by the Planning Director or the City Engineer to address issues identified in the pre-application meeting or during project review.

☑ Verification of compliance with other agency standards such as CWS, DSL, Army Corps of Engineers, ODOT, PGE, BPA, Washington County

LAND USE APPLICATION
CITY OF SHERWOOD, OREGON

THE RESERVE AT CEDAR CREEK

A 59 Lot Subdivision of Tax Lots 100 & 101, Tax Map 3S1 06, & a Modification to SZCDC 16-106.040.E.1. (Cul-de-sac Length)

January 15, 2020

OWNER TAX LOT 100:
Gerald & Liz Oulette
17045 SW Brookman Road
Sherwood, OR 97140

OWNER TAX LOT 101:
Bonnie Jean David
17117 SW Brookman Road
Sherwood, OR 97140

APPLICANT/OWNER:
David Weekley Homes
1905 NW 169th Place, Suite 102
Beaverton, OR 97006

APPLICANT'S REPRESENTATIVE:
Pioneer Design Group
9020 Washington Square Road, Suite 170
Portland, OR 97223
Contact: Matthew L. Sprague
Phone: 503-643-8286
Email: msprague@pd-grp.com

PIONEER DESIGN GROUP

9020 SW Washington Square Rd
Suite 170
Portland, Oregon 97223
p 503.643.8286
f 844.715.4743
www.pd-grp.com

FACT SHEET

Project Name:	**The Reserve at Cedar Creek**
Proposed Action:	A 59 Lot Subdivision, and a Modification to SZCDC 16-106.040.E.1. (Cul-de-sac Length)
Tax Map:	3S1 06
Tax Lots:	100 & 101
Site Size:	Tax Lot 100 – 9.90 acres Tax Lot 101 – 5.86 acres Total Site Area – 15.76 Acres
Addresses:	17045 & 17117 SW Brookman Road, Sherwood, OR 97140
Location:	On the northside of SW Brookman Road, approximately 800 feet east of its intersection with SW Oberst Road
Zoning:	MDRL – Medium Density Residential Low

Owner Tax Lot 100:
Gerald & Liz Oulette
17045 SW Brookman Road
Sherwood, OR 97140

Owner Tax Lot 101:
Bonnie Jean David
17117 SW Brookman Road
Sherwood, OR 97140

Applicant:
David Weekley Homes
1905 NW 169th Place, Suite 102
Beaverton, OR 97006
Contact: Mike Irwin
Phone: 503-213-4409
Email: mirwin@dwhomes.com

Applicant's Representatives:

Planning/Surveying/Engineering/Landscape
Pioneer Design Group
9020 Washington Square Road, Suite 170
Portland, OR 97223
Contact: Matthew L. Sprague
Phone: 503-643-8286
Email: msprague@pd-grp.com

Biologist
Environmental Science & Assessment
107 SE Washington Street, Suite 249
Portland, OR 97214
Contact: Jack Dalton
Phone: 503-478-0424
Email: jack@esapdx.com

GENERAL INFORMATION

The applicant requests preliminary approval of a 59-Lot Single-Family Detached Residential Subdivision "The Reserve at Cedar Creek", along with a Modification to SZCDC 16-106.040.E.1. (Cul-de-sac Length). The subject site, specifically identified as Tax Lots 100 & 101 of Tax Map 3S106, is 15.76 acres in size. Both lots are currently accessible by driveways extending north from SW Brookman Road. Two existing residences are located on the site, with the first located in the northern portion of Tax Lot 100, with a driveway culvert crossing of the Cedar Creek drainage to access the dwelling, while the second dwelling is located at approximately the center of Tax Lot 101, south of Cedar Creek.

The site is within the Brookman Road Concept Plan area, which was adopted by the Sherwood City Council in 2009, and is zoned Medium Density Residential Low (MDRL) by the City of Sherwood. The MDRL Zone allows for single family detached residential lots as a permitted use, with a 5,000 square foot minimum lot size.

The northern 44 proposed lots are accessed from the west via public streets within the proposed Middlebrook Subdivision (SUB 18-02). The City of Sherwood Planning Commission held a hearing for SUB 18-02 on July 9, 2019 and approved the application with conditions based on the findings of fact and conditions contained in the record including testimony received, staff report and Exhibits A-J. The decision approving SUB 18-02 was rendered on July 15, 2019, with the appeal period ending July 29, 2019.

VICINITY & SITE INFORMATION

Site Location: On the northside of SW Brookman Road, approximately 800 feet east of its intersection with SW Oberst Road.

Existing Uses: The site currently contains a single-family detached home on each lot, plus associated residential accessory structures and outbuildings. The north end of the site is used primarily as pasture for livestock, storage for landscaping materials and a small horse corral. The southern end of the site is forested with a riparian forested community along Cedar Creek and a short tributary flowing north from SW Brookman Road to a confluence with Cedar Creek in the middle of the site. The plan for the site includes removal of all existing structures to facilitate construction of the development.

Topography: The site topography slopes from the north and south ends to the middle of site along the Cedar Creek riparian corridor. The forested slopes from Cedar Creek and the small tributary in south end range from 20 percent to 42 percent. The topography at the north end is generally flat within the pasture areas with a small depression in the northwest corner.

Vegetation: Landscaping surrounds the residence north of the Cedar Creek corridor. The eastern edge of the property is a mixed riparian forest community comprised of Douglas fir (Pseudotsuga menziesii), red alder (Alnus rubra), bitter cherry (Prunus emarginata), Oregon ash (Fraxinus latifolia) with a canopy cover of up to 80 percent. Understory species include mainly native species such as beaked hazelnut (Corylus cornuta), vine maple (Acer circanatum), red elderberry (Sambucus racemosa), snowberry (Symphoricarpos albus) and swordfern (Polystichum munitum), taperfruit shortscale sedge (Carex leptopoda) and along the driveway and in the southern end of

site, there is extensive cover of invasive species such as English ivy (Hedera helix) and Himalayan blackberry (Rubus armeniacus). The plant community in the north end of site around Wetland A is primarily non-native pasture grasses and weedy species such as bentgrass (Agrostis sp.), velvet grass (Holcus lanatus), self-heal (Prunella vulgaris) and oxeye daisy (Leucanthemum vulgare).

Surrounding Land Uses: SW Brookman Road runs along the site's southern boundary, and forms the edge of the Urban Growth Boundary. South of SW Brookman Road, a mixture of County resource and rural residential zoning districts prevail, typically consisting of rural uses and single-family dwellings on large lots. To the east and west of the site, land is located within the Brookman Road Concept Plan area, and will ultimately be developed to similar residential densities as the subject property. To the west, the proposed Middlebrook Subdivision was recently approved by the City for 145 new residential units, as previously described. To the north, the Abney Revard #2 subdivision was recorded in 1996, and supports detached single-family residential homes on lots of approximately 5,000 square feet.

Transportation: Transportation facilities for automobile, transit, pedestrians, and bicyclists continue to develop in the local area. The site is within the TriMet service district boundaries; however, the closest bus routes are #93 and 94 (Tigard/Sherwood, Pacific Highway/Sherwood) on SW Main Street, located approximately 1.35 miles to the north west of the site by road. It is noted that this is a greenfield development, and it is expected that access to transit facilities will increase over time, with new bus routes or stops, and the addition of community trails allowing greater pedestrian access to SW Brookman Road.

PROJECT DESCRIPTION

The proposed project is a residential subdivision creating 59 lots for single-family detached homes. A tract of approximately 256,841 square feet (5.90 acres) (Tract C) is to be preserved as open space that will be privately owned, unless it is dedicated to Clean Water Services or another appropriate jurisdiction. The smallest lot in the subdivision is 4,500 square feet (Lots 7, 8, and 9), while the largest lot is approximately 8,584 square feet (Lot 56). The average lot size is approximately 5,125 square feet, however the applicant is requesting the ability to reduce minimum lot areas to 4,500 square feet and lot widths at the building line to 45 feet, while maintaining the 5,000 square foot average lot size. The development is proposed to occur in two phases, with the northern 44 lots proposed as Phase 1, and the southern 15 lots proposed as Phase 2.

The design for the site includes minor improvements to SW Brookman Road to include curb and sidewalk returns and tapers to existing pavement edges. It has been determined by the City, Washington County and the Applicant that full half street improvements cannot be completed at this time and fee in lieu of what cannot be constructed will be applied and 100% creditable. Additionally, the project will construct the extension of the proposed SW Kalapuya Lane and SW Atfalati Lane from the Middlebrook Subdivision to the west; a short public street connecting the two local streets (Street A); and a public cul-de-sac extending north from SW Brookman Road (Street B). Due to the length of the cul-de-sac, which at 260 feet in length exceeds the 200 foot maximum length of SZCDC 16-106.040.E.1., the applicant has applied with this submittal a request for Modification to the cul-de-sac length standards. In addition, two short private streets will serve 2 lots each, and will be constructed to City private street standards. SW Brookman

Road will have limited improvements as described above, with a requested right-of-way width of width of 53 feet to centerline.

Local streets within the development are proposed to meet the City local street standards, with 52 feet of right-of-way and a 28-foot paved surface, curb and gutter, 6-foot-wide sidewalks, planter strips, street trees, and illumination.

The applicant proposes two water quality facilities, designed and constructed as drainage swales, located on each side of Cedar Creek and identified as Tracts B and D. Drainage from the site will be directed to these facilities via catch basins, manholes and pipes and then released into the adjoining Cedar Creek drainageway. Private street tract A and proposed public street Robin Hood Place will serve to provide access to the facilities.

The Cedar Creek channel flows west to east through the middle of site, through a culvert for the property driveway and extends off-site to the northeast. A short tributary flows north from SW Brookman Road along the southeastern end of site to a confluence with Cedar Creek in the middle of the site. The riparian forested community bordering both sides of Cedar Creek extends approximately 200 feet. The stream channel is 6 to 8 feet wide at the Ordinary High Water (OHW) line and is bordered by wetland on both sides. The vegetative community is forested wetland comprised of species described in the Vicinity and Site Information section above.

III. Applicable Review Criteria

CITY OF SHERWOOD COMMUNITY DEVELOPMENT CODE

Title 16 -ZONING AND COMMUNITY DEVELOPMENT CODE

Division II. - LAND USE AND DEVELOPMENT

Chapter 16.12 - RESIDENTIAL LAND USE DISTRICTS

The residential districts are intended to promote the livability, stability and improvement of the City's neighborhoods.

16.12.010 - Purpose and Density Requirements

C. Medium Density Residential (MDRL)

The MDRL zoning district provides for single-family and two-family housing, manufactured housing and other related uses with a density of 5.6 to 8 dwelling units per acre. Minor land partitions shall be exempt from the minimum density requirements.

RESPONSE: The entire development site is zoned Medium Density Residential Low (MDRL) within the Brookman Road Concept Plan. The proposed subdivision, "The Reserve at Cedar Creek", includes a total of 59 lots for single-family detached residential units. While the combined gross site area of both subject tax lots equals approximately 15.76 acres, when

removing approximately 7.55 acres of streets and resource areas, the net area of the site is 8.32 acres. Minimum and Maximum densities based on the net site area are calculated as follows:

Minimum Density = 8.32 acres x 5.6 units/acre = 46.60 = 46 units.
Maximum Density = 8.32 acres x 8 units/acre = 66.56 = 66 units.

Accordingly, the proposed 59 lots falls within the minimum and maximum density requirements for the site.

16.12.020 - Allowed Residential Land Uses

A. Residential Land Uses

The table below identifies the land uses that are allowed in the Residential Districts. The specific land use categories are described and defined in Chapter 16.10.

USES	MDRL
RESIDENTIAL	
Single-Family Attached or Detached Dwellings	P

RESPONSE: The application proposes the creation of 59 lots for the construction of detached single-family residential dwelling units. Detached single-family dwellings are a permitted use in the MDRL district. Therefore, this criterion is met.

B. Any use not otherwise listed that can be shown to be consistent or associated with the permitted uses or conditionally permitted uses identified in the residential zones or contribute to the achievement of the objectives of the residential zones will be allowed or conditionally permitted using the procedure under Chapter 16.88 (Interpretation of Similar Uses).

C. Any use that is not permitted or conditionally permitted under this zone that cannot be found to be consistent with the allowed or conditional uses identified as in B. is prohibited in the residential zone using the procedure under Chapter 16.88 (Interpretation of Similar Uses).

RESPONSE: The application includes only the above listed permitted uses. Therefore, these criteria do not apply.

16.12.030 - Residential Land Use Development Standards

A. Generally

No lot area, setback, yard, landscaped area, open space, offstreet parking or loading area, or other site dimension or requirement,

existing on, or after, the effective date of this Code shall be reduced below the minimum required by this Code. Nor shall the conveyance of any portion of a lot, for other than a public use or right-of-way, leave a lot or structure on the remainder of said lot with less than minimum Code dimensions, area, setbacks or other requirements, except as permitted by Chapter 16.84. (Variance and Adjustments)

B. *Development Standards*

Except as modified under Chapter 16.68 (Infill Development), Section 16.144.030 (Wetland, Habitat and Natural Areas) Chapter 16.44 (Townhomes), or as otherwise provided, required minimum lot areas, dimensions and setbacks shall be provided in the following table.

C. *Development Standards per Residential Zone*

RESPONSE: The following development standards are applicable to single-family detached dwelling units in the MDRL zone:

DEVELOPMENT STANDARD BY RESIDENTIAL ZONE	MDRL
Minimum Lot areas: (in square ft.)	
Single-Family Detached	5,000
Minimum Lot width at front property line: (in feet)	25
Minimum Lot width at building line[1] (in feet)	
Single-Family	50
Lot Depth	80
Maximum Height [2] (in feet)	30 or 2 stories
Setbacks (in feet)	
Front yard [4]	14
Face of garage	20
Interior side yard	
Single-family detached	5
Corner lot street side	
Single-family or Two family	15
Rear Yard	20

RESPONSE: As proposed, each of the lots meets the required dimensional standards listed above with the exception of minimum lot size, including both lot area and minimum lot width at the building line. In accordance with Section 16.144.030.B.1., the applicant is requesting an exception to these dimensional standards, to the maximum permitted 10% reduction. Accordingly, the minimum lot size proposed is 4,500 square feet, with a minimum lot width at

the building line of 45 feet. Please see the response to Section 16.144.030.B.1. for findings related to the exception criteria.

The Preliminary Plat submitted with the application demonstrates that each lot is capable of supporting a detached single-family dwelling unit meeting minimum setback requirements at the time of building permit review. Therefore, these criteria are met.

16.12.040 - Community Design

For standards relating to off-street parking and loading, energy conservation, historic resources, environmental resources, landscaping, access and egress, signs, parks and open space, on-site storage, and site design, see Divisions V, VIII, IX.

RESPONSE: This written narrative demonstrates that the proposed 59 lots subdivision meets the applicable community design standards of Division V. – Community Design, and Division VIII. – Environmental Resources. There are no identified historic resources on the site, therefore Division IX.- Historic Resources does not apply to this application.

16.12.050 - Flood Plain

Except as otherwise provided, Section 16.134.020 shall apply.

RESPONSE: The site is bisected by Cedar Creek, which runs from west to east across the site dividing it into north and south areas, and its associated 100-year flood plain. Therefore, Section 16.134.020 is applicable to this application, and addressed later in this written narrative.

Division IV. - PLANNING PROCEDURES

Chapter 16.84 - VARIANCES

16.84.020 – Applicability

A. Exceptions and Modifications versus Variances

A code standard or approval criterion may be modified without approval of a variance if the applicable code section expressly allows exceptions or modifications. If the code provision does not expressly provide for exceptions or modifications then a variance is required to modify that code section and the provisions of Chapter 16.84 apply.

RESPONSE: The applicant proposes to modify the cul-de-sac length of SW Robin Hood Place from 200 feet to 260 feet. Pursuant to SZCDC Section 16.84.020.A., above, and in conjunction with SZCDC 16.106.020.E, code standards may be modified without approval of a variance where the code expressly provides for such modifications.

In looking at the provisions of Section 16.106 – Transportation Facilities, Section 16.106.020.E states:

E. Transportation Facilities Modifications

1. *A modification to a standard contained within this Chapter and Section 16.58.010 and the standard cross sections contained in Chapter 8 of the adopted TSP may be granted in accordance with the procedures and criteria set out in this section.*

2. *A modification request concerns a deviation from the general design standards for public facilities, in this Chapter, Section 16.58.010, or Chapter 8 in the adopted Transportation System Plan. The standards that may be modified include but are not limited to:*

   ...

   d. Geometric design (length, width, bulb radius, etc.).

   ...

RESPONSE: Section 16.106.40.E.1 subsequently requires that a cul-de-sac not be more than two hundred (200) feet in length, which is a general design standard (geometric design) which may be modified in accordance with Section 16.106.020.E.2.d. above

Accordingly, subject to compliance with the remainder of SZCDC 16.106 as is described in this narrative, a modification to the cul-de-sac length of SW Robin Hood Place may be permitted through a Type II procedure, in conjunction with the subdivision application, without need to request a variance. Please see the response to SZCDC 16.106 for additional findings.

Division V. - COMMUNITY DESIGN

Chapter 16.92 - LANDSCAPING

16.92.030 - Site Area Landscaping and Perimeter Screening Standards

D. Visual Corridors

Except as allowed by subsection 6. above, new developments shall be required to establish landscaped visual corridors along Highway 99W and other arterial and collector streets, consistent with the Natural Resources and Recreation Plan Map, Appendix C of the Community Development Plan, Part II, and the provisions of Chapter 16.142 (Parks, Trees, and Open Space). Properties within the Old Town Overlay are exempt from this standard.

16.142.040 - Visual Corridors

A. Corridors Required

New developments located outside of the Old Town Overlay with frontage on Highway 99W, or arterial or collector streets

designated on Figure 8-1 of the Transportation System Plan shall be required to establish a landscaped visual corridor according to the following standards:

Highway 99W: 25 feet
Arterial: 15 feet
Collector: 10 feet

In residential developments where fences are typically desired adjoining the above described major street the corridor may be placed in the road right-of-way between the property line and the sidewalk. In all other developments, the visual corridor shall be on private property adjacent to the right-of-way.

RESPONSE: SW Brookman Road is classified as an Arterial street; therefore a 15-foot landscaped visual corridor is required. As shown on the preliminary plat, a 15-foot wide visual corridor is provided along the entire SW Brookman Road frontage, except at the proposed public street access location, and where Tract C (containing Cedar Creek and associated flood plain and riparian areas) intersects the SW Brookman Road right-of-way. These visual corridors are identified as Tracts E and F on the Preliminary Plat. Although the planted materials may have to be replaced after a future County construction project on Brookman, the planted materials are needed to serve the screening purpose in the interim and will therefore be installed. Therefore, this criterion is met.

B. Landscape Materials

The required visual corridor areas shall be planted as specified by the review authority to provide a continuous visual and/or acoustical buffer between major streets and developed uses. Except as provided for above, fences and walls shall not be substituted for landscaping within the visual corridor. Uniformly planted, drought resistant street trees and ground cover, as specified in Section 16.142.060, shall be planted in the corridor by the developer. The improvements shall be included in the compliance agreement. In no case shall trees be removed from the required visual corridor.

RESPONSE: As illustrated on the Preliminary Street Tree and Open Space Planting Plan (Sheets L1 and L2), street trees meeting City requirements and extensive ground cover landscaping are provided within the visual corridor areas. Therefore, this criterion is met.

C. Establishment and Maintenance

Designated visual corridors shall be established as a portion of landscaping requirements pursuant to Chapter 16.92. To assure continuous maintenance of the visual corridors, the review authority may require that the development rights to the corridor

areas be dedicated to the City or that restrictive covenants be recorded prior to the issuance of a building permit.

RESPONSE: The Applicant is aware and understands that the City may require dedication of the development rights or restrictive covenants to be recorded for the visual corridor area. This criterion can be met, as determined appropriate by the City through the land use review.

D. Required Yard

Visual corridors may be established in required yards, except that where the required visual corridor width exceeds the required yard width, the visual corridor requirement shall take precedence. In no case shall buildings be sited within the required visual corridor, with the exception of front porches on townhomes, as permitted in Section 16.44.010(E)(4)(c).

RESPONSE: The visual corridor area is not in a required yard, and no buildings are proposed to be sited in the corridor. Therefore, this criterion is met.

Chapter 16.96 - ON-SITE CIRCULATION

16.96.010 - On-Site Pedestrian and Bicycle Circulation

A. Purpose

On-site facilities shall be provided that accommodate safe and convenient pedestrian access within new subdivisions, multi-family developments, planned unit developments, shopping centers and commercial districts, and connecting to adjacent residential areas and neighborhood activity centers within one-half mile of the development.

Neighborhood activity centers include but are not limited to existing or planned schools, parks, shopping areas, transit stops or employment centers. All new development, (except single-family detached housing), shall provide a continuous system of private pathways/sidewalks.

RESPONSE: As shown on the Preliminary Plat, Preliminary Street Tree and Open Space Planting Plan (Sheet L1), and the submitted plan set, designated pedestrian pathways are provided adjacent to natural resource areas and throughout the subdivision, including a pedestrian crossing of Cedar Creek connecting the north and south portions of the development site, and to SW Brookman Road. Therefore, this criterion is met.

B. Maintenance

No building permit or other City permit shall be issued until plans for ingress, egress and circulation have been approved by the City.

Any change increasing any ingress, egress or circulation requirements, shall be a violation of this Code unless additional facilities are provided in accordance with this Chapter.

RESPONSE: The Applicant understands that no building permits or other City permits will be issued until the plans for ingress, egress, and circulation have been approved by the City. This criterion can be met.

C. Joint Access

Two (2) or more uses, structures, or parcels of land may utilize the same ingress and egress when the combined ingress and egress of all uses, structures, or parcels of land satisfied the other requirements of this Code, provided that satisfactory legal evidence is presented to the City in the form of deeds, easements, leases, or contracts to clearly establish the joint use.

RESPONSE: Joint access is provided over private street tracts to Lots 34 and 35 via Tract A, and Lots 53 and 54 via Tract G. Each of these joint accessways meets the requirements of this code, as demonstrated within this written narrative. Satisfactory legal evidence will be provided to the City in the form of deeds, easements, leases, or contracts to clearly establish the joint use, prior to or at the time of Final Plat approval. Therefore, this criterion is met.

D. Connection to Streets

1. Except for joint access per this Section, all ingress and egress to a use or parcel shall connect directly to a public street, excepting alleyways with paved sidewalk.

RESPONSE: With the exception of Lots 34, 35, 53, and 54 described above, individual ingress and egress connections for all proposed lots are available directly to public streets within the development, as shown on the Preliminary Plat. Therefore, this criterion is met.

2. Required private sidewalks shall extend from the ground floor entrances or the ground floor landing of stairs, ramps or elevators to the public sidewalk or curb of the public street which provides required ingress and egress.

RESPONSE: Private sidewalks will extend from the primary ground floor entrance of each dwelling to the nearest public street sidewalk. These private sidewalks will be planned and installed as part of the individual home construction on each lot. Therefore, this criterion will be met.

E. Maintenance of Required Improvements

Required ingress, egress and circulation improvements shall be kept clean and in good repair.

RESPONSE: Following construction, required ingress, egress and circulation improvements will be maintained and kept clean and in good repair by the individual homeowner adjacent to such improvement, or other legal entity legally responsible for maintenance and upkeep of said improvements such as a Home Owners Association. This criterion will be met.

F. Access to Major Roadways

Points of ingress or egress to and from Highway 99W and arterials designated on the Transportation Plan Map, attached as Appendix C of the Community Development Plan, Part II, shall be limited as follows:

1. *Single and two-family uses and manufactured homes on individual residential lots developed after the effective date of this Code shall not be granted permanent driveway ingress or egress from Highway 99W and arterial roadways. If alternative public access is not available at the time of development, provisions shall be made for temporary access which shall be discontinued upon the availability of alternative access.*

2. *Other private ingress or egress from Highway 99W and arterial roadways shall be minimized. Where alternatives to Highway 99W or arterials exist or are proposed, any new or altered uses developed after the effective date of this Code shall be required to use the alternative ingress and egress.*

3. *All site plans for new development submitted to the City for approval after the effective date of this Code shall show ingress and egress from existing or planned local or collector streets, consistent with the Transportation Plan Map and Section VI of the Community Development Plan.*

RESPONSE: SW Brookman Road is classified as an Arterial street on the Washington County Transportation System Plan and the City of Sherwood Transportation System Plan. As such, single-family uses are not permitted permanent driveway ingress or egress from SW Brookman Road. This application includes ingress and egress to the single-family lots from proposed interior local streets, with one public street access meeting arterial spacing standards providing access to lots 45 through 59 adjacent to SW Brookman Road. The Washington County Community Development Code specifies a 600-foot access spacing standard, the same as that specified in the City of Sherwood Municipal Code Section 16.106.040.M.2.d.(2)(a). The nearest existing street access, being SW Oberst Road, is located approximately 1,050 feet west of the site. Therefore, this criterion is met.

G. Service Drives

Service drives shall be provided pursuant to Section 16.94.030.

RESPONSE: The subject application does not include service drives. Therefore, this criterion is not applicable.

16.96.020 - Minimum Residential standards

Minimum standards for private, on-site circulation improvements in residential developments:

A. Driveways

1. Single-Family: One (1) driveway improved with hard surface pavement with a minimum width of ten (10) feet, not to exceed a grade of 14%. Permeable surfaces and planting strips between driveway ramps are encouraged in order to reduce stormwater runoff.

RESPONSE: Each lot within the subdivision is planned to have a single driveway, each of which will be improved with hard surface pavement. Each of the driveways will be greater than 10 feet in width to provide off-street parking for each lot, and will be constructed with a grade of less than 14%. The criterion will be met.

B. Sidewalks, Pathways and Curbs

1. Single, Two-Family, and Manufactured Home on Individual Residential Lot: No on-site sidewalks and curbs are required when not part of a proposed partition or subdivision.

RESPONSE: As illustrated on the Preliminary Street Tree and Open Space Planting Plan (Sheet L1), a curb, sidewalk and planter strip are planned to be installed along the street frontage of each lot in the subdivision, where they abut a public street. This criterion will be met.

16.96.030 - Minimum Non-Residential Standards

RESPONSE: The application does not include commercial or industrial uses. The Section does not apply.

16.96.040 - On-Site Vehicle Circulation

A. Maintenance

No building permit or other City permit shall be issued until plans for ingress, egress and circulation have been approved by the City. Any change increasing any ingress, egress or circulation requirements, shall be a violation of this Code unless additional facilities are provided in accordance with this Chapter.

RESPONSE: The Applicant is aware that no building permit or other City permit will be issued until the plans for ingress, egress, and circulation have been approved by the City. This criterion can be met.

B. Joint Access [See also Chapter 16.108]

Two (2) or more uses, structures, or parcels of land are strongly encouraged to utilize jointly the same ingress and egress when the combined ingress and egress of all uses, structures, or parcels of land satisfy the other requirements of this Code, provided that satisfactory legal evidence is presented to the City in the form of deeds, easements, leases, or contracts to clearly establish the joint use. In some cases, the City may require a joint access to improve safety, vision clearance, site distance, and comply with access spacing standards for the applicable street classification.

RESPONSE: As described above, joint access is provided over private street tracts to Lots 34 and 35 via Tract A, and Lots 53 and 54 via Tract G. Each of these joint accessways meets the requirements of this code, as demonstrated within this written narrative. Satisfactory legal evidence will be provided to the City in the form of deeds, easements, leases, or contracts to clearly establish the joint use, prior to or at the time of Final Plat approval. Therefore, this criterion is met.

C. Connection to Streets

1. Except for joint access per this Section, all ingress and egress to a use or parcel shall connect directly to a public street, excepting alleyways.

RESPONSE: With the exception of the joint access points to Lots 34, 35, and Lots 54 and 55 described above, individual ingress and egress connections for all proposed lots are available directly to public streets within the development, as shown on the Preliminary Plat. Therefore, this criterion is met.

2. Required private sidewalks shall extend from the ground floor entrances or the ground floor landing of stairs, ramps or elevators to the public sidewalk or curb of the public street which provides required ingress and egress.

RESPONSE: Private sidewalks will extend from the primary ground floor entrance of each dwelling to the nearest public street sidewalk. These private sidewalks will be planned and installed as part of the individual home construction on each lot. Therefore, this criterion will be met.

D. Maintenance of Required Improvements

Required ingress, egress and circulation improvements shall be kept clean and in good repair.

RESPONSE: Following construction, required ingress, egress and circulation improvements will be maintained and kept clean and in good repair by the individual homeowner adjacent to such improvement, or other legal entity legally responsible for maintenance and upkeep of said improvements such as a Home Owners Association. This criterion will be met.

E. Service Drives

Service drives shall be provided pursuant to Section 16.94.030.

RESPONSE: This proposed development does not include service drives. This criterion is not applicable to this application.

Division VI. - PUBLIC INFRASTRUCTURE

Chapter 16.106 - TRANSPORTATION FACILITIES

16.106.010 - Generally

A. Creation

Public streets shall be created in accordance with provisions of this Chapter. Except as otherwise provided, all street improvements and rights-of-way shall conform to standards for the City's functional street classification, as shown on the Transportation System Plan (TSP) Map (Figure 15) and other applicable City standards. The following table depicts the guidelines for the street characteristics.

Type of Street	Right of Way Width	Number of Lanes	Minimum Lane Width	On Street Parking Width	Bike Lane Width	Sidewalk Width	Landscape Strip (exclusive of Curb)	Median Width
Arterial	**60-102**	**2-5**	**12'**	**Limited**	**6 feet**	**6-8'**	**5'**	**14' if required**
Local (<1000 vpd)	**52'**	**2**	**14'**	**8' on one side only**	**None**	**6'**	**5' with 1' buffer**	**None**

RESPONSE: SW Brookman Road is under the jurisdiction of Washington County. The proposed improvements to SW Brookman Road have been coordinated with the City and County whereas existing site conditions do not permit full construction at this time. Fee-in-lieu will be utilized for unimproved portions. The new local streets are designed according to City standards, as described above. Therefore, these criteria are met.

B. Street Naming

1. *All streets created by subdivision or partition will be named prior to submission of the final plat.*

2. *Any street created by a public dedication shall be named prior to or upon acceptance of the deed of dedication.*

3. *An action to name an unnamed street in the City may be initiated by the Council or by a person filing a petition as described in this Section.*

4. *All streets named shall conform to the general requirements as outlined in this Section.*

5. *At the request of the owner(s), the City may approve a private street name and address. Private streets are subject to the same street name standards as are public streets. All private street signs will be provided at the owner(s) expense.*

RESPONSE: Two streets within the proposed plat will be extensions of existing streets, being SW Atfalati Lane and SW Kalapuya Lane, and these names are shown on the proposed plat. The remaining public streets, being the short north-south street at the east end of SW Atfalati Lane and SW Kalapuya Lane, and the north-south cul-de-sac north of SW Brookman Road, are proposed to be named SW Paiute Terrace and SW Robin Hood Place respectively. The private streets on the site, being those located within Tracts A and G, will be named prior to submission of the final plat. These criteria are met.

C. Street Name Standards

1. *All streets named or renamed shall comply with the following criteria:*

   a. *Major streets and highways shall maintain a common name or number for the entire alignment.*
   b. *Whenever practicable, names as specified in this Section shall be utilized or retained.*
   c. *Hyphenated or exceptionally long names shall be avoided.*
   d. *Similar names such as Farview and Fairview or Salzman and Saltzman shall be avoided.*
   e. *Consideration shall be given to the continuation of the name of a street in another jurisdiction when it is extended into the City.*

2. *The following classifications (suffixes) shall be utilized in the assignment of all street names:*

a. *Boulevards: North/south arterials providing through traffic movement across the community.*
b. *Roads: East/west arterials providing through traffic movement across the community.*
c. *Avenues: Continuous, north/south collectors or extensions thereof.*
d. *Streets: Continuous, east-west collectors or extensions thereof.*
e. *Drives: Curvilinear collectors (less than 180 degrees) at least 1,000 feet in length or more.*
f. *Lanes: Short east/west local streets under 1,000 feet in length.*
g. *Terraces: short north/south local streets under 1,000 feet in length.*
h. *Court: All east/west cul-de-sacs.*
i. *Place: All north/south cul-de-sacs.*
j. *Ways: All looped local streets (exceeding 180 degrees).*
k. *Parkway: A broad landscaped collector or arterial.*

3. *Except as provided for by this section, no street shall be given a name that is the same as, similar to, or pronounced the same as any other street in the City unless that street is an extension of an already named street.*

4. *All proposed street names shall be approved, prior to use, by the City.*

D. Preferred Street Names

Whenever practicable, historical names will be considered in the naming or renaming of public roads. Historical factors to be considered shall include, but not be limited to the following:

a. *Original holders of Donation Land Claims in Sherwood.*
b. *Early homesteaders or settlers of Sherwood.*
c. *Heirs of original settlers or long-time (50 or more years) residents of Sherwood.*
d. *Explorers of or having to do with Sherwood.*
e. *Indian tribes of Washington County.*
f. *Early leaders and pioneers of eminence.*
g. *Names related to Sherwood's flora and fauna.*
h. *Names associated with the Robin Hood legend.*

RESPONSE: As described above, two streets within the proposed plat will be extensions of existing streets, being SW Atfalati Lane and SW Kalapuya Lane, and these names are shown on the proposed plat. The remaining two public streets are proposed to be identified as SW Paiute Terrace, consistent with the indigenous tribal naming preference, and SW Robin Hood Place,

consistent with ties to Sherwood. Private streets located in Tract A and G will be named prior to submission of the final plat as required by Section 16.106.010.B.1., and will comply with the applicable standards listed above. Therefore, these criteria are met.

16.106.020 - Required Improvements

A. Generally

Except as otherwise provided, all developments containing or abutting an existing or proposed street, that is either unimproved or substandard in right-of-way width or improvement, shall dedicate the necessary right-of-way prior to the issuance of building permits and/or complete acceptable improvements prior to issuance of occupancy permits. Right-of-way requirements are based on functional classification of the street network as established in the Transportation System Plan, Figure 15.

RESPONSE: SW Brookman Road is under the jurisdiction of Washington County. The proposed improvements to SW Brookman Road have been coordinated between the City, County and Applicant to include curb and sidewalk returns and tapers to existing asphalt. It also includes dedication of 33-feet of additional right-of-way along the site frontage to provide 53 feet of right-of-way to centerline. Portions that can't be constructed at this time will be subject to fee-in-lieu requirements. SW Brookman Road is 100% creditable. The new local streets are designed according to City standards, and will be extended consistent with the applicable local street standards. Therefore, these criteria are met.

B. Existing Streets

Except as otherwise provided, when a development abuts an existing street, the improvements requirement shall apply to that portion of the street right-of-way located between the centerline of the right-of-way and the property line of the lot proposed for development. In no event shall a required street improvement for an existing street exceed a pavement width of thirty (30) feet.

RESPONSE: SW Brookman Road is under the jurisdiction of Washington County. The proposed improvements to SW Brookman Road have been coordinated between the City, County and Applicant to include curb and sidewalk returns and tapers to existing asphalt. It also includes dedication of 33-feet of additional right-of-way along the site frontage to provide 53 feet of right-of-way to centerline. The new local streets are designed according to City standards, with a 52-foot total right-of-way width and 28 feet of paved surface. Therefore, these criteria are met.

C. Proposed Streets

1. *Except as otherwise provided, when a development includes or abuts a proposed street, in no event shall the required street improvement exceed a pavement width of forty (40) feet.*

2. *Half Streets: When a half street is created, a minimum of 22 feet of driving surface shall be provided by the developer.*

RESPONSE: Local Streets A and B are planned to be constructed to City standards with a total pavement width of 28 feet, which is less than 40 feet, but more than the minimum required 22 feet of driving surface. Therefore, these criteria are met.

D. Extent of Improvements

1. *Streets required pursuant to this Chapter shall be dedicated and improved consistent with Chapter 6 of the Community Development Plan, the TSP and applicable City specifications included in the City of Sherwood Construction Standards. Streets shall include curbs, sidewalks, catch basins, street lights, and street trees. Improvements shall also include any bikeways designated on the Transportation System Plan map. Applicant may be required to dedicate land for required public improvements only when the exaction is directly related to and roughly proportional to the impact of the development, pursuant to Section 16.106.090.*

RESPONSE: Proposed right-of-way dedication and street improvements are shown within the submitted plan set, in particular Sheets 5.0, 5.1 and 5.2, include curbs, sidewalks behind planter strips, drainage, street lights, and street trees. Frontage improvements to SW Brookman Road are shown and will be provided in accordance with agreement between the City, County and Applicant. Therefore, these criteria are met.

2. *If the applicant is required to provide street improvements, the City Engineer may accept a future improvements guarantee in lieu of street improvements if one or more of the following conditions exist, as determined by the City:*

   a. *A partial improvement is not feasible due to the inability to achieve proper design standards;*
   b. *A partial improvement may create a potential safety hazard to motorists or pedestrians.*
   c. *Due to the nature of existing development on adjacent properties it is unlikely that street improvements would be extended in the foreseeable future and the improvement associated with the project under review does not, by itself, provide a significant improvement to street safety or capacity;*
   d. *The improvement would be in conflict with an adopted capital improvement plan;*

e. *The improvement is associated with an approved land partition on property zoned residential use and the proposed land partition does not create any new streets; or*
f. *Additional planning work is required to define the appropriate design standards for the street and the application is for a project that would contribute only a minor portion of the anticipated future traffic on the street.*

RESPONSE: Washington County Land Use & Transportation Engineering and Construction Services staff have not indicated at this time that a fee in-lieu of frontage improvements may be required along SW Brookman Road. However, the applicant will provide fee-in-lieu or physical improvements as required. Therefore, this criterion can be met.

E. Transportation Facilities Modifications

1. A modification to a standard contained within this Chapter and Section 16.58.010 and the standard cross sections contained in Chapter 8 of the adopted TSP may be granted in accordance with the procedures and criteria set out in this section.

RESPONSE: This application requests a modification to the standard in 16.106.040.E.1 to permit a cul-de-sac in excess of the 200-foot maximum length, with SW Robin Hood Place equaling approximately 260 feet in length. Therefore, the following sections are applicable.

2. A modification request concerns a deviation from the general design standards for public facilities, in this Chapter, Section 16.58.010, or Chapter 8 in the adopted Transportation System Plan. The standards that may be modified include but are not limited to:

a. *Reduced sight distances.*
b. *Vertical alignment.*
c. *Horizontal alignment.*
d. *Geometric design (length, width, bulb radius, etc.).*
e. *Design speed.*
f. *Crossroads.*
g. *Access policy.*
h. *A proposed alternative design which provides a plan superior to these standards.*
i. *Low impact development.*
j. *Access Management Plans*

RESPONSE: Section 16.106.020.E.identifies permitted modifications to the standards listed in a-j above, and other similar deviations from the general design standards for public facilities. This application requests a modification to the maximum cul-de-sac length of Section 16.106.040.E.1. , which is a permitted modification in accordance with d. above.

3. *Modification Procedure*

   a. *A modification shall be proposed with the application for land use approval.*
   b. *A modification is processed as a Type II application. Modification requests shall be processed in conjunction with the underlying development proposal.*
   c. *When a modification is requested to provide a green street element that is not included in the Engineering Design Manual, the modification process will apply, but the modification fee will be waived.*

RESPONSE: The modification shall be processed as a Type II application in conjunction with the review of this subdivision application.

4. *Criteria for Modification: Modifications may be granted when criterion 4a and any one of criteria 4b through 4e are met:*

   a. *Consideration shall be given to public safety, durability, cost of maintenance, function, appearance, and other appropriate factors to advance the goals of the adopted Sherwood Comprehensive Plan and Transportation System Plan as a whole. Any modification shall be the minimum necessary to alleviate the hardship or disproportional impact.*
   b. *Topography, right-of-way, existing construction or physical conditions, or other geographic conditions impose an unusual hardship on the applicant, and an equivalent alternative which can accomplish the same design purpose is available.*
   c. *A minor change to a specification or standard is required to address a specific design or construction problem which, if not enacted, will result in an unusual hardship. Self- imposed hardships shall not be used as a reason to grant a modification request.*
   d. *An alternative design is proposed which will provide a plan equal to or superior to the existing street standards.*
   e. *Application of the standards of this chapter to the development would be grossly disproportional to the impacts created.*

RESPONSE: Section 16.106.040.E.1 limits cul-de-sacs to a maximum of 200 feet in length. The applicant requests a modification to this standard to allow SW Robin Hood Place to be constructed with an approximately 260-foot cul-de-sac length. The cul-de-sac is necessary due to the location of Cedar Creek and its associated flood plain to the north of SW Robin Hood Place, which restricts the ability to provide a through connection to SW Kalapuya Lane, along with arterial access

restrictions which limit the southern portion of the site to a single public street access. At 260 feet in length, the cul-de-sac is the minimum length necessary to provide adequate access to developable lands in the southern portion of the site, without impacting the resource area. Further, as SW Robin Hood Place only serves 15 lots, trip generation on the street is anticipated to be low, especially when compared to the 25 lots permitted under Section 16.106.040.E.1.

Alternative designs are available which would potentially limit the length of the cul-de-sac to 200 feet. However, limiting the cul-de-sac to no more than 200 feet would necessarily entail the use of private streets and/or flag lots from the cul-de-sac bulb, including increased distance from the cul-de-sac bulb to the main sections of the proposed Community Trail, in order to continue providing access to buildable portions of the site. Such private streets would provide little benefit other than limiting the length of the public section of SW Robin Hood Place, and would serve to eliminate the traditional residential street frontage of Lots 45 through 47 and Lots 57 through 59, while limiting direct emergency vehicle access, and reducing

With the exception of street length, the SW Robin Hood Place cul-de-sac is designed according to City of Sherwood and TVF&R standards. Therefore, 4a and 4b above can be met, and the criteria to grant a modification to the maximum cul-de-sac length are satisfied.

16.106.030 - Location

A. Generally

The location, width and grade of streets shall be considered in their relation to existing and planned streets, topographical conditions, and proposed land uses. The proposed street system shall provide adequate, convenient and safe traffic and pedestrian circulation, and intersection angles, grades, tangents, and curves shall be adequate for expected traffic volumes. Street alignments shall be consistent with solar access requirements as per Chapter 16.156, and topographical considerations.

RESPONSE: The proposed development and associated streets have been designed and located to provide City standard access to each of the planned lots; to meet arterial access spacing restrictions; and to extend existing street stubs through the site in a logical manner. These existing streets (SW Brookman Road, SW Kalapuya Lane, and SW Atfalati Lane) dictate to a large degree the circulation system within the site, including intersection angles, grades, tangents, and curves, and therefore lot orientation. Adequate, convenient and safe pedestrian circulation is provided through public sidewalks and publicly accessible trails within the development. Street alignments are consistent with the solar access requirements of Chapter 16.156 as discussed below. The criterion is met.

B. Street Connectivity and Future Street Systems

1. Future Street Systems. The arrangement of public streets shall provide for the continuation and establishment of future street systems as shown on the Local Street Connectivity Map

contained in the adopted Transportation System Plan (Figure 16).

RESPONSE: The Local Street Connectivity Map (Figure 18) of the City of Sherwood Transportation System Plan shows conceptual street connections, including those along SW Brookman Road. While footnotes on Figure 18 identify that the alignments shown are approximate and may vary, SW Robin Hood Place is located generally as indicated in Figure 18. SW Robin Hood Place, however, will not connect to other streets due to the location of significant natural resources bisecting the site. SW Kalapuya Lane and SW Atfalati Lane will be extended east through the site from the western property line. Therefore, this criterion is met.

2. *Connectivity Map Required. New residential, commercial, and mixed-use development involving the construction of new streets shall be submitted with a site plan that implements, responds to and expands on the Local Street Connectivity map contained in the TSP.*

    a. *A project is deemed to be consistent with the Local Street Connectivity map when it provides a street connection in the general vicinity of the connection(s) shown on the map, or where such connection is not practicable due to topography or other physical constraints; it shall provide an alternate connection approved by the decision-maker.*
    b. *Where a developer does not control all of the land that is necessary to complete a planned street connection, the development shall provide for as much of the designated connection as practicable and not prevent the street from continuing in the future.*
    c. *Where a development is disproportionately impacted by a required street connection, or it provides more than its proportionate share of street improvements along property line (i.e., by building more than 3/4 width street), the developer shall be entitled to System Development charge credits, as determined by the City Engineer.*
    d. *Driveways that are more than 24 feet in width shall align with existing streets or planned streets as shown in the Local Street Connectivity Map in the adopted Transportation System Plan (Figure 17), except where prevented by topography, rail lines, freeways, pre-existing development, or leases, easements, or covenants.*

RESPONSE: The submitted plan set demonstrates compliance with the Local Street Connectivity Map (Figure 18) of the City of Sherwood Transportation System Plan. Access to SW Brookman Road is located as indicated on Figure 18, and existing stub streets will be

extended through the site. A three-quarter street is being constructed along the north east boundary of the site (SW Paiute Terrace, in order to provide public street access to east. These criteria are met.

3. *Block Length. For new streets except arterials, block length shall not exceed 530 feet. The length of blocks adjacent to arterials shall not exceed 1,800 feet.*

RESPONSE: All interior blocks are less than 530 feet in length, with the blocks of SW Kalapuya Lane and SW Atfalati Lane being approximately 480 feet within the development, with a through street provided immediately to the west within the proposed Middlebrook subdivision. A through pedestrian connection is provided between these two streets within this development, to shorten the proposed pedestrian block length. A vehicular block cannot be formed to the south to connect to SW Brookman Road due to the location of Cedar Creek and its associated Flood Plain, however a pedestrian connection has been provided between the two separate portions of the site. There are no blocks a created along provided along SW Brookman Road due to the location of significant natural resources and arterial access spacing restrictions. This criterion is met.

4. *Where streets must cross water features identified in Title 3 of the Urban Growth Management Functional Plan (UGMFP), provide crossings at an average spacing of 800 to 1,200 feet, unless habitat quality or length of crossing prevents a full street connection.*

RESPONSE: This project does not involve a street crossing of Cedar Creek, the water feature on the site. This criterion does not apply.

5. *Where full street connections over water features identified in Title 3 of the UGMFP cannot be constructed in centers, main streets and station communities (including direct connections from adjacent neighborhoods), or spacing of full street crossings exceeds 1,200 feet, provide bicycle and pedestrian crossings at an average spacing of 530 feet, unless exceptional habitat quality or length of crossing prevents a connection.*

RESPONSE: A vehicular block cannot be formed to the south to connect SW Kalapuya Lane to SW Brookman Road due to the location of Cedar Creek and its associated Flood Plain, however a pedestrian connection has been provided between the two separate portions of the site. Therefore, this criterion has been met.

6. *Pedestrian and Bicycle Connectivity. Paved bike and pedestrian accessways consistent with cross section standards in Figure 8-6 of the TSP shall be provided on public easements or right- of-way when full street connections are not possible, with spacing between*

connections of no more than 300 feet. Multi-use paths shall be built according to the Pedestrian and Bike Master Plans in the adopted TSP.

RESPONSE: An extensive network of pedestrian paths in pedestrian access easements are provided throughout the site, with design and construction to meet the requirements above. Both north-south and east-west connections are provided. This criterion is met.

7. *Exceptions. Streets, bike, and pedestrian connections need not be constructed when any of the following conditions exists:*

   a. *Physical or topographic conditions make a street or accessway connection impracticable. Such conditions include but are not limited to freeways, railroads, steep slopes, wetlands or other bodies of water where a connection could not reasonably be provided.*
   b. *Buildings or other existing development on adjacent lands physically preclude a connection now or in the future considering the potential for redevelopment; or*
   c. *Where streets or accessways would violate provisions of leases, easements, covenants, restrictions or other agreements existing as of May 1, 1995, which preclude a required street or accessway connection.*

RESPONSE: Street connections cannot be created between the northern and southern portions of the site, due to the location of Cedar Creek and its associated flood plains bifurcating the site into northern and southern sections, and surrounding the southern portion. Street connections are made to the east and west within the northern portion of the site. In lieu of providing street connections between the northern and southern portions of the development, an extensive network of pedestrian paths in pedestrian access easements are provided throughout the site, with both north-south and east-west connections provided. Therefore, these criteria are met.

C. Underground Utilities

All public and private underground utilities, including sanitary sewers and storm water drains, shall be constructed prior to the surfacing of streets. Stubs for service connections shall be long enough to avoid disturbing the street improvements when service connections are made.

RESPONSE: Public and private utilities are proposed to be located underground with the construction of streets and accessways through the site. This requirement is satisfied.

D. Additional Setbacks

Generally additional setbacks apply when the width of a street right-of-way abutting a development is less than the standard width under the functional classifications in Section VI of the Community Development Plan. Additional setbacks are intended to provide unobstructed area for future street right-of-way dedication and improvements, in conformance with Section VI. Additional setbacks shall be measured at right angles from the centerline of the street.

	Classification	Additional Setback
2.	**Arterial**	**37 feet**
5.	**Local**	**26 feet**

RESPONSE: Dedication of 33 feet of right-of-way to Washington County arterial standards along SW Brookman Road is shown on the submitted plan set, creating a right-of-way meeting or exceeding the required standard. There are no other existing abutting streets, with the exception of stub streets to the west from the Middlebrook subdivision, which will be extended with the required 52 feet of right-of-way for a full local street section. Therefore, this criterion is met.

16.106.040 - Design

Standard cross sections showing street design and pavement dimensions are located in the City of Sherwood's Engineering Design Manual.

A. Reserve Strips

Reserve strips or street plugs controlling access or extensions to streets are not allowed unless necessary for the protection of the public welfare or of substantial property rights. All reserve strips shall be dedicated to the appropriate jurisdiction that maintains the street.

RESPONSE: No reserve strips or street plugs are proposed this application. Therefore, this criterion is met.

B. Alignment

All proposed streets shall, as far as practicable, be in alignment with existing streets. In no case shall the staggering of streets create a "T" intersection or a dangerous condition. Street offsets of less than one hundred (100) feet are not allowed.

RESPONSE: As shown on the submitted plan set, there are no specific public street intersections created which would create offsets, therefore this criterion is met.

C. Future Extension

Where necessary to access or permit future subdivision or development of adjoining land, streets must extend to the boundary of the proposed development and provide the required roadway width. Dead-end streets less than 100' in length must comply with the Engineering Design Manual.

A durable sign must be installed at the applicant's expense. The sign is required to notify the public of the intent to construct future streets. The sign must read as follows: "This road will be extended with future development. For more information contact the City of Sherwood Engineering Department."

RESPONSE: As described previously, the northern portion of the development connects to the proposed street stubs of SW Kalapuya Lane and SW Atfalati Lane to the east, and extend the streets through to create a ¾ street abutting the eastern property boundary (SW Paiute Terrace), thereby creating the opportunity for future connections to the east.

Within the southern portion of the site, the development area is surrounded by Cedar Creek and its associated floodplain, wetlands, and vegetated areas to the north and west, and by an unnamed tributary to Cedar Creek to the east. Other than the single street access to SW Brookman Road, no additional opportunities to connect streets are available. This criterion is met to the extent practicable.

D. Intersection Angles

Streets shall intersect as near to ninety (90) degree angles as practical, except where topography requires a lesser angle. In all cases, the applicant shall comply with the Engineering Design Manual.

RESPONSE: New streets including SW Robin Hood Place, and private streets within Tracts A, and G are designed to intersect at 90-degree angles, and will comply with the requirements of the City of Sherwood Engineering Design Manual. Therefore, these criteria are met.

E. Cul-de-sacs

1. *All cul-de-sacs shall be used only when exceptional topographical constraints, existing development patterns, or compliance with other standards in this code preclude a street extension and circulation. A cul-de-sac shall not be more than two hundred (200) feet in length and shall not provide access to more than 25 dwelling units.*

2. *All cul-de-sacs shall terminate with a turnaround in accordance with the specifications in the Engineering Design Manual. The radius of circular turnarounds may be larger when they contain a landscaped island, parking bay in their center, Tualatin Valley Fire and Rescue submits a written*

request, or an industrial use requires a larger turnaround for truck access.

3. *Public easements, tracts, or right-of-way shall provide paved pedestrian and bicycle access ways at least 6 feet wide where a cul-de-sac or dead-end street is planned, to connect the ends of the streets together, connect to other streets, or connect to other existing or planned developments in accordance with the standards of this Chapter, the TSP, the Engineering Design Manual or other provisions identified in this Code for the preservation of trees.*

RESPONSE: The applicant proposes the construction of two dead end private streets and one cu-de-sac, being SW Robin Hood Place. While the two private streets are no more than 135 feet in length and serve 2 lots each, SW Robin Hood Place exceeds the maximum cul-de-sac length of Section 16.106.040.E.1 above, which limits cul-de-sacs to a maximum of 200 feet in length. The applicant requests a Modification to this standard to allow SW Robin Hood Place to be constructed with an approximately 260-foot cul-de-sac length. The cul-de-sac is necessary due to the location of Cedar Creek and its associated flood plain to the north of Street B, which restricts the ability to provide a through connection to SW Kalapuya Lane, along with arterial access restrictions which limit the southern portion of the site to a single public street access. At 260 feet in length, the cul-de-sac is the minimum length necessary to provide adequate access to developable lands in the southern portion of the site, without impacting the resource area.

With the exception of street length, the SW Robin Hood Place cul-de-sac is designed according to City of Sherwood and TVF&R standards. Therefore, 4a and 4b above can be met, and the criteria to grant a modification to the maximum cul-de-sac length are satisfied. The cul-de-sac turnaround is designed in accordance with the requirements Engineering Design Manual. A pedestrian path within a pedestrian access easement are provided from the cul-de-sac bulb to connect to the north and SW Kalapuya Street, utilizing the existing residential driveway to cross the floodplain and provide additional pedestrian connectivity. Therefore, these criteria are met.

A Transportation Facilities Modification is included in this application to permit the cul-de-sac length to exceed 200-feet.

F. Grades and Curves

Grades shall be evaluated by the City Engineer and comply with the Engineering Design Manual.

RESPONSE: All street grades within the development have been designed in accordance with the applicable City standards. This criterion is met.

G. Streets Adjacent to Railroads

Streets adjacent to railroads shall run approximately parallel to the railroad and be separated by a distance suitable to allow

landscaping and buffering between the street and railroad. Due consideration shall be given at cross streets for the minimum distance required for future grade separations and to provide sufficient depth to allow screening of the railroad.

RESPONSE: The site does not abut a railroad, and therefore no streets are located adjacent to the railroad. Accordingly, this criterion does not apply.

H. Buffering of Major Streets

Where a development abuts Highway 99W, or an existing or proposed principal arterial, arterial or collector street, or neighborhood route, adequate protection for residential properties must be provided, through and local traffic be separated, and traffic conflicts minimized. In addition, visual corridors pursuant to Section 16.142.040, and all applicable access provisions of Chapter 16.96, are to be met. Buffering may be achieved by: parallel access streets, lots of extra depth abutting the major street with frontage along another street, or other treatment suitable to meet the objectives of this Code.

RESPONSE: The subject site abuts SW Brookman Road, a county Arterial street. The four lots located along this frontage (Lots 49, 51, 52, and 53) are buffered from SW Brookman Road by the 15-foot landscaped visual corridor required along SW Brookman Road by Section 16.142.040. In addition, as recommended above each of the lots faces the interior local street. As such, this criterion is met.

I. Median Islands

As illustrated in the adopted Transportation System Plan, Chapter 8, median islands may be required on arterial or collector streets for the purpose of controlling access, providing pedestrian safety or for aesthetic purposes.

RESPONSE: Frontage improvements along SW Brookman Road are not proposed to include a median, and County staff have not indicated that a median island would be required as part of this development. Accordingly, this criterion is not applicable at this time.

J. Transit Facilities

Development along an existing or proposed transit route, as illustrated in Figure 7-2 in the TSP, is required to provide areas and facilities for bus turnouts, shelters, and other transit-related facilities to Tri-Met specifications. Transit facilities shall also meet the following requirements:

1. *Locate buildings within 20 feet of or provide a pedestrian plaza at major transit stops.*

2. *Provide reasonably direct pedestrian connections between the transit stop and building entrances on the site.*

3. *Provide a transit passenger landing pad accessible to disabled persons (if not already existing to transit agency standards).*

4. *Provide an easement or dedication for a passenger shelter and underground utility connection from the new development to the transit amenity if requested by the public transit provider.*

5. *Provide lighting at a transit stop (if not already existing to transit agency standards).*

RESPONSE: It is noted that the Transit System and Potential Enhancements plan (Figure 14) of the City of Sherwood Transportation System Plan (TSP) identifies SW Brookman Road as a route for *"Potential Local Enhancements."* However, SW Brookman Road is not identified as an existing or proposed transit route within either the City of Sherwood TSP or the Washington County TSP. Figure 14 does contain a note which states, *"Transit projects in this TSP include enhancement to local and regional transit service to be identified through a refinement plan. While specific transit service enhancement locations have not been identified, for the purposes of providing information for other planning efforts, this map indicates corridors that could be selected for future enhancements through further planning studies. This information is subject to change pending future planning efforts."* It is further noted that the Washington County TSP designates SW Brookman Road and surrounds as a *"TSP Refinement Area"*. Therefore, SW Brookman Road is not considered an existing or proposed transit route, and therefore these criteria do not apply.

K. Traffic Controls

1. *Pursuant to Section 16.106.080, or as otherwise required by the City Engineer, an application must include a traffic impact analysis to determine the number and types of traffic controls necessary to accommodate anticipated traffic flow.*

2. *For all other proposed developments including commercial, industrial or institutional uses with over an estimated 400 ADT, or as otherwise required by the City Engineer, the application must include a traffic impact analysis to determine the number and types of traffic controls necessary to accommodate anticipated traffic flow.*

RESPONSE: A Transportation Impact Analysis (TIA) has been submitted with this application, prepared by Kittleson and Associates, and dated September 19, 2019. As discussed in the TIA, City of Sherwood Municipal Code Section 16.106.080 requires analysis of all intersections where fifty (50) or more peak hour vehicle trips can be expected to result from the development. The 12 intersections included in the TIA are identical to the Middlebrook Subdivision study for consistency; however, only the proposed shared site access on SW Brookman Road is projected to experience 50 or more peak hour vehicle trips resulting from this development.

The TIA found the following with regard to intersection impacts:

Four off-site study intersections were identified that require mitigation to comply with applicable agency requirements in the future. These mitigation measures are not triggered by the proposed development but rather by growth in regional traffic. As discussed herein, the proposed homes have an incremental additional traffic impact at each of the four intersections. The recommended mitigation associated with The Reserve [at Cedar Creek] development is:

- *With site development and subject to City review, pay a proportionate share contribution (estimated to be $106,947 in total) towards future improvements at the following intersections:*

  - *SW Sunset Boulevard/SW Woodhaven Drive (study intersection #2): $19,849 toward the construction of a planned future traffic signal;*
  - *SW Sunset Boulevard/SW Timbrel Lane (study intersection #3): $14,858 toward the construction of a planned future mini-roundabout;*
  - *SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard (study intersection #4): $17,025 toward the construction of a planned future traffic signal; and*
  - *SW Baker Road-SW Murdock Road/SW Sunset Boulevard (study intersection #5): $55,215 toward the construction of planned future north and southbound turn lanes.*

In addition to the proportional share mitigation payments listed above, trips from the proposed homes were found to trigger the need for providing an eastbound left-turn lane on SW Brookman Road at the west site access (shared access to the previously approved Middlebrook Residential Subdivision, Reference 1). SW Brookman Road is planned to have a center left-turn lane at its ultimate configuration; however, widening and tapers needed to provide the eastbound left-turn lane in conjunction with site development require off-site property acquisition that may not be possible. Accordingly, it is recommended the Applicant coordinate with City of Sherwood and Washington County staff to assess the potential for constructing an eastbound left-turn lane at the west access with site development and/or to pay a fee-in-lieu of the turn lane construction (with the fee intended to be used to construct the turn lane in conjunction with a future public road project).

L. Traffic Calming

1. The following roadway design features, including internal circulation drives, may be required by the City in new construction in areas where traffic calming needs are anticipated:

a. *Curb extensions (bulb-outs).*
b. *Traffic diverters/circles.*

c. *Alternative paving and painting patterns.*
d. *Raised crosswalks, speed humps, and pedestrian refuges.*
e. *Other methods demonstrated as effective through peer reviewed Engineering studies.*

2. *With approval of the City Engineer, traffic calming measures such as speed humps and additional stop signs can be applied to mitigate traffic operations and/or safety problems on existing streets. They should not be applied with new street construction unless approved by the City Engineer and Tualatin Valley Fire & Rescue.*

RESPONSE: No specific or new traffic calming measures have been identified as required or proposed for this development. Therefore, these criteria do not apply.

M. Vehicular Access Management

All developments shall have legal access to a public road. Access onto public streets shall be permitted upon demonstration of compliance with the provisions of adopted street standards in the Engineering Design Manual.

1. *Measurement: See the following access diagram where R/W = Right-of-Way; and P.I. = Point-of Intersection where P.I. shall be located based upon a 90-degree angle of intersection between ultimate right-of-way lines.*

   a. *Minimum right-of-way radius at intersections shall conform to City standards.*
   b. *All minimum distances stated in the following sections shall be governed by sight distance requirements according to the Engineering Design Manual.*
   c. *All minimum distances stated in the following sections shall be measured to the nearest easement line of the access or edge of travel lane of the access on both sides of the road.*
   d. *All minimum distances between accesses shall be measured from existing or approved accesses on both sides of the road.*
   e. *Minimum spacing between driveways shall be measured from Point "C" to Point "C" as shown below:*

2. *Roadway Access*

   No use will be permitted to have direct access to a street or road except as specified below. Access spacing shall be measured from existing or approved accesses on either side of a street or road. The lowest functional

classification street available to the legal lot, including alleys within a public easement, shall take precedence for new access points.

a. Local Streets:

Minimum right-of-way radius is fifteen (15) feet. Access will not be permitted within ten (10) feet of Point "B," if no radius exists, access will not be permitted within twenty-five (25) feet of Point "A." Access points near an intersection with a Neighborhood Route, Collector or Arterial shall be located beyond the influence of standing queues of the intersection in accordance with AASHTO standards. This requirement may result in access spacing greater than ten (10) feet.

b. Neighborhood Routes:

Minimum spacing between driveways (Point "C" to Point "C") shall be fifty (50) feet with the exception of single family residential lots in a recorded subdivision. Such lots shall not be subject to a minimum spacing requirement between driveways (Point "C" to Point "C"). In all instances, access points near an intersection with a Neighborhood Route, Collector or Arterial shall be located beyond the influence of standing queues of the intersection in accordance with AASHTO standards. This requirement may result in access spacing greater than fifty (50) feet.

c. Collectors:

All commercial, industrial and institutional uses with one-hundred-fifty (150) feet or more of frontage will be permitted direct access to a Collector. Uses with less than one-hundred-fifty (150) feet of frontage shall not be permitted direct access to Collectors unless no other alternative exists.

Where joint access is available it shall be used, provided that such use is consistent with Section 16.96.040, Joint Access. No use will be permitted direct access to a Collector within one- hundred (100) feet of any present Point "A." Minimum spacing between driveways (Point "C" to Point "C") shall be

one-hundred (100) feet. In all instances, access points near an intersection with a Collector or Arterial shall be located beyond the influence of standing queues of the intersection in accordance with AASHTO standards. This requirement may result in access spacing greater than one hundred (100) feet.

d. Arterials and Highway 99W - Points of ingress or egress to and from Highway 99W and arterials designated on the Transportation Plan Map, attached as Figure 1 of the Community Development Plan, Part II, shall be limited as follows:

(1) Single and two-family uses and manufactured homes on individual residential lots developed after the effective date of this Code shall not be granted permanent driveway ingress or egress from Highway 99W or arterials. If alternative public access is not available at the time of development, provisions shall be made for temporary access which shall be discontinued upon the availability of alternative access.

(2) Other private ingress or egress from Highway 99W and arterial roadways shall be minimized. Where alternatives to Highway 99W or arterials exist or are proposed, any new or altered uses developed after the effective date of this Code shall be required to use the alternative ingress and egress. Alternatives include shared or crossover access agreement between properties, consolidated access points, or frontage or backage roads. When alternatives do not exist, access shall comply with the following standards:

(a) *Access to Highway 99W shall be consistent with ODOT standards and policies per OAR 734, Division 51, as follows: Direct access to an arterial or principal arterial will be permitted provided that Point 'A' of such access is more than six hundred (600) feet from any intersection Point 'A' or other access to that arterial (Point 'C').*

(3) The access to Highway 99W will be considered temporary until an alternative access to public

right-of-ways is created. When the alternative access is available the temporary access to Highway 99W shall be closed.

(4) All site plans for new development submitted to the City for approval after the effective date of this Code shall show ingress and egress from existing or planned local, neighborhood route or collector streets, including frontage or backage roads, consistent with the Transportation Plan Map and Chapter 6 of the Community Development Plan.

3. Exceptions to Access Criteria for City-Owned Streets

a. *Alternate points of access may be allowed if an access management plan which maintains the classified function and integrity of the applicable facility is submitted to and approved by the City Engineer as the access management plan must be included as part of the land use submittal or an application for modification as described in § 16.106.020 E. (Transportation Facilities Modifications).*

b. *Access in the Old Town (OT) Overlay Zone*

Access points in the OT Overlay Zone shown in an adopted plan such as the Transportation System Plan, are not subject to the access spacing standards and do not need a variance. However, the applicant shall submit a partial access management plan for approval by the City Engineer. The approved plan shall be implemented as a condition of development approval.

RESPONSE: The submitted plans for the application demonstrate that the vehicular access management standards above are met. All street access points, including the SW Robin Hood Place access to SW Brookman Road, meet the required City and County access spacing standards. The nearest existing street access to SW Brookman Road, being SW Oberst Road, is located approximately 1,050 feet west of the site. The site does not access Highway 99W and is not located in the Old Town Overlay District. Therefore, the applicable criteria are met.

N. Private Streets

1. *The construction of a private street serving a single-family residential development is prohibited unless it provides principal access to two or fewer residential lots or parcels (i.e. flag lots).*

2. *Provisions shall be made to assure private responsibility for future access and maintenance through recorded easements. Unless otherwise specifically authorized, a private street shall comply with the same standards as a public street identified in the Community Development Code and the Transportation System Plan.*

3. *A private street shall be distinguished from public streets and reservations or restrictions relating to the private street shall be described in land division documents and deed records.*

4. *A private street shall also be signed differently from public streets and include the words "Private Street".*

RESPONSE: The application includes two private streets, located in each of Tracts A and G. Each private street will serve two single-family dwellings, and will be maintained, identified and recorded as required above. Therefore, these criteria are met.

16.106.060 - Sidewalks

A. Required Improvements

1. *Except as otherwise provided, sidewalks shall be installed on both sides of a public street and in any special pedestrian way within new development.*

2. *For Highway 99W, arterials, or in special industrial districts, the City Manager or designee may approve a development without sidewalks if alternative pedestrian routes are available.*

3. *In the case of approved cul-de-sacs serving less than fifteen (15) dwelling units, sidewalks on one side only may be approved by the City Manager or designee.*

RESPONSE: As shown on the submitted plan set, all new streets (excepting the east side of three-quarter street improvement identified as SW Paiute Terrace, Brookman Road, and the private streets located within Tracts A and G) include sidewalks on both sides of the street. Community Trail/sidewalk improvements are not proposed along Brookman at this time because they would have to be completely reconstructed with a future County Improvement Project. Sidewalks are also proposed within all pedestrian access easements. Accordingly, these criteria are met.

B. Design Standards

1. *Arterial and Collector Streets*

Arterial and collector streets shall have minimum eight (8) foot wide sidewalks/multi- use path, located as required by this Code.

2. *Local Streets*

Local streets shall have minimum five (5) foot wide sidewalks, located as required by this Code.

3. *Handicapped Ramps*

Sidewalk handicapped ramps shall be provided at all intersections.

RESPONSE: The County, City and Applicant have coordinated on constructability of improvements on SW Brookman Road which is classified as a County Arterial street. It has been determined that at this time, due to on and off-site conditions, full half street improvements including sidewalk cannot be constructed. Handicapped ramps will be provided as required by code. These criteria, as applicable, are met.

C. Pedestrian and Bicycle Paths

Provide bike and pedestrian connections on public easements or right-of-way when full street connections are not possible, with spacing between connections of no more than 330 feet except where prevented by topography, barriers such as railroads or highways, or environmental constraints such as rivers and streams.

RESPONSE: As shown on the submitted plan set, bicycle and pedestrian connections are provided both between the northern and southern portions of the site, and east-west across the site on the north and south sides of the Cedar Creek resource area. An additional pedestrian connection is provided between SW Kalapuya Lane and SW Atfalati Lane, in order to limit this pedestrian block length to less than 300 feet. Accordingly, it is considered that the applicant has made every effort to provide pedestrian and bicycle connections wherever possible. Therefore, the criterion is met.

16.106.070 - Bike Lanes

If shown in Figure 13 of the Transportation System Plan, bicycle lanes shall be installed in public rights-of-way, in accordance with City specifications. Bike lanes shall be installed on both sides of designated roads, should be separated from the road by a twelve-inch stripe or other means approved by Engineering Staff, and should be a minimum of five (5) feet wide.

RESPONSE: Figure 13 of the City of Sherwood Transportation System Plan (TSP), identifies that bicycle lanes are required along SW Brookman Road. SW Brookman Road is under the jurisdiction of Washington County. The planned right-of-way dedication is in accordance with Washington County arterial standards, and the improvements are limited at this time as

previously discussed. The bike lane will be constructed with a future County Improvement Project and at that time will and provide adequate area for a bike lane within the proposed street section. Accordingly, this criterion is met.

16.106.080 - Traffic Impact Analysis (TIA)

A. Purpose

The purpose of this section is to implement Sections 660012-0045(2)(b) and -0045(2)(e) of the State Transportation Planning Rule (TPR), which require the City to adopt performance standards and a process to apply conditions to land use proposals in order to minimize impacts on and protect transportation facilities. This section establishes requirements for when a traffic impact analysis (TIA) must be prepared and submitted; the analysis methods and content involved in a TIA; criteria used to review the TIA; and authority to attach conditions of approval to minimize the impacts of the proposal on transportation facilities.

This section refers to the TSP for performance standards for transportation facilities as well as for projects that may need to be constructed as mitigation measures for a proposal's projected impacts. This section also relies on the City's Engineering Design Manual to provide street design standards and construction specifications for improvements and projects that may be constructed as part of the proposal and mitigation measures approved for the proposal.

B. Applicability

A traffic impact analysis (TIA) shall be required to be submitted to the City with a land use application at the request of the City Engineer or if the proposal is expected to involve one (1) or more of the following:

1. *An amendment to the Sherwood Comprehensive Plan or zoning map.*

2. *A new direct property approach road to Highway 99W is proposed.*

3. *The proposed development generates fifty (50) or more PM peak-hour trips on Highway 99W, or one hundred (100) PM peak-hour trips on the local transportation system.*

4. *An increase in use of any adjacent street or direct property approach road to Highway 99W by ten (10) vehicles or more per day that exceed the twenty thousand-pound gross vehicle weight.*

5. *The location of an existing or proposed access driveway does not meet minimum spacing or sight distance requirements, or is located where vehicles entering or leaving the property are*

restricted, or such vehicles are likely to queue or hesitate at an approach or access connection, thereby creating a safety hazard.

6. *A change in internal traffic patterns that may cause safety problems, such as back up onto the highway or traffic crashes in the approach area.*

RESPONSE: A Transportation Impact Analysis (TIA) has been submitted with this application, prepared by Kittleson and Associates, and dated September 19, 2019. The TIA addresses the requirements of City of Sherwood Municipal Code Section 16.106.080 as well as applicable Washington County and ODOT review requirements. The study methodology, assumptions and scope were determined based on a review of existing travel patterns, the City of Sherwood's Development Code and direction provided to Kittleseon and Associates by DKS Associates (the City's traffic engineer). The study intersections and requirements are the same as was required for the recently approved Middlebrook Residential Subdivision. This requirement is met.

G. Conditions of Approval

The City may deny, approve, or approve a development proposal with conditions needed to meet operations and safety standards and provide the necessary right-of-way and improvements to ensure consistency with the future planned transportation system. Improvements required as a condition of development approval, when not voluntarily provided by the applicant, shall be roughly proportional to the impact of the development on transportation facilities, pursuant to Section 16.106.090. Findings in the development approval shall indicate how the required improvements are directly related to and are roughly proportional to the impact of development.

RESPONSE: The Applicant understands that the City may deny, approve, or approve a development proposal with conditions. Any such conditions the City wishes to impose are required to be based upon an essential nexus and roughly proportional to an identified development impact on transportation facilities.

16.106.090 - Rough Proportionality

A. Purpose

The purpose of this section is to ensure that required transportation facility improvements are roughly proportional to the potential impacts of the proposed development. The rough proportionality requirements of this section apply to both frontage and non-frontage improvements. A proportionality analysis will be conducted by the City Engineer for any proposed development that triggers transportation facility improvements pursuant to this chapter. The City Engineer will take into consideration any benefits that are

estimated to accrue to the development property as a result of any required transportation facility improvements. A proportionality determination can be appealed pursuant to Chapter 16.76. The following general provisions apply whenever a proportionality analysis is conducted.

B. *Mitigation of impacts due to increased demand for transportation facilities associated with the proposed development shall be provided in rough proportion to the transportation impacts of the proposed development. When applicable, anticipated impacts will be determined by the TIA in accordance with Section 16.106.080. When no TIA is required, anticipated impacts will be determined by the City Engineer.*

C. *The following shall be considered when determining proportional improvements:*

1. *Condition and capacity of existing facilities within the impact area in relation to City standards. The impact area is generally defined as the area within a one-half-mile radius of the proposed development. If a TIA is required, the impact area is the TIA study area.*

2. *Existing vehicle, bicycle, pedestrian, and transit use within the impact area.*

3. *The effect of increased demand on transportation facilities and other approved, but not yet constructed, development projects within the impact area that is associated with the proposed development.*

4. *Applicable TSP goals, policies, and plans.*

5. *Whether any route affected by increased transportation demand within the impact area is listed in any City program including school trip safety; neighborhood traffic management; capital improvement; system development improvement, or others.*

6. *Accident history within the impact area.*

7. *Potential increased safety risks to transportation facility users, including pedestrians and cyclists.*

8. *Potential benefit the development property will receive as a result of the construction of any required transportation facility improvements.*

9. *Other considerations as may be identified in the review process pursuant to Chapter 16.72.*

RESPONSE: It is understood that the City will make appropriate proportionality findings in line with the above requirements for conditions of approval applied in the City's decision for this application.

Chapter 16.110 - SANITARY SEWERS

16.110.010 - Required Improvements

Sanitary sewers shall be installed to serve all new developments and shall connect to existing sanitary sewer mains. Provided, however, that when impractical to immediately connect to a trunk sewer system, the use of septic tanks may be approved, if sealed sewer laterals are installed for future connection and the temporary system meets all other applicable City, Clean Water Services, Washington County and State sewage disposal standards.

RESPONSE: The project will include necessary public sanitary sewer infrastructure as shown on the preliminary utility plans. The applicant is aware that Clean Water Services is currently working to design and construct a trunk sewer main that will serve the Brookman Addition Concept Plan area, including this project area and the neighboring Middlebrook Subdivision. Improvements will be designed and constructed in accordance with applicable City, Clean Water Services, and State standards. These criteria are met.

16.110.020 - Design Standards

A. Capacity

Sanitary sewers shall be constructed, located, sized, and installed at standards consistent with this Code, the Sanitary Sewer Service Plan Map in the Sanitary Sewer Master Plan, and other applicable Clean Water Services and City standards, in order to adequately serve the proposed development and allow for future extensions.

B. Over-Sizing

1. *When sewer facilities will, without further construction, directly serve property outside a proposed development, gradual reimbursement may be used to equitably distribute the cost of that over-sized system.*

2. *Reimbursement shall be in an amount estimated by the City to be a proportionate share of the cost for each connection made to the sewer by property owners outside of the*

development, for a period of ten (10) years from the time of installation of the sewers. The boundary of the reimbursement area and the method of determining proportionate shares shall be determined by the City. Reimbursement shall only be made as additional connections are made and shall be collected as a surcharge in addition to normal connection charges.

RESPONSE: Clean Water Services is currently working to design and construct a trunk sewer main that will serve the Brookman Addition Concept Plan area, including this project area and the neighboring Middlebrook Subdivision. On site sanitary sewer infrastructure will be sized properly and oversized as necessary to serve potential future growth. The applicant will work with the City and Clean Water Services to identify the appropriate design solutions, and to determine appropriate reimbursement/SDC credits for any over-sized sanitary sewer system infrastructure where applicable. These criteria are met.

16.110.030 - Service Availability

Approval of construction plans for new facilities pursuant to Chapter 16.106, and the issuance of building permits for new development to be served by existing sewer systems shall include certification by the City that existing or proposed sewer facilities are adequate to serve the development.

RESPONSE: The applicant acknowledges that certification by the City as described above is required prior to approval of construction plans and issuance of building permits. The criterion will be met.

Chapter 16.112 - WATER SUPPLY

16.112.010 - Required Improvements

Water lines and fire hydrants conforming to City and Fire District standards shall be installed to serve all building sites in a proposed development. All waterlines shall be connected to existing water mains or shall construct new mains appropriately sized and located in accordance with the Water System Master Plan.

RESPONSE: The applicant will extend and loop water service through the site including water lines, hydrants, and connections, as shown on the submitted Preliminary Composite Utility Plan (Sheet 6.0). These improvements are shown to be extended from the proposed Middlebrook subdivision, and have been appropriately sized and designed to meet all applicable standards. Therefore, the criterion is met.

16.112.020 - Design Standards

A. Capacity

Water lines providing potable water supply shall be sized, constructed, located and installed at standards consistent with this Code, the Water System Master Plan, the City's Design and Construction Manual, and with other applicable City standards and specifications, in order to adequately serve the proposed development and allow for future extensions.

B. Fire Protection

All new development shall comply with the fire protection requirements of Chapter 16.116, the applicable portions of Chapter 7 of the Community Development Plan, and the Fire District.

C. Over-Sizing

1. *When water mains will, without further construction, directly serve property outside a proposed development, gradual reimbursement may be used to equitably distribute the cost of that over-sized system.*

2. *Reimbursement shall be in an amount estimated by the City to be the proportionate share of the cost of each connection made to the water mains by property owners outside the development, for a period of ten (10) years from the time of installation of the mains. The boundary of the reimbursement area and the method of determining proportionate shares shall be determined by the City. Reimbursement shall only be made as additional connections are made and shall be collected as a surcharge in addition to normal connection charges.*

3. *When over-sizing is required in accordance with the Water System Master Plan, it shall be installed per the Water System Master Plan. Compensation for over-sizing may be provided through direct reimbursement, from the City, after mainlines have been accepted. Reimbursement of this nature would be utilized when the cost of over-sizing is for system wide improvements.*

RESPONSE: All components of the proposed water system will be sized properly and oversized where necessary to serve potential future growth within the area. The Applicant will work with the City to determine reimbursement/SDC credits as applicable for any oversized water supply infrastructure. The criteria are met.

16.112.030 - Service Availability

Approval of construction plans for new water facilities pursuant to Chapter 16.106, and the issuance of building permits for new development to be served by existing water systems shall include certification by the City that existing or proposed water systems are adequate to serve the development.

RESPONSE: The applicant acknowledges that certification by the City as described above is required prior to approval of construction plans and issuance of building permits. Therefore, this criterion will be met.

Chapter 16.114 - STORMWATER

16.114.010 - Required Improvements

Storm water facilities, including appropriate source control and conveyance facilities, shall be installed in new developments and shall connect to the existing downstream drainage systems consistent with the Comprehensive Plan and the requirements of the Clean Water Services water quality regulations contained in their Design and Construction Standards R&O 04-9, or its replacement.

RESPONSE: All components of the proposed stormwater facilities, as shown on the preliminary plan set and identified at Tracts B and D, have been appropriately sized and designed in accordance with all applicable City, State, DEQ and CWS standards. See also the Preliminary Storm Drainage Report submitted with this application. Therefore, this criterion is met.

16.114.020 - Design Standards

A. Capacity

Storm water drainage systems shall be sized, constructed, located, and installed at standards consistent with this Code, the Storm Drainage Master Plan Map, attached as Exhibit E, Chapter 7 of the Community Development Plan, other applicable City standards, the Clean Water Services Design and Construction standards R&O 04-9 or its replacement, and hydrologic data and improvement plans submitted by the developer.

B. On-Site Source Control

Storm water detention and groundwater recharge improvements, including but not limited to such facilities as dry wells, detention ponds, and roof top ponds shall be constructed according to Clean Water Services Design and Construction Standards.

C. Conveyance System

The size, capacity and location of storm water sewers and other storm water conveyance improvements shall be adequate to serve the development and accommodate upstream and downstream flow. If an upstream area discharges through the property proposed for development, the drainage system shall provide capacity to the

receive storm water discharge from the upstream area. If downstream drainage systems are not sufficient to receive an increase in storm water caused by new development, provisions shall be made by the developer to increase the downstream capacity or to provide detention such that the new development will not increase the storm water caused by the new development.

RESPONSE: The proposed stormwater drainage system has been sized and designed in accordance with applicable City, State, DEQ and CWS standards. As shown in the attached Preliminary Storm Drainage Report, stormwater treatment will be provided on-site within Tracts B and D using water quality swales, prior to being released to the adjacent Cedar Creek. Therefore, these criteria will be met.

16.114.030 - Service Availability

Approval of construction plans for new storm water drainage facilities pursuant to Chapter 16.106, and the issuance of building permits for new development to be served by existing storm water drainage systems shall include certification by the City that existing or proposed drainage facilities are adequate to serve the development.

RESPONSE: The applicant acknowledges that certification by the City as described above is required prior to approval of construction plans and issuance of building permits. As illustrated by the submitted plans and Preliminary Storm Drainage Report, these criteria will be met.

Chapter 16.116 - FIRE PROTECTION

16.116.010 - Required Improvements

When land is developed so that any commercial or industrial structure is further than two hundred and fifty (250) feet or any residential structure is further than five hundred (500) feet from an adequate water supply for fire protection, as determined by the Fire District, the developer shall provide fire protection facilities necessary to provide adequate water supply and fire safety.

RESPONSE: Proposed fire protection facilities are included on the Preliminary Composite Utility Plan (Sheet 6.0). These improvements are appropriately sized and designed in accordance with applicable Oregon Fire Code, City of Sherwood building standards, and Tualatin Valley Fire and Rescue standards. Therefore, this criterion is met.

16.116.020 - Standards

A. Capacity

All fire protection facilities shall be approved by and meet the specifications of the Fire District, and shall be sized, constructed, located, and installed consistent with this Code, Chapter 7 of the

Community Development Plan, and other applicable City standards, in order to adequately protect life and property in the proposed development.

B. Fire Flow

Standards published by the Insurance Services Office, entitled "Guide for Determination of Required Fire Flows" shall determine the capacity of facilities required to furnish an adequate fire flow. Fire protection facilities shall be adequate to convey quantities of water, as determined by ISO standards, to any outlet in the system, at no less than twenty (20) pounds per square inch residual pressure. Water supply for fire protection purposes shall be restricted to that available from the City water system. The location of hydrants shall be taken into account in determining whether an adequate water supply exists.

C. Access to Facilities

Whenever any hydrant or other appurtenance for use by the Fire District is required by this Chapter, adequate ingress and egress shall be provided. Access shall be in the form of an improved, permanently maintained roadway or open paved area, or any combination thereof, designed, constructed, and at all times maintained, to be clear and unobstructed. Widths, height clearances, ingress and egress shall be adequate for District firefighting equipment. The Fire District, may further prohibit vehicular parking along private accessways in order to keep them clear and unobstructed, and cause notice to that effect to be posted.

D. Hydrants

Hydrants located along private, accessways shall either have curbs painted yellow or otherwise marked prohibiting parking for a distance of at least fifteen (15) feet in either direction, or where curbs do not exist, markings shall be painted on the pavement, or signs erected, or both, given notice that parking is prohibited for at least fifteen (15) feet in either direction.

RESPONSE: As described above, proposed fire protection facilities will be sized properly, constructed, located, and installed consistent with applicable Oregon Fire Code, City of Sherwood building standards, and Tualatin Valley Fire and Rescue standards. Therefore, this criterion is met.

16.116.030 - Miscellaneous Requirements

A. Timing of Installation

When fire protection facilities are required, such facilities shall be installed and made serviceable prior to or at the time any combustible construction begins on the land unless, in the opinion of the Fire District, the nature or circumstances of said construction makes immediate installation impractical.

B. Maintenance of Facilities

All on-site fire protection facilities, shall be maintained in good working order. The Fire District may conduct periodic tests and inspection of fire protection and may order the necessary repairs or changes be made within ten (10) days.

C. Modification of Facilities

On-site fire protection facilities, may be altered or repaired with the consent of the Fire District; provided that such alteration or repairs shall be carried out in conformity with the provisions of this Chapter.

RESPONSE: The applicant acknowledges the above in that Tualatin Valley Fire and Rescue may require installation of proposed fire protection facilities prior to or at the time of construction, may conduct inspections of fire protection facilities, and may consent to modification of fire protection facilities. These criteria are considered to be met.

Chapter 16.118 - PUBLIC AND PRIVATE UTILITIES

16.118.010 - Purpose

Public telecommunication conduits as well as conduits for franchise utilities including, but not limited to, electric power, telephone, natural gas, lighting, and cable television shall be installed to serve all newly created lots and developments in Sherwood.

16.118.020 - Standard

A. Installation of utilities shall be provided in public utility easements and shall be sized, constructed, located and installed consistent with this Code, Chapter 7 of the Community Development Code, and applicable utility company and City standards.

B. Public utility easements shall be a minimum of eight (8) feet in width unless a reduced width is specifically exempted by the City Engineer. An eight-foot wide public utility easement (PUE) shall be provided on private property along all public street frontages. This standard does not apply to developments within the Old Town Overlay.

C. *Where necessary, in the judgment of the City Manager or his designee, to provide for orderly development of adjacent properties, public and franchise utilities shall be extended through the site to the edge of adjacent property(ies).*

D. *Franchise utility conduits shall be installed per the utility design and specification standards of the utility agency.*

E. *Public Telecommunication conduits and appurtenances shall be installed per the City of Sherwood telecommunication design standards.*

F. *Exceptions: Installation shall not be required if the development does not require any other street improvements. In those instances, the developer shall pay a fee in lieu that will finance installation when street or utility improvements in that location occur.*

RESPONSE: As illustrated on the submitted Preliminary Plat, all proposed lots are encumbered by an 8-foot wide public utility easement along the adjacent street frontage, where these lots abut a local public street. These easements provide sufficient area for franchise utility installation, and meet the requirements specified above. Therefore, this criterion can be met.

16.118.030 - Underground Facilities

Except as otherwise provided, all utility facilities, including but not limited to, electric power, telephone, natural gas, lighting, cable television, and telecommunication cable, shall be placed underground, unless specifically authorized for above ground installation, because the points of connection to existing utilities make underground installation impractical, or for other reasons deemed acceptable by the City.

16.118.040 - Exceptions

Surface-mounted transformers, surface-mounted connection boxes and meter cabinets, temporary utility service facilities during construction, high capacity electric and communication feeder lines, and utility transmission lines operating at fifty thousand (50,000) volts or more may be located above ground. The City reserves the right to approve location of all surface-mounted transformers.

RESPONSE: All new utility facilities are planned to be placed underground. It is noted that should a fee in lieu be required for construction of SW Brookman Road, overhead utilities may remain in place until such time as a County Capital Improvement Project completes required right-of-way improvements to ultimate line and grade, if deemed acceptable by the City. Therefore, these criteria can be met.

16.118.050 - Private Streets

The construction of new private streets, serving single family residential developments shall be prohibited unless it provides principal access to two or fewer residential lots or parcels i.e. flag lots. Provisions shall be made to assure private responsibility for future access and maintenance through recorded easements. Unless otherwise specifically authorized, a private street shall comply with the same standards as a public street identified in the Community Development Code and the Transportation System Plan. A private street shall be distinguished from public streets and reservations or restrictions relating to the private street shall be described in land division documents and deed records. A private street shall also be signed differently from public streets and include the words "Private Street".

RESPONSE: The application includes two private streets, with one located in each of Tracts A and G. Each private street will serve two single-family dwellings, and will be maintained, identified and recorded as required above. Therefore, these criteria are met.

Chapter 16.120 - SUBDIVISIONS

16.120.010 - Purpose

Subdivision regulations are intended to promote the public health, safety and general welfare; lessen traffic congestion; provide adequate light and air; prevent overcrowding of land; and facilitate adequate water supply, sewage and drainage.

16.120.020 - General Subdivision Provisions

A. Approval of a subdivision occurs through a two-step process: the preliminary plat and the final plat.

1. The preliminary plat shall be approved by the Approval Authority before the final plat can be submitted for approval consideration; and

2. The final plat shall reflect all conditions of approval of the preliminary plat.

RESPONSE: This application fulfills the requirement for the approval of the preliminary plat step of the two-step process. Following approval of the preliminary plat application, and subsequent engineering approvals as applicable, the applicant will submit a separate application for final plat approval that will demonstrate compliance with the conditions of approval from the preliminary plat approval. Therefore, these criteria can be met.

B. All subdivision proposals shall conform to all state regulations set forth in ORS Chapter 92, Subdivisions and Partitions.

RESPONSE The applicable subdivision and partition regulations contained in ORS Chapter 92 are implemented through the City's Municipal Code, and compliance with all applicable requirements is identified in this narrative. Therefore, this criterion is met.

C. Future re-division

When subdividing tracts into large lots, the Approval Authority shall require that the lots be of such size and shape as to facilitate future re-division in accordance with the requirements of the zoning district and this Division.

D. Future Partitioning

When subdividing tracts into large lots which may be resubdivided, the City shall require that the lots be of a size and shape, and apply additional building site restrictions, to allow for the subsequent division of any parcel into lots of smaller size and the creation and extension of future streets.

RESPONSE: No lots of a size or shape which would facilitate future re-division or future partitioning will be created through this development. These criteria are not applicable.

E. Lot averaging

Lot size may be averaged to allow lots less than the minimum lot size allowed in the underlying zoning district subject to the following regulations:

1. *The average lot area for all lots is not less than allowed by the underlying zoning district.*

2. *No lot created under this provision shall be less than 90 % of the minimum lot size allowed in the underlying zoning district.*

3. *The maximum lot size cannot be greater than 10 % of the minimum lot size.*

RESPONSE: As previously described, each of the lots meets the required dimensional standards of the MDRL Zone with the exception that a number of the lots do not meet the minimum lot size, including both lot area and minimum lot width at the building line. In accordance with Section 16.144.030.B.1., the applicant is requesting an exception to these dimensional standards for those lots which do not meet the minimum requirement, to the maximum permitted 10% reduction. Accordingly, the minimum lot size proposed is approximately 4,500 square feet (actual preliminary measurement is 4,508 square feet, Lot 11), with a minimum lot width at the building line of 45 feet (Lot 1). Please see the response to Section 16.144.030.B.1. for findings related to the exception criteria.

As the applicant is demonstrating compliance with the requirements of Section 16.144.030.B.1., the applicant is not utilizing the lot averaging standards of this Section.

F. Required Setbacks

All required building setback lines as established by this Code, shall be shown in the preliminary subdivision plat.

RESPONSE: Proposed building envelopes are shown on Sheet P3.1, Conceptual Building Setback Plan, of the submitted plan set. All of the 59 proposed lots are capable of supporting a detached single-family dwelling meeting the setbacks of the MDRL Zone. Therefore, this criterion is met.

G. Property Sales

No property shall be disposed of, transferred, or sold until required subdivision approvals are obtained, pursuant to this Code.

RESPONSE: The applicant acknowledges that individual lots may not be disposed of, transferred, or sold until the preliminary and final plat applications are approved and the final subdivision plat is recorded. This criterion will be met.

16.120.030 - Approval Procedure-Preliminary Plat

A. Approval Authority

1. *The approving authority for preliminary and final plats of subdivisions shall be in accordance with Section 16.72.010 of this Code.*

    a. *A subdivision application for 4-10 lots will follow a Type II review process.*
    b. *A subdivision application for 11-50 lots will follow a Type III review process.*
    c. *A subdivision application for over 50 lots will follow a Type IV review process.*

2. *Approval of subdivisions is required in accordance with this Code before a plat for any such subdivision may be filed or recorded with County. Appeals to a decision may be filed pursuant to Chapter 16.76.*

RESPONSE: The proposed subdivision includes more than 50 residential lots, and will therefore follow a Type IV review process. The applicant acknowledges the requirement that approval from the City is required prior to recordation of the final plat with Washington County. These criteria are considered to be met.

B. Phased Development

1. The Approval Authority may approve a time schedule for developing a subdivision in phases, but in no case shall the actual construction time period for any phase be greater than two years without reapplying for a preliminary plat.

2. The criteria for approving a phased subdivision review proposal are:

a. The public facilities shall be scheduled to be constructed in conjunction with or prior to each phase to ensure provision of public facilities prior to building occupancy;
b. The development and occupancy of any phase shall not be dependent on the use of temporary public facilities:

(1) For purposes of this subsection, a temporary public facility is an interim facility not constructed to the applicable City or district standard; and
(2) The phased development shall not result in requiring the City or other property owners to construct public facilities that were required as a part of the approval of the preliminary plat.

3. The application for phased development approval shall be reviewed concurrently with the preliminary plat application and the decision may be appealed in the same manner as the preliminary plat.

RESPONSE: The proposed development is requested for approval in 2 phases, with Phase 1 being the development of the site north of the Cedar Creek drainage, and Phase 2 being the development of the site to the south of the Cedar Creek drainage. The actual phasing line is shown on Sheet P3.0, Preliminary Plat, of the preliminary plan set. The applicant acknowledges the timeframes and criteria listed above, and will comply with these requirements through the anticipated implementation of Conditions of Approval. It is noted that the applicant may choose to develop Phase 2 prior to the development of Phase 1, based on the availability of access to the site. These criteria are met.

16.120.040 - Approval Criteria: Preliminary Plat

No preliminary plat shall be approved unless:

A. Streets and roads conform to plats approved for adjoining properties as to widths, alignments, grades, and other standards, unless the City determines that the public interest is served by modifying streets or road patterns.

B. Streets and roads held for private use are clearly indicated on the plat and all reservations or restrictions relating to such private roads and streets are set forth thereon.

C. The plat complies with applicable zoning district standards and design standards in Division II, and all provisions of Divisions IV, VI, VIII and IX. The subdivision complies with Chapter 16.128 (Land Division Design Standards).

D. Adequate water, sanitary sewer, and other public facilities exist to support the use of land proposed in the plat.

E. Development of additional, contiguous property under the same ownership can be accomplished in accordance with this Code.

F. Adjoining land can either be developed independently or is provided access that will allow development in accordance with this Code.

G. Tree and woodland inventories have been submitted and approved as per Section 16.142.060.

H. The plat clearly shows the proposed lot numbers, setbacks, dedications and easements.

I. A minimum of five percent (5%) open space has been provided per Section 16.44.010.B.8 (Townhome-Standards) or Section 16.142.030 (Parks, Open Spaces and Trees-Single Family Residential Subdivisions), if applicable.

RESPONSE: This written narrative includes responses to the applicable criteria listed above, demonstrating compliance with this section. Compliance is further demonstrated by the submitted preliminary plan set, and the relevant attachments including the storm drainage report, arborists report, biologists report, and geotechnical report, upon which these compliance statements are based. Accordingly, these standards are considered to be met.

Chapter 16.128 - LAND DIVISION DESIGN STANDARDS

16.128.010 - Blocks

A. Connectivity

1. Block Size

The length, width, and shape of blocks shall be designed to provide adequate building sites for the uses proposed, and for convenient access, circulation, traffic control and safety.

RESPONSE: As described throughout this written narrative, blocks and overall street layouts have been designed to create convenient access and circulation, while creating lots suitable for the construction of single-family detached dwelling units which meet the intent and purpose of the MDRL Zone. This criterion is considered to be met.

2. *Block Length*

Block length standards shall be in accordance with Section 16.108.040. Generally, blocks shall not exceed five-hundred thirty (530) feet in length, except blocks adjacent to principal arterial, which shall not exceed one thousand eight hundred (1,800) feet. The extension of streets and the formation of blocks shall conform to the Local Street Network map contained in the Transportation System Plan.

RESPONSE: As previously described, all interior blocks are less than 530 feet in length, with the blocks of SW Kalapuya Lane and SW Atfalati Lane being approximately 480 feet within the development, with a through street provided immediately to the west within the proposed Middlebrook subdivision. A through pedestrian connection is also provided between these two streets within this development, to shorten the proposed pedestrian block length. A vehicular block cannot be formed to the south to connect to SW Brookman Road due to the location of Cedar Creek and its associated Flood Plain, however a pedestrian connection has been provided between the two separate portions of the site. There are no blocks created along SW Brookman Road due to the location of significant natural resources and arterial access spacing restrictions. This criterion is met.

3. *Pedestrian and Bicycle Connectivity. Paved bike and pedestrian accessways shall be provided on public easements or right-of-way consistent with Figure 7.401.*

RESPONSE: The subject site contains an extensive network of trails, providing multiple connections to the north, east, south, and west as demonstrated on the submitted preliminary plan set. These accessways will be located within public pedestrian easements, to ensure public access. This criterion is met.

B. *Utilities Easements for sewers, drainage, water mains, electric lines, or other utilities shall be dedicated or provided for by deed. Easements shall be a minimum of ten (10) feet in width and centered on rear or side lot lines; except for tieback easements, which shall be six (6) feet wide by twenty (20) feet long on side lot lines at the change of direction.*

RESPONSE: All new public utility mains required to serve the proposed development will be located within the rights-of-way adjacent to individual lots. An 8-foot-wide public utility easement is provided along the frontage of the lots to accommodate necessary franchise utilities. Further, a public utility easement is located over Tracts A and G, as well as over Tract C, where

appropriate for public utilities. Final easement locations will be determined in conjunction with the appropriate service providers based on the approved engineering designs and construction of the sewer trunk lines. Therefore, this criterion is met.

C. Drainages

Where a subdivision is traversed by a watercourse, drainage way, channel or street, drainage easements or rights-of-way shall be provided conforming substantially to the alignment and size of the drainage.

RESPONSE: Tract C within the development and as shown on the preliminary plan set submitted with the application contains the Cedar Creek drainage and its associated riparian areas and floodplain, along with an unnamed tributary of Cedar Creek. It is anticipated that the Tract in its entirety will include stormwater drainage easements to Clean Water Services, in order to ensure accesses for public utility needs. It is anticipated that these easements will be required as a Condition of Approval. This criterion will be met.

16.128.020 - Pedestrian and Bicycle Ways

Pedestrian or bicycle ways may be required to connect cul-de-sacs, divide through an unusually long or oddly shaped block, or to otherwise provide adequate circulation.

RESPONSE: As described above, the proposed subdivision provides extensive pedestrian and bicycle circulation throughout the site. A through pedestrian connection is provided between SW Kalapuya Lane and SW Atfalati Lane in order to shorten the proposed pedestrian block length to approximately 300 feet at its maximum. A vehicular block cannot be formed to the south of SW Kalapuya Lane to connect to SW Brookman Road as a result of the location of Cedar Creek and its associated Flood Plain, however a pedestrian connection has been provided between the two separate portions of the site. To the south, this pedestrian connection will connect directly to the cul-de-sac located within Street B. Additional links are created through the east-west trail system on each side of the Cedar Creek Drainage. Each of these trails will be located with public pedestrian and bicycle access easements, as required. Therefore, this criterion is met.

16.128.030 - Lots

A. Size and Shape

Lot size, width, shape, and orientation shall be appropriate for the location and topography of the subdivision or partition, and shall comply with applicable zoning district requirements, with the following exception:

1. *Lots in areas not served by public sewer or water supply shall conform to any special County Health Department standards.*

RESPONSE: As discussed previously, and shown within the submitted preliminary plan set, lot dimension and orientation are proposed consistent with the requirements of the MDRL Zone, with the allowance for a 10% reduction in lot size (lot area and width at the building line), consistent with the exception criteria of Section 16.144.030.B.1. All lots within the subdivision are to be served by public sewer and water supply. These criteria are met.

B. Access

All lots in a subdivision shall abut a public street, except as allowed for infill development under Chapter 16.68.

RESPONSE: As shown on the preliminary plan set and described in this written narrative, all lots abut a public street, or in the case of Lots 34, 35, 53, and 54, direct access to a public street via a private street tract. Therefore, this criterion is satisfied.

C. Double Frontage

Double frontage and reversed frontage lots are prohibited except where essential to provide separation of residential development from railroads, traffic arteries, adjacent nonresidential uses, or to overcome specific topographical or orientation problems. A five (5) foot wide or greater easement for planting and screening may be required.

RESPONSE: The proposed subdivision does not include any double frontage or reversed frontage lots. Therefore, this criterion does not apply.

D. Side Lot Lines Side lot lines shall, as far as practicable, run at right angles to the street upon which the lots face, except that on curved streets side lot lines shall be radial to the curve of the street.

RESPONSE: To the extent practicable, all side lot lines are perpendicular to the fronting street with the exception of those lots located at the terminus of the cul-de-sac within Street B, which have side lot lines radial to the cul-de-sac bulb. Therefore, these criteria are met.

E. Grading

Grading of building sites shall conform to the following standards, except when topography of physical conditions warrants special exceptions:

1. *Cut slopes shall not exceed one (1) and one-half (1 1/2) feet horizontally to one (1) foot vertically.*

2. *Fill slopes shall not exceed two (2) feet horizontally to one (1) foot vertically.*

RESPONSE: Proposed site grading is shown on the submitted Preliminary Grading and Erosion Control Plan (North) Sheet P4.0 and Preliminary Grading and Erosion Control Plan South (Sheet P4.1). All site grading has been designed to comply with the above standards relating to cut and fill slopes, as will be demonstrated through the Grading Permit process. These criteria will be met.

Division VIII. - ENVIRONMENTAL RESOURCES

Chapter 16.134 - FLOODPLAIN (FP) OVERLAY

16.134.010 - Generally

Special resource zones are established to provide for preservation, protection, and management of unique natural and environmental resources in the City that are deemed to require additional standards beyond those contained elsewhere in this Code. Special resource zones may be implemented as underlying or overlay zones depending on patterns of property ownership and the nature of the resource. A property or properties may be within more than one resource zone. In addition, the City may identify special resource areas and apply a PUD overlay zone in advance of any development in order to further protect said resources.

The areas of special flood hazard identified by the Federal Insurance Administration in a scientific and engineering report entitled, "The Flood Insurance Study for Washington County, Oregon and Incorporated Areas," (flood insurance study) dated November 4, 2016, with accompanying Flood Insurance Maps are hereby adopted by reference and declared to be a part of this ordinance. The Flood Insurance Study is on file with the Sherwood City Engineer at Sherwood City Hall.

16.134.020 - Purpose

The purpose of this ordinance is to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in specific areas by complying with the provisions of this chapter.

A. The FP zoning district is an overlay district that controls and regulates flood hazard areas in order to protect the public health, safety and general welfare; to reduce potential flood damage losses; and to protect floodways and natural drainageways from encroachment by uses which may adversely affect water quality and water flow and subsequent upstream or downstream flood levels. The FP zone shall be applied to all

areas within the base flood, and shall supplement the regulations of the underlying zoning district.

B. *FP zoning districts are areas within the base flood as identified by the Federal Emergency Management Agency (FEMA) in a Flood Insurance Study (FIS) and in Flood Insurance Rate Maps (FIRM) published for the City and surrounding areas, or as otherwise identified in accordance with Section 16.134.020C. These FEMA documents are adopted by reference as part of this Code, and are on file at the City.*

C. *When base flood elevation data is not available from the FIS or FIRM, the City shall obtain, review, and reasonably utilize any base flood elevation and floodway data available from a federal, state, or other source, and standards developed by the FEMA, in order to administer the provisions of this Code.*

RESPONSE: Cedar Creek flows from west to east across the subject site, bifurcating the site into north and south development areas. The base flood elevation of Cedar Creek closest to the site is approximately 176 feet above MSL. The lowest elevation on the subject site is approximately 164 feet, adjacent to the existing driveway crossing. Therefore, these criteria are applicable.

16.134.030 – Greenways

The FP zoning districts overlaying the Rock Creek and Cedar Creek floodplains are designated greenways in accordance with Chapter 5 of the Community Development Plan. All development in these two floodplains shall be governed by the policies in Division V, Chapter 16.142 of this Code, in addition to the requirements of this Section and the Clean Water Services Design and Construction Standards R&O 07-20, or its replacement.

16.134.040 - Development Review and Floodplain Administrator Duties

A. *The City Engineer is the designated local Floodplain Administrator and is responsible for maintaining local floodplain management records for the City.*

B. *Provided land is not required to be dedicated as per Section 16.134.030, a conditional use permit (CUP) is required before any use, construction, fill, or alteration of a floodplain, floodway, or watercourse, or any other development begins within any FP zone, except as provided in Section 16.134.050.*

C. *Application for a CUP for development in a floodplain shall conform to the requirements of Chapter 16.82 and may include, but is not limited to, plans and scale drawings showing the nature, location, dimensions, and elevations of the area in question, existing or proposed structures, fill, storage of materials, and drainage facilities.*

D. *The following specific information is required in a floodplain CUP application and shall be certified and verified by a registered civil engineer or architect. The City shall maintain such certifications as part of the public record. All certifications shall be based on the as-built elevations of lowest building floors.*

1. *Elevations in relation to the current FIRM and FIS of the lowest floor (including basement) of all structures;*

2. *Elevations in relation to the current FIRM and FIS to which any structure has been flood proofed.*

3. *That the flood proofing methods for any structure meet the requirements of this section, Floodplain Structures.*

4. *Description of the extent to which any watercourse will be altered or relocated as a result of the proposed development.*

5. *A base flood survey and impact study made by a registered civil engineer.*

6. *Proof all necessary notifications have been sent to, and permits have been obtained from, those federal, state, or other local government agencies for which prior approval of the proposed development is required.*

7. *Any other information required by this section, by any applicable federal regulations, or as otherwise determined by the City to be necessary for the full and proper review of the application.*

E. *The floodplain administrator shall review all development permits to determine if the proposed development is located in the floodway. If located in the floodway, assure that the encroachment provisions of Section 16.134.070.F are met.*

F. *Where base flood elevation data is provided through the Flood Insurance Study, FIRM or required under Section 16.134.020.C the local Floodplain Administrator shall:*

1. *Obtain and record the actual elevation (in relation to mean sea level) of the lowest floor (including basement) of all new and substantially improved structures, and*

2. *If the structure has been floodproofed in accordance with Sections 16.134.090.A.3 and D.1.a, then obtain the elevation (in relation to mean sea level) to which the structure was floodproofed, and*

3. *Maintain all elevation and floodproofing certificates required under Section 16.134.040.D, and*

4. *Maintain for public inspection all records pertaining to the provisions of this ordinance.*

G. *Where elevation data is not available as per subsection D of this section, or from other sources as per Section 16.134.020.C, a floodplain CUP shall be reviewed using other relevant data, as determined by the City, such as historical information, high water marks, and other evidence of past flooding. The City may require utility structures and habitable building floor elevations, and building flood proofing, to be at least two feet above the probable base flood elevation, in such circumstances where more definitive flood data is not available.*

H. *The floodplain administrator shall:*

1. *Notify adjacent communities, the Department of Land Conservation and Development and other appropriate state and federal agencies, prior to any alteration or relocation of a watercourse, and submit evidence of such notification to the Federal Insurance Administration as required in Section 16.134.100.C.*

2. *Require that maintenance is provided within the altered or relocated portion of said watercourse so that the flood carrying capacity is not diminished.*

I. *The floodplain administrator shall make interpretations where needed, as to exact location of the boundaries of the areas of special flood hazards (for example, where there appears to be a conflict between a mapped boundary and actual field conditions). The person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretation. Such appeals shall be granted consistent with the*

standards of Section 60.6 of the Rules and Regulations of the National Flood Insurance Program (44 CFR 59-76).

J. *Variances to any standard within the floodplain overlay shall comply with the provisions of the Code of Federal Regulations (CFR) section 44 CFR 60.6(a)(1)—(7).*

16.134.050 - Permitted Uses

In the FP zone the following uses are permitted outright, and do not require a CUP, provided that floodway flow, or floodplain capacity, will not be impeded, as determined by the City, and when greenway dedication is not required as per Section 16.134.030.

A. *Agricultural uses, provided that associated structures are not allowed, except for temporary building and boundary fences that do not impede the movement of floodwaters and flood-carried materials.*

B. *Open space, park and recreational uses, and minor associated structures, if otherwise allowed in the underlying zoning district that do not impede the movement of floodwaters and flood-carried materials.*

C. *Public streets and appurtenant structures, and above and underground utilities, subject to the provisions of Sections 16.134.080 and 16.134.090.*

D. *Other accessory uses allowed in the underlying zoning district that do not involve structures, and will not, in the City's determination, materially alter the stability or storm drainage absorption capability of the floodplain.*

16.134.060 - Conditional Uses

In the FP zone the following uses are permitted as conditional uses, subject to the provisions of this Section and Chapter 16.82, when greenway dedication is not required as per this Section.

Greenways:

A. *Any permitted or conditional use allowed in the underlying zoning district, when located in the flood fringe only, as specifically defined by this Code.*

16.134.070 - Prohibited Uses

In the FP zone the following uses are expressly prohibited:

A. *The storage or processing of materials that are buoyant, flammable, contaminants, explosive, or otherwise potentially injurious to human, animal or plant life.*

B. *Public and private sewerage treatment systems, including drainfields, septic tanks and individual package treatment plants.*

C. *Any use or activity not permitted in the underlying zoning district.*

D. *Any use or activity that, in the City's determination, will materially alter the stability or storm drainage absorption capability of the floodplain.*

E. *Any use or activity that, in the City's determination, could create an immediate or potential hazard to the public health, safety and welfare, if located in the floodplain.*

F. *Any use, activity, or encroachment located in the floodway, including fill, new construction, improvements to existing developments, or other development, except as otherwise allowed by Section 16.134.050 and unless certification by a registered professional engineer or architect is provided demonstrating through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the use, activity, or encroachment will not result in any increase to flood levels during the occurrence of the base flood discharge.*

    a. *If paragraph F of this section is satisfied, all new construction and substantial improvements shall comply with all applicable flood hazard provisions of Sections 16.134.080 and .090, or ASCE 24, whichever is more stringent.*

G. *The storage of recreational vehicles. This is the most restrictive provision wherein.*

16.134.080 - Floodplain Development

A. *Floodplain Alterations*

    1. *Floodplain Survey*

    The floodplain, including the floodway and flood fringe areas, shall be surveyed by a registered land surveyor or civil engineer,

and approved by the City, based on the findings of the flood insurance study and other available data. Such delineation shall be based on the current FIRM and FIS data and be field-located from recognized valid benchmarks.

2. Grading Plan

Alteration of the existing topography of floodplain areas may be made upon approval of a grading plan by the City. The plan shall include both existing and proposed topography and a plan for alternate drainage. Contour intervals for existing and proposed topography shall be included and shall be not more than one foot for ground slopes up to five percent (5%) and for areas immediately adjacent to a stream or drainage way, two feet for ground slopes between five and ten percent (5% to 10%), and five feet for greater slopes.

3. Fill and Diked Lands

a. Proposed floodplain fill or diked lands may be developed if a site plan for the area to be altered within the floodplain is prepared and certified by a registered civil engineer and approved by the Commission pursuant to the applicable provisions of this Code.

b. Vehicular access shall be provided from a street above the elevation of the base flood to any proposed fill or dike area if the area supports structures for human occupancy. Unoccupied fill or dike areas shall be provided with emergency vehicle access.

4. Alteration Site Plan

a. The certified site plan prepared by a registered civil engineer or architect for an altered floodplain area shall show that:

(1) Proposed improvements will not alter the flow of surface water during flooding such as to cause a compounding of flood hazards or changes in the direction or velocity of floodwater flow.

(2) No structure, fill, storage, impervious surface or other uses alone, or in combination with existing or future uses, will materially reduce the capacity of the floodplain or increase in flood heights.

(3) *Proposed floodplain fill or diked areas will benefit the public health, safety and welfare and incorporate adequate erosion and storm drainage controls, such as pumps, dams and gates.*

(4) *No serious environmental degradation shall occur to the natural features and existing ecological balance of upstream and downstream areas.*

(5) *On-going maintenance of altered areas is provided so that flood-carrying capacity will not be diminished by future erosion, settling, or other factors.*

b. *Applicants must obtain a conditional letter of map revision (CLOMR) from FEMA before any encroachment, including fill, new construction, substantial improvement, or other development, in the regulatory floodway is permitted. Applicants are responsible for preparing technical data to support the CLOMR application and paying any processing or application fees to FEMA.*

RESPONSE: The applicant has obtained the base flood elevation from FEMA Maps for the site and Cedar Creek, and has mapped the flood elevation on plans submitted with the application. As designed, no permanent impacts to the Cedar Creek flood plain, which is proposed to be contained entirely within the boundaries of Tract C, are anticipated and therefore the requirements listed above generally are not applicable to the application. Pedestrian and bicycle trails within the flood plain will utilize existing formed hard surface areas, including the crossing of Cedar Creek, which will utilize the existing driveway culvert crossing. Uses in the floodplain area will be limited to the pedestrian and bicycle trail, and temporary impacts to the flood plain for public utilities, both of which are identified as permitted uses under Section 16.134.050.B. and C. respectively. The above criteria, as applicable, can be met.

5. *Subdivisions and Partitions*

All proposed subdivisions or partitions including land within an FP zone must establish the boundaries of the base flood by survey and dedicate said land as per Section 16.134.030. The balance of the land and development must:

a. *Be designed to include adequate drainage to reduce exposure to flood damage, and have public sewer, gas, electrical and other utility systems so located and constructed to minimize potential flood damage, as determined by the City.*

b. *Provide for each parcel or lot intended for structures, a building site which is at or above the base flood*

elevation, and meets all setback standards of the underlying zoning district.

c. *Where base flood elevation data is not provided, or is not available from an authoritative source, it shall be generated by the applicant for subdivision proposals and other proposed developments which contain at least fifty (50) lots or five acres, whichever is less.*

RESPONSE: As stated above, the applicant has obtained the base flood elevation from FEMA Maps for the site and Cedar Creek, and has mapped the flood elevation on plans submitted with the application. All aspects of the subdivision have been designed to include adequate drainage to reduce exposure to flood damage, and have public sewer, gas, electrical and other utility systems so located and constructed to minimize potential flood damage, as will be determined by the City and appropriate jurisdictional districts through the review of final engineering plans. Each residential lot within the subdivision contains a building site which is above the delineated base flood elevation, and meets all setback standards of the MDRL. These criteria will be met.

16.134.090 - Floodplain Structures

Structures in the FP zone permitted in accordance with this section, shall be subject to the following conditions, in addition to the standards of the underlying zoning district:

A. *Generally*

1. *All structures, including utility equipment, and manufactured housing dwellings, shall be anchored to prevent lateral movement, floatation, or collapse during flood conditions, and shall be constructed of flood-resistant materials, to standards approved by the City, State Structural and Plumbing Specialty Codes and applicable building codes.*

2. *The lowest floor elevation of a structure designed for human occupancy must be at least one and one-half feet above the base flood elevation and the building site must comply with the provisions of Section 16.134.080.A.*

3. *The lower portions of all structures shall be flood proofed according to the provisions of the State Structural and Plumbing Specialty Code to an elevation of at least one and one-half feet above the base flood elevation.*

4. *The finished ground elevation of any under floor crawl space shall be above the grade elevation of an adjacent street, or natural or approved drainage way unless specifically*

approved by the City. A positive means of drainage from the low point of such crawl space shall be provided.

5. *All new construction and substantial improvements shall be constructed using methods and practices that minimize flood damage.*

RESPONSE: All residential structures located on the site will be situated such that all construction is located at least one and one-half feet above the base flood elevation. Utilities and other service structures such as outfall locations will either be elevated above the flood plain, or will be anchored to prevent lateral movement, floatation, or collapse during flood conditions, and will be constructed of flood-resistant materials. All on-site construction will minimize flood damage using appropriate construction techniques. These criteria will be met.

B. Utilities

1. *Electrical, heating, ventilation, plumbing and air-conditioning equipment and other service facilities located within structures shall be designed and/or otherwise elevated or located so as to prevent water from entering or accumulating within the components during conditions of flooding.*

2. *Electrical service equipment, or other utility structures, shall be constructed at or above the base flood elevation. All openings in utility structures shall be sealed and locked.*

3. *Water supply and sanitary sewer systems (not prohibited under section 16.134.070.B) shall be approved by the Washington County Health Department, and shall be designed to minimize or eliminate the infiltration of floodwaters into the systems, or any discharge from systems into floodwaters.*

    a. *On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding consistent with Washington County Health Authority and Oregon Department of Environmental Quality.*

RESPONSE: While the final design of utilities has not yet been reviewed or approved by the appropriate jurisdictional districts at this time, it is anticipated that utilities including water and sanitary sewer will be constructed within the area of the Cedar Creek flood plain. All water supply and sanitary sewer systems will be designed and permitted to meet or exceed the standards of the applicable jurisdictional district, and approved by the Washington County Health Department. These systems will be designed to minimize or eliminate the infiltration of floodwaters into the systems, or any discharge from systems into floodwaters. These criteria will be met.

C. Residential Structures

1. *All residential structures shall have the lowest floor, including basement, elevated to at least one and one-half feet above the base flood elevation.*

2. *Fully enclosed areas below the lowest floor that are subject to flooding are not permitted unless they are designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered engineer or architect, or must meet or exceed the following minimum criteria:*

    a. *A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided.*

    b. *The bottom of all openings shall be no higher than one foot above grade.*

    c. *Openings may be equipped with screens, louvers, or other coverings or devices, provided they permit the automatic entry and exit of floodwaters.*

3. *Shall be constructed with materials resistant to flood damage.*

RESPONSE: All residential structures located on the site will be situated such that all construction is located at least one and one-half feet above the base flood elevation. This criterion is will be met, and will be confirmed at the time of building permit approval.

D. Non-Residential Construction

1. *All commercial, industrial or other non-residential structures shall have either the lowest floor, including basement, elevated to the level of the base flood elevation; or, together with attendant utility and sanitary facilities, shall:*

    a. *Be flood proofed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water.*

    b. *Have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy.*

    c. *Be certified by a Registered Professional Engineer or Architect that the design and methods of construction are*

in accordance with accepted standards of practice for meeting all provisions of this Section. A record of such certificates shall be maintained by the Floodplain Administrator in accordance with Section 16.134.040.A.

d. Nonresidential structures that are elevated and not flood proofed must meet the same standards for space below the lowest floor as per Section 16.134.090.C.2.

RESPONSE: All structures proposed to be located on the site are for residential, rather than commercial, industrial or other non-residential uses. This criterion is not applicable.

E. Manufactured Dwellings

1. Manufactured dwellings supported on solid foundation walls shall be constructed with flood openings that comply with paragraph C.2 of this section;

2. The bottom of the longitudinal chassis frame beam in A zones (excluding coastal A zones), shall be at or above BFE;

3. The manufactured dwelling shall be anchored to prevent flotation, collapse, and lateral movement during the base flood. Anchoring methods may include, but are not limited to, use of over-the-top or frame ties to ground anchors (Reference FEMA's "Manufactured Home Installation in Flood Hazard Areas" guidebook for additional techniques), and;

4. Electrical crossover connections shall be a minimum of 12 inches above BFE.

RESPONSE: No manufactured dwellings are proposed to be located on the site. This criterion is not applicable.

F. Recreational Vehicles

Except where prohibited under Section 16.134.070.G Recreational vehicles placed on sites are required to:

1. Be on the site for fewer than 180 consecutive days, and

2. Be fully licensed and ready for highway use, on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions; or

3. *Meet the requirements of paragraph E of this section and the elevation and anchoring requirements for manufactured dwellings.*

RESPONSE: No recreational vehicles are proposed to be located on the site. This criterion is not applicable.

16.134.100 - Additional Requirements

A. *Dimensional standards or developments in the FP zone are the same as in the underlying zoning district, except as provided in Section 16.134.100.*

B. *Approval of a site plan pursuant to Chapter 16.90 that includes portions of the FP overlay may be conditioned by the City to protect the best interests of the surrounding area or the community as a whole, and to carry out the terms of the Comprehensive Plan. These conditions may include, but are not limited to:*

1. *Increasing the required lot sizes, yard dimensions, modifying street widths, or off-street parking spaces.*

2. *Limiting the height, size, or location of buildings.*

3. *Controlling the location and number of vehicle access points.*

4. *Limiting the number, size, location, or lighting of signs.*

5. *Requiring diking, fencing, screening, landscaping, or other facilities to protect the proposed development, or any adjacent or nearby property.*

6. *Designating sites for open space or water retention purposes.*

7. *Construction, implementation, and maintenance of special drainage facilities and activities.*

RESPONSE: No activities are proposed within the Cedar Creek floodplain which would necessitate the imposition of Conditions of Approval under provisions 1. through 5. and 7 above. The entirety of the delineated 100-year flood plain will be located within an open space tract(s), meeting the intent of 6. above. These criteria are met or are otherwise not applicable.

C. *FEMA Notification.*

1. *Notify FEMA within six months of project completion when a conditional letter of map revision (CLOMR) has been obtained from FEMA or when development altered a*

watercourse, modified floodplain boundaries, or modified base flood elevations. This notification shall be provided as a letter of map revision (LOMR).

2. *The applicant is responsible for preparing technical data to support the LOMR application and paying any processing or application fees to FEMA. 3. The floodplain administrator is under no obligation to sign the Community Acknowledgement Form, which is part of the CLOMR/LOMR application, until the applicant demonstrates that the project will or has met the requirements of this Code and all applicable state and federal laws.*

RESPONSE: No activities are proposed within the Cedar Creek floodplain which would necessitate the requirement for a LOMA, CLOMR, or LOMR. This criterion is not applicable.

Chapter 16.142 - PARKS, TREES AND OPEN SPACES

16.142.010 - Purpose

This Chapter is intended to assure the provision of a system of public and private recreation and open space areas and facilities consistent with this Code and applicable portions of Chapter 5 of the Community Development Plan Part 2. The standards of this section do not supersede the open space requirements of a Planned Unit Development, found in Chapter 16.40 - Planned Unit Development (PUD).

RESPONSE: The subject site includes open space areas complying with the intent of this Code. This application is not submitted as a Planned Unit Development; therefore, the open space standards of this section apply.

16.142.030 - Single-Family or Duplex Residential Subdivisions

A. *A minimum of five percent (5%) of the net buildable site (after exclusion of public right-of-way and environmentally constrained areas) shall be maintained as "open space". Open space must include usable areas such as public parks, swimming and wading pools, grass areas for picnics and recreational play, walking paths, and other like space. The following may not be used to calculate open space:*

   1. *Required yards or setbacks.*

   2. *Required visual corridors.*

   3. *Required sensitive areas and buffers.*

4. *Any area required to meet a standard found elsewhere in this code.*

RESPONSE: The net buildable area of the site is approximately 8.32 acres, and accordingly this section requires the creation of 5% of the net buildable area, or 0.42 acres (18,120 square feet), of open space. The development, as illustrated on the Conceptual Open Space Plan (Sheet P3.2), is currently shown to include approximately 1.08 acres (13% of net buildable area/47,045 square feet) of additional open space outside of Sensitive Areas, Vegetated Corridor, and 100-Year Flood Plain. However, this open space area is required to be reduced by 8,809 square feet to accommodate the requirements of Section 16.144.030.B.1., for a total additional open space dedication of 0.88 acres (10.5% of net buildable area/38,236 square feet)

These open space areas are located within Tract C, at either end of the pedestrian crossing of the Cedar Creek drainage, and pedestrian paths located adjacent to, but outside of, the natural resource areas associated with Cedar Creek. The open space will primarily be improved with a network of connected pedestrian trails not otherwise required by the Code, consistent with Section 16.142.030.A., which includes walking paths as an approved improvement. In total, these areas will provide for over 0.40 lineal miles of pedestrian trails, accessible to both residents and the wider community. Due to the creek crossing between the northern and southern ends of the site, and the multiple proposed links to properties to the east and west, it is anticipated that the trails will be heavily used by the public for circulation within and through the development. Due to the trail locations, numerous educational and recreational opportunities will also be available for passive enjoyment of Cedar Creek and its associated riparian areas. This requirement can and will be met.

B. *Enhanced streetscapes such as "boulevard treatments" in excess of the minimum public street requirements may count toward a maximum of 10,000 square feet of the open space requirement.*

   1. *Example: if a 52-foot-wide right-of-way [ROW] is required for a 1,000 foot-long street and a 62-foot wide ROW with 5-foot additional plantings/meandering pathway is provided on each side of the street, the additional 10-foot-wide area x 1,000 linear feet, or 10,000 square feet, counts toward the open space requirement.*

RESPONSE: The subdivision and street designs do not include boulevard treatments. This criterion is not applicable.

C. *The open space shall be conveyed in accordance with one of the following methods:*

   1. *By dedication to the City as public open space (if acceptable to the City). Open space proposed for dedication to the City must be acceptable to the City Manager or the Manager's designee with regard to the size, shape, location,*

improvement, environmental condition, and budgetary and maintenance abilities;

2. *By leasing or conveying title (including beneficial ownership) to a corporation, homeowners' association or other legal entity, with the City retaining the development rights to the open space. The terms of such lease or other instrument of conveyance must include provisions (e.g., maintenance, property tax payment, etc.) suitable to the City.*

RESPONSE: In accordance with 2. above, the open space areas and other tracts, including Tracts B, C, D, E, and F are anticipated to be conveyed to a future homeowner's association perC.2. above. However, if requested by the City or other appropriate jurisdictional district, the open spaces could potentially be publicly dedicated. Therefore, this criterion can be met.

D. The density of a single-family residential subdivision shall be calculated based on the net buildable site prior to exclusion of open space per this Section.

1. *1Example: a 40,000 square foot net buildable site would be required to maintain 2,000 square feet (5%) of open space but would calculate density based on 40,000 square feet.*

RESPONSE: The density of the proposed subdivision was calculated using the net buildable site area, prior to the removal of the 13% open space provided. This criterion is met.

E. If a proposed residential subdivision contains or is adjacent to a site identified as "parks" on the Acquisition Map of the Parks Master Plan (2006) or has been identified for acquisition by the Sherwood Parks and Recreation Board, establishment of open space shall occur in the designated areas if the subdivision contains the park site, or immediately adjacent to the parks site if the subdivision is adjacent to it.

RESPONSE: The Brookman Addition Concept Plan does not identify a park site within or immediately adjacent to the development site. This criterion can be met.

F. If the proposed residential subdivision does not contain or is not adjacent to a site identified on the Parks Master Plan map or otherwise identified for acquisition by the Parks and Recreation Board, the applicant may elect to convey off-site park/open space.

G. This standard does not apply to a residential partition provided that a development may not use phasing or series partitions to avoid the minimum open space requirement. A partition of land that was part of an approved partition within the previous five

(5) years shall be required to provide the minimum five percent (5%) open space in accordance with subsection (A) above.

RESPONSE: The applicant has not elected to convey off site park/open space. However, it is noted that if requested by the City or other appropriate jurisdictional district, the open spaces within the development could potentially be publicly dedicated. The above criteria do not apply.

H. The value of the open space conveyed under Subsection (A) above may be eligible for Parks System Development Charges (SDCs) credits based on the methodology identified in the most current Parks and Recreation System Development Charges Methodology Report.

RESPONSE: Eligibility for System Development Charges (SDCs) credits will be assessed if and when open space is conveyed, using the methodology identified in the most current Parks and Recreation System Development Charges Methodology Report. The criterion can be met as applicable.

16.142.040 - Visual Corridors

A. Corridors Required

New developments located outside of the Old Town Overlay with frontage on Highway 99W, or arterial or collector streets designated on Figure 8-1 of the Transportation System Plan shall be required to establish a landscaped visual corridor according to the following standards:

Highway 99W: 25 feet
Arterial: 15 feet
Collector: 10 feet

In residential developments where fences are typically desired adjoining the above described major street the corridor may be placed in the road right-of-way between the property line and the sidewalk. In all other developments, the visual corridor shall be on private property adjacent to the right-of-way.

B. Landscape Materials

The required visual corridor areas shall be planted as specified by the review authority to provide a continuous visual and/or acoustical buffer between major streets and developed uses. Except as provided for above, fences and walls shall not be substituted for landscaping within the visual corridor. Uniformly planted, drought resistant street trees and ground cover, as specified in Section 16.142.060, shall be planted in the corridor by the developer. The

improvements shall be included in the compliance agreement. In no case shall trees be removed from the required visual corridor.

C. Establishment and Maintenance

Designated visual corridors shall be established as a portion of landscaping requirements pursuant to Chapter 16.92. To assure continuous maintenance of the visual corridors, the review authority may require that the development rights to the corridor areas be dedicated to the City or that restrictive covenants be recorded prior to the issuance of a building permit.

D. Required Yard

Visual corridors may be established in required yards, except that where the required visual corridor width exceeds the required yard width, the visual corridor requirement shall take precedence. In no case shall buildings be sited within the required visual corridor, with the exception of front porches on townhomes, as permitted in Section 16.44.010(E)(4)(c).

E. Pacific Highway 99W Visual Corridor

1. Provide a landscape plan for the highway median paralleling the subject frontage. In order to assure continuity, appropriate plant materials and spacing, the plan shall be coordinated with the City Planning Department and ODOT.

2. Provide a visual corridor landscape plan with a variety of trees and shrubs. Fifty percent (50%) of the visual corridor plant materials shall consist of groupings of at least five (5) native evergreen trees a minimum of ten (10) feet in height each, spaced no less than fifty (50) feet apart, if feasible. Deciduous trees shall be a minimum of four (4) inches DBH and twelve (12) feet high, spaced no less than twenty-five (25) feet apart, if feasible.

RESPONSE: SW Brookman Road is classified as an Arterial street; therefore a 15-foot landscaped visual corridor is required. As shown on the preliminary plat, a 15-foot wide visual corridor is provided along the entire SW Brookman Road frontage, except at the proposed public street access location, and where Tract C (containing Cedar Creek and associated flood plain and riparian areas) intersects the SW Brookman Road right-of-way. These visual corridors are identified as Tracts E and F on the Preliminary Plat, as opposed to being provided within required yards, and are proposed to be landscaped in accordance with the requirements of this section. Therefore, this criterion is met.

16.142.050 - Park Reservation

Areas designated on the Natural Resources and Recreation Plan Map, in Chapter 5 of the Community Development Plan, which have not been dedicated pursuant to Section 16.142.030 or 16.134.020, may be required to be reserved upon the recommendation of the City Parks Board, for purchase by the City within a period of time not to exceed three (3) years.

RESPONSE: The Community Development Plan does not include the Brookman Addition area. However, the site is located within the adopted Brookman Addition Concept Plan Area which illustrates the conceptual location of natural resource areas. If requested by the City or other appropriate jurisdictional district, the open spaces within the development could however potentially be publicly dedicated or purchased. The criterion can be met.

16.142.060 - Street Trees

A. Installation of Street Trees on New or Redeveloped Property.

Trees are required to be planted to the following specifications along public streets abutting or within any new development or re-development. Planting of such trees shall be a condition of development approval. The City shall be subject to the same standards for any developments involving City-owned property, or when constructing or reconstructing City streets. After installing street trees, the property owner shall be responsible for maintaining the street trees on the owner's property or within the right-of-way adjacent to the owner's property.

1. *Location: Trees shall be planted within the planter strip along a newly created or improved streets. In the event that a planter strip is not required or available, the trees shall be planted on private property within the front yard setback area or within public street right-of-way between front property lines and street curb lines or as required by the City.*

2. *Size: Trees shall have a minimum trunk diameter of two (2) caliper inches, which is measured six inches above the soil line, and a minimum height of six (6) feet when planted.*

3. *Types: Developments shall include a variety of street trees. The trees planted shall be chosen from those listed in 16.142.080 of this Code.*

4. *Required Street Trees and Spacing:*

a. *The minimum spacing is based on the maximum canopy spread identified in the recommended street tree list in section 16.142.080 with the intent of providing a continuous canopy without openings between the trees. For example, if a tree has a canopy of forty (40) feet, the spacing between trees is forty (40) feet. If the tree is not on the list, the mature canopy width must be provided to the planning department by a certified arborist.*

b. *All new developments shall provide adequate tree planting along all public streets. The number and spacing of trees shall be determined based on the type of tree and the spacing standards described in a. above and considering driveways, street light locations and utility connections. Unless exempt per c. below, trees shall not be spaced more than forty (40) feet apart in any development.*

c. *A new development may exceed the forty foot spacing requirement under section b. above, under the following circumstances:*

   (1) Installing the tree would interfere with existing utility lines and no substitute tree is appropriate for the site; or

   (2) There is not adequate space in which to plant a street tree due to driveway or street light locations, vision clearance or utility connections, provided the driveways, street light or utilities could not be reasonably located elsewhere so as to accommodate adequate room for street trees; and

   (3) The street trees are spaced as close as possible given the site limitations in (1) and (2) above.

   (4) The location of street trees in an ODOT or Washington County right-of-way may require approval, respectively, by ODOT or Washington County and are subject to the relevant state or county standards.

   (5) For arterial and collector streets, the City may require planted medians in lieu of paved twelve foot wide center turning lanes, planted with trees to the specifications of this subsection.

RESPONSE: The Preliminary Street Tree and Open Space Planting Plan (Sheet L1) of the submitted plan set shows the location, spacing, and species of street trees proposed within the development. The Preliminary Street Tree and Open Space Planting Plan demonstrates compliance with the above requirements. Accordingly, these criteria are met.

B. Removal and Replacement of Street Trees.

The removal of a street tree shall be limited and in most cases, necessitated by the tree. A person may remove a street tree as provided in this section. The person removing the tree is responsible for all costs of removal and replacement. Street trees less than five (5) inches DBH can be removed by right by the property owner or his or her assigns, provided that they are replaced. A street tree that is removed must be replaced within six (6) months of the removal date.

1. *Criteria for All Street Tree Removal for trees over five (5) inches DBH. No street tree shall be removed unless it can be found that the tree is:*

    a. *Dying, becoming severely diseased, or infested or diseased so as to threaten the health of other trees, or*
    b. *Obstructing public ways or sight distance so as to cause a safety hazard, or*
    c. *Interfering with or damaging public or private utilities, or*
    d. *Defined as a nuisance per City nuisance abatement ordinances.*

2. *Street trees between five (5) and ten (10) inches DBH may be removed if any of the criteria in 1. above are met and a tree removal permit is obtained.*

    a. The Tree Removal Permit Process is a Type I land use decision and shall be approved subject to the following criteria:

        (1) The person requesting removal shall submit a Tree Removal Permit application that identifies the location of the tree, the type of tree to be removed, the proposed replacement and how it qualifies for removal per Section 1. above.
        (2) The person shall post a sign, provided by the City, adjacent to the tree for ten (10) calendar days prior to removal that provides notice of the removal application and the process to comment on the application.
        (3) If an objection to the removal is submitted by the City or to the City during the ten (10) calendar day period, an additional evaluation of the tree will be conducted by an arborist to determine whether the tree meets the criteria for street tree removal in Section 1. above. The person requesting the Tree Removal Permit shall

be responsible for providing the arborist report and associated costs.

(4) Upon completion of the additional evaluation substantiating that the tree warrants removal per Section 1. above or if no objections are received within the ten-day period, the tree removal permit shall be approved.

(5) If additional evaluation indicates the tree does not warrant removal, the Tree Removal Permit will be denied.

3. Street trees over ten (10) inches DBH may be removed through a Type I review process subject to the following criteria.

a. The applicant shall provide a letter from a certified arborist identifying:

(1) The tree's condition,

(2) How it warrants removal using the criteria listed in Section 1. above, and identifying any reasonable actions that could be taken to allow the retention of the tree.

b. The applicant shall provide a statement that describes whether and how the applicant sought assistance from the City, HOA or neighbors to address any issues or actions that would enable the tree to be retained.

c. The person shall post a sign, provided by the City, adjacent to the tree for ten (10) calendar days prior to removal that provides notice of the removal application and the process to comment on the application.

d. Review of the materials and comments from the public confirm that the tree meets the criteria for removal in Section 1. above.

RESPONSE: The application does not include the removal of existing street trees. The above criteria are not applicable. However, it is noted that future homeowners will be subject to the requirements of this section.

C. Homeowner's Association Authorization.

The Planning Commission may approve a program for the adoption, administration and enforcement by a homeowners' association (HOA) of regulations for the removal and replacement of street trees within the geographic boundaries of the association.

1. *An HOA that seeks to adopt and administer a street tree program must submit an application to the City. The application must contain substantially the following information:*

    a. *The HOA must be current and active. The HOA should meet at least quarterly and the application should include the minutes from official HOA Board meetings for a period not less than eighteen (18) months (six (6) quarters) prior to the date of the application.*
    b. *The application must include proposed spacing standards for street trees that are substantially similar to the spacing standards set forth in 16.142.060.A above.*
    c. *The application must include proposed street tree removal and replacement standards that are substantially similar to the standards set forth in 16.142.060.B above.*
    d. *The application should include a copy of the HOA bylaws as amended to allow the HOA to exercise authority over street tree removal and replacement, or demonstrate that such an amendment is likely within ninety (90) days of a decision to approve the application.*
    e. *The application should include the signatures of not less than seventy-five (75) percent of the homeowners in the HOA in support of the application.*

2. *An application for approval of a tree removal and replacement program under this section shall be reviewed by the City through the Type IV land use process. In order to approve the program, the City must determine:*

    a. *The HOA is current and active.*
    b. *The proposed street tree removal and replacement standards are substantially similar to the standards set forth in 16.142.060.B above.*
    c. *The proposed street tree spacing standards are substantially similar to the standards set forth in 16.142.060.A above.*
    d. *The HOA has authority under its bylaws to adopt, administer and enforce the program.*
    e. *The signatures of not less than seventy-five (75) percent of the homeowners in the HOA in support of the application.*

3. *A decision to approve an application under this section shall include at least the following conditions:*

a. *Beginning on the first January 1 following approval and on January 1 every two (2) years thereafter, the HOA shall make a report to the city planning department that provides a summary and description of action taken by the HOA under the approved program. Failure to timely submit the report that is not cured within sixty (60) days shall result in the immediate termination of the program.*

b. *The HOA shall comply with the requirements of Section 12.20 of the Sherwood Municipal Code.*

4. *The City retains the right to cancel the approved program at any time for failure to substantially comply with the approved standards or otherwise comply with the conditions of approval.*

   a. *If an HOA tree removal program is canceled, future tree removals shall be subject to the provisions of section 16.142.060.*
   b. *A decision by the City to terminate an approved street tree program shall not affect the validity of any decisions made by the HOA under the approved program that become final prior to the date the program is terminated.*
   c. *If the city amends the spacing standards or the removal and replacement standards in this section (SZCDC 16.142.060) the City may require that the HOA amend the corresponding standards in the approved street tree program.*

5. *An approved HOA tree removal and replacement program shall be valid for five (5) years; however the authorization may be extended as approved by the City, through a Type II Land Use Review.*

RESPONSE: No street trees are proposed for removal as part of this development. In the future, a tree removal and replacement program managed by a homeowners' association (HOA), may be desirable, but it is not part of this application. The street trees are planned to be in public rights-of-way and by law become the responsibility of the future abutting property owner to maintain, unless another legal entity such as a HOA assumes responsibility. These criteria do not apply to this application.

D. Exemption from Replacing Street Trees.

A street tree that was planted in compliance with the Code in effect on the date planted and no longer required by spacing standards of section A.4. above may be removed without replacement provided:

1. *Exemption is granted at the time of street tree removal permit or authorized homeowner's association removal per Section 16.142.060.C. above.*

2. *The property owner provides a letter from a certified arborist stating that the tree must be removed due to a reason identified in the tree removal criteria listed in Section 16.142.060.B.1. above, and*

3. *The letter describes why the tree cannot be replaced without causing continued or additional damage to public or private utilities that could not be prevented through reasonable maintenance.*

E. Notwithstanding any other provision in this section, the city manager or the manager's designee may authorize the removal of a street tree in an emergency situation without a tree removal permit when the tree poses an immediate threat to life, property or utilities. A decision to remove a street tree under this section is subject to review only as provided in ORS 34.100.

F. Trees on Private Property Causing Damage.

Any tree, woodland or any other vegetation located on private property, regardless of species or size, that interferes with or damages public streets or utilities, or causes an unwarranted increase in the maintenance costs of same, may be ordered removed or cut by the City Manager or his or her designee. Any order for the removal or cutting of such trees, woodlands or other vegetation, shall be made and reviewed under the applicable City nuisance abatement ordinances.

G. Penalties. The abuse, destruction, defacing, cutting, removal, mutilation or other misuse of any tree planted on public property or along a public street as per this Section, shall be subject to the penalties defined by Section 16.02.040, and other penalties defined by applicable ordinances and statutes, provided that each tree so abused shall be deemed a separate offense.

RESPONSE: As a greenfield site, this development application does not include the removal of street trees, as none currently exist. The Applicant is aware of the penalty for illegal abuse, destruction, or removal of street trees. The criteria, as applicable, are met.

16.142.070 - Trees on Property Subject to Certain Land Use Applications

A. Generally

The purpose of this Section is to establish processes and standards which will minimize cutting or destruction of trees and woodlands within the City. This Section is intended to help protect the scenic beauty of the City; to retain a livable environment through the beneficial effect of trees on air pollution, heat and glare, sound, water quality, and surface water and erosion control; to encourage the retention and planting of tree species native to the Willamette Valley and Western Oregon; to provide an attractive visual contrast to the urban environment, and to sustain a wide variety and distribution of viable trees and woodlands in the community over time.

B. Applicability

All applications including a Type II - IV land use review, shall be required to preserve trees or woodlands, as defined by this Section to the maximum extent feasible within the context of the proposed land use plan and relative to other codes, policies, and standards of the City Comprehensive Plan.

RESPONSE: The proposed subdivision is being reviewed through a Type IV land use review procedure. As such, the criteria of this section apply.

C. Inventory

1. To assist the City in making its determinations on the retention of trees and woodlands, land use applications including Type II - IV development shall include a tree and woodland inventory and report. The report shall be prepared by a qualified professional and must contain the following information:

a. Tree size (in DBH and canopy area)
b. Tree species
c. The condition of the tree with notes as applicable explaining the assessment
d. The location of the tree on the site
e. The location of the tree relative to the planned improvements
f. Assessment of whether the tree must be removed to accommodate the development

g. Recommendations on measures that must be taken to preserve trees during the construction that are not proposed to be removed.

2. *In addition to the general requirements of this Section, the tree and woodland inventory's mapping and report shall also include, but is not limited to, the specific information outlined in the appropriate land use application materials packet.*

3. *Definitions for the inventory purposes of this Section*

   a. *A tree is a living woody plant having a trunk diameter as specified below at Diameter at Breast Height (DBH). Trees planted for commercial agricultural purposes, and/or those subject to farm forest deferral, such as nut and fruit orchards and Christmas tree farms, are excluded from this definition and from regulation under this Section, as are any living woody plants under six (6) inches at DBH. All trees six (6) inches or greater shall be inventoried.*
   b. *A woodland is a biological community dominated by trees covering a land area of 20,000 square feet or greater at a density of at least fifty (50) trees per every 20,000 square feet with at least fifty percent (50%) of those trees of any species having a six (6) inches or greater at DBH. Woodlands planted for commercial agricultural purposes and/or subject to farm forest deferral, such as nut and fruit orchards and Christmas tree farms, are excluded from this definition, and from regulation under this Section.*
   c. *A large stature tree is over 20 feet tall and wide with a minimum trunk diameter of 30 inches at DBH.*

RESPONSE: The applicant has submitted a Preliminary Tree Plan including a tree and woodland inventory, prepared by Teragan & Associates, Inc, dated September 4, 2019, with this application. The Tree Plan includes the required information listed above. These criteria, as applicable, are met.

D. Retention requirements

1. *Trees may be considered for removal to accommodate the development including buildings, parking, walkways, grading etc., provided the development satisfies of D.2 or D.3, below.*

RESPONSE: As shown on the Existing Conditions and Demolition Plan (North and South, Sheets P2.0 and 2.1), there are a large number of trees on the subject site. As is typical with greenfield developments, removal of trees is necessary to accommodate the required site improvements, including utility installation, earthwork, and grading necessary for street construction, proper drainage, and future home construction. Section D.2 is satisfied. Therefore, this criterion is met.

2. *Required Tree Canopy - Residential Developments (Single Family Attached, Single Family Detached and Two - Family)*

Each net development site shall provide a variety of trees to achieve a minimum total tree canopy of 40 percent. The canopy percentage is based on the expected mature canopy of each tree by using the equation πr 2 to calculate the expected square footage of canopy for each tree. The expected mature canopy is counted for each tree regardless of an overlap of multiple tree canopies.

The canopy requirement can be achieved by retaining existing trees or planting new trees. Required street trees can be used toward the total on site canopy required to meet this standard. The expected mature canopy spread of the new trees will be counted toward the needed canopy cover. A certified arborist or other qualified professional shall provide the estimated tree canopy of the proposed trees to the planning department for review.

RESPONSE: The Preliminary Tree Preservation and Removal Plan (North and South, Sheets P2.2 and 2.3) and Preliminary Street Tree and Open Space Planting Plan (L1), in combination with the submitted Tree Plan, demonstrate that at least 40% canopy coverage of the net development site will be provided.

As described in the Tree Plan, using the criteria described above and the locations of the trees relative to grading, paving, construction, and other site improvements, site wide 676 trees will be removed and 257 trees will be retained. Of the retained trees, 25 will be outside of located outside of environmentally constrained areas, with a total combined canopy area of 11,781 square feet. Since retained trees receive double canopy credit, the credit from preservation of the trees is 23,562 square feet. This represents 6.9 percent of the final net buildable area. The minimum canopy requirement for residential development is 40 percent. Therefore, an additional 33.1 percent of tree canopy will be planted to meet the minimum canopy requirement.

The trees to be retained will be adequately protected by adhering to the recommendations in the submitted Tree Plan. Any change to the tree protection plan will be approved by the project arborist to ensure that the trees to be retained are adequately protected. This criterion is met.

3. *Required Tree Canopy - Non-Residential and Multi-family Developments*

Each net development site shall provide a variety of trees to achieve a minimum total tree canopy of 30 percent. The canopy percentage is based on the expected mature canopy of each tree by using the equation πr^2 to calculate the expected square footage of each tree. The expected mature canopy is counted for each tree even if there is an overlap of multiple tree canopies.

The canopy requirement can be achieved by retaining existing trees or planting new trees. Required landscaping trees can be used toward the total on site canopy required to meet this standard. The expected mature canopy spread of the new trees will be counted toward the required canopy cover. A certified arborist or other qualified professional shall provide an estimated tree canopy for all proposed trees to the planning department for review as a part of the land use review process.

RESPONSE: This application involves the creation of a 59-lot residential subdivision for future detached single-family homes. The criteria of D.3. above do not apply.

4. *The City may determine that, regardless of D.1 through D.3, that certain trees or woodlands may be required to be retained. The basis for such a decision shall include; specific findings that retention of said trees or woodlands furthers the purposes and goals of this Section, is feasible and practical both within the context of the proposed land use plan and relative to other policies and standards of the City Comprehensive Plan, and are:*

    a. *Within a Significant Natural Area, 100-year floodplain, City greenway, jurisdictional wetland or other existing or future public park or natural area designated by the City Comprehensive Plan, or*

RESPONSE: The site includes jurisdictional wetlands, flood plain, vegetated corridor, and additional natural open spaces areas to be retained. The trees within these areas are planned to be protected and retained within Tract C. These criteria are met.

    b. *A landscape or natural feature as per applicable policies of the City Comprehensive Plan, or are necessary to keep other identified trees or woodlands on or near the site from being damaged or destroyed due to windfall, erosion, disease or other natural processes, or*

RESPONSE: The site includes the Cedar Creek wetlands, flood plain, and vegetated corridor areas. The trees within these areas are planned to be protected and retained within Tract C, as described above. These criteria are met.

    c. *Necessary for soil stability and the control of erosion, for managing and preserving surface or groundwater quantities or quality, or for the maintenance of a natural drainageway, as per Clean Water Services stormwater management plans and standards of the City Comprehensive Plan, or*

RESPONSE: The applicants submitted geotechnical report demonstrates that additional tree preservation is not necessary for soil stability or erosion control. The application meets all CWS requirements for preserving surface water quality, and for protecting and maintaining the natural drainageway of Cedar Creek and the unnamed tributary along the south east boundary. In doing so, the application also complies with the standards of the comprehensive plan.

d. Necessary in required buffers between otherwise incompatible land uses, or from natural areas, wetlands and greenways, or

RESPONSE: The abutting properties are proposed to include compatible residential uses with low to medium density residential zoning designations, as contained within the Brookman Area Concept Plan. Natural areas, wetlands and greenways associated with Cedar Creek and the unnamed tributary, have been provided buffers/vegetated corridors, and preserved within Tract C Therefore, additional tree protection is not necessary.

e. Otherwise merit retention because of unusual size, size of the tree stand, historic association or species type, habitat or wildlife preservation considerations, or some combination thereof, as determined by the City.

RESPONSE: The proposed subdivision preserves a substantially large area of open space along the Cedar Creek riparian corridor, and unnamed tributary, including flood plain, wetland, vegetated corridor, and additional upland areas. The result is the preservation of a significant tree stand through the center of the site, preserved within Tract C. There are no known historic association or species located on the site. Wildlife habitat preservation is also provided through the preservation of natural areas within Tract C.

5. Tree retention requirements for properties located within the Old Town Overlay or projects subject to the infill standards of Chapter 16.68 are only subject to retention requirements identified in D.4. above.

RESPONSE: The subject site is not within the Old Town Overlay and is not subject to the infill standards of Chapter 16.68. This criterion is not applicable.

6. The Notice of Decision issued for the land use applications subject to this Section shall indicate which trees and woodlands will be retained as per subsection D of this Section, which may be removed or shall be retained as per subsection D of this Section and any limitations or conditions attached thereto.

RESPONSE: The applicant acknowledges that the Notice of Decision for the project will indicate which trees and woodlands will be retained as per subsection D, which may be removed or shall be retained as per subsection D of this Section and any limitations or conditions attached thereto.

7. *All trees, woodlands, and vegetation located on any private property accepted for dedication to the City for public parks and open space, greenways, Significant Natural Areas, wetlands, floodplains, or for storm water management or for other purposes, as a condition of a land use approval, shall be retained outright, irrespective of size, species, condition or other factors. Removal of any such trees, woodlands, and vegetation prior to actual dedication of the property to the City shall be cause for reconsideration of the land use plan approval.*

RESPONSE: All trees described in the criterion of this section, not effected by the installation of approved features such as trails and utilities, will be preserved in their entirety.

E. Tree Preservation Incentive

Retention of existing native trees on site which are in good health can be used to achieve the required mature canopy requirement of the development. The expected mature canopy can be calculated twice for existing trees. For example, if one existing tree with an expected mature canopy of 10 feet (78.5 square feet) is retained it will count as twice the existing canopy (157 square feet).

F. Additional Preservation Incentives

1. *General Provisions. To assist in the preservation of trees, the City may apply one or more of the following flexible standards as part of the land use review approval. To the extent that the standards in this section conflict with the standards in other sections of this Title, the standards in this section shall apply except in cases where the City determines there would be an unreasonable risk to public health, safety, or welfare. Flexibility shall be requested by the applicant with justification provided within the tree preservation and protection report as part of the land use review process and is only applicable to trees that are eligible for credit towards the effective tree canopy cover of the site. A separate adjustment application as outlined in Section 16.84.030.A is not required.*

2. *Flexible Development Standards. The following flexible standards are available to applicants in order to preserve trees on a development site. These standards cannot be combined with any other reductions authorized by this code.*

   a. *Lot size averaging. To preserve existing trees in the development plan for any Land Division under Division*

VII, lot size may be averaged to allow lots less than the minimum lot size required in the underlying zone as long as the average lot area is not less than that allowed by the underlying zone. No lot area shall be less than 80 percent of the minimum lot size allowed in the zone;

b. *Setbacks. The following setback reductions will be allowed for lots preserving existing trees using the criteria in subsection (1) below. The following reductions shall be limited to the minimum reduction necessary to protect the tree.*

(1) Reductions allowed:

(a.) Front yard - up to a 25 percent reduction of the dimensional standard for a front yard setback required in the base zone. Setback of garages may not be reduced by this provision.
(b.) Interior setbacks - up to a 40 percent reduction of the dimensional standards for an interior side and/or rear yard setback required in the base zone.
(c.) Perimeter side and rear yard setbacks shall not be reduced through this provision.

c. *Approval criteria:*

(1.) A demonstration that the reduction requested is the least required to preserve trees; and
(2.) The reduction will result in the preservation of tree canopy on the lot with the modified setbacks; and
(3.) The reduction will not impede adequate emergency access to the site and structure.

3. *Sidewalks. Location of a public sidewalk may be flexible in order to preserve existing trees or to plant new large stature street trees. This flexibility may be accomplished through a curb-tight sidewalk or a meandering public sidewalk easement recorded over private property and shall be reviewed on a case by case basis in accordance with the provisions of the Engineering Design Manual, Street and Utility Improvement Standards. For preservation, this flexibility shall be the minimum required to achieve the desired effect. For planting, preference shall be given to retaining the planter strip and separation between the curb and sidewalk wherever practicable. If a preserved tree is to be utilized as a street tree, it must meet the criteria found in the Street Tree section, 16.142.060.*

4. *Adjustments to Commercial and Industrial development Standards. Adjustments to Commercial or Industrial Development standards of up to 20 feet additional building height are permitted provided;*

   a. *At least 50% of a Significant Tree stand's of canopy within a development site (and not also within the sensitive lands or areas that areas dedicated to the City) is preserved;*
   b. *The project arborist or qualified professional certifies the preservation is such that the connectivity and viability of the remaining significant tree stand is maximized;*
   c. *Applicable buffering and screening requirements are met;*
   d. *Any height adjustments comply with state building codes;*
   e. *Significant tree stands are protected through an instrument or action subject to approval by the City Manager or the City manager's designee that demonstrates it will be permanently preserved and managed as such;*

      (1.) A conservation easement;
      (2.) An open space tract;
      (3.) A deed restriction; or
      (4.) Through dedication and acceptance by the City.

RESPONSE: The Applicant is not pursuing the Tree Preservation Incentive to qualify for the use of lot averaging within the development.

G. Tree Protection During Development

The applicant shall prepare and submit a final Tree and Woodland Plan prior to issuance of any construction permits, illustrating how identified trees and woodlands will be retained, removed or protected as per the Notice of Decision. Such plan shall specify how trees and woodlands will be protected from damage or destruction by construction activities, including protective fencing, selective pruning and root treatments, excavation techniques, temporary drainage systems, and like methods. At a minimum, trees to be protected shall have the area within the drip line of the tree protected from grading, stockpiling, and all other construction related activity unless specifically reviewed and recommended by a certified arborist or other qualified professional. Any work within the dripline of the tree shall be supervised by the project arborist or other qualified professional onsite during construction.

RESPONSE: The applicant has submitted a Preliminary Tree Plan including tree protection recommendations, prepared by Teragan & Associates, Inc, dated September 4, 2019, with this application, meeting the requirements of this section. Final plans will be submitted prior to issuance of any construction permits for the site. This criterion is met.

H. Penalties

Violations of this Section shall be subject to the penalties defined by Section 16.02.040, provided that each designated tree or woodland unlawfully removed or cut shall be deemed a separate offense.

RESPONSE: The applicant recognizes the penalty for the unlawful removal of trees protected by this ordinance.

Chapter 16.144 - WETLAND, HABITAT AND NATURAL AREAS

16.144.010 - Generally

Unless otherwise permitted, residential, commercial, industrial, and institutional uses in the City shall comply with the following wetland, habitat and natural area standards if applicable to the site as identified on the City's Wetland Inventory, the Comprehensive Plan Natural Resource Inventory, the Regionally Significant Fish and Wildlife Habitat Area map adopted by Metro, and by reference into this Code and the Comprehensive Plan. Where the applicability of a standard overlaps, the more stringent regulation shall apply.

RESPONSE: The Applicant's Site Assessment, prepared by ESA and submitted with this application, identifies and describes those significant resources located within the boundaries and within 50 feet of the site, as described below.

16.144.020 - Standards

A. The applicant shall identify and describe the significance and functional value of wetlands on the site and protect those wetlands from adverse effects of the development. A facility complies with this standard if it complies with the criteria of subsections A.1.a and A.1.b, below:

1. The facility will not reduce the area of wetlands on the site, and development will be separated from such wetlands by an area determined by the Clean Water Services Design and Construction Standards R&O 00-7 or its replacement provided Section 16.140.090 does not require more than the requested setback.

a. A natural condition such as topography, soil, vegetation or other feature isolates the area of development from the wetland.

RESPONSE: ESA have identified two primary wetland areas on the site: Wetland A, and Wetlands associated with Cedar Creek.

Wetland A totals 4,208 square feet (0.1 acres) and is an isolated Palustrine forested/Flats wetland (PFO/FLAT. The wetland is located in the north end of the site abutting the Abney Revard #2 subdivision. Wetland A is hydrologically isolated from the other wetlands on site and has no downstream connection to off-site wetlands or waters due to the existing residential development. The wetland determination data plots associated with Wetland A are DP-1 and DP-2. Wetland A was not mapped by any resource mapping in north end as part of the Brookman Addition Concept Plan.

The Cedar Creek Wetlands are Palustrine Forested and Riverine Flow-Through (PFO/RFT), totaling 29,015 square feet, (0.67 acres) and located within the middle of site. The wetlands are located both north and south of the Cedar Creek channel and along the western edge of the small tributary in the southeast end of site.

The two facilities proposed on the site are in the vicinity of the Cedar Creek wetlands. Both facilities are separated from the wetlands by buffer areas, and meet the requirements of CWS 17-05, as demonstrated by the Amended CWS service provider letter 19-001036 issued for the development and included with this application.

b. Impact mitigation measures will be designed, implemented, and monitored to provide effective protection against harm to the wetland from sedimentation, erosion, loss of surface or ground water supply, or physical trespass.

RESPONSE: Mitigation measures to protect water quality meeting the requirements of Clean Water Services are detailed in the Site Assessment, prepared by ESA. These Impact mitigation measures have been designed and will be implemented and monitored to provide effective protection against harm to the wetland from sedimentation, erosion, loss of surface or ground water supply, or physical trespass. Compliance with this standard is evidenced by Amended CWS service provider letter 19-001036 issued for the development, and included with this application. This criterion is met.

c. A lesser setback complies with federal and state permits, or standards that will apply to state and federal permits, if required.

RESPONSE: As required by Condition 3 of CWS service provider letter 19-001036, prior to any work within the sensitive areas onsite the applicant must obtain authorization from the United States Army Corp of Engineers, and the State of Oregon Department of State Lands. The applicant will comply with all such requirements.

2. If existing wetlands are proposed to be eliminated by the facility, the applicant shall demonstrate that the project can, and will develop or enhance an area of wetland on the site or in the same drainage basin that is at least equal to the area and functional value of wetlands eliminated.

RESPONSE: The site plan proposes to remove the isolated small Wetland A (4,208 sf) in the north end of the site with the development of Lots 1 and 2. The plan avoids all impacts to the Cedar Creek wetlands and floodplain in the middle of the site. CWS service provider letter 19-001036 provides approval for the elimination of this isolated wetland, and includes appropriate onsite enhancement and mitigation conditions. Therefore, this criterion is met.

B. The applicant shall provide appropriate plans and text that identify and describe the significance and functional value of natural features on the site (if identified in the Community Development Plan, Part 2) and protect those features from impacts of the development or mitigate adverse effects that will occur. A facility complies with this standard if:

1. The site does not contain an endangered or threatened plant or animal species or a critical habitat for such species identified by Federal or State government (and does not contain significant natural features identified in the Community Development Plan, Part 2, Natural Resources and Recreation Plan).

RESPONSE: The Site Assessment prepared by ESA describes and delineates the significance and functional value of natural features on the site. The Site Assessment did not identify endangered or threatened plant or animal species or a critical habitat for such species on the subject site. Therefore, this criterion does not apply.

2. The facility will comply with applicable requirements of the zone.

RESPONSE: As demonstrated within the compliance narrative and submitted plans and exhibits, the proposed development complies with the applicable requirements of the MDRL Zone. This criterion is met.

3. The applicant will excavate and store topsoil separate from subsurface soil, and shall replace the topsoil over disturbed areas of the site not covered by buildings or pavement or provide other appropriate medium for re-vegetation of those areas, such as yard debris compost.

RESPONSE: Topsoil removed during the initial construction phases will be stored on site in a manner that protects it from erosion while grading operations are underway. The topsoil will be placed in a location where it will not suffocate root systems of trees that may remain. The topsoil will be restored after construction to provide a suitable base for seeding and planting of areas of the site not covered by buildings or pavement. This criterion does not apply.

4. The applicant will retain significant vegetation in areas that will not be covered by buildings or pavement or disturbed by excavation for the facility; will replant areas disturbed by the development and not covered by buildings or pavement with native species vegetation unless other vegetation is needed to buffer the facility; will protect disturbed areas and adjoining habitat from potential erosion until

replanted vegetation is established; and will provide a plan or plans identifying each area and its proposed use.

RESPONSE: As described by ESA, the total area of Sensitive Areas on the site is approximately 76,750 square feet, with an additional Vegetated Corridor (VC) of approximately 129,731 square feet. The VC width for most of the corridor along Cedar Creek is 50 feet in areas with less than 25% slopes. A 25 percent break in slope line was needed for a narrow area on the southeast end of the site that was determined based on CWS methodology (R&O 17-05). This area is within good condition corridor, so the 35-foot off-set from the slope break is used. The slope break was determined using the base topographic map provided by Pioneer Design Group, Inc.

The VC area south of the Cedar Creek channel is primarily in marginal condition with a small portion of good condition. The marginal condition VC has native aerial canopy of Oregon ash cover ranging from 40-60 percent. The understory is more variable where some areas have been completely cleared of shrub cover or it is overgrown with Himalayan blackberry with some native shrub cover.

The VC along the north side of Cedar Creek is in good condition except for a small area that extends over from the east in degraded condition. Aerial canopy cover of Douglas fir (Pseudotsuga menziesii), bitter cherry (Prunus emarginata), and Oregon ash is greater than 80 percent. Understory species include mainly native species such as beaked hazelnut (Corylus cornuta), vine maple (Acer circinatum), osoberry (Oemleria cerasiformis), snowberry (Symphoricarpos albus), Western swordfern (Polystichum munitum) and Pacific waterleaf (Hydrophyllum tenuipes).

As described throughout this written narrative, areas of the site with significant vegetation as described above are planned to be retained in the areas preserved within Tract C of the preliminary plat. The Preliminary Street Tree and Open Space Planting Plan (Sheet L1) shows proposed planting on the site. Appropriate erosion and sediment control methods will be utilized through the development phase. This criterion is met.

5. *Development associated with the facility will be set back from the edge of a significant natural area by an area determined by the Clean Water Services Design and Construction standards R&O 00-7 or its replacement, provided Section 16.140.090A does not require more than the requested setback. Lack of adverse effect can be demonstrated by showing the same sort of evidence as in subsection A.1 above.*

RESPONSE: The proposed subdivision preserves a substantially large area of open space along the Cedar Creek riparian corridor, and unnamed tributary, including flood plain, wetland, vegetated corridor, and additional upland areas. The result is the preservation of a significant natural area through the center of the site, preserved within Tract C. Evidence of the appropriateness of Tract C and associated setbacks from the resource is provided by Amended CWS service provider letter 19-001036 issued for the development, and included with this application. This criterion is met.

C. *When the Regionally Significant Fish and Wildlife Habitat map indicates there are resources on the site or within 50 feet of the site, the applicant shall provide plans that show the location of resources on the property. If resources are determined to be located on the property, the plans shall show the value of environmentally sensitive areas using the methodologies described in Sections 1 and 2 below.*

RESPONSE: The subject site contains inventoried regionally significant fish and wildlife habitat associated with the Cedar Creek drainage and associated flood plain and wetland areas. Plans submitted with the application, including the Conceptual Open Space Plan (Sheet P3.2) identify these areas, and the Site Assessment prepared by ESA has determined the value of environmentally sensitive areas. The accuracy of these determinations is demonstrated by Amended CWS service provider letter 19-001036 issued for the development, and included with this application. This criterion is met.

16.144.030 - Exceptions to Standards

In order to protect environmentally sensitive areas that are not also governed by floodplain, wetland and Clean Water Services vegetated corridor regulations, the City allows flexibility of the specific standards in exchange for the specified amount of protection inventoried environmentally sensitive areas as defined in this code.

A. *Process*

The flexibility of standards is only applicable when reviewed and approved as part of a land use application and shall require no additional fee or permit provided criteria is addressed. In the absence of a land use application, review may be processed as a Type 1 administrative interpretation.

B. *Standards modified*

1. *Lot size — Not withstanding density transfers permitted through Chapter 16.40, when a development contains inventoried regionally significant fish and wildlife habitats as defined in Section 16.144.020 above, lot sizes may be reduced up to ten percent (10%) below the minimum lot size of the zone when an equal amount of inventoried resource above and beyond that already required to be protected is held in a public or private open space tract or otherwise protected from further development.*

RESPONSE: As described above and detailed in the *DW Homes Brookman Road – CWS Site Assessment* prepared by Environmental Science and Assessment and submitted with this application, the subject site contains inventoried regionally significant fish and wildlife habitat associated with the Cedar Creek drainage and associated flood plain and wetland areas. Accordingly, the applicant requests the ability to reduce lot sizes by up to 10 % to reduce the

minimum lot area within the development from 5,000 square feet to 4,500 square feet (actual minimum preliminary measurement is Lot 11 at 4,508 square feet), and to reduce the lot width at the building line from 50 feet to 45 feet (Lot 1).

In total, 36 of the 59 lots are proposed to be reduced in area to between 4,500 square feet and 5,000 square feet. The total area of these lots is a combined 171,191 square feet, against a minimum of 175,000 square feet for 36 standard 5,000 square foot lots. Accordingly, the 8,809 square foot shortfall in lot area is required to be accommodated within open space areas on the site above and beyond that already required to be protected.

As described in the ESA report and site plans, as amended August 15, 2019, a total of 76,749 square feet of Sensitive Area and 129,731 square feet of Vegetated Corridor exists on the site, and is required to be preserved and protected from future development. In addition, when eliminating overlapping areas, a further 1,486 square feet of 100-year flood plain exists, and 18,120 square feet (5% of the net buildable area of the site) of open space is required pursuant to Section 16.142.030 for a total area of 226,086 square feet required to be protected.

As indicated on the Preliminary Plat (Sheet P3), 256,841 square feet of open space area is proposed to be designated for inclusion and protection within Tract C. This equates to 30,755 square feet of open space not otherwise required by Code, which far exceeds the minimum 8,809 square feet required by this Section. This requirement can and will be met, and therefore the applicant meets the requirements for a 10% reduction in minimum lot area and lot width at the building line.

2. *Setbacks — For residential zones, the setback may be reduced up to thirty percent (30%) for all setbacks except the garage setback provided the following criteria are satisfied:*

    a. *The setback reduction must result in an equal or greater amount of significant fish and/or wildlife habitat protection. Protection shall be guaranteed with deed restrictions or public or private tracts.*
    b. *In no case shall the setback reduction supersede building code and/or Tualatin Valley Fire and Rescue separation requirements.*
    c. *In no case shall the setback be reduced to less than five feet unless otherwise provided for by the underlying zone.*

3. *Density — per Section 16.10.020 (Net Buildable Acre definition), properties with environmentally sensitive areas on site may opt to exclude the environmentally sensitive areas from the minimum density requirements provided the sensitive areas are protected via tract or restrictive easement. A proposal to remove said area from the density calculation must include: a delineation of the resource in accordance with Section 16.144.020C, the acreage being protected, and the net reduction below the normally required minimum for accurate reporting to Metro.*

4. *Parking — Per Section 16.94.020.B.6, 10-25% of the required parking spaces may be reduced in order to protect inventoried regionally significant fish and wildlife habitat areas, provided these resources are protected via deed restrictions or held in public or private tracts.*

5. *Landscaping Per Section 16.92.030.B.6, exceptions may be granted to the landscaping standards in certain circumstances as outlined in that section.*

RESPONSE: The applicant is not requesting exceptions to setbacks, density, parking, or landscaping requirements; therefore, these criteria are not applicable.

Chapter 16.156 - ENERGY CONSERVATION

16.156.010 - Purpose

This Chapter and applicable portions of Chapter 5 of the Community Development Plan provide for natural heating and cooling opportunities in new development. The requirements of this Chapter shall not result in development exceeding allowable densities or lot coverage, or the destruction of existing trees.

16.156.020 - Standards

A. *Building Orientation - The maximum number of buildings feasible shall receive sunlight sufficient for using solar energy systems for space, water or industrial process heating or cooling. Buildings and vegetation shall be sited with respect to each other and the topography of the site so that unobstructed sunlight reaches the south wall of the greatest possible number of buildings between the hours of 9:00 AM and 3:00 PM, Pacific Standard Time on December 21st.*

RESPONSE: Within the northern portion of the site (Phase 1), the street alignment is typically east-west in orientation, resulting in a majority of the lots including a front lot line on a generally east-west axis, and a lot depth of over 90 feet, to maximize solar gain on the south building wall. In all, 41 of the 44 lots on the north end of the site achieve sufficient solar access.

At the southern end of the site, the single public street is required to be oriented north-south, reducing the opportunities to maximize solar access. In the southern end of the development, only 1 building has a lot orientation with the front building wall facing southwards, while 3 lots have their south wall side yard unobstructed by surrounding buildings. As such, only 4 of the 14 lots on the south end of the site achieve sufficient solar access.

In total 45 of the 59 lots receive excellent solar access, or approximately 76%, which can be considered to meet the requirement for maximum solar access. Therefore, this criterion is met.

B. Wind - The cooling effects of prevailing summer breezes and shading vegetation shall be accounted for in site design. The extent solar access to adjacent sites is not impaired vegetation shall be used to moderate prevailing winter wind on the site.

RESPONSE: The site design of the proposed development subdivision, including significant open space surrounding the lots as well as compliance with building setbacks, will allow for adequate air circulation and cooling. There is sufficient room for the addition of landscaping to regulate prevailing winter winds from the south and east. The criterion is met.

16.156.030 - Variance to Permit Solar Access

Variances from zoning district standards relating to height, setback and yard requirements approved as per Chapter 16.84 may be granted by the Commission where necessary for the proper functioning of solar energy systems, or to otherwise preserve solar access on a site or to an adjacent site.

RESPONSE: The application does not include a variance from applicable standards. This criterion does not apply.

IV. Conclusion

The required findings have been made, and this written narrative and submitted materials demonstrate the application is consistent with the applicable provisions of the City of Sherwood Municipal Code. Accordingly, the applicant respectfully requests approval of the 59-lot subdivision, "The Reserve at Cedar Creek, as submitted.

City of Sherwood Oregon

Home of the Tualatin River National Wildlife Refuge

Pre-Application Conference Notes

PAC 18-08

Meeting Date: July 21, 2018

Planning Staff Contact: Joy L. Chang
503-625-4214 or changj@sherwoodoregon.gov

Medium Density Residential Low (MDRL) Subdivision

PLEASE NOTE: The conference and notes cannot cover all Code requirements and aspects related to site planning that should apply to the development of your proposal. Failure of the staff to provide information required by the Code shall not constitute a waiver of the applicable standards or requirements. It is recommended that a prospective applicant either obtain and read the Community Development Code or ask any questions of City staff relative to Code requirements prior to submitting an application.

Proposed project name: Weekley Homes Brookman SUB

PROPOSAL DESCRIPTION: The applicant proposes to develop a 9.90 acre parcel into a 45-lot Subdivision in the MDRL zone. The parcel has a creek that bisects the parcel into two - the northern alf is proposed to be developed with 38 lots (access from future subdivision road extensions) and the southern half into 7 lots (access from a ¾ street connecting to SW Brookman Road).

APPLICANT: David Weekly Homes (Aziz Siddiqui)
1930 Thoreau Dr., Suite 160, Schaumburg IL 60173

OWNERS: Gerald J and Liz A Ouellette
PO Box 1468, Sherwood OR 97140

Applicant's Representative: Matt Sprague, Pioneer Design Group
9020 SW Washington Sq. Rd, 170, Portland OR 97223
503-643-8286

PROPERTY LOCATIONS: 17045 SW Brookman Road

Tax Lots: 3S1060000100

IDENTIFIED POTENTIAL CONSTRAINTS/ISSUES: Concerns relating to roadway connections, access points, utility services, and natural resources.

Based on the information provided, NECESSARY APPLICATIONS:
Type III – Subdivision, between 11-50 lots
Type I – Final Plat

STAFF COMMENTS

The following comments are based on staff's review of the information provided on the Pre-Application Form and accompanying attachments.

1) Reviewing the preliminary site plan, legal access to Lots 1-38 is dependent on redevelopment of abutting parcels. A Subdivision proposal that has no legal access cannot be approved, even with phased development.

2) The narrative states that sanitary sewer and water will be extended from off-site areas to the north and east with adjacent landowners permissions. However, the preliminary site plan do not reflect these services. The applicant must demonstrate how services can be obtained.

3) The approval criteria for Subdivisions are delineated in Section 16.120 of the ZCDC. (Note: approval of a subdivision is a two-step process – Preliminary Plat and Final Plat.)

16.120.040 - Approval Criteria: Preliminary Plat

No preliminary plat shall be approved unless:

A. Streets and roads conform to plats approved for adjoining properties as to widths, alignments, grades, and other standards, unless the City determines that the public interest is served by modifying streets or road patterns.

B. Streets and roads held for private use are clearly indicated on the plat and all reservations or restrictions relating to such private roads and streets are set forth thereon.

C. The plat complies with applicable zoning district standards and design standards in Division II, and all provisions of Divisions IV, VI, VIII and IX. The subdivision complies with Chapter 16.128 (Land Division Design Standards).

D. Adequate water, sanitary sewer, and other public facilities exist to support the use of land proposed in the plat.

E. Development of additional, contiguous property under the same ownership can be accomplished in accordance with this Code.

F. Adjoining land can either be developed independently or is provided access that will allow development in accordance with this Code.

G. Tree and woodland inventories have been submitted and approved as per Section 16.142.060.

H. The plat clearly shows the proposed lot numbers, setbacks, dedications and easements.

I. A minimum of five percent (5%) open space has been provided per Section 16.44.010.B.8 (Townhome-Standards) or Section 16.142.030 (Parks, Open Spaces and Trees-Single-Family Residential Subdivisions), if applicable.

4) Visual Corridor (Section 16.142.040)

The subject property is located adjacent to SW Brookman Road which is classified as an Arterial Street on the City's Street Functional Classification Map. A landscaped visual corridor is required along all collectors and arterials (as designated by the Transportation System Plan [TSP]) as well as Highway 99W. The required width of the corridor for collectors is ten (10) feet, arterials is fifteen (15) feet and Highway 99W is twenty-five (25) feet. **Any new formal development permits will require the developer to provide a landscaped visual corridor.** In residential developments where fences are typically desired adjoining the above described major street the corridor may be placed in the road right-of-way between the property line and the sidewalk. In all other developments, the visual corridor shall be on private property adjacent to the right-of-way. The site impacts the following visual corridor roadways:

SW Brookman Road is designated as an arterial on the TSP and a 15-foot landscaped visual corridor will be required. Please see COS Engineering Department Notes and Washington County Comments for any additional right-of-way needs to be dedicated for SW Brookman Road.

5) Any public improvements to SW Brookman Road or offsite improvements to ODOT Highway 99W, if required, are outlined in COS Engineering Department Notes and Washington County Comments.

6) The property is subject to the zoning identified in the Brookman Addition Concept Plan - Medium Density Residential Low (MDRL).

ZONING DISTRICT DIMENSIONAL REQUIREMENTS (Refer to Code § 16. 12)

MINIMUM LOT SIZE	**MDRL**
Single Family Detached	5,000 sq. ft.
Single Family Attached	5,000 sq. ft.
Two or Multi-Family for the first 2 units	10,000 sq. ft.
Multi-Family: each additional unit after first 2	X
LOT WIDTH AT FRONT PROPERTY LINE	25 ft.
LOT WIDTH AT BUILDING LINE	**MDRL**
Single Family	50 ft.
Two Family	60 ft.
Multi-Family	X
LOT DEPTH	80 ft.

MAXIMUM HEIGHT	30 ft. or 2 stories
SETBACKS	**MDRL**
Front yard / Face of garage	14 ft. / 20 ft.
Side – Detached / Attached	5 ft. / 10 ft.
Rear	20 ft.
Corner	15 ft.

DENSITY REQUIREMENTS

Per Section 16.12.010.C, the MDRL zoning district provides for single-family and two-family housing, manufactured housing and other related uses with a density of 5.6 to 8 dwelling units per acre.

Section 16.12.010.D states that the MDRH zoning district provides for a variety of medium density housing, including single-family, two-family housing, manufactured housing multi-family housing, and other related uses with a density of 5.5 to 11 dwelling units per acre.

Net Buildable Acre means an area measuring 43,560 square feet after excluding present and future rights-of-way, environmentally constrained areas, public parks and other public uses. When environmentally sensitive areas also exist on a property and said property is within the Metro urban growth boundary on or before January 1, 2002, these areas may also be removed from the net buildable area provided the sensitive areas are clearly delineated in accordance with this Code and the environmentally sensitive areas are protected via tract or restricted easement.

PROVISIONS under 16.144.030

Majority of the proposed tax lots are utilizing the provisions under 16.144.030 which allows the 10% design reduction of lot size of the zone when an **equal amount** of inventoried resource **above and beyond** that already required to be protected. The required application narrative will need analysis on how this standard is met. A possible provision to consider that allows for lot size flexibility is Chapter 16.40 Planned Unit Development.

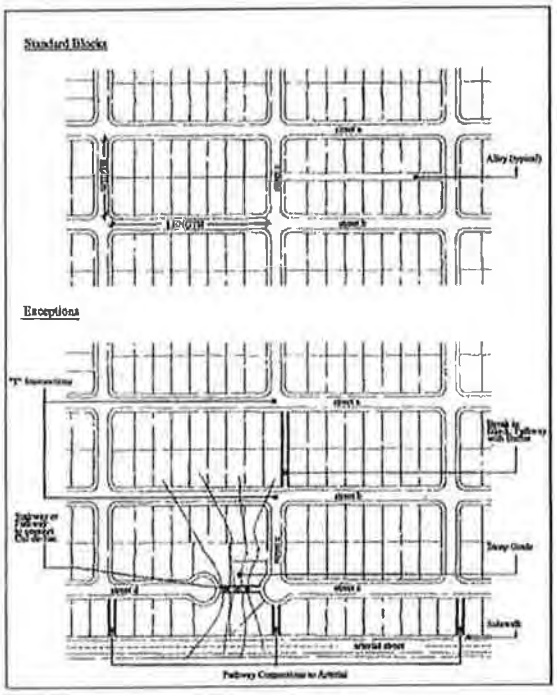
7) **Landscaping**, particularly visual corridors, will be required in accordance with **Chapter 16.92**.

8) The development will need to comply with **Chapter 16.142, Parks, Trees, and Open Space**. New developments are required to achieve minimum canopy requirements, and may be required to inventory any existing trees.

*Single-Family Residential developments are required to achieve **40% tree canopy** (Section 16.142.070). Strongly recommend required trees be in common tracts and any trees on private lots will need to be protected in CC&Rs (this includes maintenance and if needed replacement).*

Single-Family subdivisions are required to have a minimum of five percent (5%) of the net buildable site to be maintained as "open space" (Section 16.142.030). Open space must include ***usable areas*** *such as public parks, swimming and waddling pools, grass areas for picnics and recreational play, walking paths, and other like space.*

9) **Pedestrian and Bicycle Connectivity** (Section 16.128.010.3) Paved bike and pedestrian accessways shall be provided on public easements or right-of-way consistent with Figure 7.401.



10) Please refer to the COS Engineering Department Notes dated June 21, 2018 for information regarding the availability of water, sanitary sewer, stormwater, transportation, and other public facilities (**Division VI. Public Infrastructure**). Their review of the proposed development identified the following items:

- The plans must show how water and sanitary sewer can serve the lots.
- Maximum length for a cul-de-sac is 300 feet.
- Private Streets, per Section 16.118.050, shall be prohibited unless it provides principal access to two or fewer residential lots or parcels.
- SW Brookman Road 5-lane arterial right-of-way dedication.

11) Washington County Land Use and Transportation, Naomi Vogel (Associate Planner) provided the following comments:

- Required ROW dedication is 49 feet from centerline.
- Frontage improvements – street lighting for access, sidewalk & planter strip to city standards, lane needs per TIA (turn lane at a minimum) and bike lane. Fee in-lieu of the remainder (stormwater/continuous street lighting/additional lanes).
- Access to County standards – design exception for access, will need to address overall circulation for the planning area and sight distance certification.
-

12) **Tualatin Valley Fire & Rescue** provided comments dated June 22, 2018 (attached) and identified the following items:
   - One point of emergency access can serve a maximum of 30 homes. Always an option is to sprinkler the homes.
   - Fire truck turnaround for the southern segment is inadequate.
   - Fire flow test or modeling is required.
   - Fire Hydrants are not shown on the plans.

13) The development must comply with **Chapter 16.132, Environmental Resources**. The applicant will need to contact Clean Water Services (CWS) and obtain a Service Provider Letter.

14) The development must comply with **Chapter 16.144, Wetlands, Habitat, and Natural Areas**. Our mapping system identified several natural resources on site. The applicant must comply with Chapter 16.144 along with Clean Water Services requirements.

    The Code allows flexibility in development standards in exchange for the protection of sensitive lands as outlined in this Chapter. For example, qualifying developments may be allowed to reduce lot sizes up to 10% and reduce setbacks up to 30% (see Section 16.144.030). These provisions can be utilized when an **equal amount** of inventoried resource **above and beyond** that already required to be protected is held in a public or private open space tract or otherwise protected from further development.

15) The applicant should consider developing the site through a **Planned Unit Development (PUD)** - the PUD process allows creativity and flexibility in site design and review which cannot be achieved through a strict adherence to existing zoning and subdivision standards.

   - PUD provisions are delineated in Section 16.40 of the Zoning and Community Development Code (ZCDC).

   - Key steps to the PUD process
     16.40.020 – PUD Preliminary Development Plan *– among other things, the preliminary development plans include dedication of at least* ***15 percent of the buildable portion of the site*** *to the public in the form of usable open space, park or other public space, (subject to the review of the Parks & Recreation Board) or to a private entity managed by a homeowners association. Alternatively, if the project is located within close proximity to existing public spaces such as parks, libraries or plazas the development plan may propose no less than 5% on-site public space with a detailed explanation of how the proposed development and existing public spaces will together equally or better meet community needs.*

     16.120.030 Preliminary Subdivision Plat – concurrent review with PUD Preliminary Development Plan

     16.40.030.A – PUD Final Development Plan -
     Upon approval of the PUD overlay zoning district and preliminary development plan by the Council, the applicant shall prepare a detailed Final Development Plan as per this Chapter, for review and approval of the Commission. The Final Development Plan shall comply with all conditions of approval as per Section 16.40.020. In addition, the applicant shall prepare and submit a detailed site plan for any non-single-family structure or use not addressed under Section

16.40.020(B)(6), for review and approval, pursuant to the provisions of Chapter 16.90. The site plan shall be processed concurrently with the Final Development Plan.

***16.40.030 B. Final Subdivision Plat** - If the PUD involves the subdivision of land, a final plat must be prepared and submitted for final approval, pursuant to Chapter 16.120.*

- **Residential PUD Section 16.40.050**

A. Permitted Uses

The following uses are permitted outright in Residential PUD when approved as part of a Final Development Plan:

1. Varied housing types, including but not limited to single-family attached dwellings, zero-lot line housing, row houses, duplexes, cluster units, and multi-family dwellings.

...

C. Development Standards

1. Density

The number of dwelling units permitted in a Residential PUD is the same as that allowed in the underlying zoning district, except as provided in Sections 16.40.040.D and 16.40.050.C.2.

2. Density Transfer

Where the proposed PUD site includes lands within the base floodplain, wetlands and buffers, or steeply sloped areas which are proposed for public dedication, and such dedication is approved as a part of the preliminary development plan, then a density transfer may be allowed adding a maximum of 20% to the overall density of the land to be developed.

3. Minimum Lot Size

The minimum lot size required for single-family, detached dwellings is 5,000 square feet, unless the subject property is either:

a. Located within the High Density Residential zone (HDR). In that case, there is no minimum lot size provided the applicant demonstrates that the proposal meets the purpose and intent of the Zoning and Development Code and the Sherwood Comprehensive Plan until February 4, 2015.

b. Or qualifies as infill, defined as: parent parcel of 1.5 acres or less proposed for land division, where a maximum 15% reduction in lot size may be allowed from the minimum lot size.

APPLICABLE CODE CRITERIA

(These sections ***must*** be addressed in the narrative submitted with the land use application)

X	Division II (Zoning Districts) 16.12	X	16.92 (Landscaping)	__	16.122 (Land Partitions)
?	16.40 (Planned Unit Development)	X	16.94 (Off-Street Parking and Loading)		16.124 (Property Line Adjustments)
__	16.44 (Townhomes)	X	16.96 (On-Site Circulation)	X	16.134. (Flood Plain Overlay)
__	16.46 (Manufactured Homes)	__	16.98 (On-Site Storage)	X	16.142 (Parks, trees, and Open Space)
__	16.48 (Non-Conforming Uses)	__	16.102 (Signs)	__	16.146 (Noise)

__	16.50 (Accessory Uses)	X	16.106 (Transportation Facilities)	__	16.148 (Vibrations)
		X	16.106.030(D) (Additional Setbacks)		
		X	16.108.040.D (Clear Vision Areas)	__	16.150 (Air Quality)
__	16.80 (Plan Amendments)	X	16.110 (Sanitary Sewers)	__	16.152 (Odors)
__	16.82 (Conditional Uses)	X	16.112 (Water Supply)	__	16.154 (Heat and Glare)
		X	16.114 (Storm Water)	__	16.162 (Old Town Overlay District)
__	16.86 (Variances)	X	16.116 (Fire Protection)	__	16.166 (Landmark Designation)
__	16.88 (Interpretation of Similar Uses)	__	16.118 (Private Improvements)	__	16.168 (Landmark Alteration)
__	16.90 (Site Planning)	X	16.120 (Subdivisions)		

FEES
Fees as of July 1, 2018.
CONFIRM FEES WITH STAFF PRIOR TO SUBMITTAL. WE WILL HELP YOU TO CALCULATE THE FEES.

- Subdivision $6,448.44 plus $20.73 per lot plus
  - Publication/distribution of Notice $466

- Final plat processing (Subdivision) $1,142.40

OR

- Plan Unit Development (PUD) Preliminary $2,284.80 plus
- Subdivision $6,448.44 plus $20.73 per lot plus
  - Publication/distribution of Notice $466

- Plan Unit Development (PUD) Final $6,448.44 plus
  - Publication/distribution of Notice $466

- Final plat processing (Subdivision) $1,142.40

PROCEDURES

- Subdivisions – 11 to 50 lots – Type III, Hearing Officer Decision. The City Planning Commission will hear any appeals.

- Final Subdivision Plat Review – Type I

OR

- Plan Unit Development – Preliminary Development Plan and Overlay District - Type V
  Public hearing before the Planning Commission with the Commission making a recommendation on the proposal to the City Council. An additional public hearing shall be held by the City Council. Any appeals shall be heard by the Land Use Board of Appeals (LUBA).

- Subdivisions – 11 to 50 lots – Type III, concurrent with PUD above

- PUD Final Development Plan, ZCDC 16.40.030– Type IV

- Final Subdivision Plat Review – Type I

APPLICATION SUBMITTAL PROCESS

The following materials must be submitted with your application or it will not be accepted at the counter. Once taken at the counter, the City has up to 30 days to review the materials submitted to determine if we have everything we need to complete the review.

☒ **3 * copies of Application Form** completely filled out and signed by the property owner (or person with authority to make decisions on the property.

☒ **Copy of Deed** to verify ownership, easements, etc.

☒ **CWS Service Provider Letter**.

☒ **At least 3 * folded** sets of plans

☒ **At least 3 * sets** of narrative addressing application criteria. The narrative provides findings based on the applicable approval standards. Failure to provide a narrative or adequately address criteria would be reason to consider an application incomplete and delay review of the proposal. The applicant should review the code for applicable criteria. This housing type is an entirely new concept for Sherwood, and standards would need to be addressed through the code amendment.

☒ **Fee** (along with calculations utilized to determine fee if applicable)

☒ **Signed checklist** verifying submittal includes specific materials necessary for the application process

☒ **Neighborhood Meeting Verification** including affidavit, sign-in sheet and meeting summary (required for Type III, IV and V projects

☒ **PDF Electronic version of all submittal items broken down by item on a disc. Not a single PDF**

* **Note** that the required number of copies must be submitted when the application is deemed complete; however, upon initial submittal applicants are encouraged to submit only 3 copies for completeness review. Prior to completeness, required number of copies and one updated full electronic copy will be required to be submitted.

The Planning Department will perform a preliminary review of the application and will determine whether an application is complete within 30 days of the counter submittal. Staff will notify the applicant if additional information or additional copies of the submitted materials are required.

The administrative decision or public hearing will typically occur approximately 45 to 60 days after an application is deemed complete by the Planning Department. Applications involving difficult or protracted issues or requiring review by other jurisdictions may take additional time to review. Written recommendations from the Planning staff are issued seven (7) days prior to the public hearing. A 14-day public appeal period follows all land use decisions.

Planning Staff Contact: Joy L Chang, (503)625-4214 changj@sherwoodoregon.gov

RESPONSES TO QUESTIONS FROM THE APPLICANT

1. **Does the City's standards for removal and wetland mitigation apply in a case as described above and if so, please clarify the City's requirements.**

   See COS Engineering Department Comments.

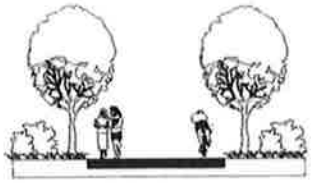
2. **For Water and Sanitary extension, will there be credits for oversizing where necessary?**

   See COS Engineering Department Comments.

3. **Please clarify the trail width and improvement standards for the required trail on each side of Cedar Creek**

   Trails within the community will need to meet "Feeder Trail" standards as depicted in Figure 16 F of the Sherwood Transportation System Plan.

   Feeder Trail

   6' 8-I 0' 6'

   R/W = 20'-22'

   Additionally, a multi-use path along Brookman Road is required and will need to meet multi-use path City Engineering Standards. See COS Engineering Department Notes. ***The city will allow the ability to stack visual corridor landscape requirements with the feeder trail landscaping requirements.***

4. **Is the City aware of any downstream restrictions or other factors that would require detention within the stormwater facility?**

   See COS Engineering Department Comments.

CITY OF SHERWOOD

PRE-APPLICATION CONFERENCE SIGN-IN SHEET

Project:	PAC 18-08 Weekly Homes Brookman SUB	**Meeting Date:**	June 21, 2018
Facilitator:	Joy Chang, Associate Planner	**Place/Room:**	City of Sherwood, Conf. Rm. A

Name	Agency or Representation	Email Address
Joy Chang	City of Sherwood, Planning	changj@sherwoodoregon.gov
Luke Lappin	PIONEER DESIGN GROUP	llappin@pd-grp.com
MIKE IRWIN	DAVID WEEKLEY HOMES	mirwin@DWHOMES.com
TOM MOONEY	TUFR	thomas.mooney@tufr.com
Scott McKie	City Sherwood	mckies@sherwoodoregon.gov
BOB GALATI	CITY OF SHERWOOD	GALATIB@SHERWOODOREGON.GOV
ERIKA PALMER	City of Sherwood	erikapalmer@sherwoodoregon.gov
Julie Sosnovske	Washington Co.	julie_sosnovske@co.washington.or.us
Naomi Vogel	Washington Co.	naomi_vogel@co.washington.or.us

Engineering Pre-Application Comments

To: Joy Chang, Associate Planner

From: Bob Galati P.E., City Engineer

Project: Weekly Homes Brookman Subdivision

Date: June 21, 2018

Engineering staff has reviewed the information provided for the proposed project. Final construction plans will need to meet the standards established by the City of Sherwood Engineering Department and Public Works Department, Washington County, Clean Water Services (CWS) and Tualatin Valley Fire & Rescue in addition to requirements established by other jurisdictional agencies providing land use comments. City of Sherwood Engineering Department comments are as follows:

General

The plans indicate two separate development areas. Area 1 is adjacent to the southern boundary line of the Abney Revard No.2 Subdivision. Area 2 is adjacent to Brookman Road.

A wetland/stream corridor and vegetated corridor separate the two development areas.

Transportation

Area 1 appears to be served by public streets which conform to City standards for a local street, which is identified with a 52-foot right-of-way. The pre-application letter indicates that the streets will connect to adjacent public streets built by adjacent development(s) in separate development actions.

The plans do not provide information on access to the proposed lots if the adjacent lots have not developed and provided public access to existing transportation facilities. This information is needed to provide a review response.

Area 2 takes access off Brookman Road in the form of a ¾ width street with partial cul-de-sac. The depth of the street scales out to be approximately 300-feet. The ¾-width street is acceptable per City standards for a minimum public local street requirement. The partial cul-de-sac does not appear to be adequate for a fire truck to make a turn. Layout of a hammer head may be more acceptable at this time.

Brookman Road right-of-way width is a big question. The scaled width of the right-of-way is approximately 56-feet. WACO survey records indicate that Brookman Road has an existing 40-foot ROW. The development is thus proposing a 16-foot ROW dedication along the north side of Brookman Road. WACO TSP show Brookman Road

being a 5-lane arterial, with a required 98-foot ROW width (A-2 designation). The proposed layout fits within WACO standards for the arterial road section.

It can be expected that a minimum ¾ street improvement will be required for the frontage portion of Brookman Road.

TDT credits for the land dedication for ROW and for improvements that exceed the local street standards may be eligible.

Transportation mitigation requirements on Brookman Road may be required due to development. The mitigation requirements will need to be determined via a TIA assessment as determined by WACO and City.

The plans lack sufficient information to provide refined review comments.

Sanitary Sewer

The nearest sanitary sewer system to either site is the sanitary sewer trunk line ending at the southern City limits boundary within the wetlands area.

For Area 1, access to the sanitary trunk line would be through adjacent properties, and connection would be dependent on the adjacent development occurring prior to the proposed development.

For Area 2, access to the sanitary trunk line would be directly to the future extension of the Brookman Sanitary Trunk Mainline project. The timing of this project is between 3 and 5 years in the future. Development would be limited until this trunk line is built.

The proposed development could extend the trunk line through the wetland and adjacent properties through private agreements. Construction by the developer would be eligible for sanitary SDC credits for the oversizing portion of the sanitary trunk line extension.

Plans are in process to construct the Brookman Sanitary Trunk Line for the existing stub to a point north and west of the Kruger-Elwert Road intersection. The timeline for this public extension of the sanitary trunk line is approximately 5-years away (2022-2023).

The plans lack sufficient information to provide refined review comments.

Water

Access to public water for either area is not available except through extension of the public main per the City's water master plan (MP projects M11 through M20).

Immediate service to the proposed developments areas is not possible unless adjacent and beyond property developments occur.

The plans lack sufficient information to provide refined review comments.

Storm Sewer

It is anticipated that any development within the Brookman Area will provide stormwater quality treatment facilities with sufficient capacity to meet CWS design requirements.

Due to proximity and potential impacts to adjacent wetlands, wetlands corridor and vegetated corridor, it is anticipated that a wetland delineation report filed with, and approved by DSL will be required.

Stormwater is anticipated to discharge to the adjacent stream corridor for both areas. Appropriate CWS, DSL, USACE, and NMFS permits may be required.

A stormwater report will be required to be provided as part of the application packet. The stormwater report will need to meet CWS stormwater facilities design standards.

Detention will not be required if a downstream analysis meeting CWS standards, shows no downstream impacts to the existing system/wetland corridor. It is anticipated that the stormwater system design will need to meet hydromodification requirements established by CWS.

Other Engineering Items

An As-Built Request Form is available on the City of Sherwood website for the obtaining of as-builts.

City of Sherwood standards require an 8-foot PUE along all right-of-way lines.

Properties between 1 acre and 5 acres require a NPDES 1200-CN permit.

A Service Provider Letter and Storm Connection Permit Authorization from Clean Water Services is required.

Permits for any building removal will need to be obtained from the City of Sherwood Building Department.

Sherwood Broadband utilities shall be installed along the subject property's frontage on interior streets and Brookman Road as per requirements set forth in City Ordinance 2005-017 and City Resolution 2005-074.

Applicant Questions:

1. Does the City's standards for removal and wetland mitigation apply in a case as described above and if so, please clarify the City's requirements.
    a. Wetland removal and mitigation requirements will be dictated by CWS and DSL requirements. If a stream corridor is impacted, additional mitigation requirements may be required by USACE and NMFS.
2. For water and sanitary extensions, will there be credits for oversizing where necessary?
    a. Oversizing credits may be eligible on the installation of a sanitary sewer trunk line which provides service to areas outside the proposed development area.
3. Please clarify the trail width and improvement standards for the required trail on each side of Cedar Creek.
    a. (n/a)
4. Is the City aware of any downstream restrictions or other factors that would require detention within the stormwater facility?

a. The applicant will need to provide a stormwater report which includes a downstream analysis of the receiving stream corridor. This stormwater report will need to meet CWS reporting standards and may include hydromodification analysis.

b. It is estimated that additional stormwater run-off intensity may impact downstream wetland flood levels. This will need to be analyzed as part of land-use approval and the design review process.

END OF COMMENTS

DISCLAIMER: The comments provided above are initial in nature and are in no way binding as to what conditions may or may not be imposed upon the development in the Notice of Decision.

Community Development Division
22560 SW Pine St.
Sherwood, OR 97140
Planning: 503-925-2308
Engineering: 503-925-2309
Building: 503-625-4226

INTERDEPARTMENTAL TRANSMITTAL

Date:	June 8, 2018
To:	Rich Sattler
From:	Joy Chang, Associate Planner
Project Name:	Weekly Homes Brookman Subdivision
LU Case No.:	PAC 18-08
COS Job No.:	192213
Project Status:	Review
Application Date:	June 7, 2018
Subject:	Review for Comments
Due Date:	June 21, 2018 by 3:00pm

Items Enclosed:

Quantity	*Date*	*Name and/or Description*
1		Application materials and plans

Comments:

- Credits will be provided for oversizing of water system
- site appears to be dependent on prior phasing for infrastructure
- water model fee applies to development - see fee schedule

Tualatin Valley Fire & Rescue

www.tvfr.com

June 22, 2018

Joy Chang
Associate Planner
City of Sherwood
22560 SW Pine Street
Sherwood, Oregon 97140

Re: Weekly Homes Brookman Subdivision
Tax Lot I.D: 3S1060000100

Dear Joy,

Thank you for the opportunity to review the proposed site plan surrounding the above named development project. These notes are provided in regards to the pre-application meeting held on June 21, 2018. There may be more or less requirements needed based upon the final project design, however, Tualatin Valley Fire & Rescue will endorse this proposal predicated on the following criteria and conditions of approval.

FIRE APPARATUS ACCESS:

1. FIRE APPARATUS ACCESS ROAD DISTANCE FROM BUILDINGS AND FACILITIES: Access roads shall be within 150 feet of all portions of the exterior wall of the first story of the building as measured by an approved route around the exterior of the building or facility. An approved turnaround is required if the remaining distance to an approved intersecting roadway, as measured along the fire apparatus access road, is greater than 150 feet. (OFC 503.1.1)

   There is no proposed access road in to the proposed development.

2. DEAD END ROADS AND TURNAROUNDS: Dead end fire apparatus access roads in excess of 150 feet in length shall be provided with an approved turnaround. Diagrams can be found in the corresponding guide. http://www.tvfr.com/DocumentCenter/View/1438 (OFC 503.2.5 & D103.1)

3. ADDITIONAL ACCESS ROADS – ONE- OR TWO-FAMILY RESIDENTIAL DEVELOPMENTS: Developments of one- or two-family dwellings, where the number of dwelling units exceeds 30, shall be provided with separate and approved fire apparatus access roads and shall meet the requirements of Section D104.3. Exception: Where there are more than 30 dwelling units on a single public or private fire apparatus access road and all dwelling units are equipped throughout with an approved automatic sprinkler system in accordance with section 903.3.1.1, 903.3.1.2, or 903.3.1.3 of the International Fire Code, access from two directions shall not be required. (OFC D107)

   An additional access road is required and is not indicated on plans. If proposing one access road then Uniform Alternate Construction Standards (UACS) would apply possibly requiring the sprinklering of all proposed homes.

4. **MULTIPLE ACCESS ROADS SEPARATION:** Where two access roads are required, they shall be placed a distance apart equal to not less than one half of the length of the maximum overall diagonal dimension of the area to be served (as identified by the Fire Marshal), measured in a straight line between accesses. (OFC D104.3)

5. **FIRE APPARATUS ACCESS ROAD WIDTH AND VERTICAL CLEARANCE:** Fire apparatus access roads shall have an unobstructed driving surface width of not less than 20 feet (26 feet adjacent to fire hydrants (OFC D103.1)) and an unobstructed vertical clearance of not less than 13 feet 6 inches. (OFC 503.2.1)

6. **NO PARKING SIGNS:** Where fire apparatus roadways are not of sufficient width to accommodate parked vehicles and 20 feet of unobstructed driving surface, "No Parking" signs shall be installed on one or both sides of the roadway and in turnarounds as needed. Signs shall read "NO PARKING - FIRE LANE" and shall be installed with a clear space above grade level of 7 feet. Signs shall be 12 inches wide by 18 inches high and shall have red letters on a white reflective background. (OFC D103.6)

7. **NO PARKING:** Parking on emergency access roads shall be as follows (OFC D103.6.1-2):
   1. 20-26 feet road width – no parking on either side of roadway
   2. 26-32 feet road width – parking is allowed on one side
   3. Greater than 32 feet road width – parking is not restricted

8. **PAINTED CURBS:** Where required, fire apparatus access roadway curbs shall be painted red (or as approved) and marked "NO PARKING FIRE LANE" at 25 foot intervals. Lettering shall have a stroke of not less than one inch wide by six inches high. Lettering shall be white on red background (or as approved). (OFC 503.3)

9. **FIRE APPARATUS ACCESS ROADS WITH FIRE HYDRANTS:** Where a fire hydrant is located on a fire apparatus access road, the minimum road width shall be 26 feet and shall extend 20 feet before and after the point of the hydrant. (OFC D103.1)

10. **SURFACE AND LOAD CAPACITIES:** Fire apparatus access roads shall be designed and maintained to support the imposed loads of fire apparatus and shall be surfaced as to provide all-weather driving capabilities. (OFC 503.2.3)

11. **BRIDGES:** Private bridges shall be designed and constructed in accordance with the State of Oregon Department of Transportation and American Association of State Highway and Transportation Officials Standards *Standard Specification for Highway Bridges*. A building permit shall be obtained for the construction of the bridge if required by the building official of the jurisdiction where the bridge is to be built. The design engineer shall prepare a special inspection and structural observation program for approval by the building official. The design engineer shall give, in writing; final approval of the bridge to the fire district after construction is completed. Maintenance of the bridge shall be the responsibility of the party or parties that use the bridge for access to their property. The fire district may at any time, for due cause, ask that a registered engineer inspect the bridge for structural stability and soundness at the expense of the property owner(s) the bridge serves. Vehicle load limits shall be posted at both entrances to bridges when required by the Fire Marshal. Where elevated surfaces designed for emergency vehicle use are adjacent to surfaces which are not designed for such use, approved barriers, approved signs or both shall be installed and maintained when required by the Fire Marshal. Where elevated surfaces designed for emergency vehicle use are adjacent to surfaces which are not designed for such use, approved barriers, approved signs or both shall be installed and maintained when required by the Fire Marshal. (OFC 503.2.6)

12. **TURNING RADIUS:** The inside turning radius and outside turning radius shall not be less than 28 feet and 48 feet respectively, measured from the same center point. (OFC 503.2.4 & D103.3)

13. **ACCESS ROAD GRADE:** Fire apparatus access roadway grades shall not exceed 15%.

14. **ANGLE OF APPROACH/GRADE FOR TURNAROUNDS:** Turnarounds shall be as flat as possible and have a maximum of 5% grade with the exception of crowning for water run-off. (OFC 503.2.7 & D103.2)

15. **ANGLE OF APPROACH/GRADE FOR INTERSECTIONS:** Intersections shall be level (maximum 5%) with the exception of crowning for water run-off. (OFC 503.2.7 & D103.2)

16. **AERIAL APPARATUS OPERATING GRADES:** Portions of aerial apparatus roads that will be used for aerial operations shall be as flat as possible. Front to rear and side to side maximum slope shall not exceed 10%.

17. **GATES:** Gates securing fire apparatus roads shall comply with all of the following (OFC D103.5, and 503.6):
    1. Minimum unobstructed width shall be not less than 20 feet (or the required roadway surface width).
    2. Gates serving three or less single-family dwellings shall be a minimum of 12 feet in width.
    3. Gates shall be set back at minimum of 30 feet from the intersecting roadway or as approved.
    4. Electric gates shall be equipped with a means for operation by fire department personnel
    5. Electric automatic gates shall comply with ASTM F 2200 and UL 325.

18. **ACCESS DURING CONSTRUCTION:** Approved fire apparatus access roadways shall be installed and operational prior to any combustible construction or storage of combustible materials on the site. Temporary address signage shall also be provided during construction. (OFC 3309 and 3310.1)

19. **TRAFFIC CALMING DEVICES:** Shall be prohibited on fire access routes unless approved by the Fire Marshal. (OFC 503.4.1). Traffic calming measures linked here: http://www.tvfr.com/DocumentCenter/View/1578

FIREFIGHTING WATER SUPPLIES:

20. **FIREFIGHTING WATER SUPPLY FOR INDIVIDUAL ONE- AND TWO-FAMILY DWELLINGS:** The minimum available fire flow for one and two-family dwellings served by a municipal water supply shall be 1,000 gallons per minute. If the structure(s) is (are) 3,600 square feet or larger, the required fire flow shall be determined according to OFC Appendix B. (OFC B105.2)

21. **FIRE FLOW WATER AVAILABILITY:** Applicants shall provide documentation of a fire hydrant flow test or flow test modeling of water availability from the local water purveyor if the project includes a new structure or increase in the floor area of an existing structure. Tests shall be conducted from a fire hydrant within 400 feet for commercial projects, or 600 feet for residential development. Flow tests will be accepted if they were performed within 5 years as long as no adverse modifications have been made to the supply system. Water availability information may not be required to be submitted for every project. (OFC Appendix B)

    A flow test or modeling is required.

22. **WATER SUPPLY DURING CONSTRUCTION IN MUNICIPAL AREAS:** In areas with fixed and reliable water supply, approved firefighting water supplies shall be installed and operational prior to any combustible construction or storage of combustible materials on the site. (OFC 3312.1)

FIRE HYDRANTS:

23. **FIRE HYDRANTS – ONE- AND TWO-FAMILY DWELLINGS & ACCESSORY STRUCTURES:** Where the most remote portion of a structure is more than 600 feet from a hydrant on a fire apparatus access road, as measured in an approved route around the exterior of the structure(s), on-site fire hydrants and mains shall be provided. (OFC 507.5.1)

24. **FIRE HYDRANT NUMBER AND DISTRIBUTION:** The minimum number and distribution of fire hydrants available to a building shall not be less than that listed in Table C 105.1. (OFC Appendix C)

    No fire hydrants are indicated on the plans.

25. **FIRE HYDRANT(S) PLACEMENT:** (OFC C104)

- Existing hydrants in the area may be used to meet the required number of hydrants as approved. Hydrants that are up to 600 feet away from the nearest point of a subject building that is protected with fire sprinklers may contribute to the required number of hydrants. (OFC 507.5.1)
- Hydrants that are separated from the subject building by railroad tracks shall not contribute to the required number of hydrants unless approved by the Fire Marshal.
- Hydrants that are separated from the subject building by divided highways or freeways shall not contribute to the required number of hydrants. Heavily traveled collector streets may be considered when approved by the Fire Marshal.
- Hydrants that are accessible only by a bridge shall be acceptable to contribute to the required number of hydrants only if approved by the Fire Marshal.

26. **PRIVATE FIRE HYDRANT IDENTIFICATION:** Private fire hydrants shall be painted red in color. Exception: Private fire hydrants within the City of Tualatin shall be yellow in color. (OFC 507)

27. **FIRE HYDRANT DISTANCE FROM AN ACCESS ROAD:** Fire hydrants shall be located not more than 15 feet from an approved fire apparatus access roadway unless approved by the Fire Marshal. (OFC C102.1)

28. **REFLECTIVE HYDRANT MARKERS:** Fire hydrant locations shall be identified by the installation of blue reflective markers. They shall be located adjacent and to the side of the center line of the access roadway that the fire hydrant is located on. In the case that there is no center line, then assume a center line and place the reflectors accordingly. (OFC 507)

29. **PHYSICAL PROTECTION:** Where fire hydrants are subject to impact by a motor vehicle, guard posts, bollards or other approved means of protection shall be provided. (OFC 507.5.6 & OFC 312)

30. **CLEAR SPACE AROUND FIRE HYDRANTS:** A 3 foot clear space shall be provided around the circumference of fire hydrants. (OFC 507.5.5)

BUILDING ACCESS AND FIRE SERVICE FEATURES

31. **KNOX BOX:** A Knox Box, padlock, or Knox key switch for gate access may be required. See Appendix A (using the link provided below) for further information and detail on required installations. Order via www.tvfr.com or contact TVF&R for assistance and instructions regarding installation and placement. (OFC 506.1)
http://www.tvfr.com/DocumentCenter/View/1438

If gated emergency access roads are proposed. They must be provided with a Knox padlock. Also see requirement #18 for gates.

32. **PREMISES IDENTIFICATION:** New and existing buildings shall have approved address numbers; building numbers or approved building identification placed in a position that is plainly legible and visible from the street or road fronting the property, including monument signs. These numbers shall contrast with their background. Numbers shall be a minimum of 4 inches high with a minimum stroke width of 1/2 inch. (OFC 505.1)

If you have questions or need further clarification, or would like to discuss any alternate methods and/or materials, please feel free to contact me at 503-259-1419.

Sincerely,

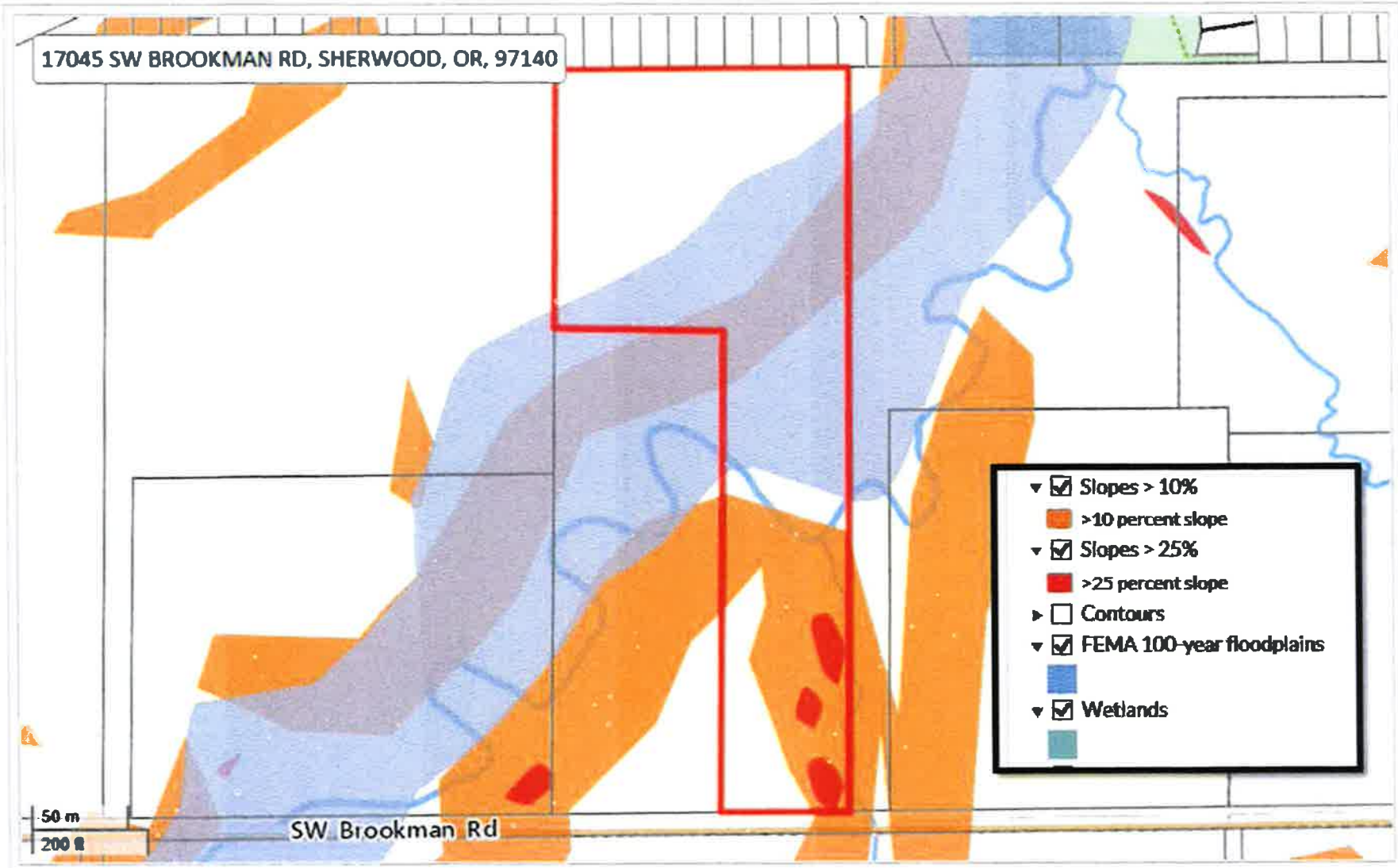
Tom Mooney

Tom Mooney
Deputy Fire Marshal II

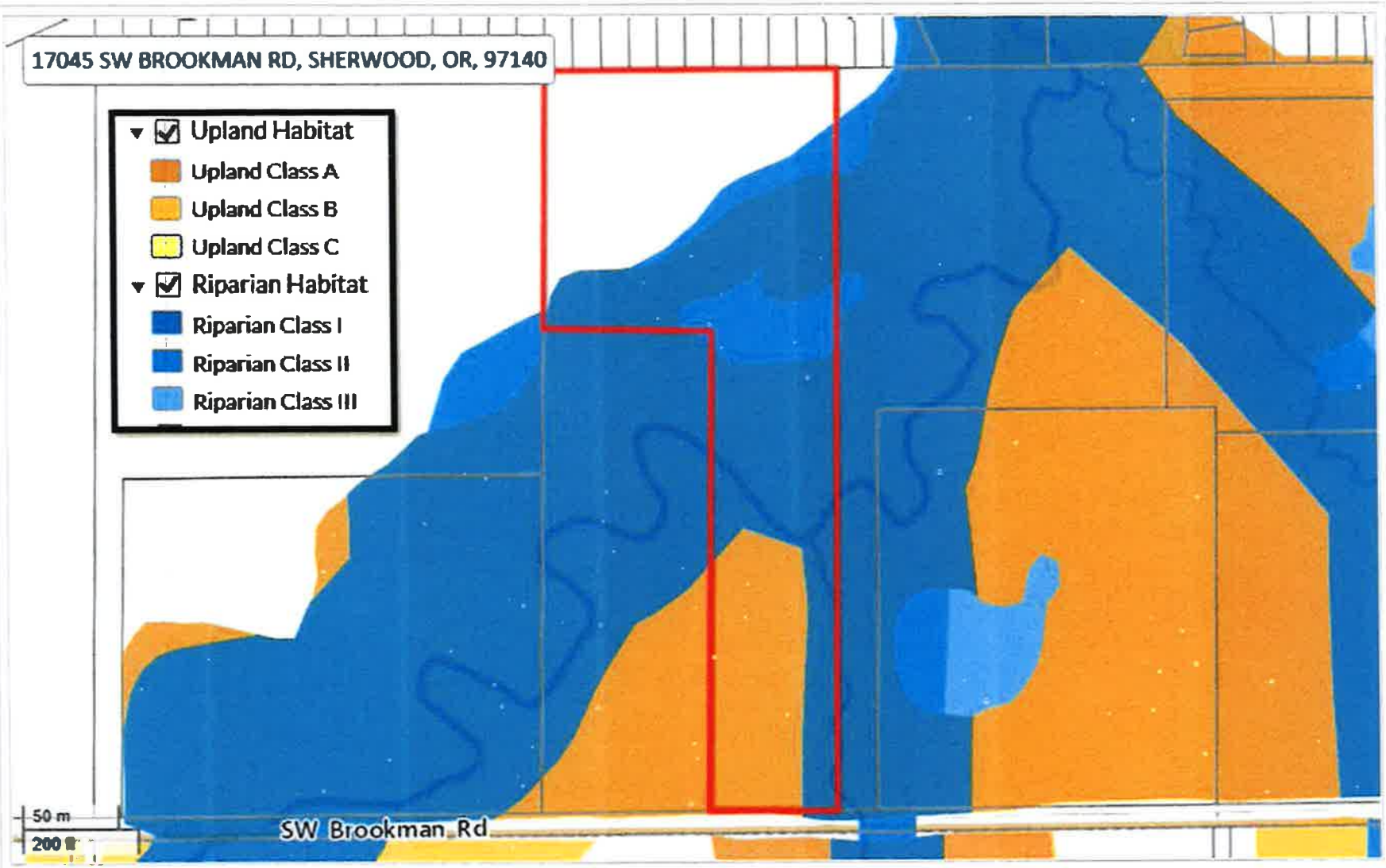
Thomas.mooney@tvfr.com

Cc: File
City of Sherwood

A full copy of the New Construction Fire Code Applications Guide for Residential Development is available at http://www.tvfr.com/DocumentCenter/View/1438

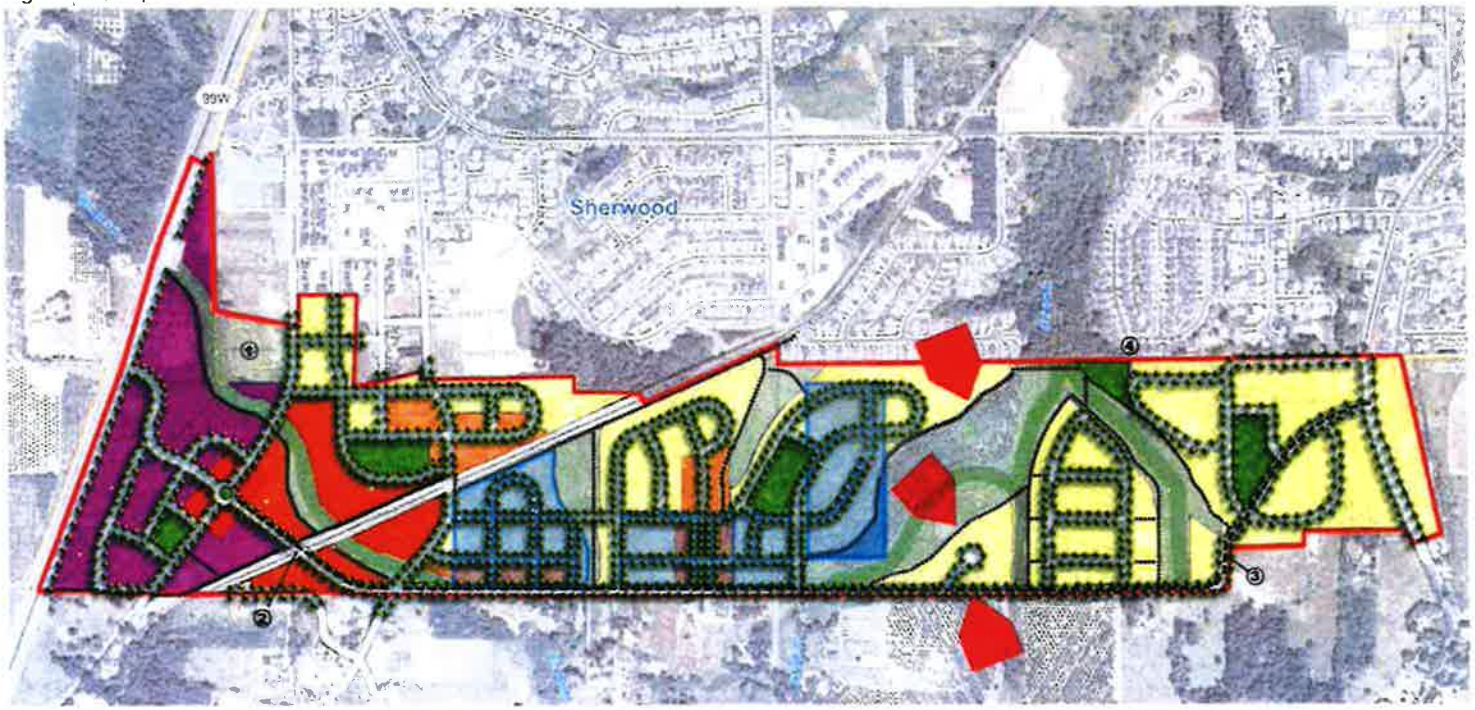


Metro
Data Resource Center
600 NE Grand Ave, Portland, OR 97232
503.797.1742 – drc@oregonmetro.gov



Metro
Data Resource Center
600 NE Grand Ave, Portland, OR 97232
503.797.1742 – drc@oregonmetro.gov

Figure 6 Parks, Trails and Schools



PLANNING DEPARTMENT NEIGHBORHOOD MEETING PACKET

(Required for all Type III, IV or V projects)

Submit the following with land use application materials to the City of Sherwood Planning Department, 22560 SW Pine St., Sherwood, OR 97140: (503) 625-5522.

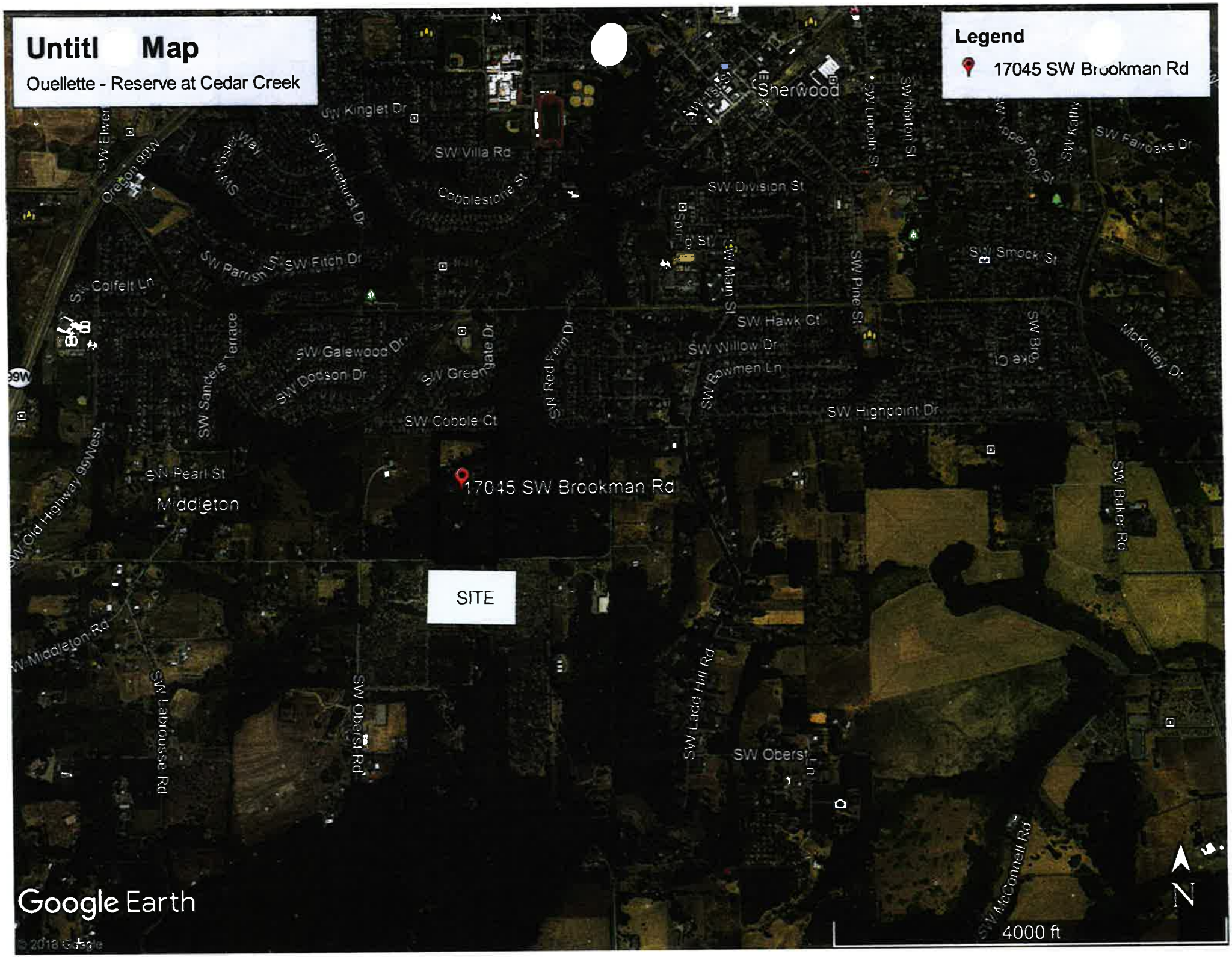
The purpose of the neighborhood meeting is to solicit input and exchange information about the proposed development per Sherwood Zoning and Community Development Code 16.70.020. The meeting must be held in a public location **prior** to submitting a land use application.

☒ **Affidavits** of mailing to adjacent property owners that are within 1,000 feet of the subject **application**.

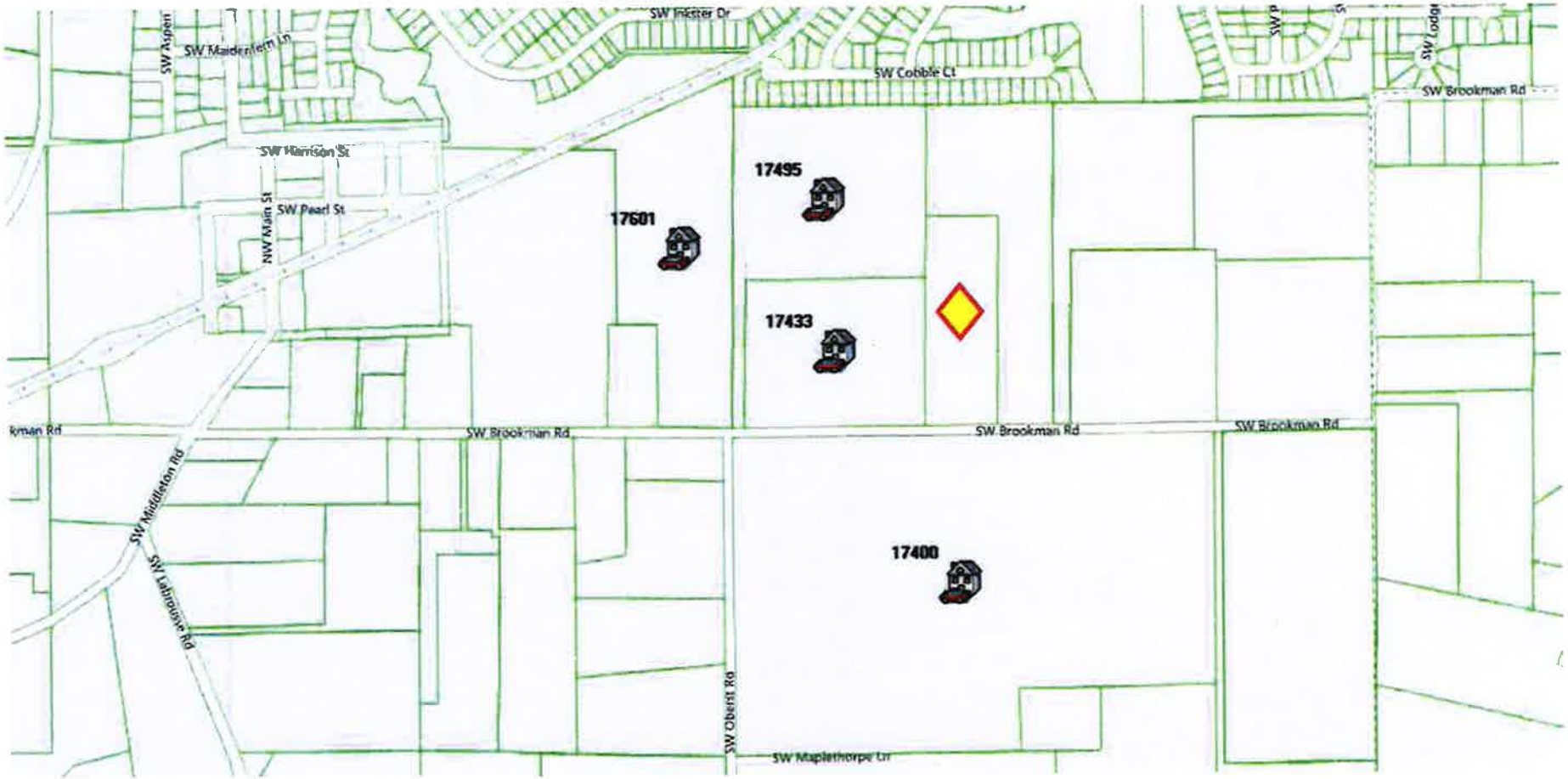
☒ Sign-in sheet(s)

☒ **Summary** of the meeting notes

(Projects requiring a neighborhood meeting in which the City or Urban Renewal District is the property owner or applicant shall also provide published and posted notice of the neighborhood meeting consistent with the notice requirements in 16.72.020.)

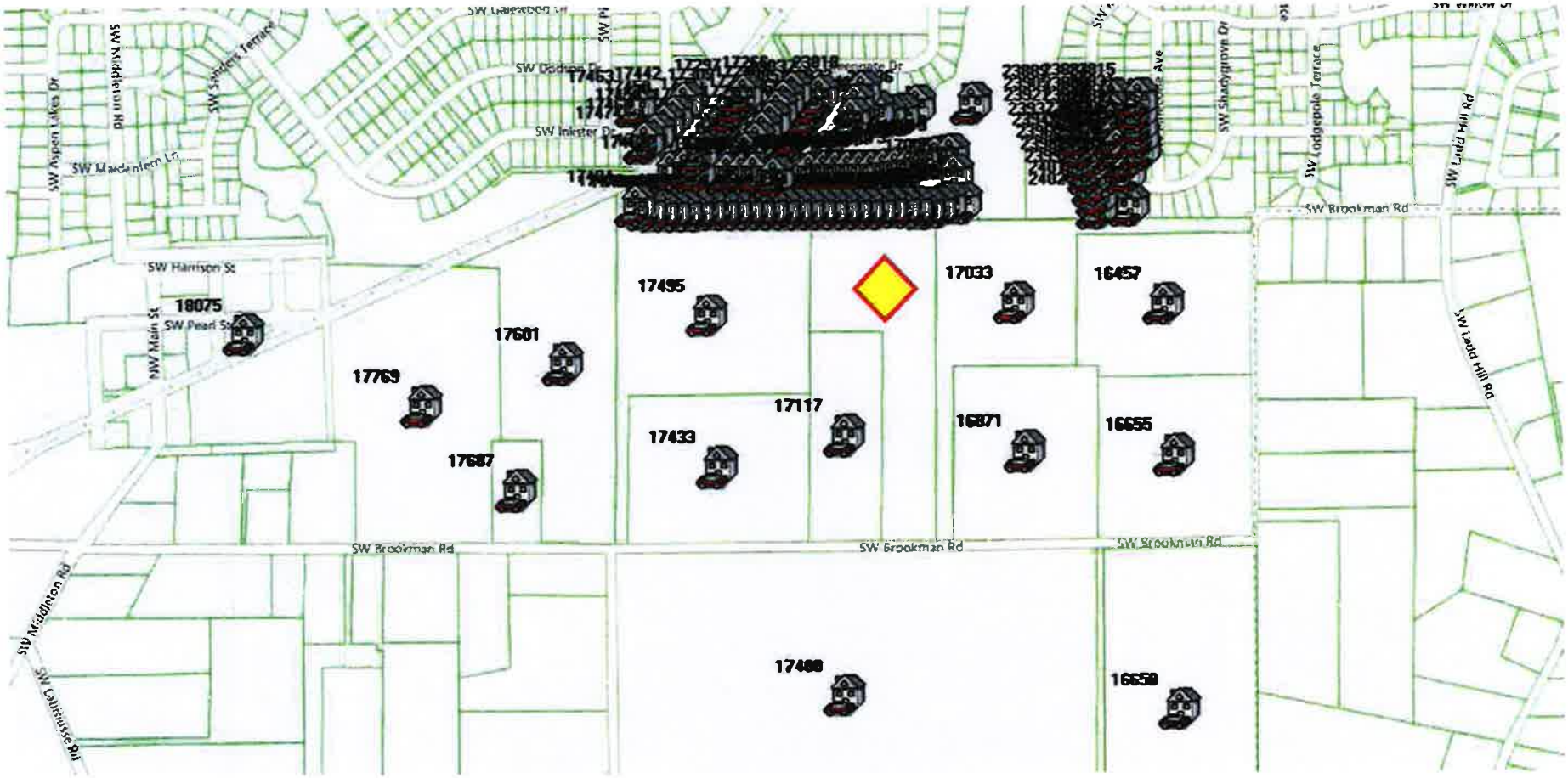

Untitl Map
Ouellette - Reserve at Cedar Creek
Legend
17045 SW Brookman Rd
Sherwood
SW Kinglet Dr
SW Villa Rd
Cobblestone St
SW Division St
SW Pinehurst Dr
SW Parrish St
SW Fitch Dr
SW Colfelt Ln
SW Galewood Dr
SW Dodson Dr
SW Greengate Dr
SW Red Fern Dr
SW Hawk Ct
SW Willow Dr
SW Bowmen Ln
SW Highpoint Dr
SW Cobble Ct
SW Pearl St
Middleton
17045 SW Brookman Rd
SITE
SW Middleton Rd
SW Labrousse Rd
SW Oberst Rd
SW Lady Hill Rd
SW Oberst
SW McConnell Rd
SW Baker Rd
SW Smock St
SW Pine St
SW Main St
SW Lincoln St
SW Norton St
SW Fairoaks Dr
McKinley Dr
Google Earth
4000 ft
N

Washing[illegible] County
1000' Radius of 3S10600 00101
April 4 2019



"This map is for your aid in locating your land with reference to streets and other parcels. While this map is believed to be correct, the company assumes no liability for any loss occurring by reason of reliance thereon"

Washingt[illegible] County
1000' Radius of 17045 SW Brookman Rd., Sherwood
March 21 2019



"This map is for your aid in locating your land with reference to streets and other parcels. While this map is believed to be correct, the company assumes no liability for any loss occurring by reason of reliance thereon"

Affidavit of Mailing

DATE:

STATE OF OREGON)
)
Washington County)

I, Ben Altman, representative for the Ouellette 46-57 Lot Subdivision proposed development project do hereby certify that the attached notice to adjacent property owners and recognized neighborhood organizations that are within 1,000 feet of the subject project, was placed in a U.S. Postal receptacle on April 4, 2019.

Ben Altman

Representatives Name: Ben Altman
Name of the Organization: Pioneer Design Group

Subscribed ad sworn to, or affirmed, before me this 4th day of April, 2019.

OFFICIAL STAMP
YVONNE L TROUTMAN
NOTARY PUBLIC-OREGON
COMMISSION NO. 972247
MY COMMISSION EXPIRES FEBRUARY 28, 2022

Yvonne L Troutman
Notary Public for the State of Oregon
County of Washington

My Commission expires February 28, 2022

Updated October 2010

PIONEER DESIGN GROUP INC.
CIVIL LAND USE PLANNING SURVEY
P 503.643.8286 F 844.715.4743 www.pd-grp.com
9020 SW Washington Square Rd Suite 170
Portland, Oregon 97223

April 3, 2019

RE: NOTICE OF NEIGHBORHOOD REVIEW MEETING FOR A PROPOSED 46 – 57 LOT SUBDIVISION.

Dear Resident or Property Owner:

Pioneer Design Group represents the owner of property located at 17045 SW Brookman Road, also identified as Tax Lot 100 of Tax Map 3S106, as shown on the attached Tax Map. You may have previously received notice of a neighborhood meeting for development of this site. However, as we may add an additional property to the application, being property located at 17117 SW Brookman Road, also identified as Tax Lot 101 of Tax Map 3S106, we are resending this updated notice. Both properties are currently zoned Medium Density Residential Low (MDRL) by the City of Sherwood.

We are considering a proposal for a 46 – 57 Lot Subdivision, depending on the final configuration. Before applying to the City of Sherwood Planning Department we would like to take the opportunity to informally discuss the proposal in more detail with you.

Prusuant to Sherwood Zoning and Community Development Code Section 16.70.020, you are invited to attend a meeting scheduled for:

Thursday, April 18 @ 6:30 pm
Marjorie Stewart Community Center
21907 SW Sherwood Blvd., Sherwood, OR 97140

The purpose of this informal meeting is to provide a forum for surrounding property owners / residents to review the proposal and to identify issues so they can be considered before the formal application is submitted. This meeting gives you the opportunity to share with us any special information you know about the property involved. We will try to answer questions related to how the project meets relevant development standards consistent with the City of Sherwood's land use regulations.

Please note that this will be an informational meeting on preliminary development plans prior to official submission to the City. These plans may change slightly before the application is submitted to the City. Depending upon the type of application, you may receive an official notice from the City of Sherwood providing the opportunity to comment either by submitting written comments, and/or by attending a public hearing.

Please feel free to contact us at 503-643-8286 or msprague@pd-grp.com if you have questions about this meeting or the proposed project. We look forward to discussing this proposal with you.

Sincerely,

Matt Sprague
Principal
Pioneer Design Group

Affidavit of Mailing

DATE: March 22, 2019

STATE OF OREGON)
)
Washington County)

I, Ben Altman, representative for the Ouellette 46 Lot Subdivision proposed development project do hereby certify that the attached notice to adjacent property owners and recognized neighborhood organizations that are within 1,000 feet of the subject project, was placed in a U.S. Postal receptacle on March 22, 2019.

Ben Altman

Representatives Name:
Name of the Organization: Pioneer Design Group

Subscribed ad sworn to, or affirmed, before me this 22nd day of March, 2019.

Yvonne L Troutman
Notary Public for the State of Oregon
County of Washington

OFFICIAL STAMP
YVONNE L TROUTMAN
NOTARY PUBLIC-OREGON
COMMISSION NO. 972247
MY COMMISSION EXPIRES FEBRUARY 28, 2022

My Commission expires: February 28, 2022

Updated October 2010

PIONEER DESIGN GROUP, INC.
CIVIL LAND USE PLANNING SURVEY
P 503.643.8286 F 844.715.4743 www.pd-grp.com
9020 SW Washington Square Rd Suite 170
Portland, Oregon 97223

March 22, 2019

RE: NOTICE OF NEIGHBORHOOD REVIEW MEETING FOR A PROPOSED 45-LOT SUBDIVISION.

Dear Resident or Property Owner:

Pioneer Design Group is representing the owner of property shown on the attached map, located at 17045 SW Brookman Road. This property is legally identified as Tax Map T3SR1W Section 6, Tax Lot 100, as shown on the attached Tax Map. This property is currently zoned Medium Density Residential Low (MDRL) by the City of Sherwood.

We are considering a proposal for a 46-Lot Subdivision. Before applying to the City of Sherwood Planning Department we would like to take the opportunity to informally discuss the proposal in more detail with you.

Prusuant to Sherwood Zoning and Community Development Code Section 16.70.020, you are invited to attend a meeting scheduled for:

Thursday, April 18 @ 6:30 pm
Marjorie Stewart Community Center
21907 SW Sherwood Blvd., Sherwood, OR 97140

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Please note that this will be an informational meeting on preliminary development plans prior to official submission to the City. These plans may change slightly before the application is submitted to the City. Depending upon the type of application, you may receive an official notice from the City of Sherwood providing the opportunity to comment either by submitting written comments, and/or by attending a public hearing.

Please feel free to contact us at 503-643-8286 or msprague@pd-grp.com if you have questions about this meeting or the proposed project. We look forward to discussing this proposal with you.

Sincerely,

Matt Sprague
Principal
Pioneer Design Group

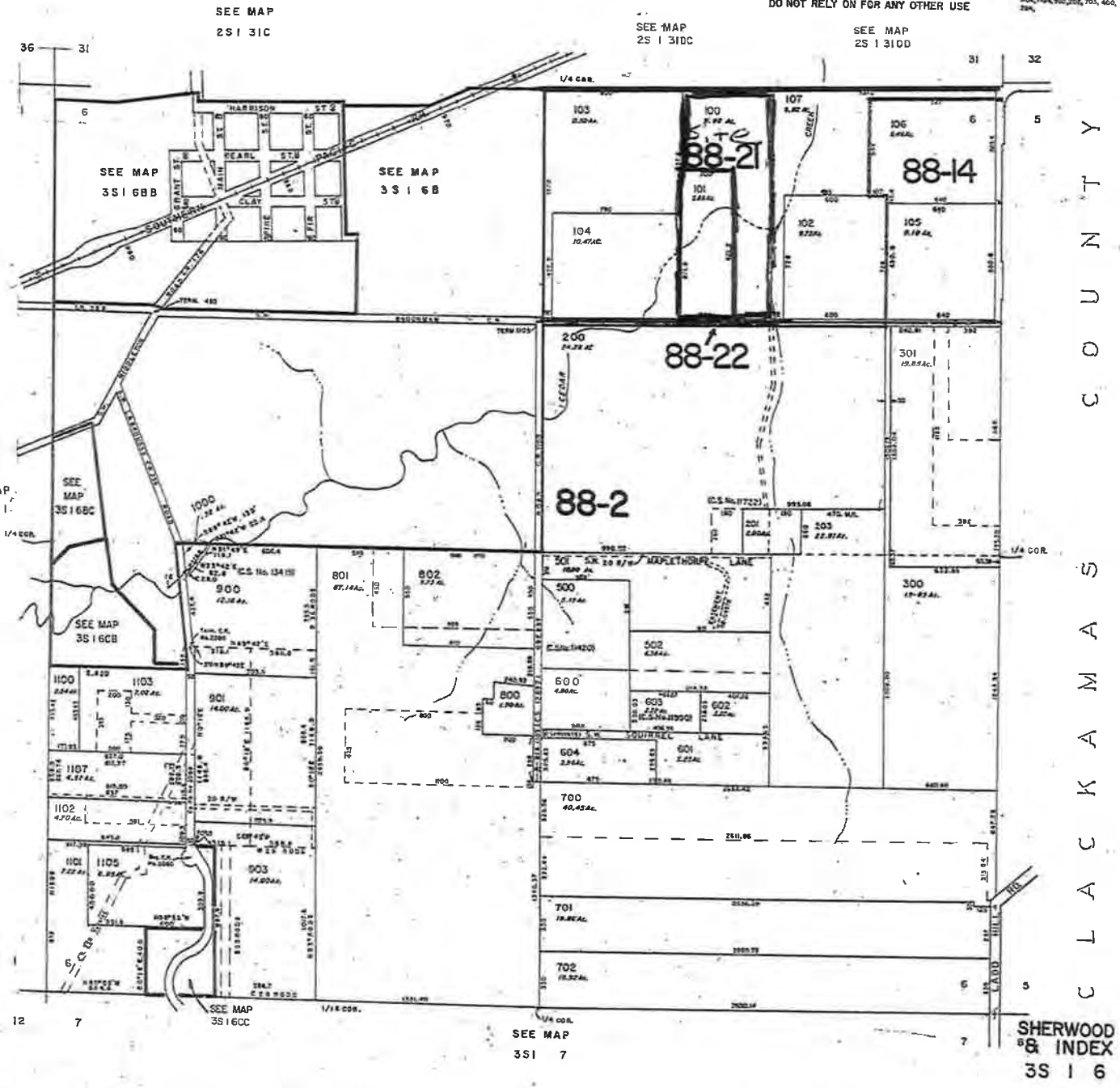
SECTION 6 3 R1W W.M.

WASHINGTON NTY OREGON

SCALE 1"=400'

3S1 6 & INDEX

FOR ASSESSMENT PURPOSES ONLY
DO NOT RELY ON FOR ANY OTHER USE



2S131DC 01400
Elizabeth Delong
23836 SW Fox Run Pl
/ood, OR 97140-6921

2S131DC 01500
Jeffrey & Salina Rygh
23862 SW Fox Run Pl
Sherwood, OR 97140-6921

2S131DC 01600
Debra Boquist
23867 SW Fox Run Pl
Sherwood, OR 97140-6952

2S131DC 01700
Laurene Ohogan
23841 SW Fox Run Pl
Sherwood, OR 97140-6952

2S131DC 02000
Lawrence Hill
Terry Muldowney-Hill
23818 SW Golden Pond Ter
Sherwood, OR 97140-6222

2S131DC 02100
Victor & Sharon Orella
23832 SW Golden Pond Ter
Sherwood, OR 97140-6222

2S131DC 02200
Saleh Family Trust
16800 NE Mountain Home Rd
Sherwood, OR 97140-8585

2S131DC 02300
Wayne Vaincourt
Catherine Ingram
23898 SW Golden Pond Ter
Sherwood, OR 97140-6222

2S131DC 02400
Naoko & Eitoku Yamanaka
23921 SW Golden Pond Ter
Sherwood, OR 97140-6958

2S131DC 02500
James Anderson Jr.
P Wahr-Anderson
23907 SW Golden Pond Ter
Sherwood, OR 97140-6958

2S131DC 02600
Nathan & Emily Hill
14980 SW Scholls Ferry Rd #D201
Beaverton, OR 97007-8523

2S131DC 02700
Cristina & V Jeffrey Sandberg
23879 SW Golden Pond Ter
Sherwood, OR 97140-6956

2S131DC 02800
Thomas Clemo
2520 3rd St #10
Santa Monica, CA 90405-3624

2S131DC 02900
Mo & Holly Taylor
23851 SW Golden Pond Ter
Sherwood, OR 97140-6956

2S131DC 03000
Jeffrey & Maria Lathrop
9265 SW Iowa Dr
Tualatin, OR 97062-7281

2S131DC 03300
Ihab Obeidi
3 Becket St
Lake Oswego, OR 97035-1038

2S131DC 03400
Anna Song
Blake Applegate
17278 SW Greengate Dr
Sherwood, OR 97140-6946

2S131DC 03500
Steven & Kori Lyn Boddington
17290 SW Greengate Dr
Sherwood, OR 97140-6947

2S131DC 03600
Kimra Peffers
17302 SW Greengate Dr
Sherwood, OR 97140-6925

2S131DC 03700
Barend & Melissa Pennings
80 Central Park W #22G
New York, NY 10023-5216

2S131DC 03800
Carol Weber
17328 SW Greengate Dr
Sherwood, OR 97140-6925

2S131DC 03900
Todd & Erin Card
17340 SW Greengate Dr
Sherwood, OR 97140-6925

2S131DC 04000
Matthew & Melissa McKinney
17357 SW Greengate Dr
Sherwood, OR 97140-

2S131DC 04100
Ming Yu
Xiuhong Zhang
17345 SW Greengate Dr
Sherwood, OR 97140-6928

2S131DC 04200
Justin & Pamela Tishendorf
17333 SW Greengate Dr
Sherwood, OR 97140-6928

2S131DC 04300
Kimberly Ghioni
17321 SW Greengate Dr
Sherwood, OR 97140-6928

2S131DC 04400
Jeanne & John Hoogstad
17309 SW Greengate Dr
Sherwood, OR 97140-6928

1DC 04500
Br..don Armatas
M Helmandollar-Armat
17297 SW Greengate Dr
Sherwood, OR 97140-6950

2S131DC 06200
City of Sherwood
22560 SW Pine St
Sherwood, OR 97140-9933

2S131DC 06500
Jessica Vanbergen
17185 SW Cobble Ct
Sherwood, OR 97140-6907

2S131DC 06600
Donald & Tina Rogie
17171 SW Cobble Ct
S ood, OR 97140-6907

2S131DC 06700
Larry & Marsha Brown
17157 SW Cobble Ct
Sherwood, OR 97140-6907

2S131DC 06800
Naoki Kuze
Minh Thu Luu
17143 SW Cobble Ct
Sherwood, OR 97140-6909

2S131DC 06900
Satish Singh
17129 SW Cobble Ct
Sherwood, OR 97140-6909

2S131DC 07000
Wendy Hubbenette
Paul Hess
17115 SW Cobble Ct
Sherwood, OR 97140-6909

2S131DC 07100
Linda Pranger
17101 SW Cobble Ct
Sherwood, OR 97140-6909

2S131DC 07200
Jonathan Wisniewski
17087 SW Cobble Ct
Sherwood, OR 97140-6913

2S131DC 07300
Richard Mikulak
17073 SW Cobble Ct
Sherwood, OR 97140-6912

2S131DC 07400
Anna & Ryan Forsyth
17057 SW Cobble Ct
Sherwood, OR 97140-6912

2S131DC 07500
Stefanie English
17033 SW Cobble Ct
Sherwood, OR 97140-6912

2S131DC 07600
James & Angela Hass
17019 SW Cobble Ct
Sherwood, OR 97140-6912

2S131DC 07700
Anthony Zukauskas
17005 SW Cobble Ct
Sherwood, OR 97140-6912

2S131DC 07800
Thomas & Laura Gall
17010 SW Cobble Ct
Sherwood, OR 97140-6910

2S131DC 07900
Teresa Conrad
17024 SW Cobble Ct
Sherwood, OR 97140-6910

2S131DC 08000
Brian & Melanie Crabtree
17038 SW Cobble Ct
Sherwood, OR 97140-6910

2S131DC 08100
Joseph & Jessica Gurule
17052 SW Cobble Ct
Sherwood, OR 97140-6910

2S131DC 08200
Isidro Toscano
17066 SW Cobble Ct
Sherwood, OR 97140-6910

2S131DC 08300
John Arzner
17080 SW Cobble Ct
Sherwood, OR 97140-6910

2S131DC 08400
Jodi Briggs
17094 SW Cobble Ct
Sherwood, OR 97140-6911

2S131DC 08500
Robert Frailey
Lin Zhang
17108 SW Cobble Ct
Sherwood, OR 97140-6908

2S131DC 08600
Robert & Shirley Costley
50485 Spyglass Hill Dr
La Quinta, CA 92253-5803

2S131DC 08700
Debra & Robert Savage
17136 SW Cobble Ct
Sherwood, OR 97140-6908

2S131DC 08800
Ang Ho
Tri Luu
17150 SW Cobble Ct
Sherwood, OR 97140-6908

2S131DC 08900
Rachel & Adam Gemmil
14164 SW Cobble Ct
Sherwood, OR 97140-

2S131DC 09000
Sherryl Hardman
17178 SW Cobble Ct
Sherwood, OR 97140-6954

2S131DC 09100
Cheryl & Jeremy Price
17192 SW Cobble Ct
Sherwood, OR 97140-6954

2S131DC 09200
Scott & Debbie Nelson
17206 SW Cobble Ct
Sherwood, OR 97140-6906

2 DC 09300
Jo A V Aceves
Monica Bello
17232 SW Cobble Ct
Sherwood, OR 97140-6917

2S131DC 09400
Scott & Laurel Demming
17258 SW Cobble Ct
Sherwood, OR 97140-6917

2S131DC 09500
Karen Blair
17286 SW Cobble Ct
Sherwood, OR 97140-6917

2S131DC 09600
Lisa Ring
17320 SW Cobble Ct
'ood, OR 97140-6924

2S131DC 09700
Christine Marr
17348 SW Cobble Ct
Sherwood, OR 97140-6924

2S131DC 09800
Yang Lu
17374 SW Cobble Ct
Sherwood, OR 97140-6924

2S131DC 09900
Clifton Taylor
Dorothy Houlihan
17400 SW Cobble Ct
Sherwood, OR 97140-6951

2S131DC 10000
Micah Ling
17414 SW Cobble Ct
Sherwood, OR 97140-6298

2S131DC 10100
Nicholas & Laura Morad
17428 SW Cobble Ct
Sherwood, OR 97140-6298

2S131DC 10200
Laurie & Eric McMuldren
17442 SW Cobble Ct
Sherwood, OR 97140-6298

2S131DC 10300
Katrien & Brant Stai
17456 SW Cobble Ct
Sherwood, OR 97140-6298

2S131DC 10400
Franklin & Lisa Jones
17470 SW Cobble Ct
Sherwood, OR 97140-6298

2S131DC 10500
Ryan & Holly Krause
17484 SW Cobble Ct
Sherwood, OR 97140-6298

2S131DC 10700
Michael & Kristine Cornett
17461 SW Cobble Ct
Sherwood, OR 97140-6299

2S131DC 10800
Sandra & Rod Widows
17433 SW Cobble Ct
Sherwood, OR 97140-

2S131DC 10900
Miran & Cameron Shayegi
17419 SW Cobble Ct
Sherwood, OR 97140-6299

2S131DC 11000
Stephen & Jean Hilt
17369 SW Greengate Dr
Sherwood, OR 97140-6929

2S131DC 11100
Rebecca & Nathan Bush
17363 SW Cobble Ct
Sherwood, OR 97140-6953

2S131DC 11200
Hpa Jv Borrower 2019-1 MI LLC
180 N Stetson Ave #3650
Chicago, IL 60601-6709

2S131DC 11300
Stephanie Lynn Charters
17281 SW Cobble Ct
Sherwood, OR 97140-6957

2S131DC 11400
Karen Koehler
23935 SW Golden Pond Ter
Sherwood, OR 97140-6958

2S131DC 12500
John & Tara Golden
17463 SW Inkster Dr
Sherwood, OR 97140-8240

2S131DC 16800
Mark & Mindy Sandilands
17442 SW Inkster Dr
Sherwood, OR 97140-8240

2S131DC 16900
David & Colleen Mulvihill
17450 SW Inkster Dr
Sherwood, OR 97140-8240

2S131DC 17000
Shelly & Matthew Hochstetler
17458 SW Inkster Dr
Sherwood, OR 97140-8240

2S131DC 17100
Kruger Family Trust
17466 SW Inkster Dr #D
Sherwood, OR 97140-8240

2S131DC 17200
Nasrin Zaman
2519 Sierra Sage St
Las Vegas, NV 89134-7226

2S131DD 03800
Kimberly & Benjamin Aanderud
17475 SW Roosevelt St
Sherwood, OR 97140-8966

2S131DD 03900
Rebecca King
Sean Cassidy
24027 SW Red Fern Dr
Sherwood, OR 97140-6285

2S131DD 04000
David Sweeney
24011 SW Red Fern Dr
Sherwood, OR 97140-6285

'DD 04100
E.. .eth & Neil Shannon
23997 SW Red Fern Dr
Sherwood, OR 97140-

2S131DD 04200
Kimberly & John Urban
23981 SW Red Fern Dr
Sherwood, OR 97140-6283

2S131DD 04300
Jun Qian
23965 SW Red Fern Dr
Sherwood, OR 97140-6283

2S131DD 04400
Carl Busse
Tara Miller
SW Red Fern Dr
Sherwood, OR 97140-6283

2S131DD 04500
Michael & Lori Gush
23937 SW Red Fern Dr
Sherwood, OR 97140-

2S131DD 04600
Chee Woo
19266 Megly Ct
Lake Oswego, OR 97035-8315

2S131DD 04700
Joshua Furrer
23905 SW Red Fern Dr
Sherwood, OR 97140-6283

2S131DD 04800
Kerby & Kyle McGinnis
23889 SW Red Fern Dr
Sherwood, OR 97140-6282

2S131DD 07200
Shawn & Kristen Jones
23884 SW Red Fern Dr
Sherwood, OR 97140-6294

2S131DD 07300
Joshua & Teddie Fial
23900 SW Red Fern Dr
Sherwood, OR 97140-6295

2S131DD 07400
Eric & Lisa Austin Sr
23926 SW Red Fern Dr
Sherwood, OR 97140-6295

2S131DD 07500
Michelle & Kendall Lallatin
23942 SW Red Fern Dr
Sherwood, OR 97140-6295

2S131DD 07600
Benjamin & Jennifer Labounty
23958 SW Red Fern Dr
Sherwood, OR 97140-6295

2S131DD 07700
Scott & Debra Lacy
23974 SW Red Fern Dr
Sherwood, OR 97140-6295

2S131DD 07800
Kathleen Harvey
13160 SW Hoodvista Ln
Portland, OR 97224-6113

2S131DD 08000
Lara & Michael Rick Jr.
23879 SW Pinecone Ave
Sherwood, OR 97140-6260

2S131DD 08100
Stephenie & Timothy Curtiss
23863 SW Pinecone Ave
Sherwood, OR 97140-6260

2S131DD 08200
Kimberly Caldwell
23847 SW Pinecone Ave
Sherwood, OR 97140-6260

2S131DD 08300
Todd & Denise Hern
23831 SW Pinecone Ave
Sherwood, OR 97140-6260

2S131DD 08400
Michael & Susan Hanson
23815 SW Pinecone Ave
Sherwood, OR 97140-6259

3S10600 00101
Bonnie David
17117 SW Brookman Rd
Sherwood, OR 97140-8528

3S10600 00102
Charles & Louise Bissett Jr.
16871 SW Brookman Rd
Sherwood, OR 97140-8094

3S10600 00103
Brookman Development LLC
Po Box 61426
Vancouver, WA 98666-1426

3S10600 00104
Richard & Linda Scott
17433 SW Brookman Rd
Sherwood, OR 97140-8801

3S10600 00105
Denise & John Hagg Jr.
16655 SW Brookman Rd
Sherwood, OR 97140-8094

3S10600 00106
Byron & Ruth Ann Gregory
16457 SW Brookman Rd
Sherwood, OR 97140-9111

3S10600 00107
Wayne & Linda Chronister
Po Box 1474
Sherwood, OR 97140-1474

3S10600 00200
Philip & Nancy Lapp
17400 SW Brookman Rd
Sherwood, OR 97140-8801

3S10600 00301
Jackie & Roy Gill
16650 SW Brookman Rd
Sherwood, OR 97140-8094

3S10600 00301
Rod Johnson
26527 SW Labrousse Rd
Sherwood, OR 97140-8937

300 00301
Josh Thatch
16650 SW Brookman Rd
Sherwood, OR 97140-8094

3S106B0 00100
Brookman Development LLC
Po Box 61426
Vancouver, WA 98666-1426

3S106B0 00101
Marie & Thomas Bartlett
17687 SW Brookman Rd
Sherwood, OR 97140-8801

3S106B0 00200
George Boyd
Carleen Brewer
x 85
...atin, OR 97062-0085

3S106BB 01000
Shane & Jennifer Bridges
20610 SW 98th Ct
Tualatin, OR 97062-7521

3S10600 00103
Brookman Development LLC
Po Box 61426
Vancouver, WA 98666-1426

3S10600 00104
Richard & Linda Scott
17433 SW Brookman Rd
Sherwood, OR 97140-8801

3S10600 00200
Nancy & Philip Lapp
17400 SW Brookman Rd
Sherwood, OR 97140-8801

3S106B0 00100
Brookman Development LLC
Po Box 61426
Vancouver, WA 98666-1426

Neighborhood Meeting Notes
The Reserve at Cedar Terrace 58 - Lot Subdivision
April 18, 2019 Beginning at 6:30 PM
Marjorie Stewart Community Center

Matthew Sprague of Pioneer Design Group introduced himself and Wayne Hayson, who is taking notes. He then summarized the City's Land Use Review process, noting that a pre-application conference has been held to review the development with City staff. This neighborhood meeting tonight is another requirement prior to submitting a formal application to the City.

Following this meeting we will finalize the application packet and submit to the City in the near future. The submittal will include site plans, written plans, a tree plan, biologists report, and a written narrative describing how the application complies with the applicable City standards. Once we submit the City has 30 days to determine if the application is complete or not. If not, they will notify us of any additional information they need, which we would have 6 months to provide. Once the application is deemed "Complete" the City has 120 days to issue the decision. The City will provide notice to everyone who received notice of this meeting that their review has begun and that you will have an opportunity to provide formal written comments, or appear at a hearing. Once the comment period has expired, the City will complete their review, or hold the hearing, and issue the decision, which will be an approval; an approval with Conditions; or a denial. If an approval is granted, the process of submitting and obtaining engineering plan approval commences, in order to be able to get on-site to begin construction. The engineering review process will take approximately 4 – 6 months to go from plan preparation to approval. Following engineering approval, the applicant will apply for Final Approval, and record the Final Plat. AT that point, lots can be sold and homes built.

Mr Sprague then provided a site orientation using an aerial photo. He showed the property in relation to the proposed Middlebrook Subdivision, Brookman Road, and the existing residential developments to the north. Mr Sprague then identified the location of the significant natural resources on the site.

He then showed the preliminary plat. He noted that the property is zoned MDRL, which requires a minimum lot size of 5,000 square feet. Mr Sprague identified that some of the lots will be below this minimum area, as we are providing additional open space area over and above that required by the code to compensate equally for the reduced lot areas and lot widths. The minimum lot area will be 4,500 square feet and lot width 45 feet. He then described the overall site plan, including lot layouts, street alignments, pedestrian improvements, significant natural resource locations, and the design and construction of public water, storm, and sanitary facilities. He identified that the development is proposed to be built in 2 phases, being a north and a south phase. Due to the availability of utilities, the northern phase will likely be constructed first.

Mr Sprague then opened the meeting up for questions.

1. In the Middlebrook Subdivision, will the roads connect to Brookman and Middleton?

Response: One access point to Brookman Road is being provided within the Middlebrook Subdivision, although there may be additional access points on Brookman in the future. No connection will be made to Middleton.

2. Will you be building a bridge over Cedar Creek?

Response: No. The existing driveway and supporting culvert serving the home on Lot 100 will remain, and be utilized as part of the proposed pedestrian and bicycle path linking the northern portion of the site to the south.

3. Will there be a Home Owners Association?

Response: Yes. An HOA is the anticipated mechanism for ownership and maintenance of the tracts and private facilities. If the open space areas are publicly dedicated, they would be owned and/or maintained by the appropriate jurisdiction, such as the City, or CWS.

4. On the map, where is Redfern Drive? Do you abut the railroad tracks?

Response: Redfern Drive is off to the northeast of the site, and is not adjoining the site. Therefore, no street connection will be made. We do not abut any railroad tracks.

5. Are you developing at minimum density?

Response: Minimum density for the site, based on the net site area rather than the gross site area, is 50 units, while maximum density is 72 units. AT 58 units, we are above minimum, but still on the low side as far as density goes.

6. Is there only 1 access to each portion of the site?

Response: Essentially yes. In the south, due to arterial access spacing restrictions, we can only provide 1 access to SW Brookman Road, and no north, east, or west connections due to the location of Cedar Creek and an unnamed tributary of Cedar Creek.

In the north, we have two connections from the Middlebrook Subdivision, at SW Atfalati Lane and SW Kalapuya Lane, although ingress and egress from Middlebrook is limited. We believe an additional temporary emergency vehicle access may be being provided for additional access out of Middlebrook.

Following this question, the group engaged in a general discussion regarding the increased ADT on Brookman Road and the surrounding area including Highway 99, proposed public and private transportation improvements in the general vicinity, and funding for those projects.

With no further questions, Mr Sprague thanked everyone for attending. He reminded them that his contact information is on the notice letter for this meeting, if anyone has any further questions.

The meeting was adjourned at 7:15 PM.

NEIGHBORHOOD MEETING SIGN IN SHEET

Proposed Project: The Reserve at Cedar Creek

Proposed Project Location: 17045 SW Brookman Road

Project Contact: Matthew Sprague, PDG

Meeting Location: _____

Meeting Date: 4/18/2019

Name	Address	E-Mail	Please identify yourself (check all that apply)			
			Resident	Property owner	Business owner	Other
Bill & Louise Bissett	16871 SW Brookman Rd Sherwood OR	billnweezie@msn.com				
Angie Bissett	16871 SW Brookman Rd	Angie@angiebissett.com				X
Neil Shannon	23997 S.W. Red Fern Dr.	NeilShan@MSN.com		✓		
Teresa Conrad	17024 SW Cobble Ct Sherwood	tg.conrad@frontier.com		✓		
Bonnie David	17117 SW Brookman Rd	dogg.david512@yahoo.com		✓		
Isidro Toscano	17066 SW Cobble Ct	isidrotoscano@yahoo.com		✓		
Elizabeth Rossberg	16615 SW Cortez Ct	lvossberg@dwhames.com				X

Clean Water Services
Our commitment is clear.

AMENDED Service Provider Letter

CWS File Number: 19-001036

This form and the attached conditions will serve as your Service Provider Letter in accordance with Clean Water Services Design and Construction Standards (R&O 19-5).

Jurisdiction:	City of Sherwood	**Review Type:**	Tier 2 Analysis
		SPL Original Date:	April 16, 2019
Site Address / Location:	17045 & 17117 SW Brookman RD Sherwood, OR 97140	**SPL Amendment Date:**	September 17, 2019
		SPL Expiration Date:	September 16, 2021

Applicant Information:		**Owner Information:**	
Name	MIKE IRWIN	Name	JACK DALTON
Company	WEEKLEY HOMES, LLC	Company	ENVIRONMENTAL SCIENCE & ASSESS
Address	1930 THOREAU DR SUITE 160 SCHEUMBURG IL 60173	Address	107 SE WASHINGTON ST SUITE 249 PORTLAND OR 97214
Phone/Fax		Phone/Fax	(503) 478-0424
E-mail:	mirwin@dwmoes.com	E-mail:	jack@esapdx.com

Tax lot ID	**Development Activity**
3S1060000100, 101	DW Homes – Brookman Subdivision

Pre-Development Site Conditions:		**Post Development Site Conditions:**	
Sensitive Area Present:	[X] On-Site [X] Off-Site	Sensitive Area Present:	[X] On-Site [X] Off-Site
Vegetated Corridor Width:	Variable	Vegetated Corridor Width:	Variable
Vegetated Corridor Condition:	Good/Marginal/Degraded		

Enhancement of Remaining Vegetated Corridor Required: [X]

Square Footage to be enhanced: 122,690

Encroachments into Pre-Development Vegetated Corridor:

Type and location of Encroachment:	Square Footage:
Lots, Road (Permanent Encroachment; Mitigation Required)	7,041

Mitigation Requirements:

Type/Location	Sq. Ft./Ratio/Cost
On-site VC Replacement	4,157/2.4:1
Per R&O 13-12, VC Encroachment Requirements Associated with Wetland Mitigation Bank Credits are Waived	5,327

[X] Conditions Attached [X] Development Figures Attached (2) [ ] Planting Plan Attached [ ] Geotech Report Required

This Service Provider Letter does NOT eliminate the need to evaluate and protect water quality sensitive areas if they are subsequently discovered on your property.

ALTERNATIVES ANALYSIS

1. **The proposed encroachment area is mitigated in accordance with Section 3.08.**
   The proposed site plan will impact Vegetated Corridors due to roadway and lot development. The VC impacts totaling 1,714 square feet in the south portion of the site will be mitigated on site within the large open space tract. The on-site mitigation totals 4,157 square feet, which includes enhancement of several degraded areas north of the creek and two areas of good condition habitat where invasive species removal will occur. Mitigation for impacts to the isolated Wetland A (4,208 sf) and 25-foot VC totaling 5,327 square feet will be mitigated through the purchase of wetland mitigation bank credits.

2. **The replacement mitigation protects the functions and values of the Vegetated Corridor and Sensitive Area.**
   VC functions impacted by trail encroachment and road encroachment will be offset with VC mitigation areas along the Cedar Creek corridor totaling greater acreage than the impact acreage. VC functions lost with the elimination of Wetland A in north end will be provided by the purchase of wetland mitigation bank credits. The mitigation bank credits will offset the lost wetland functions, which are minimal for this wetland. Elimination of the Wetland A and associated VC will not greatly impact the existing function of the local watershed, since the wetland is currently isolated from any surrounding wetland or waters by the existing subdivision to the north.

3. **Enhancement of the replacement area, if not already in Good Corridor Condition, and either the remaining Vegetated Corridor on the site or the first 50 feet of width closest to the resource.**
   A total of 54,172 square feet of existing VC (Degraded and Marginal Condition) will be enhanced along the sensitive areas in the north and south end along the Cedar Creek corridor to district standards. Good condition corridor totaling 68,518 square feet will have invasive species removal only. The Marginal VC outside of the first 50 feet (731 sf) is also included in the enhancement area to maximize the ecological benefit to the sensitive areas in south end where the highest invasive cover is currently present.

4. **A District Stormwater Connection Permit is likely to be issued based on proposed plans.**
   The project engineer has submitted a preliminary storm drainage report with the land use application to the City of Sherwood. Upon acceptance of the Tier 2, construction plans with the proposed storm water treatment plan will be submitted with the goal to achieve a Stormwater Connection Permit.

5. **Location of development and site planning minimizes incursion into the Vegetated Corridor.**
   The preferred site plan minimizes VC encroachment by clustering the lot development to the north and south end of the site and reducing the lot sizes. The preferred site plan maximizes the open space area in the middle of the site and maintains a direct connection to off-site habitat east and west of the site. The only wetland impacts are of the small isolated Wetland A in north end that is already cut off from the surrounding watershed. The VC functions associated with Wetland A lost by removal will not be significant to the watershed since the wetland is already cut off from the downstream watershed.

6. **No practicable alternative to location of the development exists that will not disturb the Sensitive Area or Vegetated Corridor.**
   The preferred alternative clusters development and avoids all impacts to the Cedar Creek wetlands and floodplain in the middle of site. This plan results in unavoidable impacts to Wetland A in north end of the site with the development of Lots 1 and 2, with direct wetland impacts (4,208 sf) and CWS VC totaling 5,327 square feet (4,674 sf on-site/ 653 sf off-site). The site plan alternatives that attempted to avoid direct impact to Wetland A were found to be unfeasible since they either resulted in greater wetland impacts in another part of site or result in indirect impacts to the wetland by cutting off source hydrology to the wetland. Unavoidable loss of Wetland A hydrology will result in any alternative, even if not impacted directly, since the adjacent subdivision to the west and the required on-site storm system will eliminate source hydrology to the wetland regardless. This plan also minimizes trail and frontage

improvements as much as possible. The trail in southeast end of the site is terminated at the edge of Good condition VC avoiding 369 square feet of previously proposed impact. The Brookman frontage improvements minimize impacts by using a 3-lane half street design standard instead of a 5-lane standard.

7. **The proposed encroachment provides public benefits.**
The site plan provides a 4,157 square foot mitigation area within an approximately 2.5-acre open space in the central and southeast portions of the site. The mitigation for trail and road improvement impacts provides a 2.4:1 mitigation area to impact area and will preserve the hydrologic functions of the Cedar Creek wetland and floodplain in the large open space area beyond the base VC setback in the middle of the site. Marginal VC outside of the first 50 feet (731 sf) is also included in the enhancement area to maximize the ecological benefit to sensitive areas where invasive cover is highest. The large contiguous open space area in the middle and southeast end of site will provide water quality public benefit to serve the surrounding Cedar Creek and downstream Tualatin River watershed. Wetland and VC functions lost with the elimination of Wetland A in north end will be replaced by the purchase of wetland mitigation bank credits and CWS PTP. The mitigation bank credits will offset the lost wetland functions, which are minimal for this wetland, by providing off-site benefits within a wetland mitigation bank.

In order to comply with Clean Water Services water quality protection requirements the project must comply with the following conditions:

1. No structures, development, construction activities, gardens, lawns, application of chemicals, uncontained areas of hazardous materials as defined by Oregon Department of Environmental Quality, pet wastes, dumping of materials of any kind, or other activities shall be permitted within the sensitive area or Vegetated Corridor which may negatively impact water quality, except those allowed in R&O 17-5, Chapter 3.
2. Prior to any site clearing, grading or construction the Vegetated Corridor and water quality sensitive areas shall be surveyed, staked, and temporarily fenced per approved plan. During construction the Vegetated Corridor shall remain fenced and undisturbed except as allowed by R&O 17-5, Section 3.06.1 and per approved plans.
3. **Prior to any activity within the sensitive area, the applicant shall gain authorization for the project from the Oregon Department of State Lands (DSL) and US Army Corps of Engineers (USACE). The applicant shall provide Clean Water Services or its designee (appropriate city) with copies of all DSL and USACE project authorization permits.**
4. An approved Oregon Department of Forestry Notification is required for one or more trees harvested for sale, trade, or barter, on any non-federal lands within the State of Oregon.
5. Prior to ground disturbing activities, an erosion control permit is required. Appropriate Best Management Practices (BMP's) for Erosion Control, in accordance with Clean Water Services' Erosion Prevention and Sediment Control Planning and Design Manual, shall be used prior to, during, and following earth disturbing activities.
6. Prior to construction, a Stormwater Connection Permit from Clean Water Services or its designee is required pursuant to Ordinance 27, Section 4.B.
7. Activities located within the 100-year floodplain shall comply with R&O 17-5, Section 5.10.
8. Removal of native, woody vegetation shall be limited to the greatest extent practicable.
9. The water quality swale and detention pond shall be planted with Clean Water Services approved native species, and designed to blend into the natural surroundings.
10. **Should final development plans differ significantly from those submitted for review by Clean Water Services, the applicant shall provide updated drawings, and if necessary, obtain a revised Service Provider Letter.**

11. The Vegetated Corridor width for sensitive areas within the project site shall be a minimum of 50 feet wide, as measured horizontally from the delineated boundary of the sensitive area.
12. For Vegetated Corridors that extend 35 feet from the break in slope, the width of Vegetated Corridors may be reduced to 15 feet wide if a stamped geotechnical report confirms that slope stability can be maintained with the reduced setback from the break in slope.
13. **For Vegetated Corridors greater than 50 feet in width, the applicant shall enhance the first 50 feet closest to the sensitive area to meet or exceed good corridor condition as defined in R&O 17-5, Section 3.14.2, Table 3-3.**
14. **For Vegetated Corridors up to 50 feet wide, the applicant shall enhance the entire Vegetated Corridor to meet or exceed good corridor condition as defined in R&O 17-5, Section 3.14.2, Table 3-3.**
15. Removal of invasive non-native species by hand is required in all Vegetated Corridors rated ""good."" Replanting is required in any cleared areas larger than 25 square feet using low impact methods. The applicant shall calculate all cleared areas larger than 25 square feet prior to the preparation of the required Vegetated Corridor enhancement/restoration plan.
16. Prior to any site clearing, grading or construction, the applicant shall provide Clean Water Services with a Vegetated Corridor enhancement/restoration plan. Enhancement/restoration of the Vegetated Corridor shall be provided in accordance with R&O 17-5, Appendix A, and shall include planting specifications for all Vegetated Corridor, including any cleared areas larger than 25 square feet in Vegetated Corridor rated ""good.""
17. Prior to installation of plant materials, all invasive vegetation within the Vegetated Corridor shall be removed per methods described in Clean Water Services' Integrated Vegetation and Animal Management Guidance, 2003. During removal of invasive vegetation care shall be taken to minimize impacts to existing native tree and shrub species.
18. Clean Water Services shall be notified 72 hours prior to the start and completion of enhancement/restoration activities. Enhancement/restoration activities shall comply with the guidelines provided in Planting Requirements (R&0 17-5, Appendix A).
19. **Maintenance and monitoring requirements shall comply with R&O 17-5, Section 2.12.2. If at any time during the warranty period the landscaping falls below the 80% survival level, the owner shall reinstall all deficient planting at the next appropriate planting opportunity and the two year maintenance period shall begin again from the date of replanting.**
20. **Performance assurances for the Vegetated Corridor shall comply with R&O 17-5, Section 2.07.2, Table 2-1 and Section 2.11, Table 2-2.**
21. **For any developments which create multiple parcels or lots intended for separate ownership, Clean Water Services shall require that the sensitive area and Vegetated Corridor be contained in a separate tract and subject to a ""STORM SEWER, SURFACE WATER, DRAINAGE AND DETENTION EASEMENT OVER ITS ENTIRETY"" to be granted to the City or Clean Water Services.**
22. **Final construction plans shall include landscape plans**. In the details section of the plans, a description of the methods for removal and control of exotic species, location, distribution, condition and size of plantings, existing plants and trees to be preserved, and installation methods for plant materials is required. Plantings shall be tagged for dormant season identification and shall remain on plant material after planting for monitoring purposes.
23. **A Maintenance Plan shall be included on final plans** including methods, responsible party contact information, and dates (minimum two times per year, by June 1 and September 30).
24. **Final construction plans shall clearly depict the location and dimensions of the sensitive area and the Vegetated Corridor** (indicating good, marginal, or degraded condition). Sensitive area boundaries shall be marked in the field.
25. Protection of the Vegetated Corridors and associated sensitive areas shall be provided by the installation of permanent fencing and signage between the development and the outer limits of

the Vegetated Corridors. **Fencing and signage details to be included on final construction plans.**

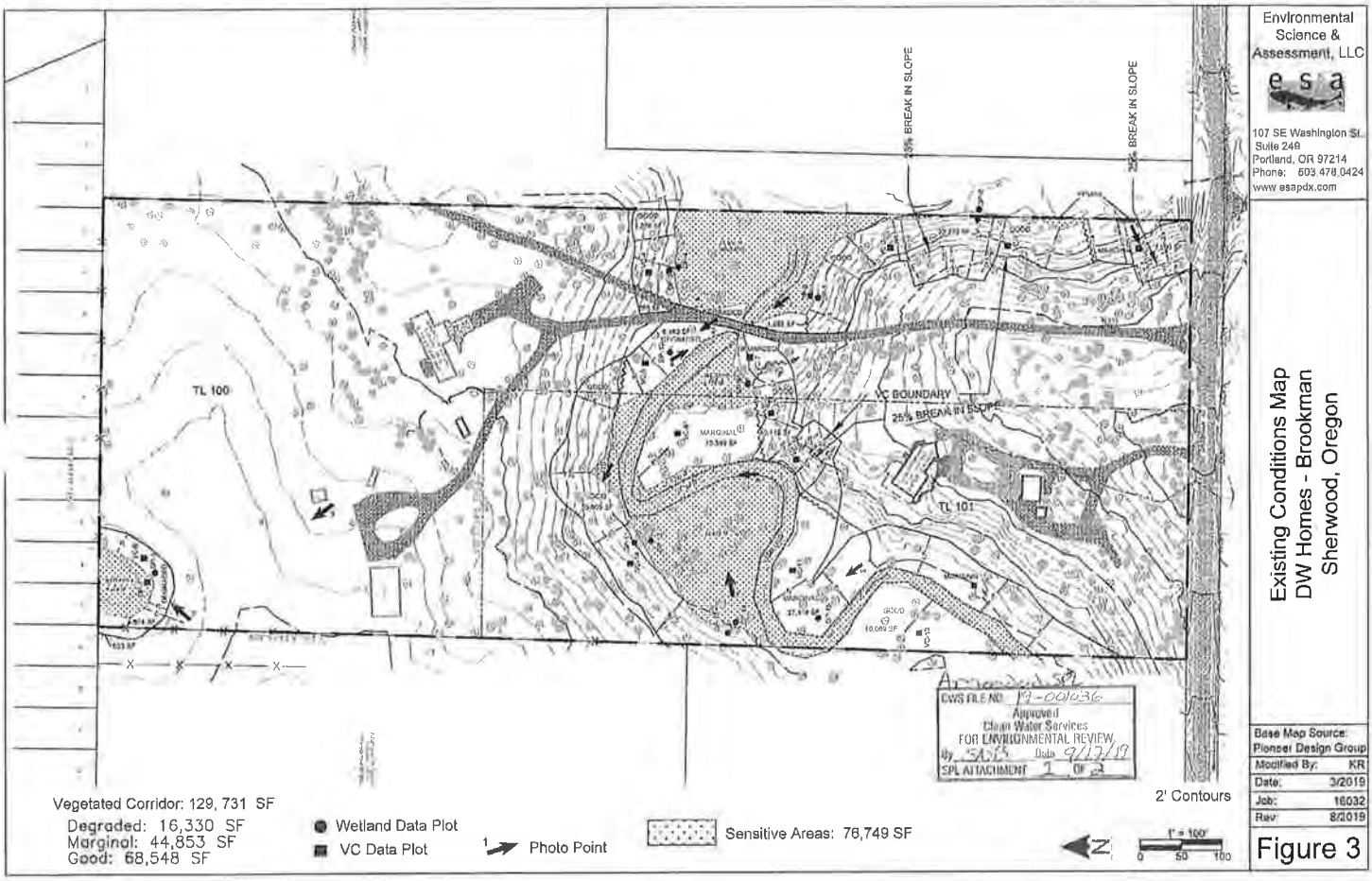
This Service Provider Letter is not valid unless CWS-approved site plan is attached.

Please call (503) 681-3667 with any questions.

Stacy Benjamin

Stacy Benjamin
Environmental Plan Review

Attachments (2)



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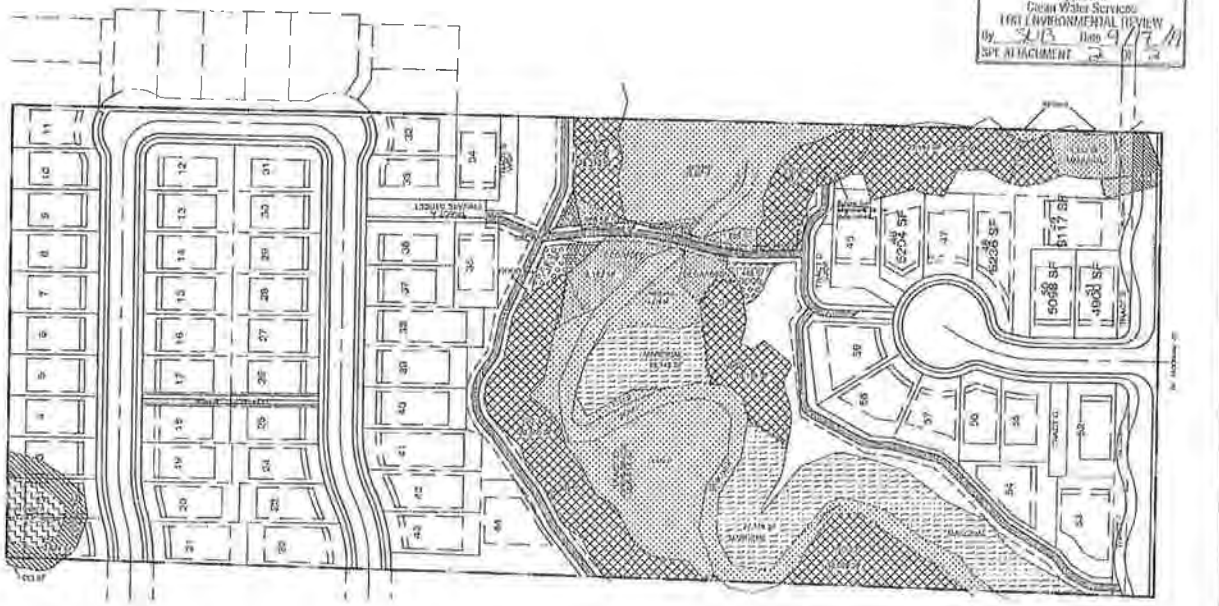
www.esapdx.com

Existing Conditions Map
DW Homes - Brookman
Sherwood, Oregon

Base Map Source:	Pioneer Design Group
Modified By:	KR
Date:	3/2019
Job:	16032
Rev:	8/2019

Figure 3



Wetland A Impacts: 4,208 SF

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(5,327 SF & 1,714 SF)

Total VC Mitigation: 9,484 SF
Onsite Mitigation 4,157 SF; (2.4:1 Ratio)
PTP Mitigation: 5,327 SF

Vegetated Corridor: 126,847 SF

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Good: 2,759 SF
No plantings, Invasive Removal

Degraded: 1,398 SF
Trees 14 & Shrubs 70

VC Enhancement: 122,690 SF
Degraded/Marginal 16,405 SF
Trees 164 & Shrubs 820

Marginal 37,767 SF
Trees 227 & Shrubs 1,888

Good Condition: 68,518 SF
No plantings, Invasive Removal

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DW Homes - Brookman
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Figure 4

Clean Water Services

Clean Water Services File Number
19-001036

Request for SPL Amendment

1. **Reason for Amendment** An additional tax lot has been added to the overall project area (3S1060000101) located at 17117 SW Brookman Road
There are no additional Sensitive Area or VC impacts.

2. **Will the project involve any additional off-site work?** ☐ Yes ☒ Same as current Service Provider Letter
If yes, location and description of additional off-site work:

Please note additional encroachments into the Sensitive Area or Vegetated Corridor may require revisions to the Natural Resources Assessment and development figures. If the Request for Amendment is in response to a red line comment, please provide a copy of the red line with your submittal.

3. **Owner Information**
Name: Bonnie Jean David
Company:
Address: 17117 SW Brookman Road
City, State, Zip: Sherwood, OR 97140
Phone/Fax:
E-Mail:

4. **Applicant Information**
Name: Mike Irwin
Company: Weekley Homes, LLC
Address: 1930 Thoureau Dr., Suite 160
City, State, Zip: scheumburg, IL 60173
Phone/Fax:
E-Mail: Mirwin@dwmoes.com

5. **Property Information** *(example 1S234AB01400)*
Tax lot ID(s): 3S1060000100 & 101
Site Address: 17045 & 17117 SW Brookman Road
City, State, Zip: Sherwood, OR 97140
Nearest Cross Street: SW Oberst Road

6. **Contact Information**
Name: Jack Dalton
Company: Environ. Science & Assessment, LLC
Address: 107 SE Washington St., #249
City, State, Zip: Portland, OR 97214
Phone/Fax: 503-478-0424
E-Mail: jack@esapdx.com

For District Use Only
Amendment Number
☐ Major Amendment: Encroaches an additional 100 SF or more into the vegetated corridor.
☐ Minor Amendment: Encroaches less than an additional 100 SF into the vegetated corridor.

Environmental Science & Assessment, LLC

MEMORANDUM

DATE: August 15, 2019

TO: Environmental Permit Review Clean Water Services

FROM: Kim Reavis ES&A, LLC
Jack Dalton ES&A, LLC

CC: Matt Sprague Pioneer Design Group

RE: CWS File No. 19-001036 - SPL Amendment

This memorandum is a request for an amendment to the Service Provider Letter (SPL) for a residential subdivision project by David Weekley Homes (CWS File No. 19-001036). The project is located at 17045 SW Brookman Road in Sherwood , Oregon, Tax Lot 100 on Washington County's assessor's map 3S106 (Figure 2).

The purpose of the amendment is due to the addition of tax lot (3S1060000101) which expands the overall size of the development site to 15.7 acres. There are no additional Vegetated Corridor or Sensitive Areas impacts than what was documented in the original SPL.

The SPL amendment addresses the existing site conditions of the additional tax lot, including site data, and a discussion of the revised site layout.

Existing Conditions (Tax Lot 101)

The additional tax lot is located at 17117 SW Brookman Road, immediately west of the original tax lot with access to SW Brookman Road bordering the site on the south end (Figure 1).

The parcel is forested with a mature tree canopy cover and a naturalized understory plant community for the exception of a cleared understory in the vicinity of the existing development which includes a single family home, additional outbuildings, access driveways and landscaping (Figure 2). Cedar Creek flows east through the center of the site, which includes a wide floodplain area along both sides of the stream. The topography slopes from the north and south ends to the middle of site along the Cedar Creek riparian corridor. Multiple wetland areas were mapped along Cedar Creek within the floodplain topography (Figure 3).

The soils within the north end of the study area are mapped as Woodburn silt loam, 3 to 7 percent slopes (45B) (Rating 1). Along the Cedar Creek channel soils include the

hydric soil Wapato silty clay loam (43) (Rating 92). The south end of the site is mapped a non-hydric soil, Woodburn silt loam, 3 to 7 percent slopes (44B), with a hydric soil rating of 3.

The Sherwood LWI does not include the study area. The National Wetland Inventory maps a freshwater forested wetland stream resource flowing from the southeast end through the middle of site

ES&A staff conducted the site investigation on May 3, 2019. ES&A collected wetland determination data at five (5) locations to define the wetland boundaries (Figure 3). The wetland is documented by wetland delineation data forms DP-11 through DP-15 (Appendix C). CWS VC data was recorded at six (6) VC data plots to characterize the adjacent VC (VC Data Forms VC-9 through VC-14, Appendix D). The data sheet numbering is a consecutive continuation of the data recorded for the original SPL (TL 100).

The wetland delineation data was collected using the methodology provided in the *Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)* (USACE, 2010).

The Sensitive Area boundaries and the data plot locations were flagged in the field and subsequently surveyed on the base map with topography, stream location, structures and tax lot boundaries prepared by Pioneer Design Group, a professional land surveyor (Figure 3). The vegetated corridor data locations (VC 9 through VC-14) were mapped by measurements from known locations on the base survey.

Sensitive Areas

The wetlands along Cedar Creek are all hydrologically connected to the main creek channel and can be classified as Palustrine Forested and Riverine Flow-Through (PFO/RFT) and totals 24,762 square feet (Figure 3, 3a, 3b). The wetlands are located both north and south of the Cedar Creek channel in the middle of the site, but do not extend off-site along the creek channel (Figure 3). The wetland is documented by wetland delineation data forms DP-11 through DP-15 .

The vegetation is primarily mature Oregon ash (*Fraxinus latifolia*, FACW) forest with an understory comprised primarily of slough sedge (*Carex obnupta*, OBL), water leaf (*Hydrophyllum tenuipes*, FAC) (Photo 5) and rose (*Rosa* sp., FAC) (Photo 7).

The Cedar Creek channel enters the site from the southwest corner and meanders through the center of the site, flowing east (18,764 SF). The channel is wide up to 15 feet in some places and the banks are fairly incised (Photo 8) The riparian forested community bordering both sides of Cedar Creek extends approximately 200 feet.

The total area of Sensitive Areas within the new lot is 43,526 square feet and the total for the updated project site is 76,749 square feet (Figure 3).

Vegetated Corridors

The total area of vegetated corridor is 75,814 square feet for the new lot (Figure 3).

The VC width for most of the corridor along Cedar Creek is 50 feet in areas with less than 25% slopes. A 25 percent break in slope line was needed for a narrow area on the southeast end of the site that was determined based on CWS methodology (R&O 17-05). This area is within good condition corridor, so the 35-foot off-set from the slope break is used. The slope break was determined using the base topographic map provided by Pioneer Design Group, Inc (Figure 3, 3a, 3b).

The VC area south of the Cedar Creek channel is primarily in marginal condition (37,767 SF) with a small portion of good condition (8,269 SF), (VC-9 to VC-12). The marginal condition VC has native aerial canopy of Oregon ash cover ranging from 40-60 percent. The understory is more variable where some areas have been completely cleared of shrub cover or it is overgrown with Himalayan blackberry with some native shrub cover (Photo 9)

The VC along the north side of Cedar Creek is in good condition (29,518 SF) (VC-13 & VC-14) except for a small area (260 SF) that extends over from the east in degraded condition. Aerial canopy cover of Douglas fir (*Pseudotsuga menziesii*), bitter cherry (*Prunus emarginata*), Oregon ash is greater than 80 percent (Photo 10). Understory species include mainly native species such as beaked hazelnut (*Corylus cornuta*), vine maple (*Acer circinatum*), osoberry (Oemleria cerasiformis), snowberry (*Symphoricarpos albus*), Western swordfern (*Polystichum munitum*) and Pacific waterleaf (Hydrophyllum tenuipes).

Overall Site Existing Conditions (Figures 3, 3a & 3b)

Sensitive Areas: 76,749 square feet

Vegetated Corridor: 129,731 square feet
(Degraded, 16,330 SF; Marginal, 44,853 SF; Good, 68,548 SF

Site Plan

The site plan for the original SPL has only modified the lower half of the site design by reconfiguring the lot layout and redesigning the cul-de-sac to incorporate the expanded project area of eight new lots on the south side of Cedar Creek. The revised subdivision has 59 residential lots. The two water quality facilities remain relatively in the same area (Figure 4 & 4a).

There are no new VC temporary or permanent impacts associated with the new layout. VC Mitigation remains the same as well. The VC enhancement for the for the new lot includes 260 square feet of Degraded VC, 37,767 square feet of Marginal VC and 37,787 square feet of Good VC.

Overall Site Plan (Figure 4 & Figure 4a)

VC Permanent Impacts: 7,041 SF

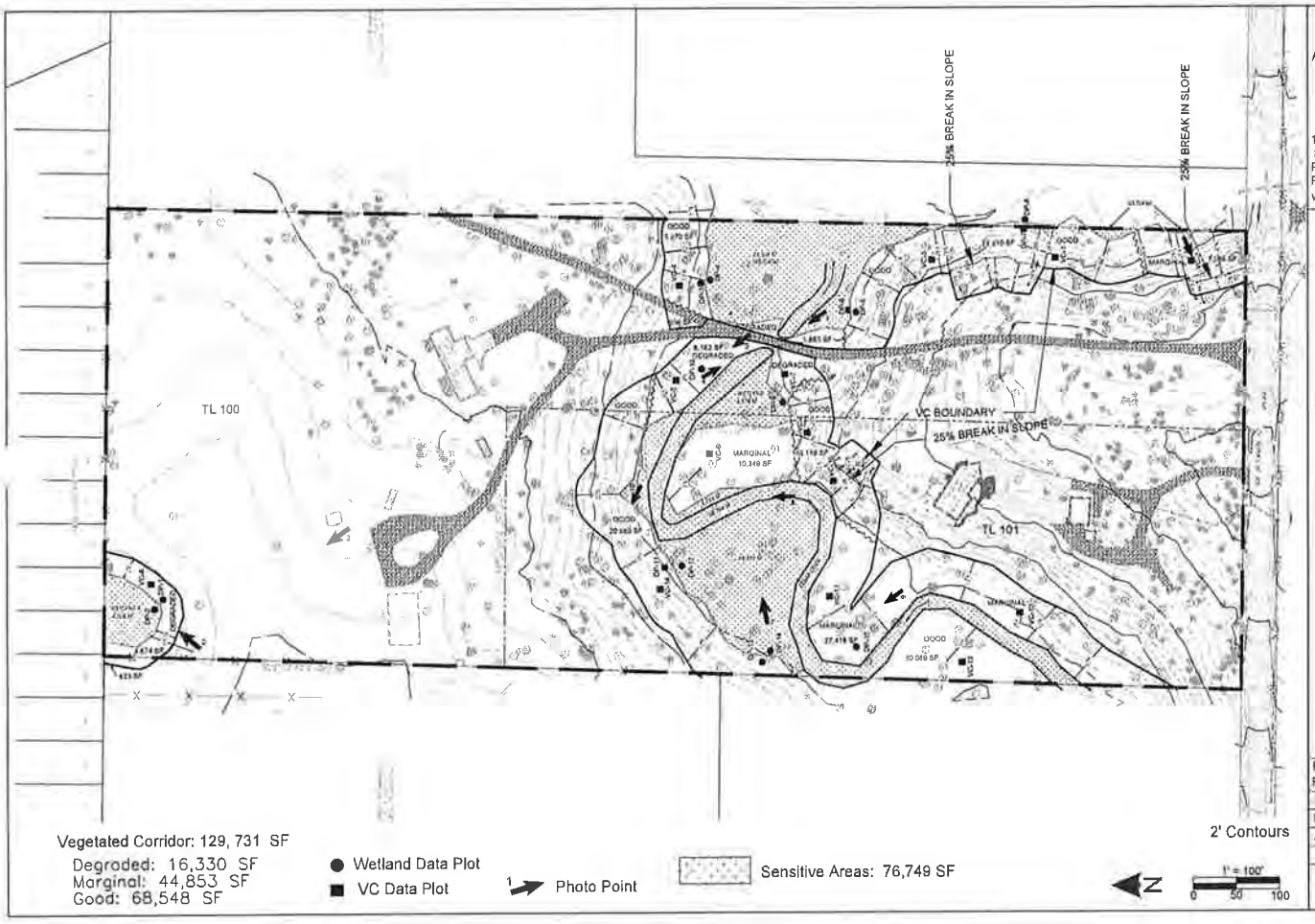
VC Mitigation: 4,157 SF

- Good Condition: 2,759 SF, No Plantings, Invasive Removal
- Degraded: 1,398 SF, 14 Trees and 70 Shrubs
  Should be planted at 100 percent base planting density

VC Enhancement: 122,690 SF

- Good Condition : 68,518 SF, No Plantings, Invasive Removal
- Marginal / Degraded: 16,405 SF, 164 Trees and 820 Shrubs
  Should be planted at 100 percent base planting density.
- Marginal: 37,767 SF: 227 Trees and 1,888 Shrubs
  Reduced planting density for trees by 40 percent due to existing Marginal aerial cover and 100 percent planting density for shrubs.

Attachment A- Figures



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Existing Conditions Map
DW Homes - Brookman
Sherwood, Oregon

Base Map Source:	Pioneer Design Group
Modified By:	KR
Date:	3/2019
Job:	18032
Rev:	6/2019

Figure 3

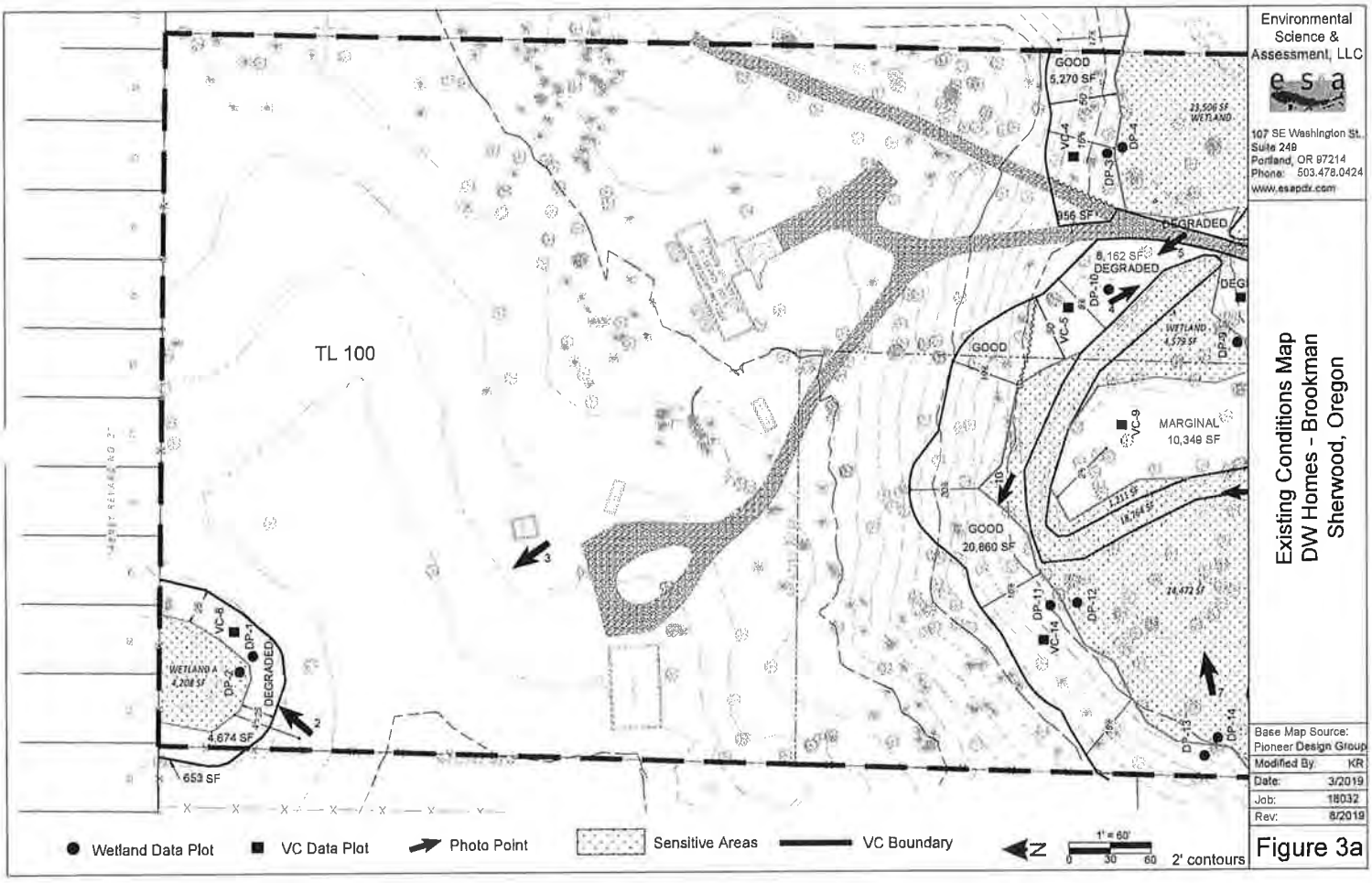

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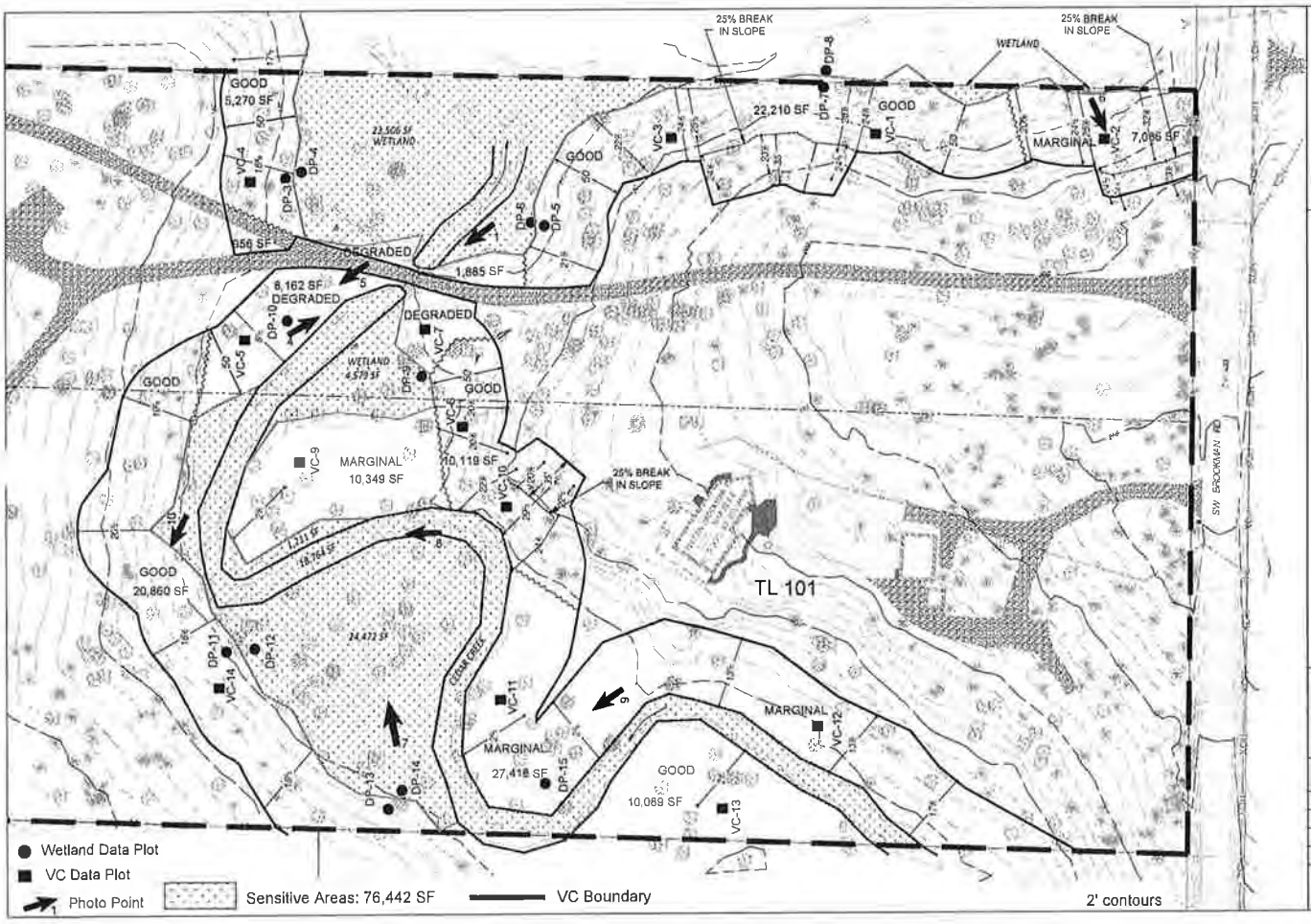
Figure 3a



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N

1" = 60'
0 30 60

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Rev:	8/2019

Figure 3b

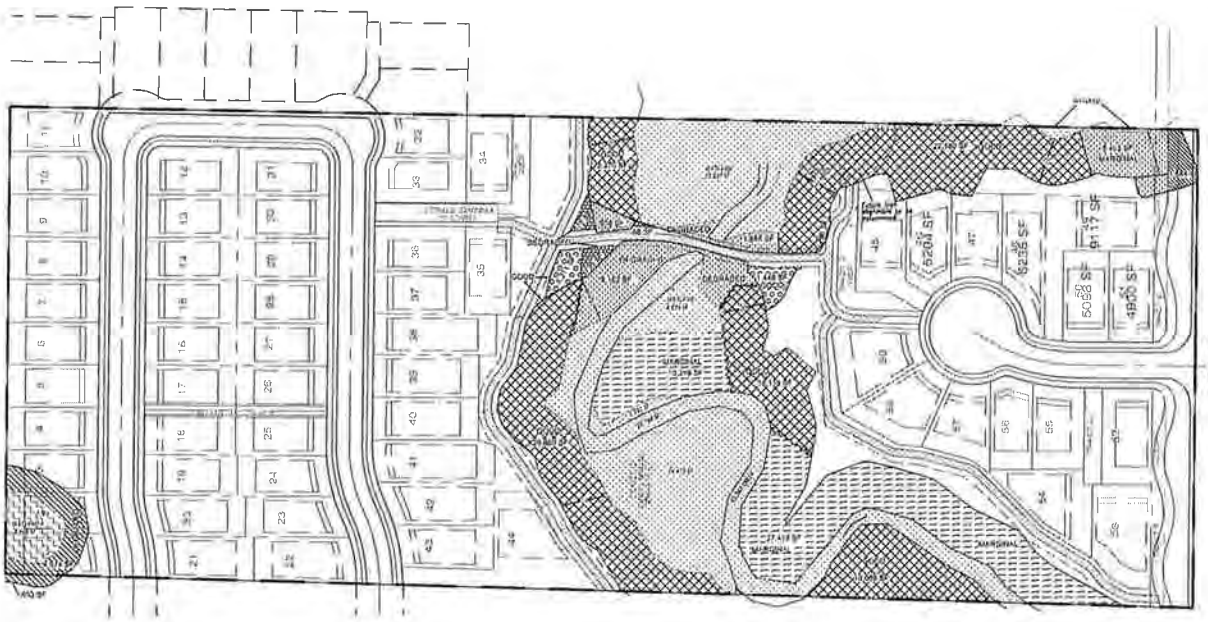

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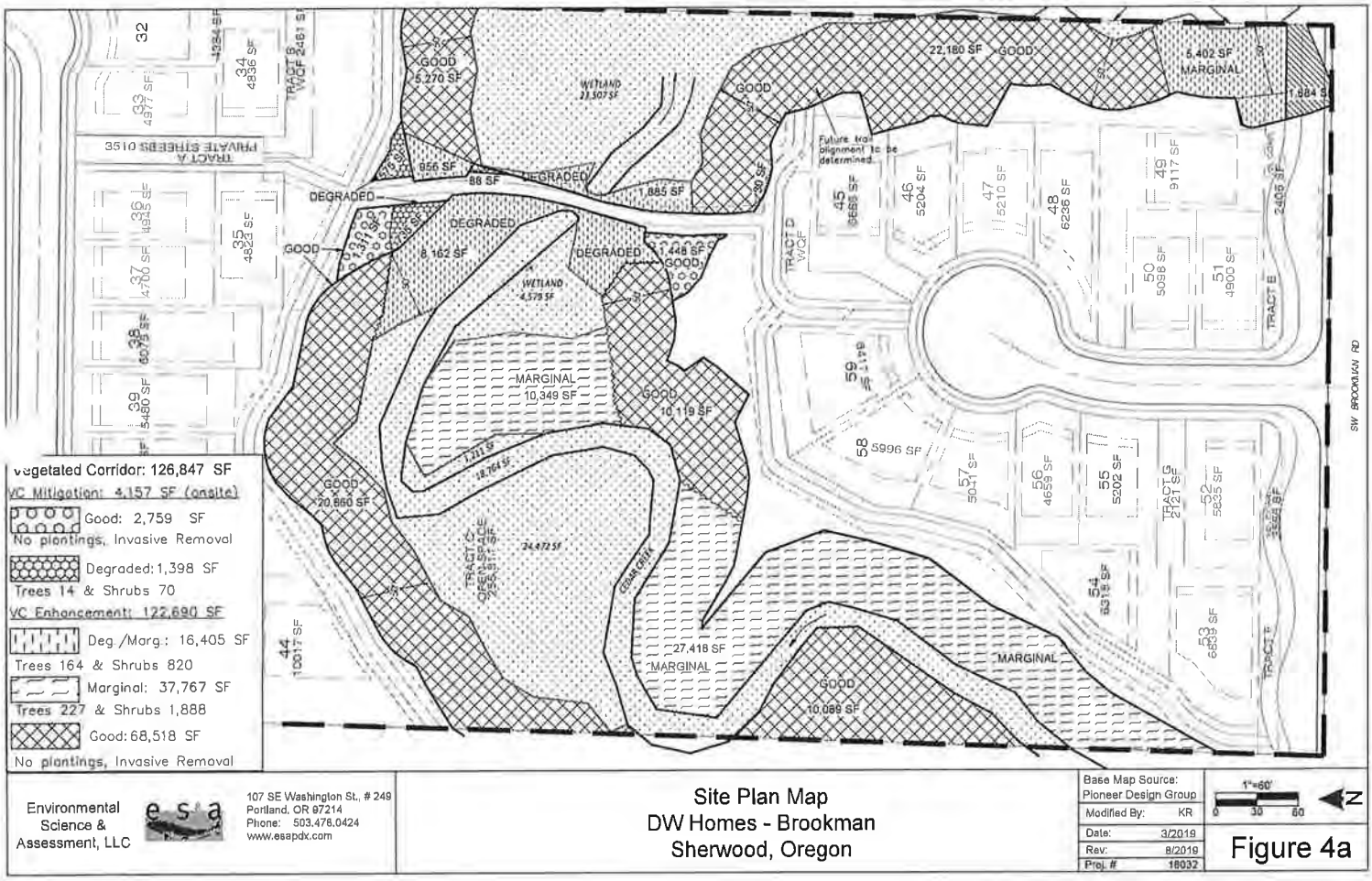
Figure 4



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1"=60'
0 30 60
N

Figure 4a

Attachment B – Wetland Determination Data Forms

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: DW Homes - Brookman Road City/County: Sherwood/Washington Sampling Date: 5/3/19

Applicant/Owner: Aziz Siddiqui State: OR Sampling Point: DP-11

Investigator(s): Kim Reavis Section, Township, Range: S06 T3S R1W

Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): none Slope (%): 16

Subregion (LRR): A-Northwest Forests and Coasts Lat: 45.3436° Long: -122.8531° Datum: N/A

Soil Map Unit Name: Woodburn silt loam, 7-12 percent slopes (45C) NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No X	**Is the Sampled Area within a Wetland?** Yes _____ No X
Hydric Soil Present?	Yes _____	No X	
Wetland Hydrology Present?	Yes _____	No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30' diameter)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 5' diameter)			
1. Corylus cornuta	40	yes	FACU
2. Oemleria cerasiformis	10		FACU
3. Symphoricarpos albus	5		FACU
4.			
5.			
	55 = Total Cover		
Herb Stratum (Plot size: 5' diameter)			
1. Hydrophyllum tenuipes	35	yes	FAC
2. Glechoma hederacea	20	yes	FACU
3. Claytonia sibirica	15		FACU
4. Tellima grandiflora	15		FACU
5. Circaea alpina	10		FAC
6.			
7.			
8.			
9.			
10.			
11.			
	95 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 5

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No X

Remarks:

SOIL

Sampling Point: DP-11

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-11	7.5YR 2.5/2	100					silt loam	
11-15	10YR 4/2	97	10YR 3/4	3	C	M	silt loam	
15-19	10YR 4/2	90	10YR 3/4	10	C	M	silt loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: DW Homes - Brookman Road City/County: Sherwood/Washington Sampling Date: 5/3/19

Applicant/Owner: Aziz Siddiqui State: OR Sampling Point: DP-12

Investigator(s): Kim Reavis Section, Township, Range: S06 T3S R1W

Landform (hillslope, terrace, etc.): flooplain Local relief (concave, convex, none): concave Slope (%): 2

Subregion (LRR): A-Northwest Forests and Coasts Lat: 45.3436° Long: -122.8531° Datum: N/A

Soil Map Unit Name: Woodburn silt loam, 7-12 percent slopes (45C) NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30' diameter)	Absolute % Cover	Dominant Species?	Indicator Status
1. Fraxinus latifolia	70	yes	FACW
2.			
3.			
4.			
	70 = Total Cover		
Sapling/Shrub Stratum (Plot size: 5' diameter)			
1. Ribes divaricatum	15	yes	FAC
2. Symphoricarpus albus	5		FACU
3.			
4.			
5.			
	20 = Total Cover		
Herb Stratum (Plot size: 5' diameter)			
1. Carex obnupta	100	yes	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks:

SOIL

Sampling Point: DP-12

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	7.5YR 2.5/2	100					silt loam	
8-18	7.5YR 2.5/2	60	7.5YR 3/4	10	C	M	silty clay loam	
	7.5YR 3/2	30					silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ___ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: DW Homes - Brookman Road City/County: Sherwood/Washington Sampling Date: 5/3/19

Applicant/Owner: Aziz Siddiqui State: OR Sampling Point: DP-13

Investigator(s): Kim Reavis Section, Township, Range: S06 T3S R1W

Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): none Slope (%): 18

Subregion (LRR): A-Northwest Forests and Coasts Lat: 45.3436° Long: -122.8531° Datum: N/A

Soil Map Unit Name: Woodburn silt loam, 7-12 percent slopes (45C) NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No X	**Is the Sampled Area within a Wetland?** Yes _____ No X
Hydric Soil Present?	Yes _____	No X	
Wetland Hydrology Present?	Yes _____	No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30' diameter)	Absolute % Cover	Dominant Species?	Indicator Status
1. Prunus avium	30	yes	FACU
2.			
3.			
4.			
	30 = Total Cover		
Sapling/Shrub Stratum (Plot size: 5' diameter)			
1. Corylus cornuta	15	yes	FACU
2. Oemleria cerasiformis	10	yes	FACU
3. Holodiscus discolor	5		FACU
4. Symphoricarpos albus	5		FACU
5.			
	45 = Total Cover		
Herb Stratum (Plot size: _____)			
1. Polystichum munitum	45	yes	FACU
2. Circaea alpina	5		FAC
3. Trillium ovatum	trace		FACU
4. Hydrophyllum tenuipes	trace		FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	50 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 50

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No X

Remarks:

SOIL

Sampling Point: DP-13

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-9	7.5YR 2.5/2	100					silt loam	
9-16	7.5YR 3/2	97					silt loam	
	7.5YR 4/2	3						
16-19	10YR 4/2	100					silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: DW Homes - Brookman Road City/County: Sherwood/Washington Sampling Date: 5/3/19

Applicant/Owner: Aziz Siddiqui State: OR Sampling Point: DP-14

Investigator(s): Kim Reavis Section, Township, Range: S06 T3S R1W

Landform (hillslope, terrace, etc.): flooplain Local relief (concave, convex, none): concave Slope (%): <1

Subregion (LRR): A-Northwest Forests and Coasts Lat: 45.3436° Long: -122.8531° Datum: N/A

Soil Map Unit Name: Woodburn silt loam, 7-12 percent slopes (45C) NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30' diameter)	Absolute % Cover	Dominant Species?	Indicator Status
1. Fraxinus latifolia	65	yes	FACW
2.			
3.			
4.			
	65 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. Rosa sp.	15	yes	FAC
2. Ribes divaricatum	trace		FAC
3.			
4.			
5.			
	15 = Total Cover		
Herb Stratum (Plot size: _____)			
1. Carex obnupta	100	yes	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks:

SOIL

Sampling Point: DP-14

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-16	7.5YR 2.5/2	100					mucky silty clay loam	
16-19	7.5YR 3/2	95	7.5YR 3/3	5	C	M		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ✓ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ✓ No ___ Depth (inches): 6

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 2

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: DW Homes - Brookman Road City/County: Sherwood/Washington Sampling Date: 5/3/19

Applicant/Owner: Aziz Siddiqui State: OR Sampling Point: DP-15

Investigator(s): Kim Reavis Section, Township, Range: S06 T3S R1W

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): concave Slope (%): <5

Subregion (LRR): A-Northwest Forests and Coasts Lat: 45.3436° Long: -122.8531° Datum: N/A

Soil Map Unit Name: Woodburn silt loam, 7-12 percent slopes (45C) NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes _____ No X
Hydric Soil Present?	Yes _____ No X	
Wetland Hydrology Present?	Yes _____ No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30' diameter)	Absolute % Cover	Dominant Species?	Indicator Status
1. Fraxinus latifolia	40	yes	FACW
2.			
3.			
4.			
	40 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: _____)			
1. Poa palustris	50	yes	FAC
2. Ranunculus repens	40	yes	FAC
3. Veronica arvensis	5		FACU
4. Carex leptopoda	3		FAC
5. Tellima grandiflora	2		FACU
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks:

SOIL

Sampling Point: DP-15

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-13	7.5YR 2.5/2	100					silt loam	
13-16	7.5YR 3/2	95					silt loam	
13-16	7.5YR 4/1	5					silt loam	
16-19	7.5YR 4/1	60	7.5YR 3/3	40	C	M	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Attachment C – Vegetated Corridor Data Forms

VEGETATED CORRIDOR DATA SHEET

Client/Project Name: DW Homes - Brookman Road	**Site Address: 17117 SW Brookman Road, Sherwood, OR 97140**	**Plot ID: VC -9**
Township/Range/Section: T3S, R1W, S06		
Tax Map: 3S106	**Lot(s): 101**	
Brief Description of Plot Location: south side of stream on the east side of the tax lot		
Site Investigator Name: Kim Reavis	**Date of Investigation: 5/3/19**	
Plant Community Type: forested		

Herbaceous Stratum	Percent Aerial Cover	Percent Relative Cover	Native? (1) Yes	Native? (1) No	Noxious?(2) Yes	Noxious?(2) No	Invasive? (3) Yes	Invasive? (3) No
1 *Telima grandiflora*	40	20	x			x		x
2 *Hydrophyllum tenuipes*	10	5	x			x		x
3		0						
4		0						
5		0						
6		0						
7		0						
8		0						
9		0						
10		0						
Shrub Stratum		0						
1 *Rubus armeniacus*	80	40		x	x		x	
2 *Oemleria cerasiformis*	20	10	x			x		x
3		0						
4		0						
5		0						
6		0						
7		0						
8		0						
9		0						
10		0						
Tree Stratum		0						
1 *Fraxinus latifolia*	50	25	x			x		x
2		0						
3		0						
4		0						
5		0						
6		0						
7		0						
8		0						
9		0						
Total	200	100						

Total percent relative native species cover	60%
Total percent aerial cover of tree canopy	50%
Total percent relative cover of non-native, noxious, and invasive species	40%

	Good Condition (native species >80% of the community and tree canopy >50% aerial cover)
X	Marginal Condition (native species 50-80% of the community and tree canopy 26-50% aerial cover)
	Degraded Condition (native species <50% of the community and tree canopy <25% aerial coverage)

(1) Portland Plant List, 2011.
(2) Noxious Weed List, ODA.
(3) R 07-20, Clean Water Services, June, 2007.

VEGETATED CORRIDOR DATA SHEET

Client/Project Name: DW Homes - Brookman Road	Site Address: 17117 SW Brookman Road, Sherwood, OR 97140	Plot ID: VC -10
Township/Range/Section: T3S, R1W, S06		
Tax Map: 3S106	Lot(s): 101	
Brief Description of Plot Location: southeast of stream		
Site Investigator Name: Kim Reavis	Date of Investigation: 5/3/19	
Plant Community Type: forested		

Herbaceous Stratum	Percent Aerial Cover	Percent Relative Cover	Native? (1) Yes	Native? (1) No	Noxious?(2) Yes	Noxious?(2) No	Invasive? (3) Yes	Invasive? (3) No
1 *Polystichum munitum*	30	16	x			x		x
2 *bareground: 15%*		0						
3		0						
4		0						
5		0						
6		0						
7		0						
8		0						
9		0						
10		0						
Shrub Stratum		0						
1 *Mahonia nervosa*	35	18	x			x		x
2 *Corylus cornuta*	10	5	x			x		x
3 *Prunus emarginata*	10	5	x			x		x
4 *Acer circinatum*	5	3	x			x		x
5 *Rubus ursinus*	5	3	x			x		x
6		0						
7		0						
8		0						
9		0						
10		0						
Tree Stratum		0						
1 *Pseudotsuga menziesii*	70	37	x			x		x
2 *Alnus rubra*	25	13	x			x		x
3		0						
4		0						
5		0						
6		0						
7		0						
8		0						
9		0						
Total	190	100						

Total percent relative native species cover	95%
Total percent aerial cover of tree canopy	95%
Total percent relative cover of non-native, noxious, and invasive species	0%

X	Good Condition (native species >80% of the community and tree canopy >50% aerial cover)
	Marginal Condition (native species 50-80% of the community and tree canopy 26-50% aerial cover)
	Degraded Condition (native species <50% of the community and tree canopy <25% aerial coverage)

trace amounts of Hypochaeris radicata

(1) Portland Plant List, 2011.
(2) Noxious Weed List, ODA.
(3) R 07-20, Clean Water Services, June, 2007.

VEGETATED CORRIDOR DATA SHEET

Client/Project Name: DW Homes - Brookman Road	Site Address: 17117 SW Brookman Road, Sherwood, OR 97140	Plot ID: VC -11
Township/Range/Section: T3S, R1W, S06		
Tax Map: 3S106	Lot(s): 101	
Brief Description of Plot Location: northwest of house, south side of stream		
Site Investigator Name: Kim Reavis	Date of Investigation: 5/3/19	
Plant Community Type: forested (cleard understory)		

Herbaceous Stratum	Percent Aerial Cover	Percent Relative Cover	Native? (1) Yes	Native? (1) No	Noxious?(2) Yes	Noxious?(2) No	Invasive? (3) Yes	Invasive? (3) No
1 *Ranunculus repens*	40	29		X		X		X
2 *Poa palustris*	50	36		X		X		X
3 *Veronica arvensis*	5	4		X		X		X
4 *Telima grandiflora*	5	4	X			X		X
5		0		X		X		X
6		0						
7		0						
8		0						
9		0						
10		0						
Shrub Stratum		0						
1		0						
2		0						
3		0						
4		0						
5		0						
6		0						
7		0						
8		0						
9		0						
10		0						
Tree Stratum		0						
1 *Fraxinus latifolia*	40	29	X					
2		0						
3		0						
4		0						
5		0						
6		0						
7		0						
8		0						
9		0						
Total	140	100						

Total percent relative native species cover	33%
Total percent aerial cover of tree canopy	40%
Total percent relative cover of non-native, noxious, and invasive species	67%

	Good Condition (native species >80% of the community and tree canopy >50% aerial cover)
X	Marginal Condition (native species 50-80% of the community and tree canopy 26-50% aerial cover)
	Degraded Condition (native species <50% of the community and tree canopy <25% aerial coverage)

(1) Portland Plant List, 2011.
(2) Noxious Weed List, ODA.
(3) R 07-20. Clean Water Services, June, 2007.

VEGETATED CORRIDOR DATA SHEET

Client/Project Name: DW Homes - Brookman Road	Site Address: 17117 SW Brookman Road, Sherwood, OR 97140	Plot ID: VC -12
Township/Range/Section: T3S, R1W, S06		
Tax Map: 3S106	Lot(s): 101	
Brief Description of Plot Location: Located on the south side of the stream, down slope of the development		
Site Investigator Name: Kim Reavis	Date of Investigation: 5/3/19	
Plant Community Type: forested (cleared understory)		

Herbaceous Stratum	Percent Aerial Cover	Percent Relative Cover	Native? (1) Yes	Native? (1) No	Noxious?(2) Yes	Noxious?(2) No	Invasive? (3) Yes	Invasive? (3) No
1 *Polystichum munitum*	5	8	x			x		x
2 *bare ground 95%*		0						
3		0						
4		0						
5		0						
6		0						
7		0						
8		0						
9		0						
10		0						
Shrub Stratum		0						
1		0						
2		0						
3		0						
4		0						
5		0						
6		0						
7		0						
8		0						
9		0						
10		0						
Tree Stratum		0						
1 *Fraxinus latifolia*	30	46	x			x		x
2 *Alnus rubra*	30	46	x			x		x
3		0						
4		0						
5		0						
6		0						
7		0						
8		0						
9		0						
Total	65	100						

Total percent relative native species cover	100%
Total percent aerial cover of tree canopy	60%
Total percent relative cover of non-native, noxious, and invasive species	0%

	Good Condition (native species >80% of the community and tree canopy >50% aerial cover)
X	Marginal Condition (native species 50-80% of the community and tree canopy 26-50% aerial cover)
	Degraded Condition (native species <50% of the community and tree canopy <25% aerial coverage)

This community is Marginal due to lack of shrub cover

(1) Portland Plant List, 2011.
(2) Noxious Weed List, ODA.
(3) R 07-20. Clean Water Services, June, 2007.

VEGETATED CORRIDOR DATA SHEET

Client/Project Name: DW Homes - Brookman Road	Site Address: 17117 SW Brookman Road, Sherwood, OR 97140	Plot ID: VC -13
Township/Range/Section: T3S, R1W, S06		
Tax Map: 3S106	Lot(s): 101	
Brief Description of Plot Location: north of stream on the far west side of the site		
Site Investigator Name: Kim Reavis	Date of Investigation: 5/3/19	
Plant Community Type: forest		

Herbaceous Stratum	Percent Aerial Cover	Percent Relative Cover	Native? (1) Yes	Native? (1) No	Noxious?(2) Yes	Noxious?(2) No	Invasive? (3) Yes	Invasive? (3) No
1 *Hydrophyllum tenuipes*	75	33	x			x		x
2 *Urtica dioica*	15	7	x			x		x
3 *Polystichum munitum*	5	2	x			x		x
4 *Tellima grandiflora*	5	2	x			x		x
5 *Gallium aparine*	5	2	x			x		x
6 *Phalaris arundinacea*	5	2		x	x		x	
7		0						
8		0						
9		0						
10		0						
Shrub Stratum		0						
1 *Ribes divaricatum*	15	7	x					
2 *Symphoricarpos albus*	15	7	x					
3 *Rubus armeniacus*	5	2		x	z		z	
4		0						
5		0						
6		0						
7		0						
8		0						
9		0						
10		0						
Tree Stratum		0						
1 *Fraxinus latifolia*	75	33	x					
2 *Crataegus douglasii*	10	4	x					
3		0						
4		0						
6		0						
6		0						
7		0						
8		0						
9		0						
Total	230	100						

Total percent relative native species cover	4%
Total percent aerial cover of tree canopy	85%
Total percent relative cover of non-native, noxious, and invasive species	96%

x	Good Condition (native species >80% of the community and tree canopy >50% aerial cover)
	Marginal Condition (native species 50-80% of the community and tree canopy 26-50% aerial cover)
	Degraded Condition (native species <50% of the community and tree canopy <25% aerial coverage)

trace amounts of Hypochaeris radicata

(1) Portland Plant List, 2011.
(2) Noxious Weed List, ODA.
(3) R 07-20. Clean Water Services, June, 2007.

VEGETATED CORRIDOR DATA SHEET

Client/Project Name: DW Homes - Brookman Road	Site Address: 17117 SW Brookman Road, Sherwood, OR 97140	Plot ID: VC -14
Township/Range/Section: T3S, R1W, S06		
Tax Map: 3S106	Lot(s): 101	
Brief Description of Plot Location: north side of stream, further east of VC-13		
Site Investigator Name: Kim Reavis	Date of Investigation: 5/3/19	
Plant Community Type: forested		

Herbaceous Stratum	Percent Aerial Cover	Percent Relative Cover	Native? (1) Yes	Native? (1) No	Noxious?(2) Yes	Noxious?(2) No	Invasive? (3) Yes	Invasive? (3) No
1 *Polystichum munitum*	50	22	x			x		x
2 *Hydrophyllum tenuipes*	30	13	x			x		x
3 *Trillim ovatum (trace)*	0	0	x			x		x
4 *Pteridium aquilinum (trace)*	0	0	x			x		x
5 *bareground: 20%*	0	0						
6		0						
7		0						
8		0						
9		0						
10		0						
Shrub Stratum		0						
1 *Symphoricarpos albus*	25	11	x			x		x
2 *Corylus cornuta*	15	7	x			x		x
3 *Oemleria cerasiformis*	10	4	x			x		x
4 *Prunus emarginata*	5	2	x			x		x
5		0						
6		0						
7		0						
8		0						
9		0						
10		0						
Tree Stratum		0						
1 *Pseudotsuga menziesii*	70	31	x			x		x
2 *Prunus emarginata*	20	9	x			x		x
3		0						
4		0						
5		0						
6		0						
7		0						
8		0						
9		0						
Total	225	100						

Total percent relative native species cover	0%
Total percent aerial cover of tree canopy	90%
Total percent relative cover of non-native, noxious, and invasive species	100%

X	Good Condition (native species >80% of the community and tree canopy >50% aerial cover)
	Marginal Condition (native species 50-80% of the community and tree canopy 26-50% aerial cover)
	Degraded Condition (native species <50% of the community and tree canopy <25% aerial coverage)

trace amounts of Hypochaeris radicata

(1) Portland Plant List, 2011.
(2) Noxious Weed List, ODA.
(3) R 07-20, Clean Water Services, June, 2007.

Clean Water Services File Number

Sensitive Areas Certification Form

1. Property Information *(example 1S234AB01400)*

Tax lot ID(s): 3S1060000100

Site Address: 17045 SW Brookman

City, State, Zip: Sherwood, OR 97140

Nearest Cross Street: SW Ladd Hill Road

2. Owner Information

Name: Gerald & Liz Ouellette

Company:

Address: 17045 SW Brookman

City, State, Zip: Sherwood, OR 97140

Phone/Fax:

E-Mail: liz.ouellette222@gmail.com

3. Development Activity *(check all that apply)*

- ☐ Addition to Single Family Residence (rooms, deck, garage)
- ☐ Lot Line Adjustment
- ☐ Minor Land Partition
- ☐ Residential Condominium
- ☐ Commercial Condominium
- ☒ Residential Subdivision
- ☐ Commercial Subdivision
- ☐ Single Lot Commercial
- ☐ Multi Lot Commercial

Other

4. Applicant Information

Name: Mike Irwin

Company: Weekley Homes, LLC

Address: 1930 Thoureau Dr., Suite 160

City, State, Zip: Scheumburg, IL 60173

Phone/Fax:

E-Mail: Mirwin@dwmoes.com

5. Check any of the following that apply to this project.

- ☐ Adds less than 500 square feet of impervious surface.
- ☐ Does not encroach closer to the Sensitive Area than existing development on the property.
- ☐ Is not located on a slope greater than 25%.

6. Applicant Information

Name: Jack Dalton

Company: Environmental Science & Assessment, LLC

Address: 107 SE Washington Street, #249

City, State, Zip: Portland, OR 97214

Phone/Fax: 503-478-0424

E-Mail: jack@esapdx.com

7. Will the project involve any off-site work? ☒ Yes ☐ No ☐ Unknown *(check appropriate box)*

If yes, location and description of off-site work Frontage work within SW Brookman Road ROW

8. Additional comments or information that may be needed to understand your project

2550 SW Hillsboro Highway Hillsboro, Oregon 97123
Phone: 503.681.3600 Fax: 503.681.3603 cleanwaterservices.org

Clean Water Services

Clean Water Services File Number

Sensitive Areas Certification Form *(continued)*

9. An on-site, water quality sensitive area reconnaissance was completed on:

Date	By	Title	Company
5/2/18 and 3/27/19	Kim Reavis and Jack Dalton	Wetland Scientists	ES&A,LLC

10. Existence of Water Quality Sensitive Areas *(check all appropriate boxes)*

As defined in the Districts Design and Construction Standards:

A. Water-quality-sensitive areas ☒ do ☐ do not exist on the tax lot.

B. Water-quality-sensitive areas ☒ do ☐ do not exist within 200' on adjacent properties, or ☐ unable to evaluate adjacent property.

C. Vegetated corridors ☒ do (53,264 SF) ☐ do not exist on the tax lot.

D. Vegetated corridors ☒ do ☐ do not exist within 200' on adjacent properties, or ☐ unable to evaluate adjacent property

E. Impacts to sensitive areas and/or vegetated corridors will occur ☒ On-site ☐ Off-site ☐ None proposed at this time.

F. If impacts, mitigation is ☒ On-site ☐ Off-site ☒ Other PTP with Wetland A removal

11. Simplified Site Assessment containing the following information: *(check only items submitted).*

Please refer to Design and Construction Standards 17-05 section 3.02.2 for application requirements.

- ☐ Complete Certification Form *(2 pages)*
- ☐ Written description of the site and proposed activity.
- ☐ Site plan of the entire property.
- ☐ Photographs of the site labeled and keyed to the site plan.

12. Standard Site Assessment containing the following information: *(check only items submitted).*

Please refer to Design and Construction Standards 17-05 section 3.02.2 for application requirements.

- ☒ Complete Certification Form (2 pages)
- ☒ Written description per Design and Construction Standards 17-05 section 3.13.3 b. 1
- ☒ Wetland Data sheets
- ☒ Vegetated Corridor Data sheets
- ☒ Existing Site Condition Figures
- ☒ Proposed Development Figures

By signing this form the Owner, or Owner's authorized agent or representative, acknowledges and agrees that employees of Clean Water Services have authority to enter the project site at all reasonable times for the purpose of inspecting project site conditions and gathering information related to the project site.

I certify that I am familiar with the information contained in this document, and to the best of my knowledge and belief, this information is true, complete, and accurate.

Applicant:

JACK DALTON	ENV. P.M.
Print/Type Name	Print/Type Title
Signature	3/29/19
	Date

2550 SW Hillsboro Highway Hillsboro, Oregon 97123
Phone: 503.681.3600 Fax: 503.681.3603 cleanwaterservices.org

Clean Water Services

Table of Contents

List of Appendices

INTRODUCTION

Environmental Science & Assessment, LLC (ES&A) was contracted by David Weekley Homes to conduct a site assessment on 9.93-acre site at 17045 SW Brookman in Sherwood, Oregon (Figure 1). The study area includes one tax lot located in Section 6, Township 3 South, Range 1 West: Tax Lot 100 on Washington County's assessor's map 3S106 (Figure 2).

SITE DESCRIPTION

The site is located with the Brookman Addition community in the south end of Sherwood, Oregon (Figure 1). The site is a large acre parcels bordered by a residential subdivision to the north and the Cedar Creek riparian corridor to the east and west (Figure 2). A driveway extends into the site from SW Brookman Road and crosses Cedar Creek at a culvert in the middle of the site and continues to the residence north of the creek (Photo 1). The site includes a single family home, several barns, out buildings and structures for livestock. The north end of the site is used primarily as pasture for livestock, storage for landscaping materials and a small horse corral. The southern end of the site is forested with a riparian forested community along Cedar Creek and a short tributary flowing north from SW Brookman Road to a confluence with Cedar Creek in the middle of the site (Figure 3).

The residence was built in 1991 and the site has been managed in its current condition since that time. The subdivision to the north was built in 1997. Surrounding parcels to the south and east are large acreage with single family homes. The parcels to the west are large acreage single-family properties that area all slated for residential development.

Landscaping surrounds the residence north of the Cedar Creek corridor. The eastern edge of the property is a mixed riparian forest community comprised of Douglas fir (*Pseudotsuga menziesii*), red alder (*Alnus rubra*), bitter cherry (*Prunus emarginata*), Oregon ash (*Fraxinus latifolia*) with a canopy cover of up to 80 percent. Understory species include mainly native species such as beaked hazelnut (*Corylus cornuta*), vine maple (*Acer circanatum*), red elderberry (*Sambucus racemosa*), snowberry (*Symphoricarpos albus*) and swordfern (*Polystichum munitum*), taperfruit shortscale sedge (*Carex leptopoda*) and along the driveway and in the southern end of site, there is extensive cover of invasive species such as English ivy (*Hedera helix*) and Himalayan blackberry (*Rubus armeniacus*). The plant community in the north end of site around Wetland A is primarily non-native pasture grasses and weedy species such as bentgrass (*Agrostis* sp.), velvet grass (*Holcus lanatus*), self-heal (*Prunella vulgaris*) and oxeye daisy (*Leucanthemum vulgare*).

The topography slopes from the north and south ends to the middle of site along the Cedar Creek riparian corridor. The forested slopes from Cedar Creek and the small tributary in south end range from 20 percent to 42 percent. The topographyat the north end is generally flat within the pasture areas with a small depression in the northwest corner.

The soils within the north end of the study area are mapped as Aloha silt loam (Map Unit 1) and Woodburn silt loam, 3 to 7 percent slopes (45B). Both of these soil types have very low hydric ratings; 1 rating. In the south end, along the Cedar Creek channel and tributary, soils include Verboort silty clay loam (42) and Wapato silty clay loam (43). Both of these soil types have high hydric ratings; 100 and 92 rating respectively. The south end of site is mapped a non-hydric soil, Woodburn silt loam, 3 to 7 percent slopes (44B), with a hydric soil rating of 3.

The site is outside the study area for the Sherwood Local Wetlands Inventory (LWI) map and the National Wetland Inventory (NWI) maps Cedar Creek as a Palustrine Forested (PFO) wetland. Additionally, the Brookman Addition Concept Plan maps Class 1 Riparian along the Cedar Creek corridor. The wetlands documented on-site are generally the same as mapped on the Brookman Addition Concept Plan. Wetland A was not mapped by any resource mapping in north end.

METHODOLOGY

The primary guidance document for this report is the *Design and Construction Standards for Sanitary Sewer and Surface Water Management* (Resolution and Order 17-05; Clean Water Services, 2017), which provides the methodology for assessing the presence and extent of Sensitive Areas (SAs) within the development site and within 200 feet of the site, and the required Vegetated Corridors (VCs) adjacent to them.

Two levels of investigation were used to evaluate the presence or absence of Sensitive Areas. The first level included a review of existing and available background data. The second level consisted of a data collection effort conducted during an on-site evaluation.

Reviewed background data included the following information:

- U.S. Geological Survey (USGS) 1:24,000 Topographic Map (MetroMap 2013).
- U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) Map Washington County, OR area (Wetlands Mapper, 2019)
- Sherwood Local Wetlands Inventory (David Evans, Inc, 1992)
- Natural Resource Conservation Service (NRCS) *Soil Survey of Washington County Area, Oregon* (Web Soil Survey, 2019)
- Brookman Addition Concept Plan – Final Report (Otak 2009)

ES&A wetland scientists, Jack Dalton and Kim Reavis conducted the site investigations on May 2, 2018, May 16, 2018 and a brief follow up on March 27, 2019 to check hydrology on site. ES&A collected wetland determination data collected at ten (10) locations to define the wetland boundaries (Figure 3). The wetland is documented by wetland delineation data forms DP-1 through DP-10

(Appendix C). CWS VC data was recorded at eight (8) VC data plots to characterize the adjacent VC (Appendix D).

Wetland A is defined by DP -1 and DP-2. Off-site wetland delineation for the property directly west of Wetland A did not map any wetland connecting to the Wetland A depression and this delineation was concurred by DSL in June 2018 (WD 2018-0275).

The wetlands along Cedar Creek are all hydrologically connected to the main creek channel and the small tributary extending along the southeastern property boundary (Figure 3). The Cedar Creek channel flows through a culvert for the property driveway in the middle of the site, but otherwise is in a natural state within a broad floodplain.

The wetland delineation data was collected using the methodology provided in the *Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)* (USACE, 2010).

The Sensitive Area boundaries and the data plot locations were flagged in the field and subsequently surveyed on the base map with topography, stream location, structures and tax lot boundaries prepared by Pioneer Design Group, a professional land surveyor (Figure 3). The vegetated corridor data locations (VC1 –VC8) were mapped by measurements from known locations on the base survey.

SENSITIVE AREAS

Two (2) wetland areas (Wetland A, Cedar Creek Wetlands), and the main Cedar Creek channel are mapped within the study area (Figure 3). Stream flows west to east through the middle of site and extends off-site to the northeast. Wetland A is an isolated from the creek floodplain and located on the north end of site (Figure 3).

Wetland A

Wetland A totals 4,208 square feet (0.01 acres) and is an isolated Palustrine forested/ Flats wetland (PFO/FLAT) (Figure 3, 3a). The wetland is located in the north end of the site (Photo 2). Wetland A is hydrologically isolated from the other wetlands on site and has no downstream connection to off-site wetlands or waters due to the existing residential development. The wetland determination data plots associated with Wetland A are DP-1 and DP-2 (Appendix C).

The plant community within and adjacent to Wetland A is primarily non-native pasture grasses and weeds such as bentgrass, velvet grass, self-heal and oxeye daisy. Shrub and tree cover is absent and the surrounding pasture is actively grazed by horses (Photo 3)

Wetland A occurs within a topographic low point on north end and source hydrology is overland from offsite to the west and from on-site south and east of wetland. Wetland indicators are high seasonal groundwater and collection of overland flow and seasonal surface water.

Hydric soils met Redox Dark Surface (F6) and Depleted Matrix (F3) indicators (Appendix B).

Cedar Creek Wetlands

The Cedar Creek Wetlands are Palustrine Forested and Riverine Flow-Through (PFO/RFT), totaling 29,015 square feet, (0.67 acres) is located within the middle of site (Figure 3). The wetlands are located both north and south of the Cedar Creek channel and along the western edge of the small tributary in the southeast end of site (Photo 4).

The vegetation is primarily mature Oregon ash forest and near the culvert crossing the understory is of mixed native and non-native herbaceous species including reed canarygrass (*Phalaris arundinacea*, FACW), creeping buttercup (*Ranunculus repens*, FACW) and on the west end slough sedge (*Carex obnupta*, OBL) (Photos 4 and 5). Shrub cover within and along the wetlands includes, Nootka rose (*Rosa nutkana*), vine maple (*Acer circanatum,* FAC), red elderberry (*Sambucus racemosa,* FACU) and snowberry. Other tree cover in the south end of site includes Douglas fir , red alder, bitter cherry and Douglas hawthorn (*Crataegus douglasii,* FAC).

Hydrology is primarily seasonal surface water ponding, high water table, water marks and geomorphic position. The hydric soils met Redox Dark Surface (F6) and Depleted Matrix (F3) indicators (Appendix B). The wetland determination data plots associated with Wetland B are DP-3 DP-4, DP-5, DP-6, DP-7, DP-8, DP 9 & DP-10 (Appendix C).

Cedar Creek

The Cedar Creek channel flows west to east through the middle of site, through a culvert for the property driveway and extends off-site to the northeast (Photo 1). A short tributary flowing north from SW Brookman Road along the southeastern end of site to a confluence with Cedar Creek in the middle of the site (Figure 3).

The riparian forested community bordering both sides of Cedar Creek extends approximately 200 feet. The stream channel is 6 to 8 feet wide at the Ordinary High Water (OHW) line and is bordered by wetland on both sides (Figure 3). The vegetative community is forested wetland comprised of species already discussed for the associated wetlands above.

VEGETATED CORRIDORS

The total area of vegetated corridor is 53,264 square feet on site (Figure 3). Eight (8) vegetated corridor plots were taken to identify the condition of the vegetated corridor. The VC along the south tributary is primarily in good condition with a small area at south end of site that is marginal condition (VC-1, VC-2 & VC-3). VC north and south of the Cedar Creek channel is a mix of good and degraded condition, with the areas closest to the existing culvert in degraded condition and the rest of the forested slopes in good condition (VC-4 to VC-7). The corridor adjacent to the isolated Wetland A in north end of site is primarily pasture and in degraded condition (VC-8) (Figure 3). See Photos 4, 5 and 6 (Figure 3)

The VC width for Wetland A is 25 feet based on less than 25% slopes and the wetland being under 0.5 acres.

The VC width for most of the corridor along Cedar Creek is 50 feet in areas of less than 25% slopes. A 25 percent break in slope line on the southeast end of site was determined based on CWS methodology (R&O 17-05). Two areas in the southeast end have slopes greater than 25 %. The northern most area is within good condition corridor, so the 35-foot off-set from the slope break is used. The southern-most steep sloped area occurs in moderate condition corridor so the VC boundary is off-set 15 feet from break (Photo 6). The slope break was determined using the base topographic map provided by Pioneer Design Group, Inc (Figure 3, 3a, 3b). A geotech consultant has evaluated the slope stability and approved the 15-foot slope break setback and this report will be provided to CWS Environmental Plan Review.

PROPOSED SITE PLAN

The proposed project is a 46-lot residential subdivision, with access off of SW Brookman for the southern portion of subdivision and access from the west for the north portion of subdivision. This site plan clusters lot development north and south of the Cedar Creek open space tract and provides a trail connection between the two areas by utilizing the existing gravel driveway and culvert crossing in middle of site. Roadway access for the north end enters the north end of the site at two points, connecting to planned road alignments in the adjacent proposed subdivision to the west.

This site plan utilizes a Sherwood code option that allows a 5% reduction in the lot width as long as the equivalent area is provided in the open space tract for site, which allows this site plan to maximize the open space in middle of site. Two water quality tracts (Tract B and D) are located north and south of the Cedar Creek open space in middle of site which is the topographic points of site (Figure 4).

Wetland Impacts

The site plan proposes to remove the isolated small Wetland A (4,208 sf) in north end of the site with the development of Lots 1 and 2 (Figure 4, 4a). The plan avoids all impacts to the Cedar Creek wetlands and floodplain in the middle of the site.

Vegetated Corridor Impacts

Proposed VC impacts include the 5,327 square-foot 25-foot VC (4,674 sf on-site/ 653 sf off-site) associated with the removal of Wetland A in the north end of site (Figure 4).

Impacts also result in south end of site for trail and frontage improvements along SW Brookman Road, both of which are required by Sherwood development standards. The trail extension in southeast end is terminated at the edge of Good VC, minimizing trail impacts, but a small impact (30sf) is still required to get the trail around the WQ facility north of Lot 40 and this is considered Tier 2 impact (Figure 4-4a).

There is also a small area of VC impact which will result from frontage improvements in south end of site (1684sf) and will be in marginal VC so not Tier 2 impact. There is also some existing VC encroachment that will remain in south end of property where the existing fill slope along SW Brookman Road extends east from the existing property driveway to a culvert on SW Brookman Road for the off-site tributary (Figure 4-4a).

CWS TIER 2 ALTERNATIVES ANALYSIS

The preferred site plan will result in sensitive area and CWS VC encroachment including of Wetland A (4,208 sf) impacts and the associated 5327 square-foot 25-foot VC (4,674 sf on-site/ 653 sf off-site) impacts. These impacts require a Tier 2 Alternatives Analysis under district standards (CWS 3.07.4).

Site Plan Elements/Constraints

The proposed DW Homes Brookman subdivision development plan follows the planning requirements established in the Brookman Addition Community Plan and Sherwood municipal code. The site development is limited generally by a segment of Cedar Creek and associated wetland and riparian forest buffer, which extends west to east through the middle of the site (Figure 3). These resources split the site into a north and south development area and will be conserved in a large open space tract in the middle of site.

Site development constraints also include the following:

- Provide a north-south access to southern lots from SW Brookman Road.
- Connect to road access from proposed subdivision west of the north end of site.

- Existing subdivision directly north provides no roadway access
- Locate the water quality and detention facility in middle of site in the lower topography north and south of the Cedar Creek riparian corridor.
- Wetland A occurs within a topographic low point on north end and source hydrology is overland from offsite to the west and from on-site south and east of wetland (Appendix E – Exhibit A)

Alternatives Analysis Criteria

Criteria used for the DW Homes Brookman development Alternative Analysis include:

1. Provide residential lots that meet the Sherwood municipal zoning requirements, with a minimum density of 34 lots and maximum of 48 lots.
2. Cluster development and reduce lot sizes as much as possible to maximize the open space tract in middle of site.
3. Minimize roadway access impacts to sensitive areas as much as feasible, while still meeting Sherwood transportation requirements.
4. Avoid wetland and Cedar Creek floodplain impacts and minimize associated CWS VC impacts as much as feasible.

Alternatives

Three (3) alternatives were considered in the alternatives analysis. Alternative site plans are provided in Attachment E.

Alternative A

This alternative site plan provides 46 residential units, with access off of SW Brookman for the southern portion of subdivision and access from the west for the north portion of subdivision. This site plan clusters lot development north and south of the Cedar Creek open space tract and provides a trail connection between the two areas by utilizing the existing gravel driveway and culvert crossing in middle of site. Roadway access for the north end enters north end at two points, connecting to established roadways in the adjacent proposed subdivision to the west. This site plan utilizes a Sherwood code option that allows a 5% reduction in the lot width as long as the equivalent area is provided in the open space tract for site, which allows the site plan to maximize the open space in middle of site.

This plan also minimizes trail and frontage improvements as much as possible. The trail in southeast end of site is terminated at the edge of Good condition VC (northeast of Lot 40). Any future trail alignment extension east will be dependent upon a trail crossing through the creek on the adjacent parcel and would be permitted at that time. The frontage improvements for Brookman minimize impacts to a 3-lane half street standard, instead of the 5-lane standard called for on the long term county transportation plan.

This site plan avoids all impacts to the Cedar Creek wetlands and floodplain. This plan proposes to remove Wetland A in north end of the site with the development of Lots 1 and 2. The direct wetland impacts total 4,208 square feet and CWS VC impacts total 5,327 square feet (4,674 sf on-site/ 653 sf off-site). Due to the topography around Wetland A, the northern roadway providing access to the northern lots will eliminate the source hydrology to the wetland, by capturing all surface water flow along the roads within the on-site storm plan. The proposed adjacent subdivision to the west will also effectively eliminate any hydrology drainage to Wetland A from off-site in the same way in that storm system. While this site plan directly impacts Wetland A and the 25-foot VC, the source hydrology will also be cut off, eliminating the wetland anyway (Alternative A – Attachment E).

Criteria Analysis:

1. Provides residential lots that meet the Sherwood municipal zoning requirements, with a minimum density of 34 lots and maximum of 48 lots.: ***Criteria Met***
2. Clusters development and reduces lot sizes as much as possible to maximize the open space tract in middle of site: ***Criteria Met***
3. Minimizes roadway access impacts to sensitive areas as much as feasible, while still meeting Sherwood transportation requirements: ***Criteria Met***
4. Avoids wetland and Cedar Creek floodplain impacts and minimizes impacts Wetland A and CWS VC as much as possible, but unavoidable loss of hydrologic source will impact Wetland A indirectly anyway: ***Criteria Met***

Alternative B

This alternative site plan provides 44 residential units instead of 46, with access off of SW Brookman Road for the southern portion of subdivision and access from the west for the north portion of subdivision. This site plan clusters lot development north and south of the Cedar Creek open space tract and provides a trail connection between the two areas by utilizing the existing gravel driveway and culvert crossing in middle of site. Roadway access for the north end enters north end at two points, connecting to established roadways in the adjacent proposed subdivision to the west. This site plan has larger lot sizes in the south end and considered using standard lots sizes with standard widths. The larger lots have the potential to increase the development footprint towards the Cedar Creek corridor from the north and south, thus reducing the open space tract in middle of site.

This plan meets the city and county requirements for trail and frontage improvements as much as possible. The trail in southeast end of site extends into the Good condition VC up to the 100-yr floodplain line (northeast of Lot 40). The future trail alignment extension to the east boundary will be completed upon a trail crossing through the creek on the adjacent parcel and would be permitted at that time. The frontage improvements for Brookman impacts a larger area of

VC in south end by meeting 5-lane half street standard called for on the long term county transportation plan.

This site plan avoids all impacts to the Cedar Creek wetlands and floodplain, but the open space north and south of creek would be smaller than Alternative A. This plan was considered to see if impacts to Wetland A (4,208 sf) and 25-foot VC (5,327 sf) could be avoided by eliminating Lots 1 and 2. However, the northern road access will still eliminate the source hydrology to Wetland A, by capturing all surface water flow along the roads within the on-site storm plan. And the adjacent subdivision to the west will still effectively eliminate any hydrology drainage to Wetland A from off-site. The attempt to avoid direct impacts to Wetland A and the 25-foot VC does not preserve the resources, since the source hydrology will still be interrupted and indirectly impact the wetland and VC anyway (Alternative B – Attachment E).

Criteria Analysis:

1. Provides residential lots that meet the Sherwood municipal zoning requirements, with a minimum density of 34 lots and maximum of 48 lots.: ***Criteria Met***
2. Clusters development, but does not reduce lot sizes as much as possible under Sherwood code, so open space are is not maximized in middle of site: ***Criteria Not Met***
3. Minimizes roadway access impacts to sensitive areas as much as feasible, while still meeting Sherwood Brookman Addition Concept Plan transportation requirements: ***Criteria Met***
4. Avoids direct wetland and CWS VC and Cedar Creek floodplain impacts, and minimizes direct impacts, but unavoidable loss of hydrologic source will impact Wetland A indirectly anyway: ***Criteria Met***

Alternative C

This alternative site plan provides 44 residential units instead of 46, with access off of SW Brookman for the southern portion of subdivision. This alternative looked at providing access to northern lot development from the south by extending a roadway across the Cedar Creek open space corridor and eliminates the northern roadway access point to try to eliminate impacts to Wetland A hydrology. This site plan still clusters lot development north and south of the Cedar Creek open space tract but would expand the access through the middle of the site to include both vehicle and trail connection between the two areas along the existing gravel driveway and culvert crossing in middle of site. Road access for the north end connects at one point only from the adjacent proposed subdivision to the west. This site plan utilizes a Sherwood code option that allows a 5% reduction in the lot width.

This plan meets the city and county requirements for trail and frontage improvements as much as possible. The trail in southeast end of site extends into the Good condition VC up to the 100-yr floodplain line (northeast of Lot 40). The future trail alignment extension to the east boundary will be completed upon

a trail crossing through the creek on the adjacent parcel and would be permitted at that time. The frontage improvements for Brookman impacts a larger area of VC in south end by meeting 5-lane half street standard called for on the long term county transportation plan.

This site plan results in impacts to the Cedar Creek wetlands and floodplain (approximately 6840 sf of additional wetland and VC impact), and the open space north and south of creek would be smaller than Alternative A or B with the expanded travel corridor from south. This plan would presumable avoid direct Wetland A (4,208 sf) and 25-foot VC (5327 sf) impacts in north end of the site by eliminating Lots 1 and 2 and adjacent roadway. However, the northern will still eliminate the source hydrology to Wetland A, by capturing surface water flow to wetland from the east within the on-site storm plan. Additionally, the adjacent subdivision to the west will still effectively eliminate any hydrology drainage to Wetland A from off-site. The attempt to avoid direct impacts to Wetland A and the 25-foot VC with an alternative roadway access does not preserve the resources, since the source hydrology will still be interrupted partially and indirectly impact these resources anyway and results in larger wetland and VC impacts along Cedar Creek (Alternative C – Attachment E).

Criteria Analysis:

1. Provides residential lots that meet the Sherwood municipal zoning requirements, with a minimum density of 34 lots and maximum of 48 lots.: ***Criteria Met***
2. Clusters development and reduces lot sizes as much as possible to maximize the open space tract in middle of site: ***Criteria Met***
3. Additional roadway access impacts to sensitive areas will result, while attempting to still meet Sherwood transportation requirements: ***Criteria Not Met***
4. Results in direct wetland and CWS VC and Cedar Creek floodplain impacts, while eliminating direct impacts to Wetland A, but unavoidable loss of hydrologic source will still impact Wetland A indirectly anyway: ***Criteria Not Met***

Preferred Alternative

Alternative A is the preferred alternative since it meets all the criteria. All other alternatives considered do not meet at least one of the design criteria and do not provide large open space tracts in both the southwest and southeast ends.

The preferred site plan avoids all impacts to the Cedar Creek wetlands and floodplain. This plan proposes to remove Wetland A in north end of the site with the development of Lots 1 and 2, with direct wetland impacts totaling 4,208 square feet and CWS VC impacts totaling 5327 square feet. The northern roadway access and the adjacent subdivision to the west will eliminate the source hydrology to Wetland A, by capturing all surface water flow along the roads as part of the subdivision developments, so the source hydrology both from on-site and off-site will be blocked, effectively eliminating Wetland A

anyway. Unavoidable loss of Wetland A will result, even if not impacted directly (Alternative A – Attachment E).

This plan also minimizes trail and frontage improvements as much as possible. The trail in southeast end of site is terminated at the edge of Good condition VC avoiding 369 square feet of impact. The future trail alignment extension east will be evaluated with the future trail crossing through the creek on the adjacent parcel and would be permitted at that time. The frontage improvements for Brookman minimize impacts to a 3-lane half street design standard, instead of the 5-lane standard called for on the long term county transportation plan (Alternative A – Attachment E).

Section 3.07.4.C Criteria

1. *Mitigation is provided in accordance with Section 3.08*. The proposed site plan will impact CWS VC with both roadway and lot development. The VC impacts totaling 2083 square feet will be mitigated on site within the large open space tract in south end. The through payment to provide (PTP) for the impacts to the isolated Wetland A (4,208 sf) and 25-foot VC totaling 5,327 square feet (4,674 sf on-site/ 653 sf off-site) in the north end. Including the SW Brookman Road frontage improvements and a small area of unavoidable trail impact, total CWS VC encroachment is 7,041 square feet. PTP mitigation is provided for the Wetland A VC removal (5,327 SF). The other mitigation is provided on-site, totaling 4,157 square feet, which includes enhancement of several degraded areas north of creek and an two areas of good condition habitat with invasive removal only – all located in the Cedar Creek open space tract.

2. *Replacement mitigation protects Vegetated Corridor function and values*. VC functions impacted by trail encroachment will be offset with VC mitigation areas along Cedar Creek corridor totaling greater acreage than the impact acreage. VC functions are also preserved by maintaining a 35 foot slope setback for the good condition VC in south end. VC functions lost with the elimination of Wetland A in north end will be provided by the purchase of wetland mitigation bank credits and CWS PTP. The mitigation bank credits will offset the lost wetland functions, which are minimal for this wetland. Elimination of the Wetland A and associated VC will not greatly impact the existing function of the local watershed, since the wetland is currently isolated from any surrounding wetland or waters by the existing subdivision to the north.

3. *Enhancement of replacement area to Good Condition.* A total of 16,145 square feet of existing VC (Degraded and Marginal Condition) will be enhanced along the sensitive areas in the north and south end along the Cedar Creek corridor to district standards. Good condition corridor totaling 30,731 square feet will have invasive removal only. The Marginal VC outside of the first 50 feet (731 sf) is also included in the enhancement

area to maximize the ecological benefit to the sensitive areas in south end where the highest invasive cover is currently present.

4. *District Stormwater Connection Permit is likely to be issued based on proposed plans.* The project engineer has submitted a preliminary storm drainage report with the land use application to city of Hillsboro. Upon acceptance of the Tier 2, construction plans with the proposed storm water treatment plan will be submitted with the goal to achieve a Stormwater Connection Permit.

5. *Location of development and site planning minimizes incursion into the Vegetated Corridor*. The preferred site plan minimizes VC encroachment by clustering the lot development to then north and south end the site and reducing the lot sizes. The preferred site plan maximizes the open space area in the middle of the site and maintains a direct connection to off-site habitat east and west of the site. VC is preserved by maintaining a 35 foot slope setback for the good condition VC in south end. The only wetland impacts are of the small isolated Wetland A in north end that is already cut off from the surrounding watershed. And the VC functions associated with Wetland A lost by removal will not be significant to the watershed since the wetland is already cut off from the downstream watershed.

6. *No practicable alternative to location of the development exists that will not disturb the Sensitive Area or Vegetated Corridor*. The preferred alternative clusters development and avoids all impacts to the Cedar Creek wetlands and floodplain in the middle of site. This plan results in unavoidable impacts to Wetland A in north end of the site with the development of Lots 1 and 2, with direct wetland impacts (4,208 sf) and CWS VC totaling 5,327 square feet (4,674 sf on-site/ 653 sf off-site). The site plan alternatives that attempted to avoid direct impact to Wetland A were found to be unfeasible since they either resulted in greater wetland impacts in another part of site or result in indirect impacts to the wetland by cutting off source hydrology to the wetland. Unavoidable loss of Wetland A hydrology will result in any alternative, even if not impacted directly, since the adjacent subdivision to the west and the required on-site storm system will eliminate source hydrology to the wetland regardless. This plan also minimizes trail and frontage improvements as much as possible. The trail in southeast end of site is terminated at the edge of Good condition VC avoiding 369 square feet of impact. The Brookman frontage improvements minimize impacts by using a 3-lane half street design standard instead of a 5-lane standard..

7. Proposed encroachment provides public benefits. The site plan provides a 4,157 square foot mitigation area within an approximately 2.5-acre open space in the central and southeast portions of the site. The mitigation for trail and road improvement impacts provides a 1.6:1 mitigation area to impact area and will preserve the hydrologic functions of the Cedar Creek wetland and floodplain in the large open space area beyond the base VC

setback in the middle of the site. Marginal VC outside of the first 50 feet (731 sf) is also included in the enhancement area to maximize the ecological benefit to sensitive areas where invasive cover is highest. The large contiguous open space area in the middle and southeast end of site will provide water quality public benefit to serve the surrounding Cedar Creek and downstream Tualatin River watershed. Wetland and VC functions lost with the elimination of Wetland A in north end will be replaced by the purchase of wetland mitigation bank credits and CWS PTP. The mitigation bank credits will offset the lost wetland functions, which are minimal for this wetland, by providing off-site benefits within a wetland mitigation bank.

Functional Assessment

A functional assessment was prepared for a small wetland in the north end of a 9.93-acre DW Homes Brookman development to meet the CWS Tier 2 Alternatives Analysis (CWS 3.07.4) requirements.

The methodology outlined in the Guidebook for *Hydrogeomorphic (HGM)-based Assessment of Oregon Wetland and Riparian Sites I. Willamette Valley Ecoregion Riverine Impounding and Slope/Flats Subclasses Volume IA: Assessment Methods* (Adamus, 2001) was used as the basis for the functional assessments.

A segment of Cedar Creek flows north through the site and two associated wetland areas were mapped along the channel. A small isolated wetland (Wetland A) is located in the northwest corner of the site in a small depression in a pasture, which is hydrologically isolated from the creek. The assessment includes only the Wetland A (Figure 3). Hydrologic connections are not present between the wetland and surrounding waters due to it being cut off by a subdivision built in 1997 directly north of the project site (Figure 3).

Wetland A is a small isolated palustrine emergent (PEM)/SLOPE wetland, totaling 0.01 acres (Figure 3). Wetland A is generally a low to moderate functioning wetland due to the past and current landuse for grazing and pasture.

The moderate scoring functions include:

- Sediment Stabilization & Phosphorus Retention (sp)
- Nitrogen Removal (n)
- Primary Production (pp)
- Amphibian & Turtle Habitat (at)
- Songbird Habitat Support (sb)

The lower scoring functions include:

- Water Storage & Delay (ws)
- Invertebrate Habitat Support (i)

- Wintering & Migrating Waterbird Support (ww)
- Support of Characteristic Vegetation (v)

The following were found to provide no functionality at this site:

- Breeding Waterbird Support (bw)

No functions rated high. The moderate scoring functions are a result of a marginal to degraded vegetative community and the lack of an outlet, which captures overland flow and is isolated from surrounding riparian or other wetland habitat.

The lower and non-scoring functions are primarily due to lack of open water and permanent inundation, lack of dead wood and hummocks, low percentage and distribution of pools, and lack of aerial canopy cover and shrubs.

The detailed functional assessment is provided in Attachment F.

VEGETATED CORRIDOR ENHANCEMENT/ MITIGATION/

VC Enhancement

The total post-development VC area is 49,353 square feet. This includes 46,507 square feet of existing VC and 2,846 square feet of VC mitigation area. All areas will be brought up to "Good" condition as per district standards (Section 3.14.2, Table 3-3 of R&O 17-05) in accordance with CWS landscape requirements (CWS *Design and Construction Standards* Chapter 3, Appendix A). The enhancements will include native tree and shrub plantings in the Degraded and Moderate condition VC and invasive plant removal in Degraded, Moderate and good condition corridor as necessary.

The VC Enhancement Area (16,145 SF) is a mix of Degraded and Marginal areas; but due to the presence of invasive species and areas lacking shrub cover, the enhancement planting densities are 100 percent of the CWS base planting requirements..

The Good condition VC enhancement areas (30,362 SF) will be enhanced by invasive removal only (no plantings) in all areas of invasive cover or bare ground that exceed 25 square feet.

Total VC Enhancement plantings: 161 trees and 907 shrubs

See Figure 4-4a for planting areas.

VC Mitigation

Mitigation Areas (4,157 SF) include three areas of Degraded condition habitat north of the Cedar Creek culvert crossing, totaling 1,398 square feet. The other two areas are Good condition habitat outside the 50-foot VC, south and north of

the culvert crossing, totaling 2,759 square feet. Plantings are proposed in Degraded areas only at 100 percent of the CWS base planting requirement for shrubs and 100 percent of the base planting requirement for trees. Good areas will have invasive removal only.

Total plantings: 14 trees and 70 shrubs

See Figure 4-4a for planting areas.

Planting Guidelines

Final locations of enhancement plantings will be determined in the field based on site conditions following the removal of the invasive non-native species. After plant removal, all areas of bare ground within the good condition and planting areas that exceed 25 square feet upon removal of the invasive non-native species shall be planted to CWS density standards (shrubs 5 foot on center spacing and trees 10-foot on-center spacing).

Table 1 is a suggested list of native species that can be planted in the VC enhancement and VC mitigation areas. Table 2 provides a seed mix for the enhancement area for use as erosion and sediment control. Additionally, it is recommended that the plantings in Table 1 each be mulched with 0.5 cubic feet of approved mulch material following planting installation. This will suppress weed growth around the plantings and promote soil moisture retention for the plantings during the growing season.

The plant list and planting densities is subject to final approval from CWS environmental review staff. A condition of the Service Provider Letter will be to coordinate with CWS on the final quantity and placement of the enhancement plantings.

Table 1: Recommended Plant List for VC Enhancement/ Mitigation Areas A

Common Name	Scientific Name	Plant Form/Size [1]	Plant Spacing (ft on center)	Total Number of plants
VC ENHANCEMENT and MITGATION AREAS (46,507 SF & 2,846 SF)				
Trees				***175***
Vine Maple	*Acer circinatum*	Bare root/18"	10 ft O.C.	---[2]
Big leaf maple	*Acer macrophyllum*	2 gal/36"	10 ft O.C.	---[2]
Red alder	*Alnus rubra*	2 gal/36"	10 ft O.C.	---[2]
Douglas fir	*Pseudotsuga menziesii*	2 gal/36"	10 ft O.C.	---[2]
Western red cedar	*Thuja plicata*	2 gal/36"	10 ft O.C.	---[2]
Shrubs				***977***
Red-osier dogwood	*Cornus sericea*	Bare root/18"	single	---[2]
Twinberry	*Lonicera involucrata*	1 gal/18"	single	---[2]
Tall Oregon Grape	*Mahonia aquifolium*	Bare root/18"	Clustered 2 ft O.C.	---[2]
Osoberry	*Oemleria cerasiformis*	2 gal/24"	cluster	---[2]
Swordfern	*Polystichum munitum*	2 gal/na	cluster	---[2]
Pacific nine-bark	*Physocarpus capitatus*	Bare root/18"	Clustered 2 ft O.C.	---[2]
Nootka Rose	*Rosa nutkana*	Bare root/18"	Clustered 2 ft O.C.	---[2]
Thimbleberry	*Rubus parviflorus*	Bare root/18"	Clustered 2 ft O.C.	---[2]
Salmonberry	*Rubus spectabilis*	2 gal/36"	5 ft O.C.	---[2]
Oceanspray	*Holodiscus discolor*	1 gal/18"	single	---[2]
Snowberry	*Symphoricarpos albus*	Bare root/18"	Clustered 2 ft O.C.	---[2]
			TOTAL	**1152**

NOTES: [1] Substitutes for plant form and species may be used based on availability. [2] Individual species quantities to be determined in landscape plan.

Table 2. Planting Area Seed Mix

Common Name	Scientific Name	Percentage of Seed Mix **
Native Wildflower/Grass Mix		
Spike bentgrass	*Agrostis exarata*	20
California Oat Grass	*Danthonia californica*	20
Blue wildrye	*Elymus glaucus*	30
Red Fescue	*Festuca rubra* ssp. *rubra*	15
	TOTAL	**100**

*Seeding rate of pure live seed (PLS) in 30 pounds per acre for hydroseed application. **Seed mix application quantity is to be calculated for VC planting area and is subject to availability and measure PLS.

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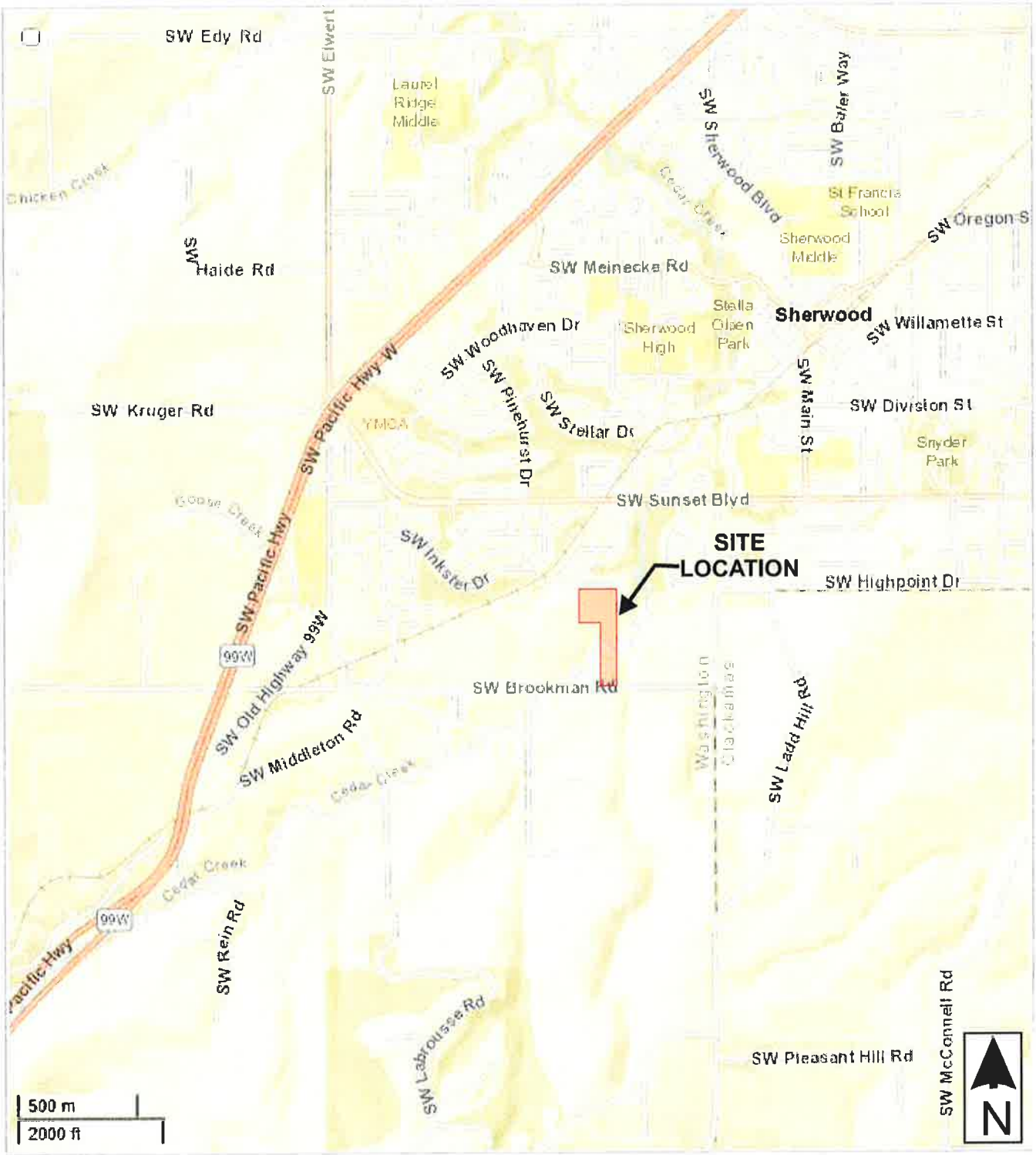
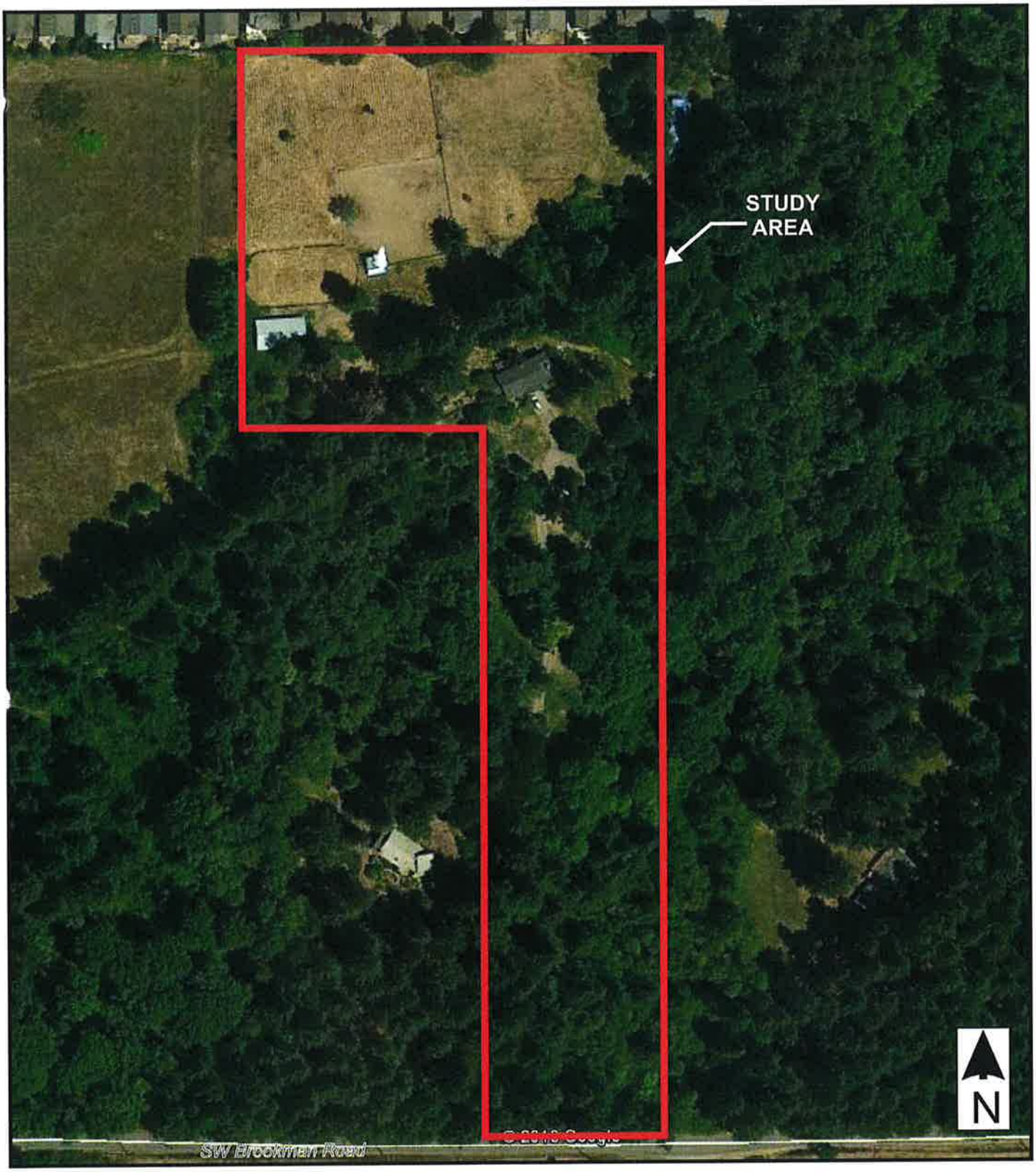
APPENDIX A: FIGURES



Source: Metro Data Resource Center. http://gis.oregonmetro.gov/metromap/

Environmental Science & Assessment, LLC	Vicinity Map DW Homes - Brookman Sherwood, Oregon	Figure 1 Approx. Scale: 1in. = 2,000 ft.



Source: Google Earth.

Imagery Date: 2018

Environmental Science & Assessment, LLC	Aerial Photograph DW Homes - Brookman Sherwood, Oregon	Figure 2 Not to Scale

Vegetated Corridor: 53,264 SF

Degraded: 15,417 SF
Marginal: 7,086 SF
Good: 30,761 SF

● Wetland Data Plot
■ VC Data Plot
1 ➤ Photo Point
Sensitive Areas: 33,223 SF

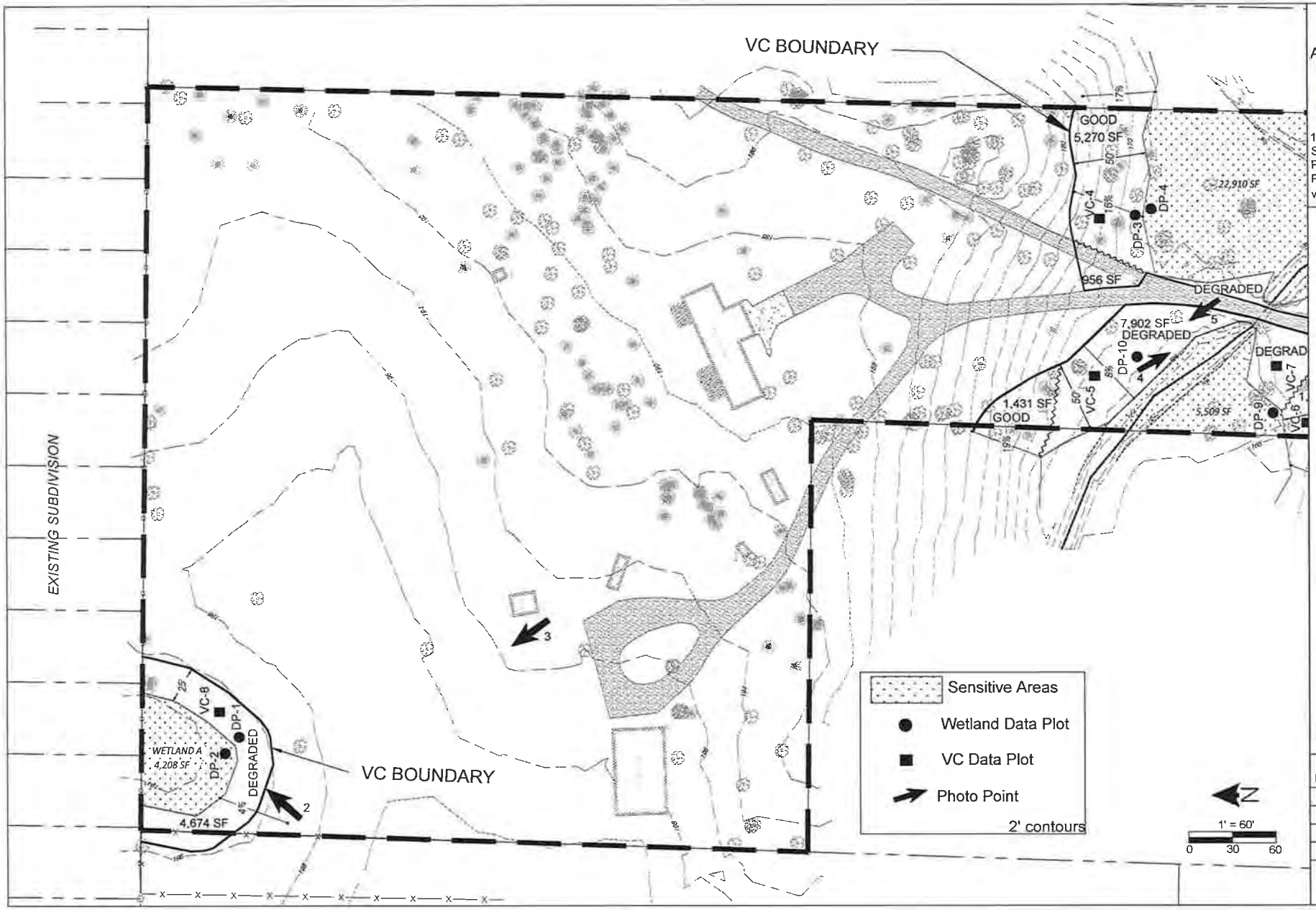
N
1" = 100'
0 50 100

Environmental Science & Assessment, LLC
107 SE Washington St., Suite 249
Portland, OR 97214
Phone: 503.478.0424
www.esapdx.com

Existing Conditions Map
DW Homes - Brookman
Sherwood, Oregon

Base Map Source:	Pioneer Design Group
Modified By:	KR
Date:	3/2019
Job:	18032
Rev:	4/2019

Figure 3



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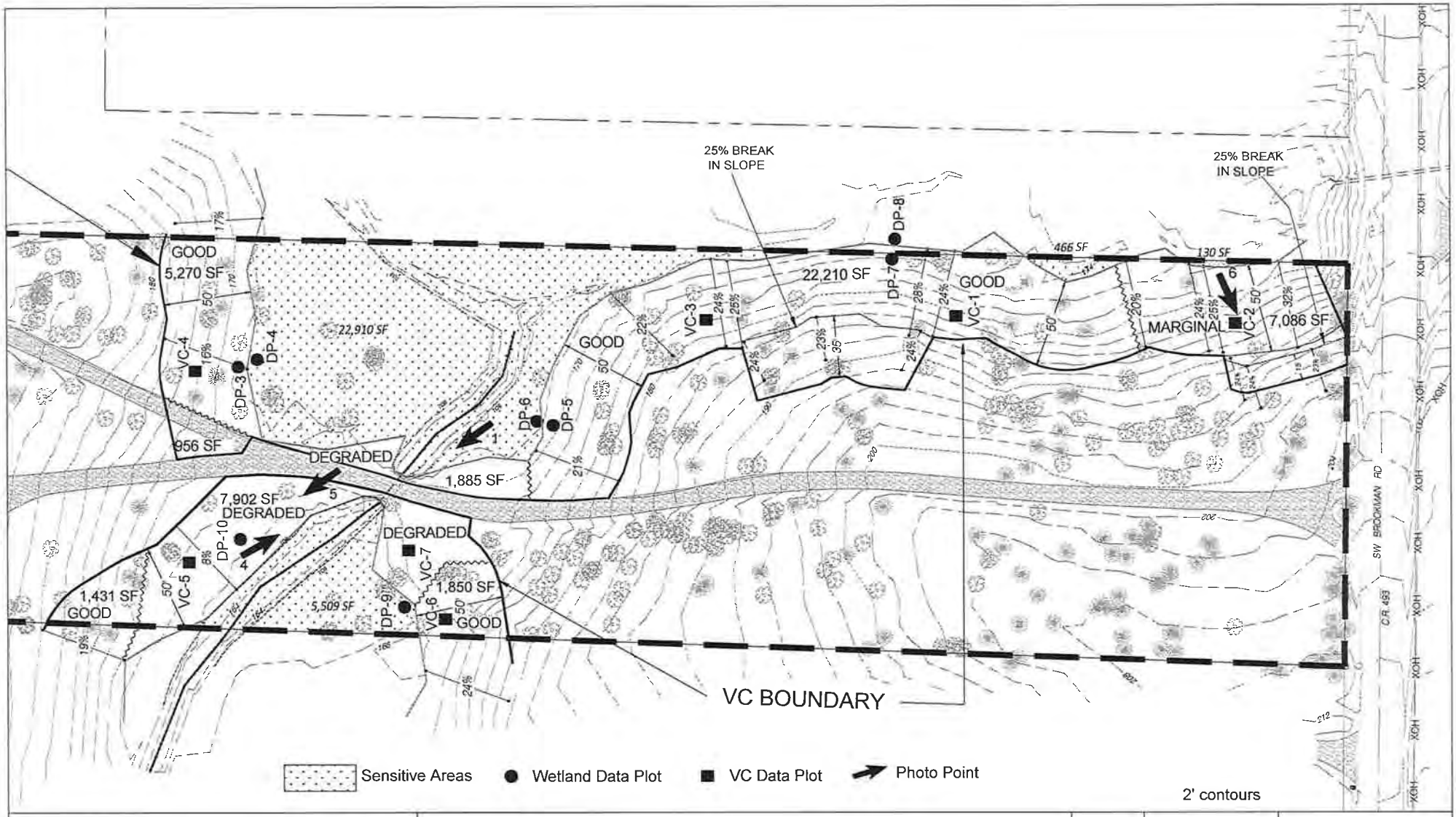
Sherwood, Oregon

Base Map Source:	Pioneer Design Group
Modified By:	KR
Date:	3/2019
Job:	18032
Rev:	4/2019

Figure 3a



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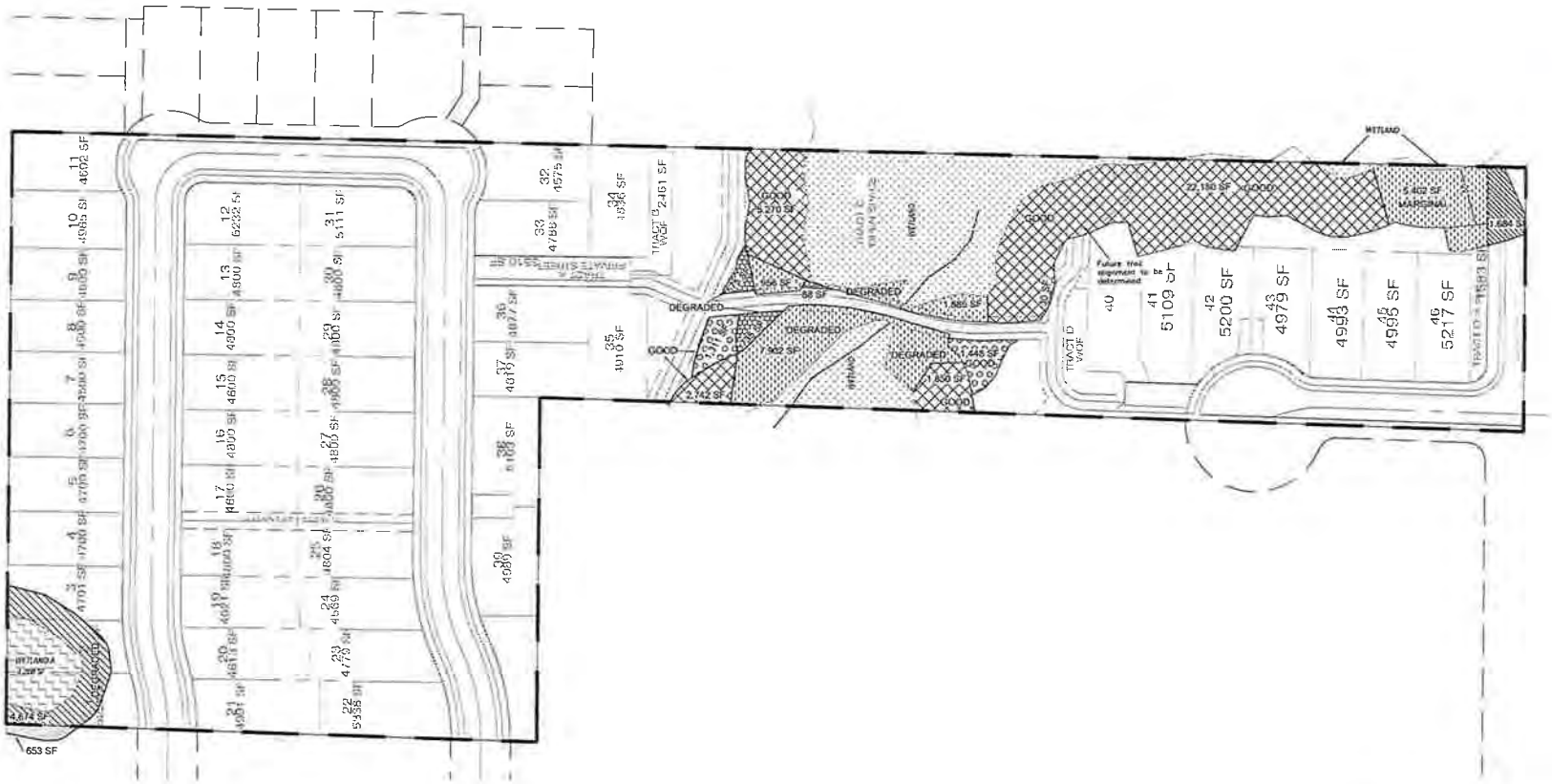
Existing Conditions Map
DW Homes - Brookman
Sherwood, Oregon

Base Map Source: Pioneer Design Group
Modified By: KR
Date: 3/2019
Rev: 4/2019
Proj. # 18032

1"=50'
0 25 50

Figure 3b



Wetland A Impacts: 4,208 SF

VC Permanent Impacts: 7,041 SF
(5,327 SF & 1,714 SF)

Total VC Mitigation: 9,484 SF

Onsite Mitigation 4,157 SF; (2.4:1 Ratio)
PTP Mitigation: 5,327 SF

Vegetated Corridor: 51,033 SF

VC Mitigation: 4,157 SF (onsite)

Good: 2,759 SF
No plantings, Invasive Removal

Degraded: 1,398 SF
Trees 14 & Shrubs 70

VC Enhancement: 46,867 SF

Degraded/Marginal 16,145 SF
Trees 161 & Shrubs 807

Good Condition: 30,731 SF
No plantings, Invasive Removal

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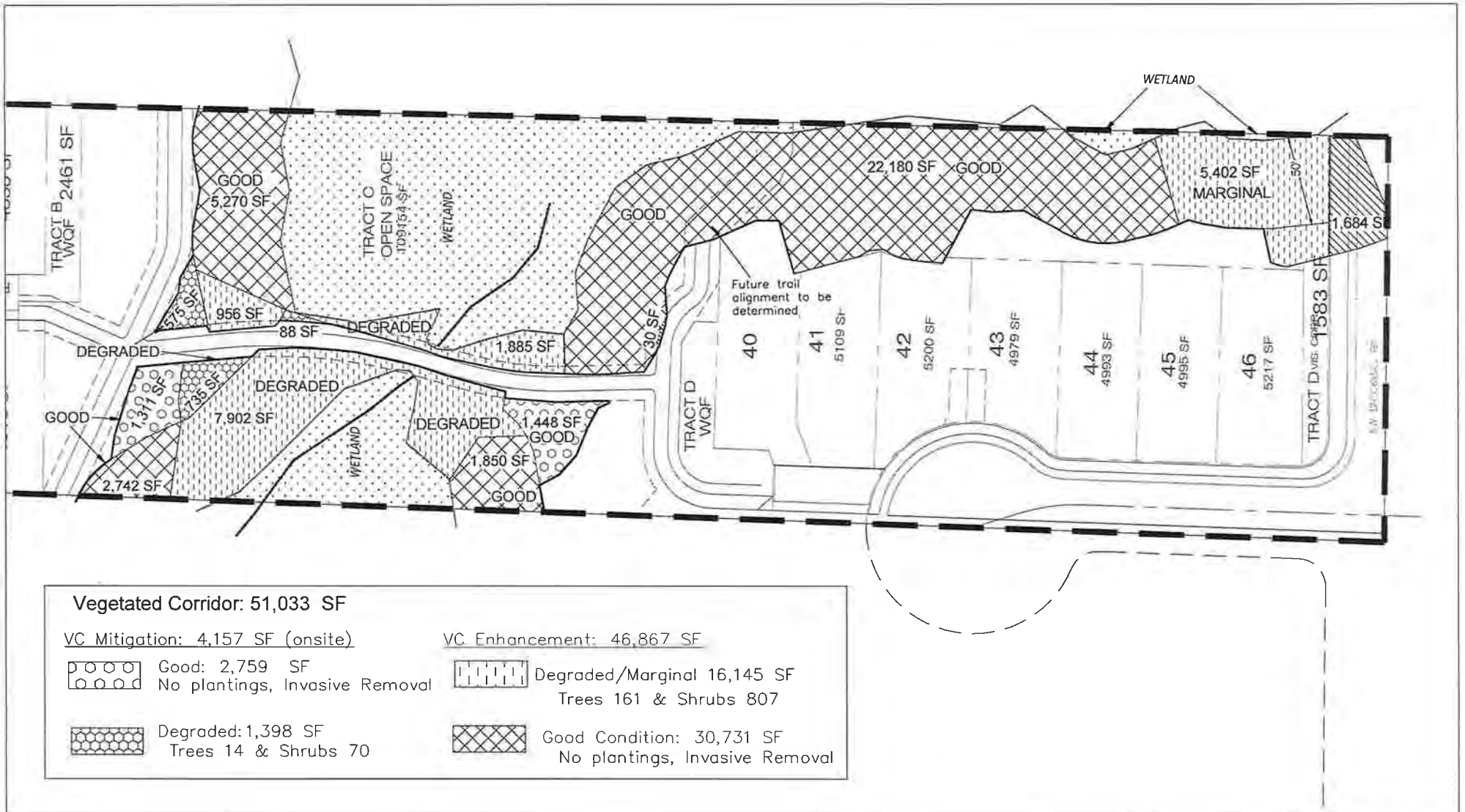
Site Plan
DW Homes - Brookman
Sherwood, Oregon

Base Map Source:	Pioneer Design Group
Modified By:	KR
Date:	3/2019
Job:	18032
Rev:	4/2019

Figure 4



Vegetated Corridor: 51,033 SF

VC Mitigation: 4,157 SF (onsite)

- Good: 2,759 SF — No plantings, Invasive Removal
- Degraded: 1,398 SF — Trees 14 & Shrubs 70

VC Enhancement: 46,867 SF

- Degraded/Marginal 16,145 SF — Trees 161 & Shrubs 807
- Good Condition: 30,731 SF — No plantings, Invasive Removal

Environmental Science & Assessment, LLC

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Site Plan Map
DW Homes - Brookman
Sherwood, Oregon

Base Map Source:	Pioneer Design Group
Modified By:	KR
Date:	3/2019
Rev:	4/2019
Proj. #	18032

1"=50'
0 25 50
N

Figure 4a

APPENDIX B: SITE PHOTOGRAPHS

Photo 1: View NW of Cedar Creek culvert/ driveway.

Photo 2: View NE of Wetland A in NW corner of site.

Photo 3: View NW of pasture/barn structure in the north end of site.

Photo 4: View SE of Cedar Creek corridor and riparian forest south of channel.

Photo 5: View NW of wetland/ riparian forest N of Cedar Creek.

Photo 6: View SW of marginal VC in SE corner of site.

APPENDIX C: WETLAND DETERMINATION DATA FORMS

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: DW Homes - Brookman Road City/County: Sherwood/Washington Sampling Date: 5/2/18

Applicant/Owner: Aziz Siddiqui State: OR Sampling Point: DP-1

Investigator(s): Kim Reavis Section, Township, Range: S06 T3S R1W

Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): concave Slope (%): <5

Subregion (LRR): A-Northwest Forests and Coasts Lat: 45.313163° Long: -122.756347° Datum: N/A

Soil Map Unit Name: Aloha silt loam (1) NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes _____ No X
Hydric Soil Present?	Yes _____ No X	
Wetland Hydrology Present?	Yes _____ No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30' diameter)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: _____)			
1. Agrostis sp.	55	yes	FAC
2. Holcus lanatus	25	yes	FAC
3. Leucanthemum vulgare	25	yes	FACU
4. Prunella vulgaris	10		FACU
5. Anthoxanthum odoratum	5		FACU
6. Hypochaeris radicata	trace		FACU
7.			
8.			
9.			
10.			
11.			
	120 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks:

SOIL

Sampling Point: DP-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-16	7.5YR 2.5/3	100			C	M	silt loam	no redox
16-19	10YR 3/2	40			C	M	silty clay loam	
	10YR 4/2	45	10YR 3/6	15	C	M	silty clay loam	
19-21	10YR 4/2	80	10YR 3/6	20	C	M	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: No hydrology - soils somewhat moist at 21".

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: DW Homes - Brookman Road City/County: Sherwood/Washington Sampling Date: 5/2/18

Applicant/Owner: Aziz Siddiqui State: OR Sampling Point: DP-2

Investigator(s): Kim Reavis Section, Township, Range: S06 T3S R1W

Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): _____ Slope (%): <5

Subregion (LRR): A-Northwest Forests and Coasts Lat: 45.313163° Long: -122.756347° Datum: N/A

Soil Map Unit Name: Huberly silt loam (2) NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30' diameter)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: _____)			
1. Agrostis sp.	100	yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100* = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks: * trace amounts of Prunella vulgaris and Juncus

SOIL

Sampling Point: DP-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/2	93	10YR 3/6	7	C	PL	silt loam	
4-12	10YR 3/1	60	7.5YR 3/3	40	C	M	silty clay loam	
12-16	10YR 3/1	60					silty clay loam	
	10YR 4/2	30	10YR 3/4	10	C	M	silty clay loam	
16-20	10YR 4/2	85	10YR 3/6	15	C	M	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): 1" (2019)

Water Table Present? Yes ✓ No _____ Depth (inches): 21" (2018)

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 18" (2018)

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: May 2 , 2018 Site Visit - Saturation at 18", standing water at bottom of pit at 21", slow to come in. Bright red OR's in upper 3". Depleted OR's down to 12". March 27, 2019 Site Visit - Surface water and high seasonal groundwater was observed in wetland.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: DW Homes - Brookman Road City/County: Sherwood/Washington Sampling Date: 5/2/18

Applicant/Owner: Aziz Siddiqui State: OR Sampling Point: DP-3

Investigator(s): Kim Reavis Section, Township, Range: S06 T3S R1W

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): convex Slope (%): <10

Subregion (LRR): A-Northwest Forests and Coasts Lat: 45.344260° Long: -122.851572° Datum: N/A

Soil Map Unit Name: Wapato silty clay loam (43) NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes _____ No _____
Hydric Soil Present?	Yes _____ No X	
Wetland Hydrology Present?	Yes _____ No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30' diameter)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pseudotsuga menziesii	40	yes	FACU
2. Crataegus douglasii	15	yes	FAC
3. Frangula purshiana	15	yes	FAC
4.			
	70	= Total Cover	
Sapling/Shrub Stratum (Plot size: _____)			
1. Rubus armeniacus	15	yes	FAC
2. Prunus sp.	5	yes	FACU
3. Ribes divaricatum	5	yes	FAC
4.			
5.			
	25	= Total Cover	
Herb Stratum (Plot size: _____)			
1. Polystichum munitum	40	yes	FACU
2. Carex obnupta	30	yes	OBL
3. Frangula purshiana	15		FAC
4. Geranium molle	10		NL
5. Galium aparine	5		FACU
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____	= Total Cover	

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 62 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks:

SOIL

Sampling Point: DP-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	7.5YR 2.5/3	100			C	M	silt loam	
12-16	7.5YR 3/2	95	5YR 3/4	5	C	M	silt loam	root refusal at 16"

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: DW Homes - Brookman Road City/County: Sherwood/Washington Sampling Date: 5/2/18

Applicant/Owner: Aziz Siddiqui State: OR Sampling Point: DP-4

Investigator(s): Kim Reavis Section, Township, Range: S06 T3S R1W

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): concave Slope (%): <5

Subregion (LRR): A-Northwest Forests and Coasts Lat: 45.344260° Long: -122.851572° Datum: N/A

Soil Map Unit Name: Wapato silty clay loam (43) NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30' diameter)	Absolute % Cover	Dominant Species?	Indicator Status
1. Fraxinus latifolia	40	yes	FACW
2.			
3.			
4.			
	40 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. Cornus sericea	25	yes	FACW
2. Prunus sp.	10	yes	FACU
3. Rosa nutkana	5		FAC
4. Ribes divaricatum	5		FAC
5. Crataegus douglasii	5		FAC
	50 = Total Cover		
Herb Stratum (Plot size: _____)			
1. Carex obnupta	95	yes	OBL
2. Tellima grandiflora	5		FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks:

SOIL

Sampling Point: DP-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-7	7.5YR 2.5/3	100			C	M		
7-14	7.5YR 3/2	95	7.5YR 3/4	5	C	M	silty clay loam	
14-18	7.5YR 3/2	90	7.5YR 3/4	10	C	M	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): _____

Water Table Present? Yes ____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: DW Homes - Brookman Road City/County: Sherwood/Washington Sampling Date: 5/2/18

Applicant/Owner: Aziz Siddiqui State: OR Sampling Point: DP-5

Investigator(s): Jack Dalton Section, Township, Range: S06 T3S R1W

Landform (hillslope, terrace, etc.): flooplain Local relief (concave, convex, none): convex Slope (%): <10

Subregion (LRR): A-Northwest Forests and Coasts Lat: 45.3446° Long: -122.8527° Datum: N/A

Soil Map Unit Name: Wapato silty clay loam (43) NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes _____ No X
Hydric Soil Present?	Yes _____ No X	
Wetland Hydrology Present?	Yes _____ No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30' diameter)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus rubra	60	yes	FAC
2. Fraxinus latifolia	10		FACW
3.			
4.			
	70	= Total Cover	
Sapling/Shrub Stratum (Plot size: _____)			
1. Corylus cornuta	35	yes	FACU
2. Sambucus racemosa	25	yes	FACU
3.			
4.			
5.			
	60	= Total Cover	
Herb Stratum (Plot size: _____)			
1. Hydrophyllum tenuipes	45	yes	FAC
2. Urtica dioica	25	yes	FAC
3. Tellima grandiflora	15		FACU
4. Athyrium filix-femina	10		FAC
5. Geranium molle	5		NL
6. Galium aparine	5		FACU
7.			
8.			
9.			
10.			
11.			
	105	= Total Cover	
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____	= Total Cover	

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 60 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks:

SOIL

Sampling Point: DP-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 3/2	100			C	M	silt loam	
16-20	10YR 3/2	98	10YR 3/6	2	C	M	silt loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: none above 20" pit. DP on slope above active floodplain.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: DW Homes - Brookman Road City/County: Sherwood/Washington Sampling Date: 5/2/18

Applicant/Owner: Aziz Siddiqui State: OR Sampling Point: DP-6

Investigator(s): Jack Dalton Section, Township, Range: S06 T3S R1W

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): concave Slope (%): <10

Subregion (LRR): A-Northwest Forests and Coasts Lat: 45.3446° Long: -122.8527° Datum: N/A

Soil Map Unit Name: Wapato silty clay loam (43) NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30' diameter)	Absolute % Cover	Dominant Species?	Indicator Status
1. Fraxinus latifolia	20	yes	FACW
2.			
3.			
4.			
	20 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. Malus fusca	15	yes	FACW
2.			
3.			
4.			
5.			
	15 = Total Cover		
Herb Stratum (Plot size: _____)			
1. Ranunculus repens	55	yes	FAC
2. Rumex crispus	20		FAC
3. Athyrium felix-femina	15		FAC
4. Phalaris arundinacea	10		FACW
5. Geranium molle	5		NL
6.			
7.			
8.			
9.			
10.			
11.			
	105 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks:

SOIL

Sampling Point: DP-6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/2	99	10YR 3/6	1	C	M	silt loam	
8-10	10YR 3/2	95	10YR 3/6	5	C	M	silt loam	
10-16	10YR 3/2	90	10YR 3/6	10	C	M	silt loam	
16-20	10YR 2/2	90	10YR 4/6	10	C	M	silt loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Ox, Rhiz at 8" - 2018

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: DW Homes - Brookman Road City/County: Sherwood/Washington Sampling Date: 5/2/18

Applicant/Owner: Aziz Siddiqui State: OR Sampling Point: DP-7

Investigator(s): Jack Dalton Section, Township, Range: S06 T3S R1W

Landform (hillslope, terrace, etc.): filodplain Local relief (concave, convex, none): covex Slope (%): <15

Subregion (LRR): A-Northwest Forests and Coasts Lat: 45.3446° Long: -122.8527° Datum: N/A

Soil Map Unit Name: Willamette silt loam, 7 to 12 percent slopes (44C) NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No X	**Is the Sampled Area within a Wetland?** Yes _____ No X
Hydric Soil Present?	Yes _____	No X	
Wetland Hydrology Present?	Yes _____	No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30' diameter)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus rubra	60	yes	FAC
2. Pseudotsuga menziesii	10		FACU
3.			
4.			
	70 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. Acer circinatum	40	yes	FAC
2. Corylus cornuta	20	yes	FACU
3.			
4.			
5.			
	60 = Total Cover		
Herb Stratum (Plot size: _____)			
1. Hydrophyllum tenuipes	20	yes	FAC
2. Polystichum munitum	15	yes	FACU
3. Trillium ovatum	15	yes	FACU
4. Unk-1	15		
5. Urtica dioica	10		FAC
6.			
7.			
8.			
9.			
10.			
11.			
	75 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 25

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species 130	x 3 = 390
FACU species 60	x 4 = 240
UPL species _____	x 5 = _____
Column Totals: 190 (A)	630 (B)

Prevalence Index = B/A = 3.3

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No X

Remarks:

SOIL

Sampling Point: DP-7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-13	7.5YR 3/2	100			C	M	silt loam	
13-16	10YR 3/2	100			C	M	silt loam	
16-20	10YR 3/2	98	10YR 3/6	2	C	M	silt loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: none in pit at 20"

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: DW Homes - Brookman Road City/County: Sherwood/Washington Sampling Date: 5/2/18

Applicant/Owner: Aziz Siddiqui State: OR Sampling Point: DP-8

Investigator(s): Jack Dalton Section, Township, Range: S06 T3S R1W

Landform (hillslope, terrace, etc.): flooplain Local relief (concave, convex, none): concave Slope (%): <5

Subregion (LRR): A-Northwest Forests and Coasts Lat: 45.3446° Long: -122.8527° Datum: N/A

Soil Map Unit Name: Willamette silt loam, 7 to 12 percent slopes (44C) NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30' diameter)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus rubra	70	yes	FAC
2. Fraxinus latifolia	10		FACW
3.			
4.			
	80 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. Acer circinatum	30	yes	FAC
2. Cornus sericea	25	yes	FACW
3.			
4.			
5.			
	55 = Total Cover		
Herb Stratum (Plot size: _____)			
1. Hydrophyllum tenuipes	50	yes	FAC
2. Tellima grandiflora	35	yes	FACU
3. Carex obnupta	10		OBL
4. Urtica dioica	5		FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

__ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

__ 3 - Prevalence Index is ≤3.0[1]

__ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ 5 - Wetland Non-Vascular Plants[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks:

SOIL

Sampling Point: DP-8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-7	10YR 3/2	99	10YR 3/6	1	C	M	silty clay loam	
7-13	10YR 3/2	95	10YR 3/6	5	C	M	silty clay loam	
13-16	10YR 4/2	95	10YR 3/6	5	C	M	silty clay loam	
16-20	10YR 4/2	90	10YR 3/6	10	C	M	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (If present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ✓ No ___ Depth (inches): 10

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 8

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: DW Homes - Brookman Road City/County: Sherwood/Washington Sampling Date: 5/2/18

Applicant/Owner: Aziz Siddiqui State: OR Sampling Point: DP-9

Investigator(s): Kim Reavis Section, Township, Range: S06 T3S R1W

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): concave Slope (%): <5

Subregion (LRR): A-Northwest Forests and Coasts Lat: 45.3446° Long: -122.8527° Datum: N/A

Soil Map Unit Name: Woodburn silt loam, 3 to 7 percent slopes (45B) NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30' diameter)	Absolute % Cover	Dominant Species?	Indicator Status
1. Fraxinus latifolia	70	yes	FACW
2.			
3.			
4.			
	70 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. Acer circinatum	30	yes	FAC
2. Rubus armeniacus	10	yes	FAC
3. Rosa nutkana	10	yes	FAC
4.			
5.			
	50 = Total Cover		
Herb Stratum (Plot size: _____)			
1. Carex obnupta	100	yes	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100* = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks: trace amounts of Tellima grandiflora and Hydrophyllum tenuipes.

SOIL

Sampling Point: DP-9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/2	100			C	M	silty clay loam	
8-20	10YR 3/2	95	10YR 3/4	5	C	M	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ___ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: soils moist at 20"

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: DW Homes - Brookman Road City/County: Sherwood/Washington Sampling Date: 5/2/18

Applicant/Owner: Aziz Siddiqui State: OR Sampling Point: DP-10

Investigator(s): Kim Reavis Section, Township, Range: S06 T3S R1W

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): concave Slope (%): <10

Subregion (LRR): A-Northwest Forests and Coasts Lat: 45.3446° Long: -122.8527° Datum: N/A

Soil Map Unit Name: Woodburn silt loam, 3 to 7 percent slopes (45B) NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes _____ No X
Hydric Soil Present?	Yes _____ No X	
Wetland Hydrology Present?	Yes _____ No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30' diameter)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: _____)			
1. Poa pratensis	70	yes	FAC
2. Geranium molle	20		NL
3. Ranunculus repens	15		FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	105 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

__ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

__ 3 - Prevalence Index is ≤3.0[1]

__ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ 5 - Wetland Non-Vascular Plants[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks: trace amounts of reed canary grass, dandelion, and ground ivy. Ash along outside along top of slope.

SOIL

Sampling Point: DP-10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	7.5YR 2.5/3	100			C	M	silt loam	
12-18	10YR 3/2	90	7.5YR 3/4	10	C	M	silt loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

APPENDIX D: VEGETATED CORRIDOR DATA FORMS

VEGETATED CORRIDOR DATA SHEET

Client/Project Name: DW Homes - Brookman Road	**Site Address:** 17045 SW Brookman Road	**Plot ID:** VC -1
Township/Range/Section: T3S, R1W, S06		
Tax Map: 3S16	**Lot(s):** 100	
Brief Description of Plot Location: Southeast portion of site		
Site Investigator Name: Jack Dalton	**Date of Investigation:** 5/2/18	
Plant Community Type: Mixed riparian forest		

Herbaceous Stratum	Percent Aerial Cover	Percent Relative Cover	Native? (1) Yes	Native? (1) No	Noxious?(2) Yes	Noxious?(2) No	Invasive? (3) Yes	Invasive? (3) No
1 *Hydrophyllum tenuipes*	60	24	x			x		x
2 *Urtica dioica*	25	10	x			x		x
3 *Trillium ovatum*	10	4	x			x		x
4 *Rubus ursinus*	5	2	x			x		x
5		0						
6		0						
7		0						
8		0						
9		0						
10		0						
Shrub Stratum		0						
1 *Acer circinatum*	60	24	x			x		x
2 *Crataegus douglasii*	10	4	x			x		x
3 *Oemlaria cerasiformis*	5	2	x			x		x
4		0						
5		0						
6		0						
7		0						
8		0						
9		0						
10		0						
Tree Stratum		0						
1 *Alnus rubra*	65	26	x			x		x
2 *Tsuga heterophylla*	10	4	x			x		x
3		0						
4		0						
5		0						
6		0						
7		0						
8		0						
9		0						
Total	250	100						

Total percent relative native species cover	100%
Total percent aerial cover of tree canopy	75%
Total percent relative cover of non-native, noxious, and invasive species	0%

X	Good Condition (native species >80% of the community and tree canopy >50% aerial cover)
	Marginal Condition (native species 50-80% of the community and tree canopy 26-50% aerial cover)
	Degraded Condition (native species <50% of the community and tree canopy <25% aerial coverage)

(1) Portland Plant List, 2011.
(2) Noxious Weed List, ODA.
(3) R 07-20, Clean Water Services, June, 2007.

VEGETATED CORRIDOR DATA SHEET

Client/Project Name: DW Homes - Brookman Road	Site Address: 17045 SW Brookman Road	Plot ID: VC -2
Township/Range/Section: T3S, R1W, S06		
Tax Map: 3S16	Lot(s): 100	
Brief Description of Plot Location: southeast portion of site		
Site Investigator Name: Jack Dalton	Date of Investigation: 3/27/19	
Plant Community Type: Mixed riparian forest		

Herbaceous Stratum	Percent Aerial Cover	Percent Relative Cover	Native? (1)		Noxious?(2)		Invasive? (3)	
			Yes	No	Yes	No	Yes	No
1 *Polystichum munitum*	15	8	X			X		X
2 *Hedera helix*	40	22		X	X		X	
3		0						
4		0						
5		0						
6		0						
7		0						
8		0						
9		0						
10		0						
Shrub Stratum		0						
1 *Rubus armeniacus*	40	22		X	X		X	
2 *Cornus sericea*	40	22	X			X		X
3 *Oemlaria cerasiformis*	20	11	X			X		X
4		0						
5		0						
6		0						
7		0						
8		0						
9		0						
10		0						
Tree Stratum		0						
1 *Pseudotsuga menziesii*	30	16	X			X		X
2		0						
3		0						
4		0						
5		0						
6		0						
7		0						
8		0						
9		0						
Total	185	100						

Total percent relative native species cover	57%
Total percent aerial cover of tree canopy	30%
Total percent relative cover of non-native, noxious, and invasive species	44%

	Good Condition (native species >80% of the community and tree canopy >50% aerial cover)
X	Marginal Condition (native species 50-80% of the community and tree canopy 26-50% aerial cover)
	Degraded Condition (native species <50% of the community and tree canopy <25% aerial coverage)

Open canopy; invasive species cover extends up hill west to driveway; lack of native herb cover.

(1) Portland Plant List, 2011.
(2) Noxious Weed List, ODA.
(3) R 07-20, Clean Water Services, June, 2007.

VEGETATED CORRIDOR DATA SHEET

Client/Project Name: DW Homes - Brookman Road	Site Address: 17045 SW Brookman Road	Plot ID: VC -3
Township/Range/Section: T3S, R1W, S06		
Tax Map: 3S16	Lot(s): 100	
Brief Description of Plot Location: south of stream on east side of driveway		
Site Investigator Name: Jack Dalton	Date of Investigation: 3/27/19	
Plant Community Type: Mixed riparian forest		

Herbaceous Stratum	Percent Aerial Cover	Percent Relative Cover	Native? (1) Yes	Native? (1) No	Noxious?(2) Yes	Noxious?(2) No	Invasive? (3) Yes	Invasive? (3) No
1 *Polystichum munitum*	45	25	X			X		X
2 *Trillium ovatum*	10	6	X			X		X
3		0						
4		0						
5		0						
6		0						
7		0						
8		0						
9		0						
10		0						
Shrub Stratum		0						
1 *Acer circinatum*	15	8	X			X		X
2 *Corylus comuta*	15	8	X			X		X
3 *Oemlaria cerasiformis*	25	14	X			X		X
4		0						
5		0						
6		0						
7		0						
8		0						
9		0						
10		0						
Tree Stratum		0						
1 *Pseudotsuga menziesii*	30	17	X			X		X
2 *Abies grandis*	40	22	X			X		X
3		0						
4		0						
5		0						
6		0						
7		0						
8		0						
9		0						
Total	180	100						

Total percent relative native species cover	100%
Total percent aerial cover of tree canopy	70%
Total percent relative cover of non-native, noxious, and invasive species	0%

X	Good Condition (native species >80% of the community and tree canopy >50% aerial cover)
	Marginal Condition (native species 50-80% of the community and tree canopy 26-50% aerial cover)
	Degraded Condition (native species <50% of the community and tree canopy <25% aerial coverage)

(1) Portland Plant List, 2011.
(2) Noxious Weed List, ODA.
(3) R 07-20, Clean Water Services, June, 2007.

VEGETATED CORRIDOR DATA SHEET

Client/Project Name: DW Homes - Brookman Road	Site Address: 17045 SW Brookman Road	Plot ID: VC -4
Township/Range/Section: T3S, R1W, S06		
Tax Map: 3S16	Lot(s): 100	
Brief Description of Plot Location: North side of stream on east side of driveway		
Site Investigator Name: Kim Reavis	Date of Investigation: 5/2/18	
Plant Community Type: Mixed riparian forest		

Herbaceous Stratum	Percent Aerial Cover	Percent Relative Cover	Native? (1) Yes	Native? (1) No	Noxious?(2) Yes	Noxious?(2) No	Invasive? (3) Yes	Invasive? (3) No
1		0						
2 *Polystichum munitum*	30	15	X			X		X
3 *Geranium molle*	10	5		X		X		X
4 *moss = 60%*		0						
5		0						
6		0						
7		0						
8		0						
9		0						
10		0						
Shrub Stratum		0						
1 *Holodiscus discolor*	10	5	X			X		X
2 *Prunus sp.*	5	3		X		X		X
3 *Acer circinatum*	10	5	X			X		X
4 *Corylus cornuta*	5	3	X			X		X
5 *Rubus ursinus*	20	10	X			X		X
6 *Oemleria cerasiformis*	20	10	X			X		X
7 *Amelanchier alnifolia*	10	5	X			X		X
8		0						
9		0						
10		0						
Tree Stratum		0						
1 *Pseudotsuga menziesii*	60	30	X			X		X
2 *Alnus rubra*	20	10	X			X		X
3		0						
4		0						
5		0						
6		0						
7		0						
8		0						
9		0						
Total	200	100						

Total percent relative native species cover	91%
Total percent aerial cover of tree canopy	80%
Total percent relative cover of non-native, noxious, and invasive species	9%

X	Good Condition (native species >80% of the community and tree canopy >50% aerial cover)
	Marginal Condition (native species 50-80% of the community and tree canopy 26-50% aerial cover)
	Degraded Condition (native species <50% of the community and tree canopy <25% aerial coverage)

(1) Portland Plant List, 2011.
(2) Noxious Weed List, ODA.
(3) R 07-20, Clean Water Services, June, 2007.

VEGETATED CORRIDOR DATA SHEET

Client/Project Name: DW Homes - Brookman Road	Site Address: 17045 SW Brookman Road	Plot ID: VC -5
Township/Range/Section: T3S, R1W, S06		
Tax Map: 3S16	Lot(s): 100	
Brief Description of Plot Location: north side of stream on west side of driveway		
Site Investigator Name: Kim Reavis	Date of Investigation: 5/2/18	
Plant Community Type: Mixed riparian forest		

Herbaceous Stratum	Percent Aerial Cover	Percent Relative Cover	Native? (1) Yes	Native? (1) No	Noxious?(2) Yes	Noxious?(2) No	Invasive? (3) Yes	Invasive? (3) No
1 *Poa pratensis*	60	48		x		x		x
2 *Geranium molle*	25	20		x		x		x
3 *Ranunculus repens*	10	8		x		x		x
4	5	4						
5		0						
6		0						
7		0						
8		0						
9		0						
10		0						
Shrub Stratum		0						
1		0						
2		0						
3		0						
4		0						
5		0						
6		0						
7		0						
8		0						
9		0						
10		0						
Tree Stratum		0						
1 *Fraxinus latifolia*	25	20	x			x		x
2		0						
3		0						
4		0						
5		0						
6		0						
7		0						
8		0						
9		0						
Total	125	100						

Total percent relative native species cover	28%
Total percent aerial cover of tree canopy	25%
Total percent relative cover of non-native, noxious, and invasive species	68%

	Good Condition (native species >80% of the community and tree canopy >50% aerial cover)
	Marginal Condition (native species 50-80% of the community and tree canopy 26-50% aerial cover)
X	Degraded Condition (native species <50% of the community and tree canopy <25% aerial coverage)

trace amounts of reed canary grass, dandelion, and ground ivy. Ash along outside along top of slope.

(1) Portland Plant List, 2011.
(2) Noxious Weed List, ODA.
(3) R 07-20, Clean Water Services, June, 2007.

VEGETATED CORRIDOR DATA SHEET

Client/Project Name: DW Homes - Brookman Road	Site Address: 17045 SW Brookman Road	Plot ID: VC -6
Township/Range/Section: T3S, R1W, S06		
Tax Map: 3S16	Lot(s): 100	
Brief Description of Plot Location: South side of stream on west side of the driveway		
Site Investigator Name: Kim Reavis	Date of Investigation: 5/2/18	
Plant Community Type: Mixed riparian forest		

Herbaceous Stratum	Percent Aerial Cover	Percent Relative Cover	Native? (1) Yes	Native? (1) No	Noxious?(2) Yes	Noxious?(2) No	Invasive? (3) Yes	Invasive? (3) No
1 *Polystichum munitum*	30	17	X			X		X
2 *Hydrophyllum tenuipes*	20	11	X			X		X
3		0						X
4		0						X
5		0						
6		0						
7		0						
8		0						
9		0						
10		0						
Shrub Stratum		0						
1 *Acer circinatum*	45	25	X			X		X
2 *Oemleria cerasiformis*	15	8	X			X		X
3		0						
4		0						
5		0						
6		0						
7		0						
8		0						
9		0						
10		0						
Tree Stratum		0						
1 *Pseudotsuga menziesii*	60	33	X			X		X
2 *Prunus sp.*	10	6		X		X		X
3		0						
4		0						
5		0						
6		0						
7		0						
8		0						
9		0						
Total	180	100						

Total percent relative native species cover	90%
Total percent aerial cover of tree canopy	80%
Total percent relative cover of non-native, noxious, and invasive species	10%

X	Good Condition (native species >80% of the community and tree canopy >50% aerial cover)
	Marginal Condition (native species 50-80% of the community and tree canopy 26-50% aerial cover)
	Degraded Condition (native species <50% of the community and tree canopy <25% aerial coverage)

Canopy cover include Fraxinus latifolia within the wetland

(1) Portland Plant List, 2011.
(2) Noxious Weed List, ODA.
(3) R 07-20, Clean Water Services, June, 2007.

VEGETATED CORRIDOR DATA SHEET

Client/Project Name: DW Homes - Brookman Road	Site Address: 17045 SW Brookman Road	Plot ID: VC -7
Township/Range/Section: T3S, R1W, S06		
Tax Map: 3S16	Lot(s): 100	
Brief Description of Plot Location: South side of stream on west side of the driveway		
Site Investigator Name: Kim Reavis	Date of Investigation: 5/2/18	
Plant Community Type: Mixed riparian forest		

	Percent Aerial Cover	Percent Relative Cover	Native? (1)		Noxious?(2)		Invasive? (3)	
Herbaceous Stratum			Yes	No	Yes	No	Yes	No
1 *Poa pratensis*	20	40		x		x	x	
2 *Geranium molle*	5	10		x		x	x	
3 *Ranunculus repens*	5	10	x			x		x
4 *rock - 80%*		0						
5		0						
6		0						
7		0						
8		0						
9		0						
10		0						
Shrub Stratum		0						
1 *Rubus armeniacus*	5	10		x	x		x	
2		0						
3		0						
4		0						
5		0						
6		0						
7		0						
8		0						
9		0						
10		0						
Tree Stratum		0						
1 *Crataegus douglasii*	15	30	x			x		x
2		0						
3		0						
4		0						
5		0						
6		0						
7		0						
8		0						
9		0						
Total	50	100						

Total percent relative native species cover	40%
Total percent aerial cover of tree canopy	15%
Total percent relative cover of non-native, noxious, and invasive species	60%

	Good Condition (native species >80% of the community and tree canopy >50% aerial cover)
	Marginal Condition (native species 50-80% of the community and tree canopy 26-50% aerial cover)
X	Degraded Condition (native species <50% of the community and tree canopy <25% aerial coverage)

(1) Portland Plant List, 2011.
(2) Noxious Weed List, ODA.
(3) R 07-20, Clean Water Services, June, 2007.

VEGETATED CORRIDOR DATA SHEET

Client/Project Name: DW Homes - Brookman Road	Site Address: 17045 SW Brookman Road	Plot ID: VC -8
Township/Range/Section: T3S, R1W, S06		
Tax Map: 3S16	Lot(s): 100	
Brief Description of Plot Location: Located in northwest corner of the site		
Site Investigator Name: Kim Reavis	Date of Investigation: 5/2/18	
Plant Community Type: field		

Herbaceous Stratum	Percent Aerial Cover	Percent Relative Cover	Native? (1)		Noxious?(2)		Invasive? (3)	
			Yes	No	Yes	No	Yes	No
1 *Agrostis sp.*	55	46		x		x		x
2 *Holcus lanatus*	25	21		x		x		x
3 *Leucanthemum vulgare*	25	21		x		x		x
4 *Prunella vulgaris*	10	8	x			x		x
5 *Anthoxanthum odoratum*	5	4		x		x		x
6		0						
7		0						
8		0						
9		0						
10		0						
Shrub Stratum		0						
1		0						
2		0						
3		0						
4		0						
5		0						
6		0						
7		0						
8		0						
9		0						
10		0						
Tree Stratum		0						
1		0						
2		0						
3		0						
4		0						
5		0						
6		0						
7		0						
8		0						
9		0						
Total	120	100						

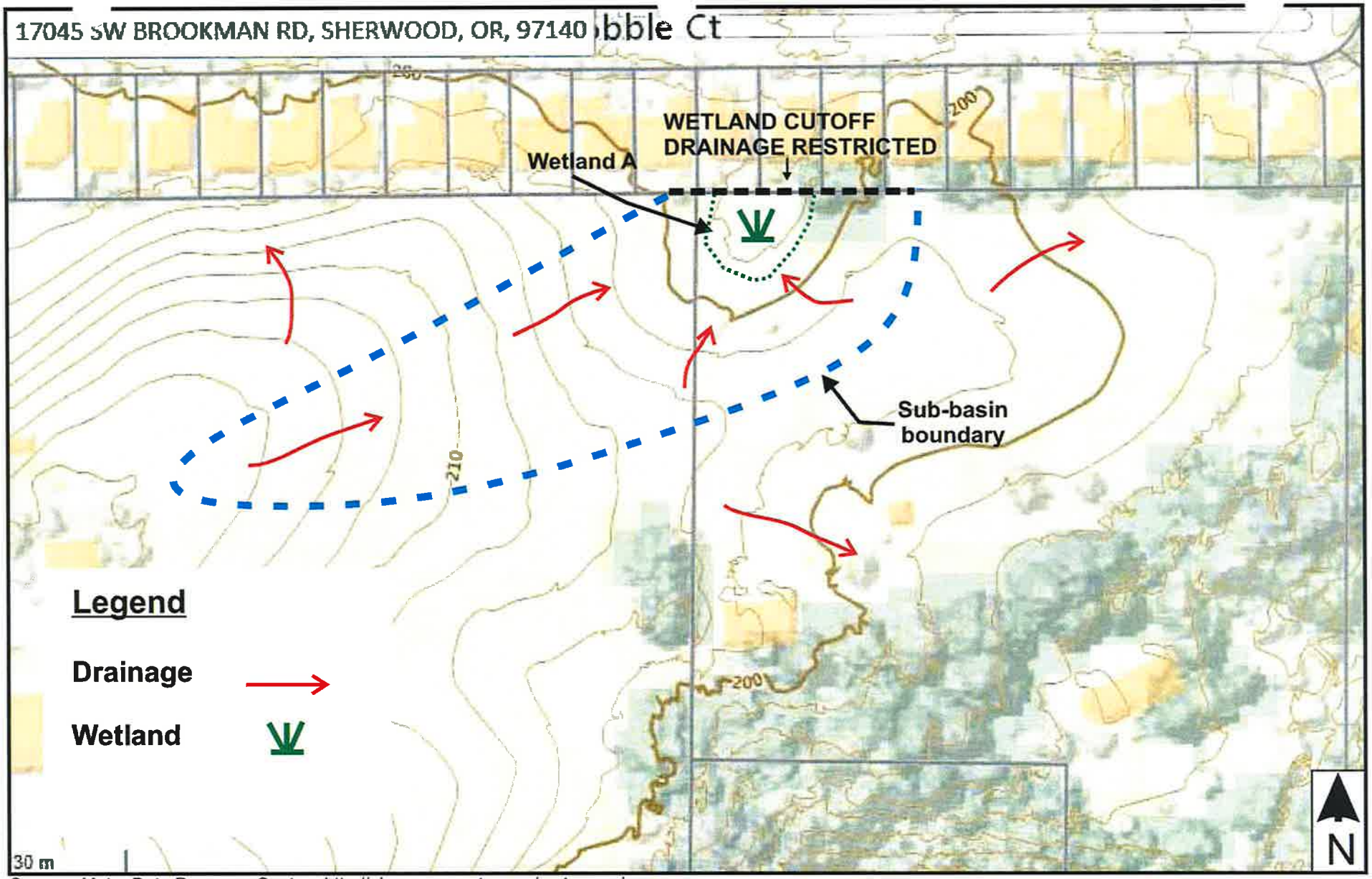
Total percent relative native species cover	8%
Total percent aerial cover of tree canopy	0%
Total percent relative cover of non-native, noxious, and invasive species	98%

	Good Condition (native species >80% of the community and tree canopy >50% aerial cover)
	Marginal Condition (native species 50-80% of the community and tree canopy 26-50% aerial cover)
X	Degraded Condition (native species <50% of the community and tree canopy <25% aerial coverage)

trace amounts of Hypochaeris radicata

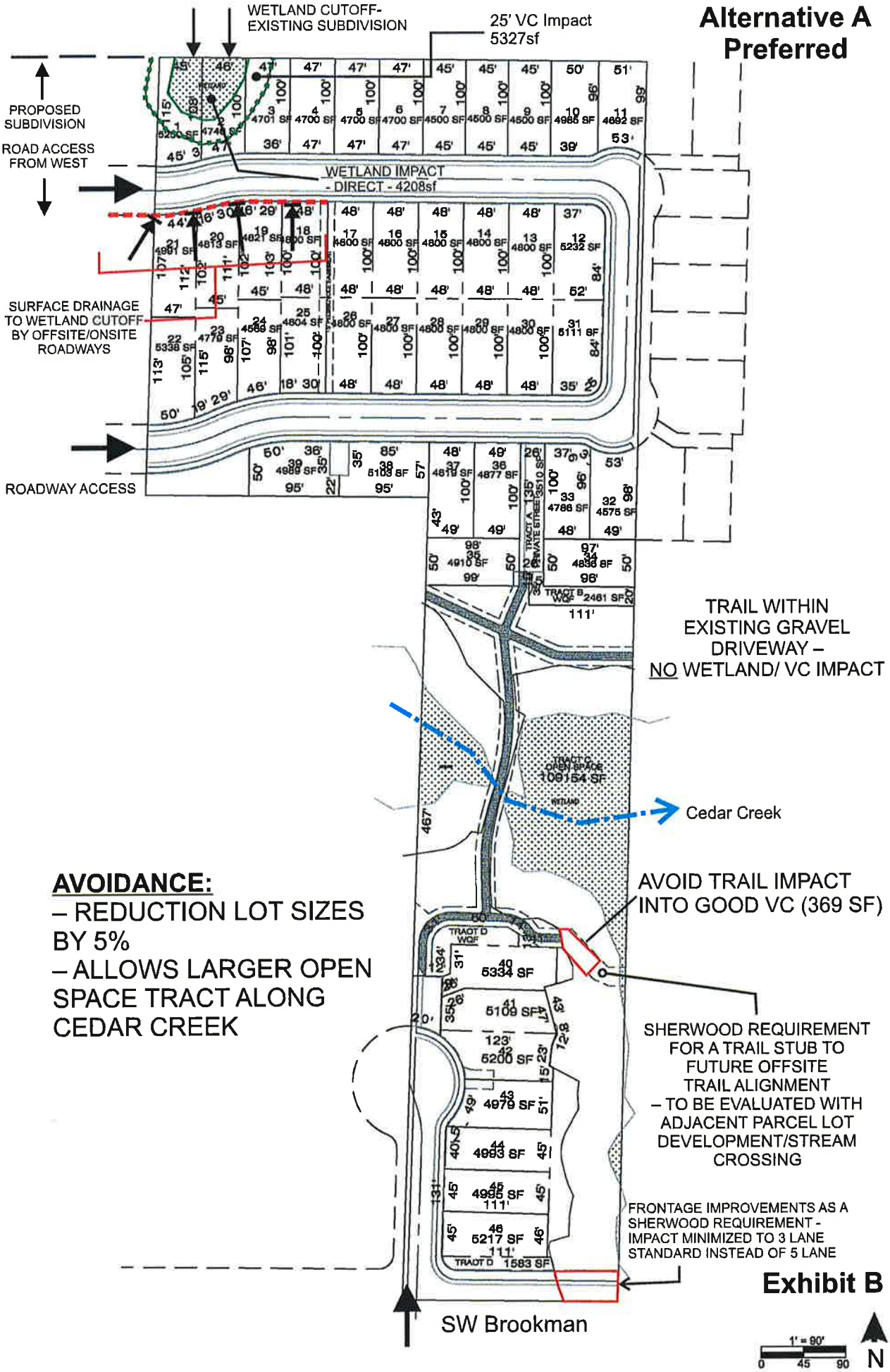
(1) Portland Plant List, 2011.
(2) Noxious Weed List, ODA.
(3) R 07-20, Clean Water Services, June, 2007.

APPENDIX E: SITE PLAN ALTERNATIVES



Source: Metro Data Resource Center. http://gis.oregonmetro.gov/metromap/

Environmental Science & Assessment, LLC	Sub-Basin Map Oullette Property Sherwood, Oregon	Approx. Scale: 1" = 100'	Exhibit A


Alternative A
Preferred
WETLAND CUTOFF-
EXISTING SUBDIVISION
25' VC Impact
5327sf
PROPOSED
SUBDIVISION
ROAD ACCESS
FROM WEST
WETLAND IMPACT
- DIRECT - 4208sf
SURFACE DRAINAGE
TO WETLAND CUTOFF
BY OFFSITE/ONSITE
ROADWAYS
ROADWAY ACCESS
TRAIL WITHIN
EXISTING GRAVEL
DRIVEWAY –
NO WETLAND/ VC IMPACT
Cedar Creek
AVOIDANCE:
– REDUCTION LOT SIZES
BY 5%
– ALLOWS LARGER OPEN
SPACE TRACT ALONG
CEDAR CREEK
AVOID TRAIL IMPACT
INTO GOOD VC (369 SF)
SHERWOOD REQUIREMENT
FOR A TRAIL STUB TO
FUTURE OFFSITE
TRAIL ALIGNMENT
– TO BE EVALUATED WITH
ADJACENT PARCEL LOT
DEVELOPMENT/STREAM
CROSSING
FRONTAGE IMPROVEMENTS AS A
SHERWOOD REQUIREMENT -
IMPACT MINIMIZED TO 3 LANE
STANDARD INSTEAD OF 5 LANE
SW Brookman
Exhibit B
1" = 90'
0
45
90
N

Alternative B

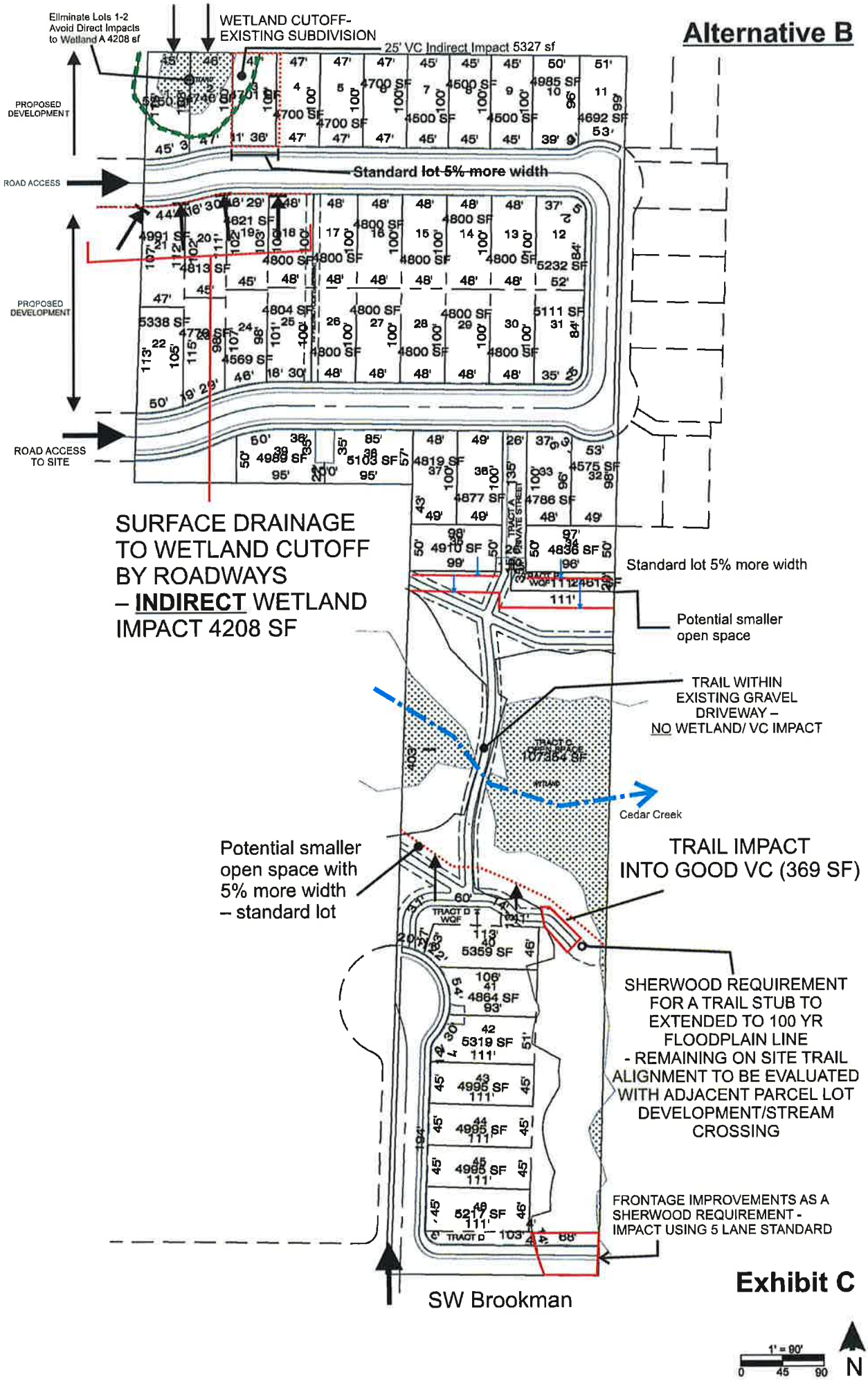
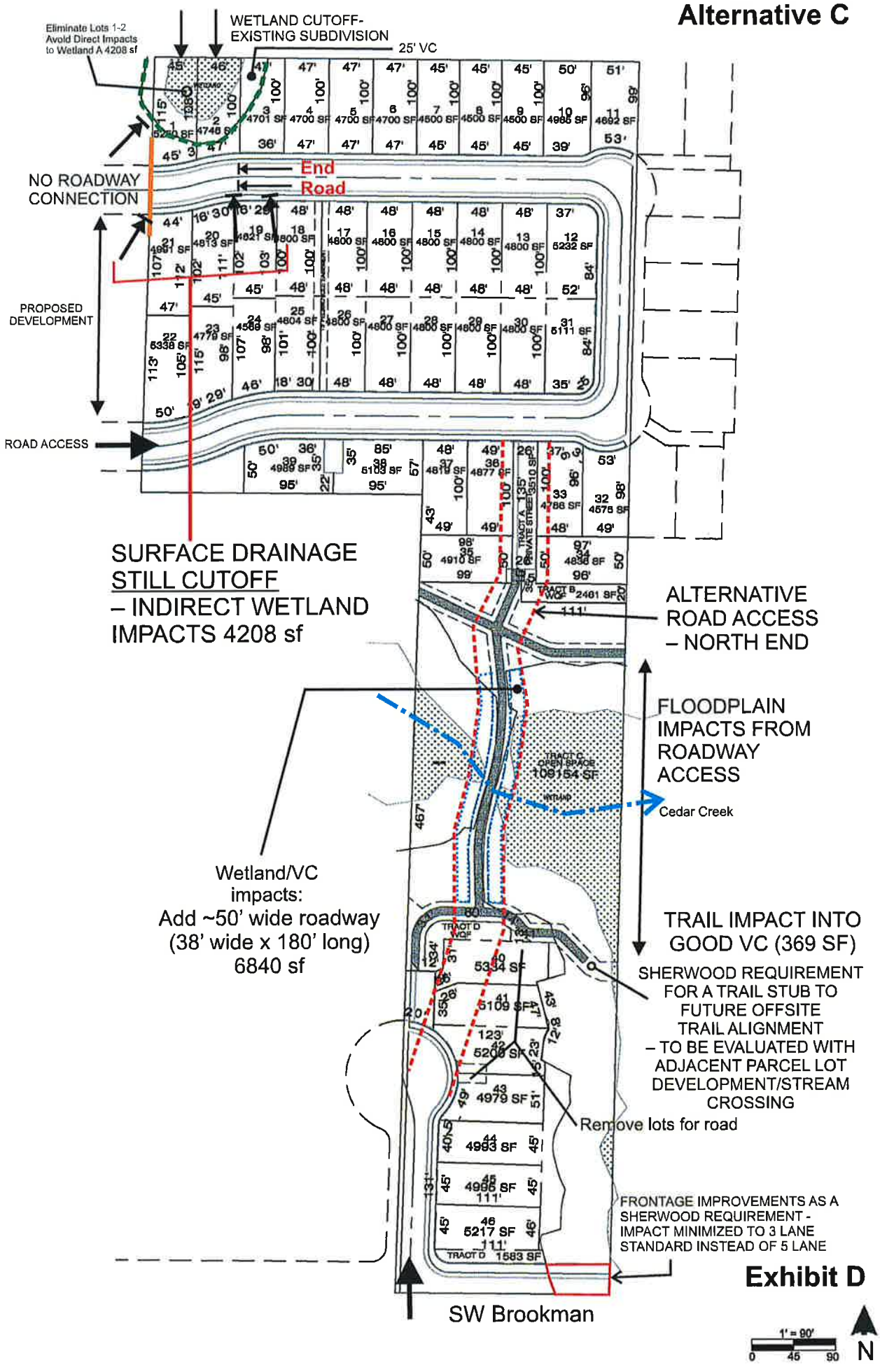


Exhibit C


Alternative C
Eliminate Lots 1-2
Avoid Direct Impacts
to Wetland A 4208 sf
WETLAND CUTOFF-
EXISTING SUBDIVISION
25' VC
NO ROADWAY
CONNECTION
End
Road
PROPOSED
DEVELOPMENT
ROAD ACCESS
SURFACE DRAINAGE
STILL CUTOFF
– INDIRECT WETLAND
IMPACTS 4208 sf
ALTERNATIVE
ROAD ACCESS
– NORTH END
FLOODPLAIN
IMPACTS FROM
ROADWAY
ACCESS
Cedar Creek
Wetland/VC
impacts:
Add ~50' wide roadway
(38' wide x 180' long)
6840 sf
TRAIL IMPACT INTO
GOOD VC (369 SF)
SHERWOOD REQUIREMENT
FOR A TRAIL STUB TO
FUTURE OFFSITE
TRAIL ALIGNMENT
– TO BE EVALUATED WITH
ADJACENT PARCEL LOT
DEVELOPMENT/STREAM
CROSSING
Remove lots for road
FRONTAGE IMPROVEMENTS AS A
SHERWOOD REQUIREMENT -
IMPACT MINIMIZED TO 3 LANE
STANDARD INSTEAD OF 5 LANE
SW Brookman
Exhibit D
1" = 90'
0 45 90
N

APPENDIX F: FUNCTIONAL ASSESSMENT

Environmental Science & Assessment, LLC

TECHNICAL MEMORANDUM

DATE: March 26, 2019

TO: File # 18032

FROM: Jack Dalton

RE: Wetland Functional Assessment for DW Homes Brookman project

A functional assessment was prepared for a small wetland in the north end of a 9.93-acre site at 17045 SW Brookman in Sherwood, Oregon (Figure 1). The study area includes the north end of the tax lot located in Section 6, Township 3 South, Range 1 West: Tax Lots 1N117CB00200 on Washington County's assessor's map 3S1060000100 (Figure 2).

Existing Conditions – Riparian Community and Wetlands

A segment of Cedar Creek flows north through the site and two associated wetland areas were mapped along the channel. A small isolated wetland (Wetland A) is located in the northwest corner of the site in a small depression in a pasture. The assessment includes only the Wetland A (Figure 3). Hydrologic connections are not present between the wetland and surrounding waters due to it being cut off by a subdivision built in 1997 directly north of the project site (Figure 3).

The site is located with the Brookman Addition community in the south end of Sherwood, Oregon (Figure 1). The site is a large acre parcels bordered by a residential subdivision to the north and the Cedar Creek riparian corridor to the east and west (Figure 2). A driveway extends into the site from SW Brookman Road and crosses Cedar Creek at a culvert in the middle of the site and continues to the residence north of the creek. The site includes a single family home and several barns and structures for livestock. The north end of the site is used primarily as pasture for livestock, storage for landscaping materials and a small horse corral. The southern end of the site is forested with a riparian forested community along Cedar Creek and a short tributary flowing north from SW Brookman to a confluence with Cedar Creek in the middle of the site (Figure 3).

The residence was built in 1991 and the site has been managed in its current condition since that time. The subdivision to the north was built in 1997. Surrounding parcels to the south and east are large acreage with single family homes. The parcels to the west are large acreage single-family properties that area all slated for residential development.

Landscaping surrounds the residence north of the Cedar Creek corridor. The eastern edge of the property is a mixed riparian forest community comprised of Douglas fir (*Pseudotsuga menziesii*), red alder (*Alnus rubra*), bitter cherry (*Prunus emarginata*), Oregon ash (*Fraxinus latifolia*) with a canopy cover of up to 80 percent. Understory species include mainly native species such as beaked hazelnut (*Corylus cornuta*), vine maple (*Acer circanatum*), red elderbary (*Sambucus racemosa*), snowberry (*Symphoricarpos albus*) and swordfern (*Polystichum munitum*), taperfruit shortscale sedge (*Carex leptopoda*) and along the driveway and in the southern end of site, there is extensive cover of invasive species such as English ivy (*Hedera helix*) and Himalayan blackberry (*Rubus armeniacus*). The plant community in the north end of site around Wetland A is primarily non-native pasture grasses and weeds such as bentgrass (*Agrostis* sp.), velvet grass (*Holcus lanatus*), self-heal (*Prunella vulgaris*) and oxeye daisy (*Leucanthemum vulgare*).

Methodology

The methodology outlined in the Guidebook for *Hydrogeomorphic (HGM)-based Assessment of Oregon Wetland and Riparian Sites I. Willamette Valley Ecoregion Riverine Impounding and Slope/Flats Subclasses Volume IA: Assessment Methods* (Adamus, 2001) was used as the basis for the functional assessments.

A functional assessment was completed for Wetland A. Wetland A is hydrologically isolated from the other wetlands on site and has no downstream connection to off-site wetlands or waters due to the existing residential development.

Functional Assessment - Wetland A

Wetland A is a small isolated palustrine emergent (PEM)/FLATS wetland, totaling 4,208 square feet (0.01 acres) (Figure 3). Wetland A is generally a low to moderate functioning wetland due to the past and current landuse for grazing and pasture.

The moderate scoring functions include:

- Sediment Stabilization & Phosphorus Retention (sp)
- Nitrogen Removal (n)
- Primary Production (pp)
- Amphibian & Turtle Habitat (at)
- Songbird Habitat Support (sb)

The lower scoring functions include:

- Water Storage & Delay (ws)
- Invertebrate Habitat Support (i)
- Wintering & Migrating Waterbird Support (ww)
- Support of Characteristic Vegetation (v)

The following were found to provide no functionality at this site:

- Breeding Waterbird Support (bw)

No functions rated high. The moderate scoring functions are a result of a marginal to degraded vegetative community and the lack of an outlet, which captures overland flow and is isolated from surrounding riparian or other wetland habitat.

The lower and non-scoring functions are primarily due to lack of open water and permanent inundation, lack of dead wood and hummocks, low percentage and distribution of pools, and lack of aerial canopy cover and shrubs.

The detailed functional assessment is provided in Attachment A.

REFERENCES

Adamus, P.R. and D. Field. 2001. *Guidebook for Hydrogeomorphic (HGM)-based Assessment of Oregon Wetland and Riparian Sites. I. Willamette Valley Ecoregion, Riverine Impounding and Slope/Flats Subclasses. Volume IA: Assessment Methods.* Oregon Division of State Lands, Salem, OR

SHEET FOR AUTOMATIC CALCULATION OF FUNCTION SCORES - revised June 2008

Slope or Flats subclass

Site Name: DW Homes Brookman - FLATS Wetland A **Date: 3/26/19**

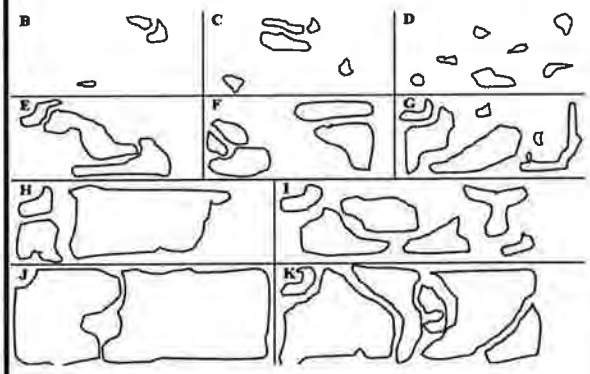
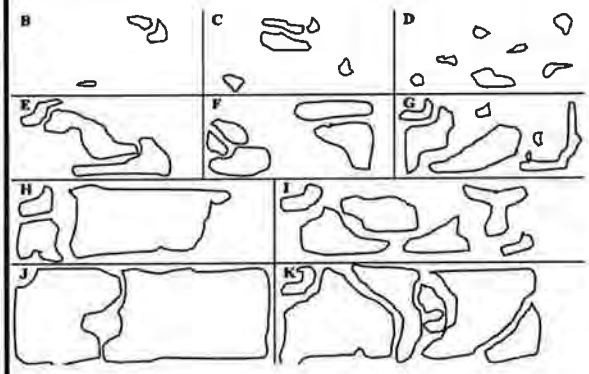
It is recommended to do a "Save As" from this blank spreadsheet for each use, assigning different file names. This will help reduce the chance of accidentally confusing new data with previously entered data.
For reference, the function(s) addressed by each indicator are noted in column E. Codes are shown below next to the function names. The capital letter in the code (e.g., sp- **B**) in column E refers to the code for the indicator in the published Volume IA.
HFR= scaled to highest functioning site of this subclass found by DSL; **LAR**= scaled to least-altered site of this subclass found by DSL Scores greater than 1 indicate the capacity of the function at the site you assessed may be greater than in all sites of this subclass assessed by the DSL team during model calibration.
Data **must** be entered for every indicator, unless the scale block for this subclass is shaded. Each value in column D must be less than or equal to 1.

Function:	Calculated Function Capacity for SF sites if HFR:	if LAR:
Water Storage & Delay (ws)	0.20	0.44
Sediment Stabilization & Phosphorus Retention (sp)	0.57	0.61
Nitrogen Removal (n)	0.59	0.70
Primary Production (pp)	0.46	0.59
Invertebrate Habitat Support (i)	0.26	0.26
Amphibian & Turtle Habitat (at)	0.59	0.78
Breeding Waterbird Support (bw)	0.00	0.00
Wintering & Migrating Waterbird Support (ww)	0.32	0.37
Songbird Habitat Support (sb)	0.41	0.63
Support of Characteristic Vegetation (v)	0.32	0.33

Note 1: Models and scores for ws, sp, n, and pp intentionally do not account for the **area** of the wetland, an especially important factor for these functions.
Note 2: This method should be applied to an entire contiguous wetland, not just to the portion affected directly by a planned alteration or restoration.

Indicator	*Raw Datum*	*Scale for SF sites*	*Scaled Datum*	*Function*
Presence of permanent surface water (water year-round during most years)? (p. 82)	absent	absent = 0 present = 1.0	0	sb-P rf-X
Percent of permanent zone that is open water (i.e., lacking emergent and underwater plants) (p. 79) (Answer "0" if no permanent zone is present)	0	100 =.1 80-99 =.8 60-80 = 1.0 40-60 =.8 20-40 =.4 0-20 = 2	0.2	at-M
Percent of site that is inundated only seasonally (i.e., watermarks, moss lines, debris lines, etc.) (p. 81)	40	none = 0 1-10 =.1 10-25 =.6 25-50 =.8 > 50 = 1.0	0.8	i-B n-A ws-A
		none = 0 1-20 =.5 20-40 =.7 40-60 =.8 60-80 =.9 >80 = 1.0	0.7	ww-A

At least 0.5 acre of surface water persists until at least July 1 and water is mostly wider than 10 ft?	No	Yes = 1 No = 0	0	bw-X
Predominant water depth during biennial low water (p. 82)	0"	0" = 0 1-2" =.6 2-24" = 1.0 2-6 ft =.8 >6 ft =.6	0	bw-D
		0 =.1 1-2" = 1.0 2-24" =.8 >24" =.2	0.1	i-D
Percent of site occupied by the most extensive depth category at this site during biennial low water. (p. 81). (Delimit the low water zone first, then break into these depth categories, then identify the category that predominates horizontally). (Possible categories are: 0 inches; 1-2 inches; 2-24 inches; 2-6 feet; < 6 feet)	60	100 = 0 80-100 =.1 50-80 =.4 30-50 =.8 <30 = 1.0	0.4	bw-B
Difference between the predominating biennial high and low water levels (p. 71) 0) = No change 1) = Difference of 1 class 2) = Difference of 2 classes 3) = Difference of 3 classes 4) = Difference of 4 classes Class 1 = 0 inches Class 2 = 1-2 inches Class 3 = 2-24 inches Class 4 = 2-6 feet Class 5 = > 6 feet	1	0) = 0 1) =.3 2) =.5 3) =.8 4) = 1.0	0.3	n-B at-E bw-E
		0) = 0 1) = .25 2) = .5 3) = .75 4) = 1.0	0.25	ww-F
Predominant vertical increase in surface water level (ft) in most of the seasonal zone (i.e., water marks, moss lines, debris lines, etc. Look at the highest point for 2 year flood and measure the difference from biennial low)	0.1	0 = 0 .1 - .4 =.25 .5- 1.0 =.5 1 - 2 =.75 >2 = 1.0	0.25	ws-B
Number of depth categories during biennial high water. (p. 77) Categories are: ___ 1 - 2 inches ___ 2 - 24 inches ___ 2 – 6 ft ___ > 6 ft	1	1 = 0 2 =.3 3 =.6 4 = 1.0	0	bw-C
		1 = .1 2 = .3 3 = .6 4 = 1.0	0.1	ww-E

Percent & distribution of pools during biennial high water. (p. 80) (Note: if site is > 1 acre, select the condition that predominates in 1 acre sub-units of the site.) A = None  	B	A = 0 B =.6 C =.65 D =.7 E,F =.75 K =.8 H =.85 I =.9 J =.95 G = 1.0	0.6 0.6	sp-C ww-D i-E, at-A
Percent & distribution of pools during biennial low water. (p. 80) (Note: if site is > 1 acre, select the condition that predominates in 1 acre sub-units of the site.) A = None  	A	A = 0 B =.6 C =.65 D =.7 E,F =.75 J =.8 H =.85 I =.9 K =.95 G = 1.0	0 0	bw-A, pp-E, n-1
Percent of the site occupied by hummocks (p. 74, 75)	none	none = 0 1-10 =.6 10-90 =.8 >90 = 1.0	0	at-B ww-C sb-M sp-B pp-C n-G i-F

Maximum annual extent of vernal pools/ shorebird scrapes and mudflats: (p. 76) A = none B = 1 – 100 sq. ft. C = 100-1000 sq. ft. D = 1000 – 10,000 sq. ft. E = >10,000 sq. ft Must meet ALL of the following: a) herbs are generally < 4" and comprise < 80% ground cover during winter or early spring b) topography is basically flat c) inundated to a depth of < 6" for 2 or more continuous weeks d) never shaded by trees, shrubs, or buildings e) not entirely a constructed ditch	A	A = 0 B =.6 C =.7 D =.8 E = 1.0	0	ww-B
Presence of logs or boulders that extend above the surface of permanent water (p. 84)	absent	absent = 0 present = 1.0	0	at-G
Predominant soil texture: (p 83) GC= gravel or cobble SA=sand, sandy loam, or loamy sand L= loam, silty loam, gravelly loam C= clay, sandy clay, silty clay, clay loam, silty clay loam O= organic particles<1mm Guidance: 1. Soil remains in a ball when squeezed YES…Go to 3; NO …Go to 2 2. > 50% of the particles (by weight) are > 1 mm YES…"GC"; NO …"SA" 3. Squeezed soil forms an even ribbon YES…Go to 4; NO …"SA" 4. Soil ribbon extended > 1" without breaking YES…"C/O"; NO …Go to 5 5. Soils feels very gritty YES... "SA"; NO…"L"	L	GC =.1 SA =.2 L =.8 C/O = 1.0	0.8	sp-D
Presence of some mottling and/or other features that indicate oxygen deficits, or, permanent water is present	present	absent = 0 present = 1.0	1	n-X
Mapped soil series is hydric (not simply a hydric inclusion). See county soil map and p. 75.	no	1= yes 0= no	0	v-C at-D ww-G i-I
Percent of site that was constructed on former uplands (non-hydric soil) (p. 81): 6) = recent, >90% of site 5) = recent, 10-90% of site 4) = recent, 1-10% of site 3) = >5 years ago, >90% of site 2) = >5 years ago, 10-90% of site 1) = >5 years ago, 1-10% of site 0) = none	0	6) = 0 5) = .1 4) = .2 3) = .3 2) = .4 1) = .5 0) = 1.0	1	i-J at-K v-K n-D

Tally the percent of surrounding land cover (exclude the site itself) as exists during a typical May. Answer each row independently. They do not necessarily sum to 100%.

within 200 ft of the site boundary:

a. % Water, wetland =	0
b. % Grassland, water, wetland =	0
c. % Grassland, row crops =	20
d. % Wooded =	0
e. % Natural (not lawn, crops, paved, building)=	25

within 1000 ft:

f. % Water, wetland =	5
g. % Grassland, water, wetland =	0
h. % Grassland, row crops =	0
i. % Wooded =	20
j. % Natural =	50

within 5,280 ft:

k. % Water, wetland =	5
l. % Grassland, row crops =	15
m. % Wooded =	15

In column D, enter the scaled value for the number in column B. (= a), above)	0	0 = 0 1–10 =.4 10-20 =.8 >20 = 1.0	0	bw-I ww-I
In column D, enter the scaled value for the number in column B. (=(b), above)	0	<10 =.1 10-20 =.2 20-40 =.4 40-60 =.6 60-80 =.8 >80 = 1.0	0.1	sb-N
In column D, enter the scaled value for the number in column B. (=(c), above)	20	<10 = 0 10-20 = .1 20-40 = .3 40-80 = .5 80-90 = .7 90-100 = 1.0	0.1	ww-K
In column D, enter the scaled value for the number in column B. (=(d), above)	0	0 = 0 1-10 =.1 10-20 =.2 20-40 =.4 40-60 =.6 60-80 =.8 >80 = 1.0	0	sb-I
In column D, enter the scaled value for the number in column B. (=(e), above)	25	<10 = 0 10-20 = .1 20-40 = .3 40-80 = .5 80-90 = .7 90-100 = 1.0	0.3	i-L at-O v-R
In column D, enter the scaled value for the number in column B. (=(a+f+k)/3), above)	3	none = 0 1 – 10 =.4 10-20 =.8 >20 = 1.0	0.4	ww-H bw-J

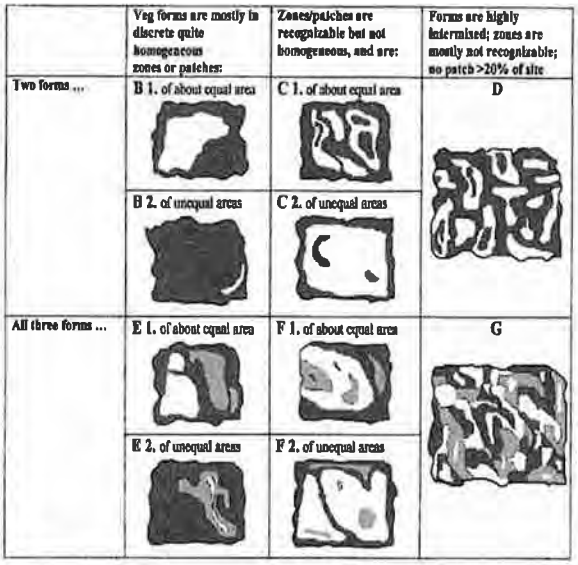
In column D, enter the scaled value for the number in column B. (=(c+h+l)/3), above)	12	<10 = 0 10-20 = .1 20-40 = .3 40-80 = .5 80-90 = .7 90-100 = 1.0	0.1	ww-J
In column D, enter the scaled value for the number in column B. (= (d+i+m)/3), above)	11.66666667	<10 =.1 10-20 =.2 20-40 =.4 40-60 =.6 60-80 =.8 >80 = 1.0	0.2	sb-J
In column D, enter the scaled value for the number in column B. (= (e+j)/2), above)	37.5	<10 = 0 10-20 = .1 20-40 = .3 40-80 = .5 80-90 = .7 90-100 = 1.0	0.3	bw-K
In column D, enter the scaled value for the number in column B. (= (b+g)/2), above)	0	<10 =.1 10-20 =.2 20-40 =.4 40-60 =.6 60-80 =.8 >80 = 1.0	0.1	sb-O
Percent of land cover within 200 ft (but only in the contributing watershed) that is "natural" – that is, NOT cropland, lawns, pavement, or buildings (p. 79)	15	<10 = 0 10-20 =.1 20-40 =.3 40-90 =.5 90-100 = 1.0	0.1	pp-F
		<10 = 0 10-20 =.1 20-40 =.3 40-90 =.5 90-99 =.9 100 = 1.0	0.1	i-M v-Q
Percent woodland divided by percent grassland-crops within 200 ft of the site (p. 71)	0	<.1 =.1 0.1-0.8 =.6 0.8-1.2 = 1.0 1.2 –2.0 =.6 >2.0 =.1	0.1	at-P
Distance (ft) to nearest busy road (p. 71) This includes a) any road or parking lot in a develop area that contains >4 buildings per acre, b) any road with a maximum traffic rate of > 6 vehicles per minute, during an average day during the summer	50	<100 = 0 100-300 =.3 300-600 =.5 600-1200 =.7 1200-2400 =.8 2400-4800 =.9 >4800 = 1.0	0	bw-G at-N v-P sb-R

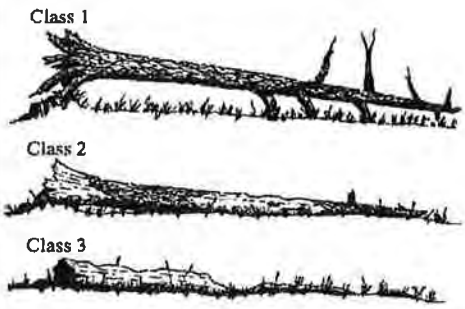
Note: The following 5 rows must sum to 100%. The **number** of visitors is immaterial.

Percent of site including 100-ft buffer that is visited 365 days a year or almost so =	0
Percent of site including 100-ft buffer that is visited more than 80 days a year (>20% of year), but less than daily =	20
Percent of site including 100-ft buffer that is visited 20-80 days a year (e.g., about once a week) =	20
Percent of site including 100-ft buffer that is visited just a few days a year =	60
Percent of site including 100-ft buffer that is almost never visited =	0

Scale the calculated value in the box on the right (sum of the above 5 rows) and enter the scaled value in column D (p. 72)	340	100-200 = 0 200-300 =.3 300-400 =.7 400-500 =1.0	0.7	bw-H v-O sb-Q
Percent of site affected by soil leveling (i.e., portion previously leveled by equipment for farming)	50	100 =.1 10-99 =.3 1-10 =.6 0 = 1.0	0.3	at-C i-G pp-D sp-F n-H
Percent of site currently affected by soil compaction: (i.e., by equipment, vehicles, livestock, humans, fill) 6 = recent, at >90% of site 5 = recent, at 10-90% of site 4 = recent, at 1-10% of site 3 = >5 years ago, >90% of site 2 = >5 years ago, 10-90% of site 1 = >5 years ago, 1-10% of site 0 = none	6	5/6) =.1 4) =.2 3) =.4 2) =.6 1) =.8 0) = 1.0	0.1	sp-G v-M sb-K
Percent of site's vegetation that is mowed or subject to extreme grazing at least annually (p. 81)	100	>90 = 0 10-90 =.2 1-10 =.4 none = 1.0	0	sb-L v-N
Most of site is burned, or harvested for hay or timber, at least biennially? (p. 72)	no	no = 0 yes = 1.0	0	n-J
Percent of site currently affected by soil mixing (plowing, excavation, bulldozing, etc.): (p. 81) 6 = recent, at >90% of site 5 = recent, at 10-90% of site 4 = recent, at 1-10% of site 3 = >5 years ago, >90% of site 2 = >5 years ago, 10-90% of site 1 = >5 years ago, 1-10% of site 0 = none	3	5 or 6 =.1 4 =.2 3 =.4 2 =.6 1 =.8 0 = 1.0	0.4	at-f i-H v-L pp-A n-C sp-E
Percent of the site that is vegetated (including submersed aquatics) (p. 82)	90	<10 =.1 10-20 =.2 20-40 =.4 40-60 =.6 60-80 =.8 >80 = 1.0	1	sb-A v-A

Percent of site with woody vegetation (p. 82)	15	<10 =.1 10-20 =.2 20-40 =.4 40-60 =.6 60-80 =.8 >80 = 1.0	0.2	sb-b
Percent of seasonal zone that is bare during most of the dry season. (i.e., devoid of vegetation, except trees) (Answer "0" if no seasonal zone)	0	>80 = 0 60-80 =.2 40-60 =.4 20-40 =.6 1-20 =.8 0 = 1.0	1	pp-G sp-H
Percent of site that is inundated permanently and contains emergent, floating, or submersed plants (p. 72)	0	0 = 0 1-10 =.9 >10 = 1.0	0	i-A
		0 = 0 1-10 =.4 10-30 =.8 30-60 = 1.0 60-90 =.9 >90 =.6	0	bw-F
Percent cover of herbs within the seasonal zone (p. 72)	90	0 = 0 1-30 =.1 30-50 =.6 50-70 =.75 70-100 = 1.0	1	at-L
Percent of whole site that has closed canopy (p. 80)	0	<10 =.1 10-20 =.2 20-40 =.4 40-60 =.6 60-80 =.8 >80 = 1.0	0.1	sb-C
Percent understory shrub & vine cover beneath the drip line of trees (p. 82) (Answer "0" if no wooded areas)	0	<10 =.1 10-20 =.2 20-40 =.4 40-60 =.6 60-80 =.8 >80 = 1.0	0.1	sb-D

Number & distribution of vegetation forms --- herbs, shrubs, trees. If only one form, answer "A". To count, the patch must comprise >0.5 acre or >5% of vegetated area. See p. 77 for enlargement of diagram.  	b2	A = 0 B2 =.60 C2 =.65 B1 =.70 C1,D =.75 E2 =.80 F2 =.85 E1 =.90 F1 =.95 G = 1.0	0.6	pp-B v-B at-J i-K sb-H
Number of woody species (p. 82)	2	unwooded= 0 1-2 =.1 3-4 =.25 5-6 =.5 7-9 =.75 10-18 =.9 >18 = 1.0	0.1	sb-E
Number of native woody species(p. 78)	1	0 = 0 1 =.1 2-3 =.25 4-5 =.5 6-9 =.75 10-13 =.9 >14 = 1.0	0.1	v-F
Percent of woody species list consisting of species that are native (p. 78)	50	0 = 0 1-57 =.1 58-66 =.25 67-74 =.5 75-79 =.75 80-99 =.9 100 = 1.0	0.1	v-g
Percent of woody cover within stratum that is comprised of non-native species (p. 82) (Use the greater of the tree, understory shrub, or open shrub stratum's percent)	50	100 = 0 80-99 =.1 30-79 =.25 10-29 =.5 5-9 =.75 1-4 =.9 0 = 1.0	0.25	v-H
Spatial predominance of non-native herbs (p. 84) A = Non-natives predominate B = Cannot determine (about equal) C = Natives predominate	A	A = 0 B =.5 C = 1.0	0	v-D

Percent of herb species list comprised of species that are non-native (p. 80)	80	100 = 0 80-99 =.1 67-79 =.25 60-66 =.5 25-59 =.75 1-24 =.9 0 = 1.0	0.1	v-E
Average diameter (inches) of the 3 largest trees. (p. 71)	2	none = 0 1-5 =.1 6-9 =.25 10-17 =.5 18-25 =.75 26-35 =.9 >35 = 1.0	0.1	sb-G v-J at-I n-F
Number of deadwood types. Potentially 12 types:(p. 77) ___ Class 1: freshly fallen, have bark & branches, 4-8" ___ Class 1: freshly fallen, have bark & branches, 8-20" ___ Class 1: freshly fallen, have bark & branches, >20" ___ Class 2: mildly rotted and mostly on ground: 4-8" ___ Class 2: mildly rotted and mostly on ground: 8-20" ___ Class 2: mildly rotted and mostly on ground: >20" ___ Class 3: well rotted, losing shape: 4-8" ___ Class 3: well rotted, losing shape: 8-20" ___ Class 3: well rotted, losing shape: >20" ___ Standing stumps/snags: 4-8" ___ Standing stumps/snags: 8-20" ___ Standing stumps/snags: >20" ___ Artificial debris – check only if no others present 	0	0 = 0 1 =.1 2 =.25 3-4 =.5 5-7 =.75 >7 = 1.0	0	sb-F v-I n-E at-H
Land cover in the vicinity of the site in the 1850's was wooded?	Yes	1 = Yes 0 = No	1	n-K pp-H at-R sb-S v-S

Oregon
Kate Brown, Governor

Department of State Lands
775 Summer Street NE, Suite 100
Salem, OR 97301-1279
(503) 986-5200
FAX (503) 378-4844
www.oregon.gov/dsl

September 18, 2019

Weekley Homes, LLC
Attn: Mike Irwin
1905 NW 169th Place, #102
Beaverton, OR 97006

Re: WD # 2019-0476 **Approved**
Wetland Delineation Report for DW Homes-Brookman Road
Washington County; T3S R1W S6 TLs 100, 101

Dear Mr. Irwin:

The Department of State Lands has reviewed the wetland delineation report prepared by Environmental Science & Assessment, LLC for the site referenced above. Based upon the information presented in the report, we concur with the wetland and waterway boundaries as mapped in Figure 6, 6a and 6b of the report. Please replace all copies of the preliminary wetland maps with

Within the study area, two wetlands and one wetland/waterway (Wetland A-B, Wetland/Waterway C, all totaling approximately 1.3 acres) and Cedar Creek were identified. The wetlands, wetland/waterway and creek are subject to the permit requirements of the state Removal-Fill Law. Under current regulations, a state permit is required for cumulative fill or annual excavation of 50 cubic yards or more in wetlands or below the ordinary high-water line (OHWL) of the waterway (or the 2-year recurrence interval flood elevation if OHWL cannot be determined).

This concurrence is for purposes of the state Removal-Fill Law only. We recommend that you attach a copy of this concurrence letter to any subsequent state permit application to speed application review. Federal or local permit requirements may apply as well. The U.S. Army Corps of Engineers will determine jurisdiction under the Clean Water Act, which may require submittal of a complete Wetland Delineation Report.

Please be advised that state law establishes a preference for avoidance of wetland impacts. Because measures to avoid and minimize wetland impacts may include reconfiguring parcel layout and size or development design, we recommend that you work with Department staff on appropriate site design before completing the city or county land use approval process.

This concurrence is based on information provided to the agency. The jurisdictional determination is valid for five years from the date of this letter unless new information

necessitates a revision. Circumstances under which the Department may change a determination are found in OAR 141-090-0045 (available on our web site or upon request). In addition, laws enacted by the legislature and/or rules adopted by the Department may result in a change in jurisdiction; individuals and applicants are subject to the regulations that are in effect at the time of the removal-fill activity or complete permit application. The applicant, landowner, or agent may submit a request for reconsideration of this determination in writing within six months of the date of this letter.

Thank you for having the site evaluated. If you have any questions, please contact the Jurisdiction Coordinator for Washington County, Chris Stevenson at (503) 986-5246.

Sincerely,

Peter Ryan Digitally signed by Peter Ryan
Date: 2019.09.18 11:31:04
-07'00'

Peter Ryan, PWS
Aquatic Resource Specialist

Enclosures

ec: Jack Dalton, Environmental Science & Assessment
City of Sherwood Planning Department (Maps enclosed for updating LWI)
Carrie Bond, Corps of Engineers
Anita Huffman, DSL

WETLAND DELINEATION / DETERMINATION REPORT COVER FORM

This form must be included with any wetland delineation report submitted to the Department of State Lands for review and approval. A wetland delineation report submittal is not "complete" unless the fully completed and signed report cover form and the required fee are submitted. Attach this form to the front of an unbound report or include a hard copy of the completed form with a CD/DVD that includes a single PDF file of the report cover form and report (minimum 300 dpi resolution) and submit to: **Oregon Department of State Lands, 775 Summer Street NE, Suite 100, Salem, OR 97301-1279.** A single PDF attachment of the completed cover from and report may be e-mailed to **Wetland_Delineation@dsl.state.or.us.** For submittal of PDF files larger than 10 MB, e-mail instructions on how to access the file from your ftp or other file sharing website. Fees can be paid by check or credit card. Make the check payable to the Oregon Department of State Lands. To pay the fee by credit card, call 503-986-5200.

☒ Applicant ☐ Owner Name, Firm and Address:
Mike Irwin
Weekley Homes, LLC
~~1030 Thoureau Dr., Suite 180~~ 1905 NW 164th Pl, #102
~~Schaumburg, IL 60173~~ Beaverton, OR 97006

Business phone #
Mobile phone # (optional)
E-mail: Mirwin@dwhomes.com

RECEIVED
AUG 19 2019
DEPARTMENT OF STATE LANDS

☒ Authorized Legal Agent, Name and Address:
Same as Applicant

Business phone #
Mobile phone #
E-mail: Mirwin@dwhomes.com

I either own the property described below or I have legal authority to allow access to the property. I authorize the Department to access the property for the purpose of confirming the information in the report, after prior notification to the primary contact.
Typed/Printed Name: **Mike Irwin** Signature:
Date: Special instructions regarding site access:

Project and Site Information (using decimal degree format for lat/long., enter centroid of site or start & end points of linear project)

Project Name: **DW Homes – Brookman Road**	Latitude: **45.3440** Longitude: **-122.8520**
Proposed Use: **Residential subdivision**	Tax Map # **3S10600**
Project Street Address (or other descriptive location): **17045 SW Brookman Road**	Township **3S** Range **1W** Section **06** QQ Tax Lot(s) **100 & 101**
City: **Sherwood** County: **Washington**	Waterway: **Cedar Creek** River Mile: NWI Quad(s): **Sherwood**

Wetland Delineation Information

Wetland Consultant Name, Firm and Address:
Jack Dalton
Environmental Science & Assessment, LLC
107 SE Washington St., #249
Portland, OR 97214

Phone # **503-478-0424**
Mobile phone #
E-mail: **jack@esapdx.com**

The information and conclusions on this form and in the attached report are true and correct to the best of my knowledge.
Consultant Signature: Date: **08/13/19**

Primary Contact for report review and site access is ☒ Consultant ☐ Applicant/Owner ☐ Authorized Agent

Wetland/Waters Present? ☒ Yes ☐ No | Study Area size: **15.76 acres** | Total Wetland Acreage: **1.30 ac**

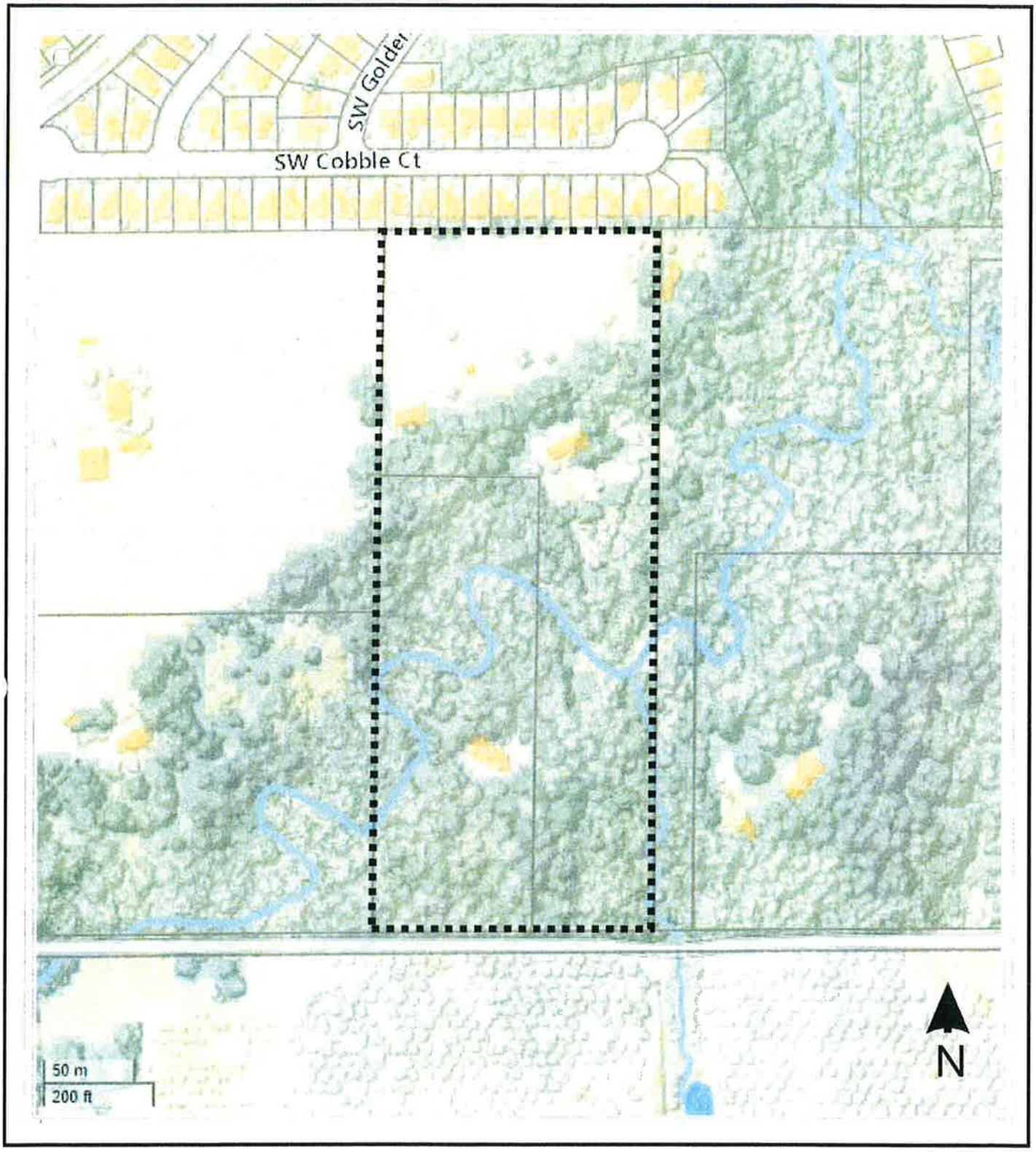
Check Box Below if Applicable:	**Fees:**
☐ R-F permit application submitted	☒ Fee payment submitted $ **454**
☐ Mitigation bank site	☐ Fee ($100) for resubmittal of rejected report
☐ Wetland restoration/enhancement project (not mitigation)	☐ No fee for request for reissuance of an expired report
☐ Industrial Land Certification Program Site	
☐ Reissuance of a recently expired delineation	
Previous DSL # Expiration date ____	

Other Information:	Y	N	
Has previous delineation/application been made on parcel?	☐	☒	If known, previous
Does LWI, if any, show wetland or waters on parcel?	☒	☐	

For Office Use Only

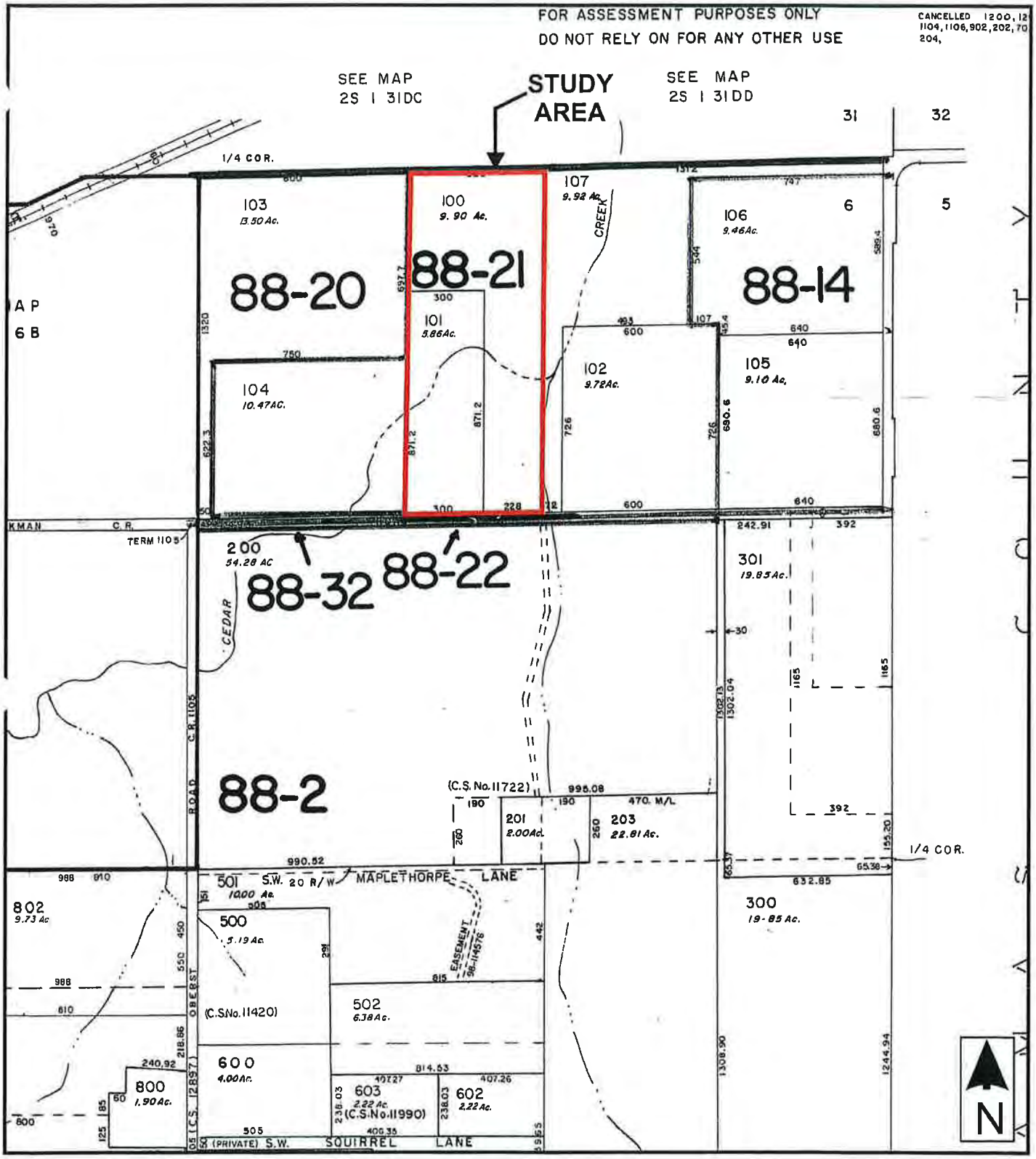
DSL Reviewer: CS Fee Paid Date: ____ / ____ / ____ DSL WD # 2019-0476
Date Delineation Received: 8 / 19 / 19 DSL Project # 78689 DSL Site # ____
Scanned: ☐ Final Scan: ☐ DSL WN # ____ DSL App. # ____

Form Updated 01 03 2013



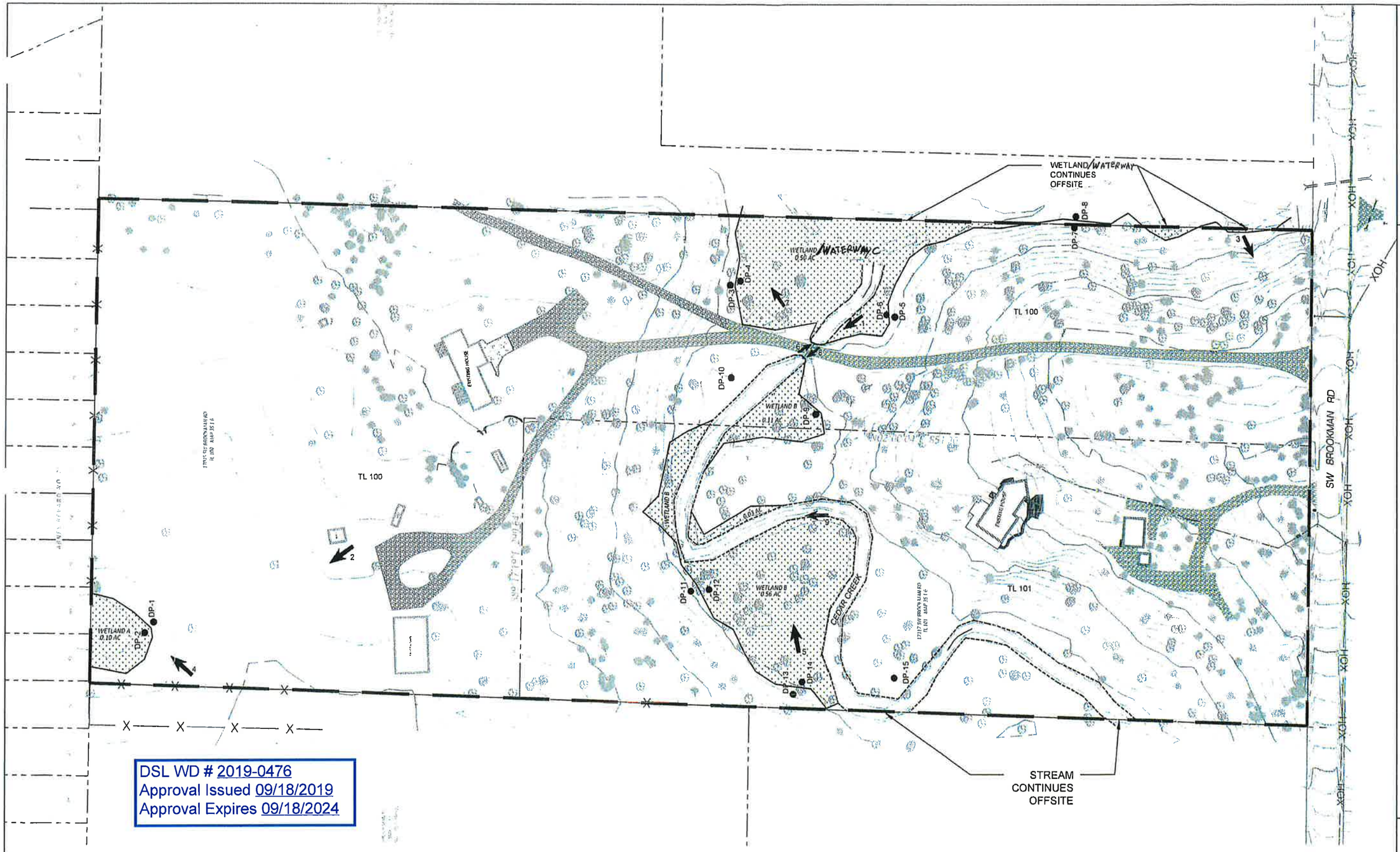
Source: Metro Data Resource Center. http://gis.oregonmetro.gov/metromap/

Environmental Science & Assessment, LLC	Vicinity Map DW Homes - Brookman Road Sherwood, Oregon	Figure 1 Approx. Scale: 1in. = 200 ft.



Source: www.ormap.net

Environmental Science & Assessment, LLC	Tax Lot Map DW Homes - Brookman Road Sherwood, Oregon	Figure 2 Not to Scale



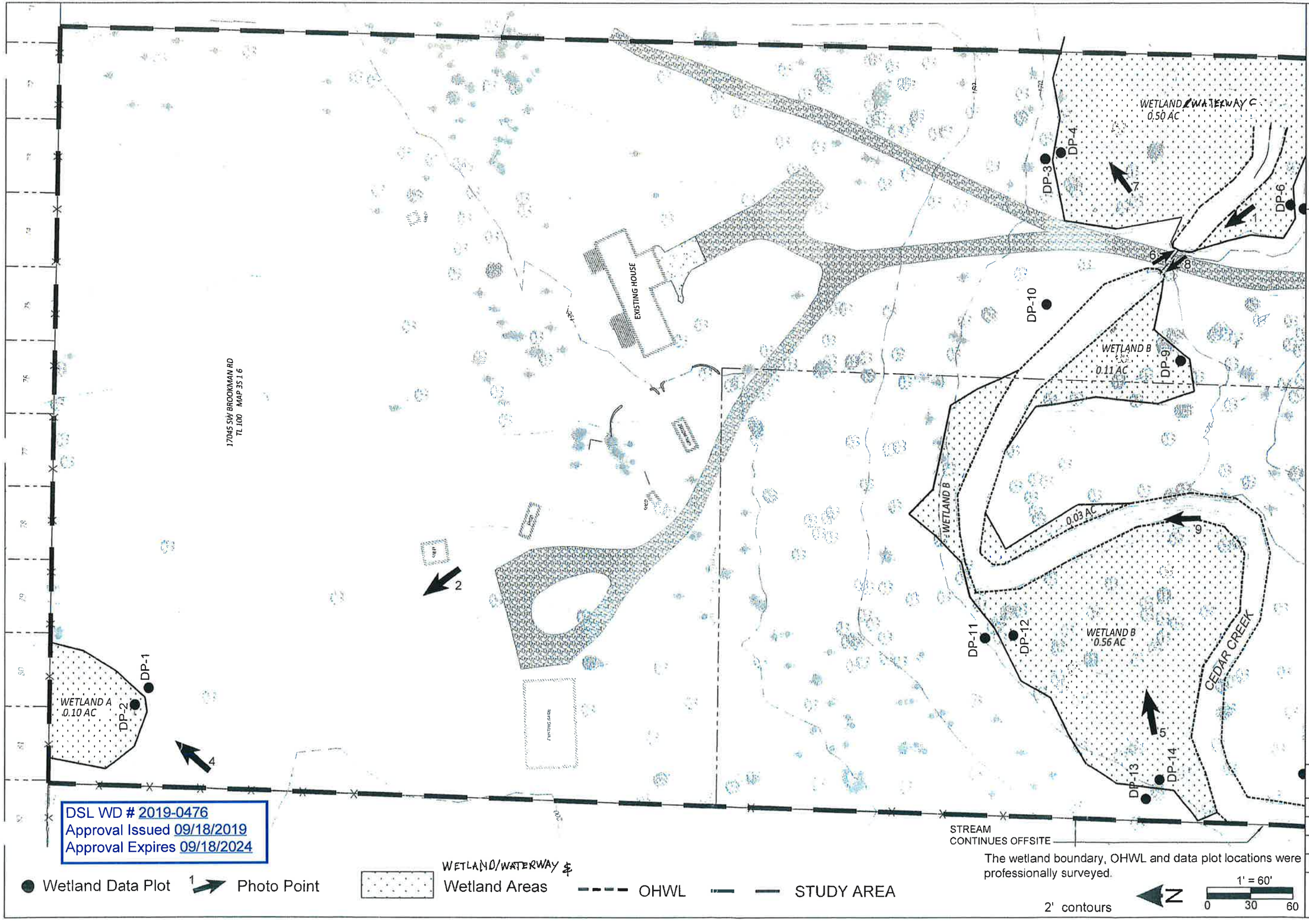
The wetland boundary, OHWL and data plot locations were professionally surveyed.

Environmental Science & Assessment, LLC
107 SE Washington St., Suite 249
Portland, OR 97214
Phone: 503.478.0424
www.esapdx.com

Wetland Map
DW Homes - Brookman
Sherwood, Oregon

Base Map Source:	Pioneer Design Group
Modified By:	KR
Date:	8/2019
Job:	18032
Rev:	

Figure 6



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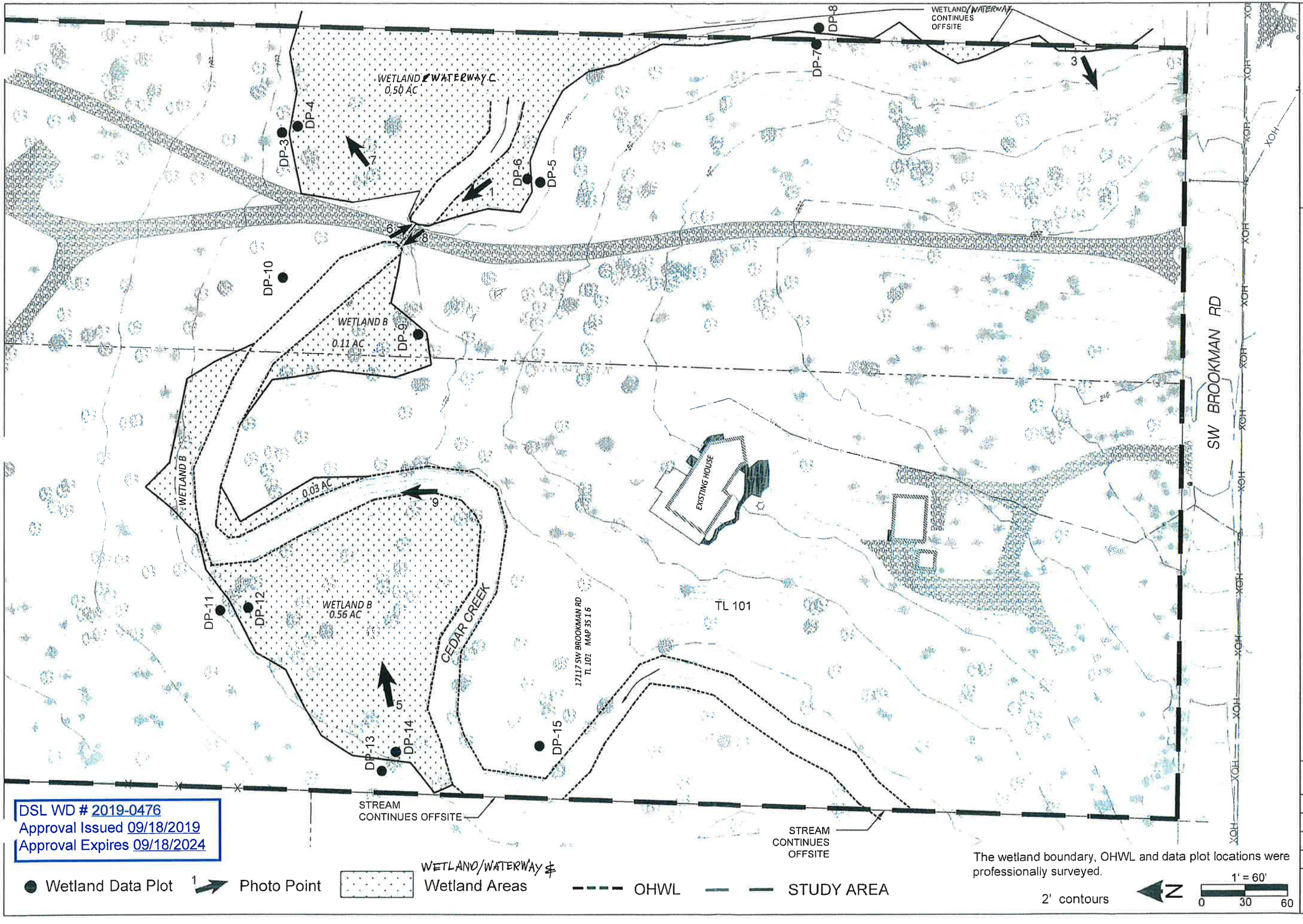
Wetland Map
DW Homes - Brookman
Sherwood, Oregon

Base Map Source:	Pioneer Design Group
Modified By:	KR
Date:	8/2019
Job:	18032
Rev:	

Figure 6a



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Wetland Map
DW Homes - Brookman
Sherwood, Oregon

Base Map Source:	Pioneer Design Group
Modified By:	KR
Date:	8/2019
Job:	18032
Rev:	

Figure 6b

TERAGAN & ASSOCIATES, INC.
ARBORICULTURAL CONSULTANTS

MEMORANDUM

DATE: September 4, 2019

TO: Aziz Siddiqui (David Weekley Homes)

FROM: Todd Prager, AICP, RCA #597, ISA Board Certified Master Arborist

RE: Tree Plan for The Reserve at Cedar Creek

Summary

This report includes tree removal and protection recommendations to meet the requirements in section 16.142.070 (Trees on Property Subject to Certain Land Use Applications) of the City of Sherwood Code for The Reserve at Cedar Creek Subdivision.

The total canopy provided through the preservation of trees outside of environmentally constrained lands at the site will be 6.9 percent. The minimum canopy requirement for residential development is 40 percent. Therefore, an additional 33.1 percent of tree canopy is required to be planted to meet the minimum canopy requirement.

Background

David Weekley Homes is proposing to subdivide the subject property at SW Brookman Road in Sherwood and develop 59 new lots with single family homes. Existing trees are present on the property in the area of the proposed development. The proposed site plan with grading, streets, pathways, and lots in relation to the existing trees is provided in Attachment 1.

The assignment requested of our firm for this project was to:

- Assess the existing trees at the project site;
- Identify the trees to be removed and retained based on construction impacts;
- Provide tree protection recommendations for the trees to be retained; and
- Provide recommendations for meeting the tree canopy requirements in section 16.142.070 of the City of Sherwood Code.

Teragan & Associates, Inc.
3145 Westview Circle • Lake Oswego, OR 97034
Phone: 971.295.4835 • Fax: 503.697.1976
Email: todd@teragan.com • Website: teragan.com

Tree Assessment

In August 2019 I completed the inventory of existing trees at the project site.

The complete inventory data for each tree is provided in Attachment 2 and includes the tree number, common name, scientific name, trunk diameter (DBH), crown radius, crown area (canopy), health condition, structural condition, pertinent comments, whether the tree is offsite, treatment recommendations (remove or retain), and whether the tree is a retained tree that is outside environmentally constrained lands.

The tree numbers in the inventory in Attachment 2 correspond to the tree numbers on the proposed site plan in Attachment 1.

Tree Removal and Retention

The standard tree protection requirement in the City of Sherwood Code is to limit construction activities within the driplines of the trees to be retained unless otherwise approved by the project arborist. A typical alternative minimum recommended root protection zone encompasses a radius around a tree to be retained of .5 feet per inch of DBH. For example, a tree with a 24-inch DBH would have a minimum root protection zone radius of 12 feet. This standard may need to be adjusted on a case by case basis due to tree health, species, root distribution, whether the tree will be impacted on multiple sides, and other factors.

Using the criteria described above and the locations of the trees relative to grading, paving, construction, and other site improvements, 676 trees will be removed and 257 trees will be retained.[1]

Tree protection recommendations for the trees to be retained are provided in the next section of this report.

Tree Protection Recommendations

The standard tree protection requirement in section 16.142.070.G (Tree Protection During Development) of the City of Sherwood Code is to limit construction activities within the driplines of the trees to be retained unless otherwise approved by the project arborist. A typical alternative minimum recommended root protection zone encompasses a radius around a tree to be retained of .5 feet per inch of DBH. For example, a tree with a 24-inch DBH would have a minimum root protection zone radius of 12 feet. This standard may need to be adjusted on a case by case basis due to tree health, species, root distribution, whether the tree will be impacted on multiple sides, and other factors.

[1] Trees 7604, 7607, 7609, 10310, and 10311 are recommended for removal but appear to be on the property line or offsite. Permission of the adjacent property owner is typically required for the removal of property line or offsite trees.

The critical root zone radii of .5 feet per inch of DBH are shown on the site plan in Attachment 1 for the trees adjacent to proposed construction. The trees to be retained can be adequately protected by placing tree protection fencing at or beyond their critical root zones wherever possible as shown in Attachment 1. No grading, stockpiling, storage, disposal, or any other construction related activity shall occur in the tree protection zones unless specifically reviewed and approved by the project arborist.

The following additional tree protection measures shall apply to the trees to be retained:

- *Tree Protection Fencing*: Tree protection fencing shall be placed in the locations shown in Attachment 1. Note that on sheet P2.2 in Attachment 1, the proposed pathway and associated grading should be shifted outside the critical root zones of trees 7890, 7897, and 7898 if possible. If the pathway cannot be shifted, it shall be constructed under arborist supervision in the critical root zones to minimize root impacts.
- *Directional Felling*: Fell the trees to be removed away from the trees to be retained so they do not contact or otherwise damage the trunks or branches of the trees to be retained. No vehicles or heavy equipment shall be permitted within the tree protection zones during tree removal operations.
- *Snag Creation*: Some of the trees to be removed from the environmentally constrained areas may be converted into wildlife snags. Snag creation work should be completed by hand without the use of heavy equipment in the tree protection zone. Do not contact the branches or trunks of the adjacent trees during snag creation. Reduce heights to less than the distances to the proposed streets, buildings, or other high value targets to reduce risk of impact.
- *Stump Removal*: Flush cut and retain stumps or carefully grind stumps of trees to be removed from within the tree protection zones and critical root zones. Do not pull stumps with a machine.
- *Protect Tree Crowns*: Care will need to be taken to not contact or otherwise damage the crowns of the trees that may extend into the construction area.

Additional tree protection recommendations that are consistent with section 16.142.070.G for the trees to be retained are provided in Attachment 3.

Tree Canopy Requirements

Section 16.142.070.D of the City of Sherwood Code requires residential development to achieve a minimum total tree canopy of 40 percent. Trees that are retained receive credit for double their existing canopy area, and trees that are planted receive credit for the expected mature canopy area as determined by a certified arborist. Street trees are eligible for full canopy credit even though they are planted in the public right of way.

Note that the 40 percent canopy requirement applies to the net buildable area of the site which excludes public rights of way, parks, and environmentally constrained

lands. Only those trees that are retained within the net buildable areas are eligible for canopy credit. The net buildable area of the site is 341,153 square feet.

Retained Trees
The canopy area for each of the 25 retained trees outside of environmentally constrained areas is provided in the tree inventory in Attachment 2. Their total combined canopy area is 11,781 square feet. Since retained trees receive double canopy credit, the credit from preservation of the trees is 23,562 square feet. This represents 6.9 percent of the net buildable area.

Planted Trees
An additional 33.1 percent or 112,900 square feet of tree canopy is required to be planted to meet the 40 percent canopy requirement. These plantings can include street trees and other trees outside of environmentally constrained areas.

Canopy for street trees is provided on the City of Sherwood Street Tree List at:

https://www.sherwoodoregon.gov/sites/default/files/fileattachments/Planning/page/668/recommended_street_tree_list.pdf

If other trees not on the list are proposed to be planted, I can work with you to determine their canopy measurements.

Conclusion

The total canopy provided through the preservation of trees outside of environmentally constrained lands at the site will be 6.9 percent. The minimum canopy requirement for residential development is 40 percent. Therefore, an additional 33.1 percent of tree canopy is required to be planted to meet the minimum canopy requirement.

The trees to be retained will be adequately protected by adhering to the recommendations in this report. Any change to the tree protection plan should be approved by the project arborist to ensure that the trees to be retained are adequately protected.

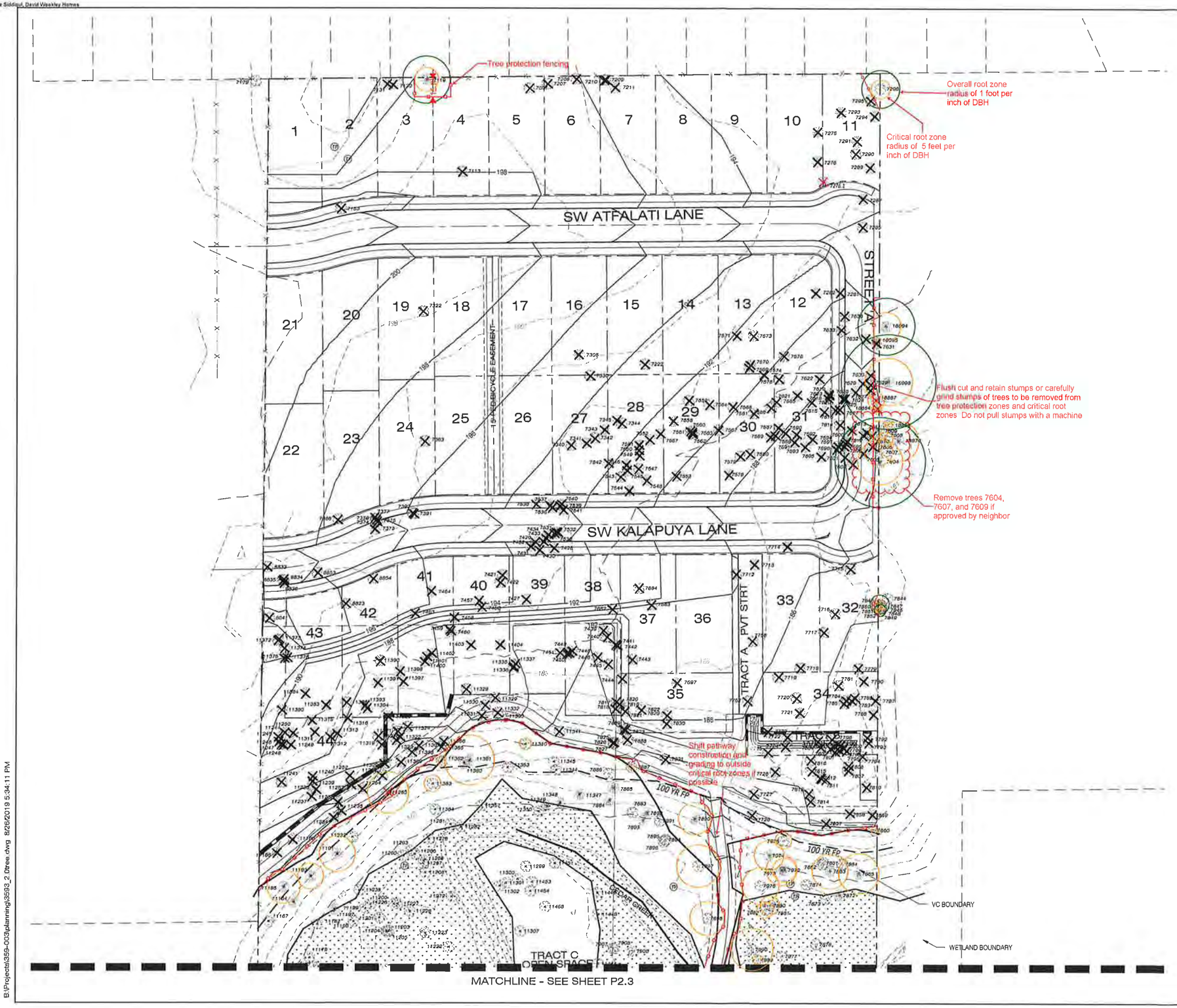
Please contact me if you have questions, concerns, or need any additional information.

Sincerely,

Todd Prager

Todd Prager
ASCA Registered Consulting Arborist #597
ISA Board Certified Master Arborist, WE-6723B
ISA Qualified Tree Risk Assessor
AICP, American Planning Association

Attachments: Attachment 1 - Site Plan with Trees
Attachment 2 - Tree Inventory
Attachment 3 - Tree Protection Recommendations
Attachment 4 - Assumptions and Limiting Conditions



LEGEND

- EXISTING 2' CONTOUR
- EXISTING 10' CONTOUR
- PROPOSED 2' CONTOUR
- PROPOSED 10' CONTOUR
- EXISTING TREE TO REMAIN
- EXISTING TREE TO BE REMOVED

Attachment 1

SCALE
40 0 20 40
1 INCH = 40 FEET

PIONEER DESIGN GROUP
CIVIL ENGINEERING • LAND USE PLANNING • LAND SURVEYING • LANDSCAPE ARCHITECTURE
9020 SW WASHINGTON SQUARE RD., SUITE 170 PORTLAND, OREGON 97223
p 503.643.8286 www.pd-grp.com

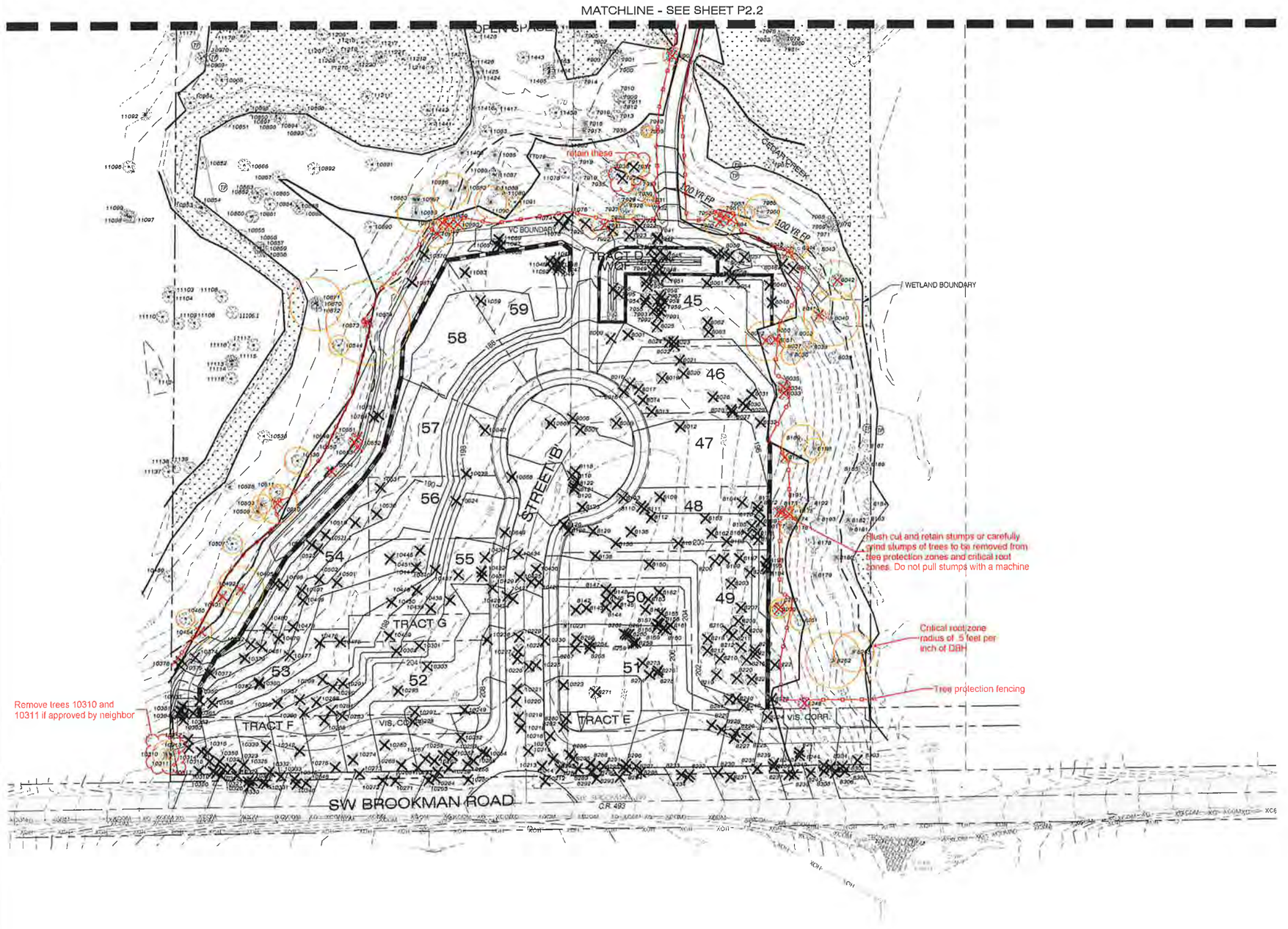
PRELIMINARY TREE PRESERVATION AND REMOVEL PLAN (NORTH)

THE RESERVE AT CEDAR CREEK
CITY OF SHERWOOD, OREGON

Designed by	JS	Date	08/19
Drawn by	JS	Date	08/19
Reviewed by	MLS	Date	08/19
Project No.	359-003	REF.	
Horiz. Scale:	1" = 40'		
Vert. Scale:	N/A		

No.	Date	Revision	By

Project
RESERVE AT CEDAR CREEK
No.
359-003
Type
PLANNING
Sheet
P2.2



LEGEND

- EXISTING 2' CONTOUR
- EXISTING 10' CONTOUR
- PROPOSED 2' CONTOUR
- PROPOSED 10' CONTOUR
- EXISTING TREE TO REMAIN
- EXISTING TREE TO BE REMOVED

Attachment 1

SCALE
40 0 20 40
1 INCH = 40 FEET

PIONEER DESIGN GROUP
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9205 SW WASHINGTON SQUARE RD., SUITE 170 PORTLAND, OREGON 97223
p 503.643.8286 www.pd-grp.com

PRELIMINARY TREE PRESERVATION AND REMOVEL PLAN (SOUTH)

THE RESERVE AT CEDAR CREEK
CITY OF SHERWOOD, OREGON

Designed by	JJS	Date	08/19
Drawn by	JJS	Date	08/19
Reviewed by	MLS	Date	08/19
Project No.	359-003	REF.	
Horiz. Scale:	1" = 40'		
Vert. Scale:	N/A		

No.	Date	Revision	By

Project
RESERVE AT CEDAR CREEK
No.
359-003
Type
PLANNING
Sheet
P2.3

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
7091	Norway maple	*Acer platanoides*	11	15	707	good	fair	codominant at 6' with included bark		remove	
7113	Norway maple	*Acer platanoides*	5	5	79	very poor	very poor	extensive sunscald on trunk, significant dieback		remove	
7119	Douglas-fir	*Pseudotsuga menziesii*	20	20	1257	good	fair	one sided		retain	x
7130	Douglas-fir	*Pseudotsuga menziesii*	16	15	707	good	fair	one sided		remove	
7131	Douglas-fir	*Pseudotsuga menziesii*	8	0	0	very poor	very poor	dead, 20' snag		remove	
7153	Norway maple	*Acer platanoides*	8	5	79	poor	poor	extensive sunscald on trunk		remove	
7179	English hawthorn	*Crataegus monogyna*	16	15	707	good	fair	multiple leaders	x	retain	
7207	Crimson King maple	*Acer platanoides* 'Crimson King'	9	15	707	good	fair	codominant near ground level		remove	
7208	Norway maple	*Acer platanoides*	12	20	1257	good	fair	multiple leaders, codominant near ground		remove	
7209	Norway maple	*Acer platanoides*	18	20	1257	good	fair	multiple leaders near ground with included bark		remove	
7210	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7209		n/a	
7211	Douglas-fir	*Pseudotsuga menziesii*	23	20	1257	good	fair	moderately one sided, codominant at 15'		remove	
7222	European birch	*Betula pendula*	12	0	0	very poor	very poor	dead		remove	
7275	Douglas-fir	*Pseudotsuga menziesii*	15	15	707	good	good			remove	
7276	Douglas-fir	*Pseudotsuga menziesii*	17	15	707	good	good			remove	
7276.1	Douglas-fir	*Pseudotsuga menziesii*	19	15	707	good	good	added to site map in approximate location by arborist		remove	
7281	Douglas-fir	*Pseudotsuga menziesii*	6	8	201	good	good			remove	
7282	Douglas-fir	*Pseudotsuga menziesii*	8	10	314	good	good			remove	
7285	black cottonwood	*Populus trichocarpa*	27	25	1963	good	good			remove	
7287	Douglas-fir	*Pseudotsuga menziesii*	26	20	1257	good	good			remove	
7289	Douglas-fir	*Pseudotsuga menziesii*	27	20	1257	fair	fair	history of branch failure		remove	
7290	Scouler's willow	*Salix scouleriana*	8	15	707	fair	fair	one sided, multiple leaders		remove	
7291	Douglas-fir	*Pseudotsuga menziesii*	10	10	314	good	good			remove	
7293	Douglas-fir	*Pseudotsuga menziesii*	17	20	1257	good	good			remove	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
7294	Douglas-fir	*Pseudotsuga menziesii*	16	15	707	good	good			remove	
7295	Lombardy poplar	*Populus nigra*	22	10	314	good	fair	one sided, codominant at 3' with included bark		remove	
7296	Lombardy poplar	*Populus nigra*	16	10	314	good	good			retain	x
7305	Douglas-fir	*Pseudotsuga menziesii*	18	0	0	very poor	very poor	dead		remove	
7322	n/a	n/a	n/a	n/a	n/a	n/a	n/a	not present		n/a	
7330	European birch	*Betula pendula*	9	15	707	very poor	very poor	top dieback, suspect bronze birch borer		remove	
7340	European mountain ash	*Sorbus aucuparia*	8	10	314	good	fair	multiple leaders at 4'		remove	
7341	Douglas-fir	*Pseudotsuga menziesii*	16	15	707	good	fair	one sided		remove	
7342	madrone	*Arbutus menziesii*	7	5	79	fair	fair	significant lean, partially uprooted, branch dieback		remove	
7343	Douglas-fir	*Pseudotsuga menziesii*	15	15	707	good	fair	one sided		remove	
7344	madrone	*Arbutus menziesii*	9	10	314	fair	fair	multiple leaders at 1', topped 4" stem		remove	
7345	Douglas-fir	*Pseudotsuga menziesii*	6	5	79	good	fair	moderately one sided		remove	
7363	pin oak	*Quercus palustris*	24	20	1257	good	fair	codominant at 25'		remove	
7366	European birch	*Betula pendula*	16	20	1257	fair	fair	minor dieback		remove	
7373	Douglas-fir	*Pseudotsuga menziesii*	45	25	1963	fair	fair	history of branch failure		remove	
7374	sweet cherry	*Prunus avium*	19	15	707	good	fair	multiple leaders at ground level, one sided		remove	
7375	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7374		n/a	
7376	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7374		n/a	
7377	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7374		n/a	
7391	orchard apple	*Malus domestica*	9	10	314	fair	fair	codominant at ground level, not maintained for fruit production		remove	
7392	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7391		n/a	
7421	cascara	*Rhamnus purshiana*	9	10	314	very poor	very poor	codominant at ground, dead 6" stem		remove	
7422	Oregon ash	*Fraxinus latifolia*	5	5	79	poor	poor	sloughing bark at lower trunk, poor trunk taper		remove	
7427	Douglas-fir	*Pseudotsuga menziesii*	39	25	1963	fair	fair	multiple leaders at 15', significant sap flow		remove	
7428	Douglas-fir	*Pseudotsuga menziesii*	30	25	1963	good	fair	one sided		remove	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
7429	Douglas-fir	*Pseudotsuga menziesii*	34	25	1963	good	fair	35% live crown ratio		remove	
7430	Douglas-fir	*Pseudotsuga menziesii*	21	20	1257	good	fair	one sided		remove	
7431	Douglas-fir	*Pseudotsuga menziesii*	23	20	1257	fair	fair	one sided, moderately thin crown		remove	
7432	Douglas-fir	*Pseudotsuga menziesii*	23	20	1257	fair	fair	one sided, moderately thin crown		remove	
7433	Douglas-fir	*Pseudotsuga menziesii*	21	15	707	fair	fair	moderately suppressed, marginal trunk taper		remove	
7434	Douglas-fir	*Pseudotsuga menziesii*	7	3	28	poor	poor	suppressed		remove	
7439	ornamental cherry	*Prunus sp.*	12	10	314	fair	fair	multiple leaders, significant ivy		remove	
7440	weeping cherry	*Prunus pendula*	6	5	79	poor	poor	overtopped by adjacent trees		remove	
7441	deodar cedar	*Cedrus deodara*	28	20	1257	good	fair	codominant at 2', moderately one sided		remove	
7442	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7441		n/a	
7443	orchard cherry	*Prunus sp.*	7	10	314	fair	fair	overtopped by adjacent trees, thin crown		remove	
7444	English hawthorn	*Crataegus monogyna*	14	10	314	very poor	very poor	significant dieback, extreme lean		remove	
7445	English hawthorn	*Crataegus monogyna*	13	20	1257	fair	poor	multiple leaders, extreme lean		remove	
7446	English hawthorn	*Crataegus monogyna*	13	15	707	fair	poor	multiple leaders, significant lean		remove	
7448	English hawthorn	*Crataegus monogyna*	9	5	79	fair	fair	wounded lower trunk		remove	
7449	black hawthorn	*Crataegus douglasii*	5	5	79	fair	fair	one sided		remove	
7450	black hawthorn	*Crataegus douglasii*	5	5	79	fair	fair	one sided		remove	
7451	English hawthorn	*Crataegus monogyna*	14	10	314	poor	poor	multiple leaders, significant dieback		remove	
7456	grand fir	*Abies grandis*	28	15	707	good	fair	one sided		remove	
7457	Douglas-fir	*Pseudotsuga menziesii*	21	20	1257	fair	fair	one sided, moderately thin crown		remove	
7458	Douglas-fir	*Pseudotsuga menziesii*	24	10	314	poor	poor	significant dieback		remove	
7459	Douglas-fir	*Pseudotsuga menziesii*	6	3	28	poor	poor	overtopped by adjacent trees, suppressed		remove	
7460	Douglas-fir	*Pseudotsuga menziesii*	28	15	707	poor	poor	significant dieback, moderately suppressed		remove	
7463	Douglas-fir	*Pseudotsuga menziesii*	48	0	0	very poor	very poor	dead		remove	
7464	Douglas-fir	*Pseudotsuga menziesii*	42	0	0	very poor	very poor	dead		remove	
7530	Douglas-fir	*Pseudotsuga menziesii*	25	20	1257	fair	fair	multiple leaders at ground level, one sided		remove	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
7531	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7530		n/a	
7532	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7530		n/a	
7536	Douglas-fir	*Pseudotsuga menziesii*	39	25	1963	fair	fair	codominant at 2' with included bark, top of north stem failed		remove	
7537	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7536		n/a	
7538	Douglas-fir	*Pseudotsuga menziesii*	44	30	2827	good	fair	one sided		remove	
7539	Douglas-fir	*Pseudotsuga menziesii*	11	5	79	poor	poor	suppressed		remove	
7540	Douglas-fir	*Pseudotsuga menziesii*	22	20	1257	fair	fair	one sided, bowed trunk		remove	
7541	Leyland cypress	*Cupressus × leylandii*	5	10	314	good	fair	moderately one sided		remove	
7542	Douglas-fir	*Pseudotsuga menziesii*	39	30	2827	good	fair	moderately one sided		remove	
7543	sweet cherry	*Prunus avium*	4	8	201	good	good			remove	
7544	Douglas-fir	*Pseudotsuga menziesii*	31	20	1257	good	fair	one sided		remove	
7545	Douglas-fir	*Pseudotsuga menziesii*	15	10	314	fair	fair	one sided, moderately suppressed		remove	
7546	Douglas-fir	*Pseudotsuga menziesii*	14	10	314	fair	fair	one sided, moderately suppressed		remove	
7547	sweet cherry	*Prunus avium*	5	8	201	good	fair	multiple leaders, overtopped by adjacent trees		remove	
7548	grand fir	*Abies grandis*	29	25	1963	good	fair	one sided		remove	
7549	grand fir	*Abies grandis*	17	15	707	fair	fair	overtopped by adjacent trees, one sided		remove	
7550	Douglas-fir	*Pseudotsuga menziesii*	24	15	707	fair	poor	poor trunk taper, moderately suppressed		remove	
7551	Douglas-fir	*Pseudotsuga menziesii*	41	25	1963	fair	fair	history of branch failure		remove	
7552	Douglas-fir	*Pseudotsuga menziesii*	17	10	314	fair	fair	overtopped by adjacent trees, moderately suppressed		remove	
7553	grand fir	*Abies grandis*	30	20	1257	good	fair	moderately one sided		remove	
7557	Douglas-fir	*Pseudotsuga menziesii*	36	30	2827	good	fair	one sided		remove	
7558	hazelnut	*Corylus cornuta*	n/a	n/a	n/a	n/a	n/a	not a tree species		remove	
7559	sweet cherry	*Prunus avium*	14	10	314	fair	fair	significant lean, overtopped by adjacent trees		remove	
7560	Oregon ash	*Fraxinus latifolia*	18	10	314	fair	fair	multiple leaders at ground level, overtopped by adjacent trees		remove	
7561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7560		n/a	
7562	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7560		n/a	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
7563	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7560		n/a	
7564	Scouler's willow	*Salix scouleriana*	16	0	0	very poor	very poor	dead, top failed		remove	
7567	Scouler's willow	*Salix scouleriana*	9	0	0	very poor	very poor	dead and decayed		remove	
7568	Scouler's willow	*Salix scouleriana*	16	10	314	very poor	very poor	extensive dieback and decay		remove	
7569	plum	*Prunus sp.*	10	5	79	poor	poor	suppressed, significant lean		remove	
7570	plum	*Prunus sp.*	12	5	79	poor	poor	suppressed, significant lean		remove	
7571	Douglas-fir	*Pseudotsuga menziesii*	22	20	1257	good	fair	one sided		remove	
7573	hazelnut	*Corylus cornuta*	n/a	n/a	n/a	n/a	n/a	not a tree species		remove	
7574	Douglas-fir	*Pseudotsuga menziesii*	40	25	1963	good	good			remove	
7575	Pacific dogwood	*Cornus nuttallii*	7	10	314	fair	fair	one sided, moderately thin crown		remove	
7576	Scouler's willow	*Salix scouleriana*	12	0	0	very poor	very poor	dead		remove	
7578	Douglas-fir	*Pseudotsuga menziesii*	34	25	1963	good	fair	moderately one sided		remove	
7579	Oregon ash	*Fraxinus latifolia*	6	5	79	good	fair	moderately one sided		remove	
7580	hazelnut	*Corylus cornuta*	n/a	n/a	n/a	n/a	n/a	not a tree species		remove	
7581	Scouler's willow	*Salix scouleriana*	16	0	0	very poor	very poor	dead, top failed		remove	
7585	bigleaf maple	*Acer macrophyllum*	10	20	1257	good	fair	one sided, codominant at 15'		remove	
7586	Oregon ash	*Fraxinus latifolia*	16	10	314	fair	fair	one sided, significant ivy		remove	
7587	Douglas-fir	*Pseudotsuga menziesii*	14	10	314	poor	poor	suppressed, extensive ivy		remove	
7588	Douglas-fir	*Pseudotsuga menziesii*	31	15	707	fair	fair	one sided, sweep in lower trunk, extensive ivy		remove	
7589	Douglas-fir	*Pseudotsuga menziesii*	17	15	707	poor	poor	one sided, smothered by ivy		remove	
7590	Douglas-fir	*Pseudotsuga menziesii*	25	15	707	fair	fair	crown extensive suppressed by adjacent trees		remove	
7591	Douglas-fir	*Pseudotsuga menziesii*	12	5	79	fair	poor	overtopped by adjacent trees, moderately suppressed		remove	
7592	Douglas-fir	*Pseudotsuga menziesii*	8	5	79	poor	poor	suppressed, extensive ivy		remove	
7593	Douglas-fir	*Pseudotsuga menziesii*	12	5	79	fair	poor	overtopped by adjacent trees, moderately suppressed		remove	
7594	Douglas-fir	*Pseudotsuga menziesii*	22	15	707	fair	fair	one sided, marginal trunk taper		remove	
7595	Douglas-fir	*Pseudotsuga menziesii*	16	0	0	very poor	very poor	dead		remove	
7596	Douglas-fir	*Pseudotsuga menziesii*	15	15	707	good	fair	one sided		remove	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
7597	Douglas-fir	*Pseudotsuga menziesii*	12	0	0	very poor	very poor	dead, 20' snag		remove	
7598	Douglas-fir	*Pseudotsuga menziesii*	8	0	0	very poor	very poor	dead		remove	
7599	Douglas-fir	*Pseudotsuga menziesii*	10	0	0	very poor	very poor	dead		remove	
7600	Douglas-fir	*Pseudotsuga menziesii*	26	15	707	fair	poor	one sided, marginal trunk taper		remove	
7601	Douglas-fir	*Pseudotsuga menziesii*	18	15	707	good	fair	one sided		remove	
7602	Douglas-fir	*Pseudotsuga menziesii*	14	15	707	good	fair	one sided		remove	
7604	Douglas-fir	*Pseudotsuga menziesii*	38	25	1963	good	fair	one sided	x	retain	
7605	Douglas-fir	*Pseudotsuga menziesii*	26	15	707	fair	poor	moderately suppressed, poor trunk taper		remove	
7606	Douglas-fir	*Pseudotsuga menziesii*	14	10	314	poor	poor	suppressed, poor trunk taper		remove	
7607	Douglas-fir	*Pseudotsuga menziesii*	24	15	707	fair	fair	one sided, kinked trunk		retain	
7608	Douglas-fir	*Pseudotsuga menziesii*	12	0	0	very poor	very poor	dead	x	retain	
7609	Douglas-fir	*Pseudotsuga menziesii*	16	5	79	very poor	very poor	suppressed		remove	
7610	Douglas-fir	*Pseudotsuga menziesii*	12	0	0	very poor	very poor	dead 10' snag		remove	
7611	Douglas-fir	*Pseudotsuga menziesii*	16	5	79	poor	poor	suppressed, poor trunk taper, kinked upper trunk		remove	
7612	Douglas-fir	*Pseudotsuga menziesii*	16	5	79	poor	poor	suppressed, poor trunk taper		remove	
7613	Douglas-fir	*Pseudotsuga menziesii*	24	15	707	fair	poor	one sided, poor trunk taper		remove	
7614	Pacific dogwood	*Cornus nuttallii*	8	10	314	fair	fair	thin crown, suspect dogwood anthracnose		remove	
7615	Douglas-fir	*Pseudotsuga menziesii*	12	5	79	poor	poor	suppressed, extensive ivy		remove	
7616	Douglas-fir	*Pseudotsuga menziesii*	32	20	1257	fair	fair	one sided, marginal trunk taper		remove	
7617	Douglas-fir	*Pseudotsuga menziesii*	36	20	1257	fair	fair	one sided, marginal trunk taper		remove	
7618	grand fir	*Abies grandis*	8	3	28	fair	poor	suppressed, poor trunk taper		remove	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
7619	Douglas-fir	*Pseudotsuga menziesii*	40	25	1963	good	fair	one sided		remove	
7620	Douglas-fir	*Pseudotsuga menziesii*	6	5	79	fair	fair	suppressed, extensive ivy		remove	
7621	Douglas-fir	*Pseudotsuga menziesii*	22	15	707	good	fair	one sided		remove	
7622	Douglas-fir	*Pseudotsuga menziesii*	14	15	707	good	fair	one sided		remove	
7623	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as 7619		n/a	
7624	Douglas-fir	*Pseudotsuga menziesii*	24	0	0	very poor	very poor	dead		remove	
7625	Douglas-fir	*Pseudotsuga menziesii*	6	5	79	poor	fair	suppressed		remove	
7626	Douglas-fir	*Pseudotsuga menziesii*	20	15	707	fair	poor	moderately suppressed, poor trunk taper		remove	
7627	Douglas-fir	*Pseudotsuga menziesii*	28	20	1257	fair	poor	one sided, poor trunk taper		remove	
7628	Douglas-fir	*Pseudotsuga menziesii*	30	20	1257	fair	poor	one sided, poor trunk taper		remove	
7629	Douglas-fir	*Pseudotsuga menziesii*	12	3	28	poor	poor	suppressed, poor trunk taper		remove	
7630	Douglas-fir	*Pseudotsuga menziesii*	13	10	314	poor	poor	overtopped by adjacent trees, suppressed		remove	
7631	Douglas-fir	*Pseudotsuga menziesii*	26	20	1257	good	fair	one sided, marginal trunk taper		remove	
7632	Douglas-fir	*Pseudotsuga menziesii*	10	10	314	poor	poor	overtopped by adjacent trees, suppressed		remove	
7633	sweet cherry	*Prunus avium*	14	10	314	good	fair	multiple leaders		remove	
7636	sweet cherry	*Prunus avium*	5	5	79	good	good			remove	
7682	honeylocust	*Robinia pseudoacacia*	14	10	314	poor	poor	topped at 10'		remove	
7683	southern magnolia	*Magnolia grandiflora*	14	15	707	fair	poor	topped		remove	
7684	Japanese maple	*Acer palmatum*	11	20	1257	good	good			remove	
7697	incense cedar	*Calocedrus decurrens*	15	12	452	fair	good	suspect Seridium canker		remove	
7712	sweet cherry	*Prunus avium*	12	15	707	good	fair	multiple leaders		remove	
7713	Douglas-fir	*Pseudotsuga menziesii*	30	17	908	fair	good	history of branch failure		remove	
7714	Douglas-fir	*Pseudotsuga menziesii*	18	15	707	fair	fair	moderate branch dieback		remove	
7715	purpleleaf plum	*Prunus cerasifera*	13	15	707	fair	fair	multiple leaders, significant epicormic growth		remove	
7716	purpleleaf plum	*Prunus cerasifera*	11	15	707	poor	poor	overtopped by adjacent trees, failed tops		remove	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
7717	Norway maple	*Acer platanoides*	17	25	1963	good	fair	multiple leaders at 4'		remove	
7718	Scouler's willow	*Salix scouleriana*	24	30	2827	very poor	very poor	extensive dieback and decay		remove	
7719	pear	*Pyrus sp.*	6	5	79	fair	fair	not maintained for fruit production		remove	
7720	orchard apple	*Malus domestica*	8	10	314	fair	poor	not maintained for fruit production, cracked trunk at 2'		remove	
7721	Scots pine	*Pinus sylvestris*	17	15	707	fair	fair	codominant at 6', moderately thin crown		remove	
7722	Scots pine	*Pinus sylvestris*	10	10	314	fair	fair	moderately thin crown, one sided		remove	
7723	Scots pine	*Pinus sylvestris*	13	15	707	fair	fair	moderately thin crown		remove	
7724	Douglas-fir	*Pseudotsuga menziesii*	11	10	314	good	fair	one sided		remove	
7725	English hawthorn	*Crataegus monogyna*	9	10	314	poor	poor	multiple leaders at ground level, significant dieback and decay		remove	
7726	pear	*Pyrus sp.*	12	15	707	fair	fair	not maintained for fruit production		remove	
7727	Scouler's willow	*Salix scouleriana*	12	0	0	very poor	very poor	dead		remove	
7728	Oregon ash	*Fraxinus latifolia*	14	20	1257	good	fair	multiple leaders, extensive ivy		remove	
7752	purpleleaf plum	*Prunus cerasifera*	17	15	707	poor	poor	topped at 15'		remove	
7756	Norway maple	*Acer platanoides*	19	20	1257	good	fair	multiple leaders		remove	
7779	Scouler's willow	*Salix scouleriana*	12	0	0	very poor	very poor	dead		remove	
7780	Douglas-fir	*Pseudotsuga menziesii*	26	20	1257	good	fair	moderately one sided		remove	
7781	sweet cherry	*Prunus avium*	4	5	79	good	fair	one sided		remove	
7782	black hawthorn	*Crataegus douglasii*	5	5	79	fair	poor	overtopped by adjacent trees, extreme lean		remove	
7783	black hawthorn	*Crataegus douglasii*	6	5	79	poor	poor	overtopped by adjacent trees, extreme lean, suppressed		remove	
7784	sweet cherry	*Prunus avium*	5	5	79	fair	fair	one sided		remove	
7785	sweet cherry	*Prunus avium*	7	10	314	fair	fair	one sided		remove	
7787	Douglas-fir	*Pseudotsuga menziesii*	28	20	1257	good	fair	moderately one sided		remove	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
7788	Douglas-fir	*Pseudotsuga menziesii*	30	20	1257	good	fair	moderately one sided		remove	
7792	sweet cherry	*Prunus avium*	6	5	79	fair	fair	marginal trunk taper, moderately thin crown		remove	
7793	sweet cherry	*Prunus avium*	8	10	314	fair	fair	one sided, moderately thin crown		remove	
7794	Scouler's willow	*Salix scouleriana*	15	0	0	very poor	very poor	dead		remove	
7795	sweet cherry	*Prunus avium*	8	5	79	fair	fair	codominant at 1', one sided, significant lean		remove	
7796	sweet cherry	*Prunus avium*	6	5	79	fair	fair	one sided, marginal trunk taper		remove	
7797	Oregon ash	*Fraxinus latifolia*	9	10	314	good	fair	one sided, marginal trunk taper		remove	
7798	sweet cherry	*Prunus avium*	14	15	707	good	fair	codominant at 10', one sided		remove	
7799	sweet cherry	*Prunus avium*	6	5	79	poor	poor	suppressed		remove	
7800	sweet cherry	*Prunus avium*	6	5	79	fair	fair	moderately suppressed		remove	
7801	sweet cherry	*Prunus avium*	10	8	201	fair	fair	one sided, significant lean, codominant at 1'		remove	
7802	sweet cherry	*Prunus avium*	7	5	79	good	fair	one sided		remove	
7803	sweet cherry	*Prunus avium*	14	25	1963	good	fair	one sided		remove	
7804	sweet cherry	*Prunus avium*	6	5	79	good	fair	one sided		remove	
7805	sweet cherry	*Prunus avium*	7	10	314	good	fair	one sided		remove	
7806	sweet cherry	*Prunus avium*	7	5	79	good	fair	35% live crown ratio		remove	
7807	sweet cherry	*Prunus avium*	6	5	79	good	fair	one sided, sweep in lower trunk		remove	
7810	sweet cherry	*Prunus avium*	5	8	201	good	fair	35% live crown ratio		remove	
7811	sweet cherry	*Prunus avium*	11	10	314	very poor	very poor	extensive dieback and decay		remove	
7812	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7811		n/a	
7813	red alder	*Alnus rubra*	10	10	314	fair	fair	one sided		remove	
7814	sweet cherry	*Prunus avium*	8	10	314	good	fair	codominant at ground level		remove	
7815	sweet cherry	*Prunus avium*	7	5	79	good	fair	35% live crown ratio		remove	
7816	black hawthorn	*Crataegus douglasii*	6	5	79	poor	poor	suppressed, extreme lean		remove	
7817	Oregon ash	*Fraxinus latifolia*	8	0	0	very poor	very poor	dead		remove	
7818	Oregon ash	*Fraxinus latifolia*	11	15	707	good	fair	one sided, multiple leaders		remove	
7819	cascara	*Rhamnus purshiana*	7	5	79	poor	poor	suppressed		remove	
7820	Oregon ash	*Fraxinus latifolia*	5	5	79	fair	poor	overtopped by adjacent trees, significant lean		remove	
7821	black hawthorn	*Crataegus douglasii*	6	5	79	very poor	very poor	top failed		remove	
7822	black hawthorn	*Crataegus douglasii*	6	0	0	very poor	very poor	dead, fallen over		remove	
7823	pear	*Pyrus sp.*	5	5	79	poor	fair	significant dieback		remove	
7825	English hawthorn	*Crataegus monogyna*	16	10	314	fair	fair	multiple leaders at 1'		remove	
7826	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7826		n/a	
7827	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7826		n/a	
7829	purpleleaf plum	*Prunus cerasifera*	6	10	314	fair	fair	multiple leaders, one sided		remove	
7830	Oregon ash	*Fraxinus latifolia*	16	20	1257	good	good			remove	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
7831	Scouler's willow	*Salix scouleriana*	16	10	314	very poor	very poor	extensive dieback, multiple leaders		remove	
7844	sweet cherry	*Prunus avium*	9	10	314	fair	fair	one sided	x	retain	
7845	sweet cherry	*Prunus avium*	9	5	79	fair	fair	moderately suppressed	x	retain	
7846	sweet cherry	*Prunus avium*	8	10	314	fair	fair	one sided	x	retain	
7847	sweet cherry	*Prunus avium*	5	5	79	fair	fair	one sided, significant lean	x	retain	
7848	sweet cherry	*Prunus avium*	9	10	314	fair	fair	one sided	x	retain	
7849	sweet cherry	*Prunus avium*	6	5	79	fair	fair	one sided	x	retain	
7850	sweet cherry	*Prunus avium*	7	5	79	fair	fair	one sided		retain	x
7851	sweet cherry	*Prunus avium*	8	5	79	fair	fair	one sided	x	retain	
7852	sweet cherry	*Prunus avium*	5	5	79	fair	fair	one sided, significant lean	x	retain	
7857	sweet cherry	*Prunus avium*	9	20	1257	good	fair	moderately one sided		remove	
7858	Douglas-fir	*Pseudotsuga menziesii*	25	20	1257	good	fair	moderately one sided		remove	
7859	grand fir	*Abies grandis*	25	20	1257	good	fair	moderately one sided		remove	
7860	sweet cherry	*Prunus avium*	5	5	79	fair	fair	overtopped by adjacent trees, one sided		remove	x
7861	sweet cherry	*Prunus avium*	13	20	1257	fair	fair	codominant at ground level, one sided		retain	
7862	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7861		n/a	
7863	Douglas-fir	*Pseudotsuga menziesii*	30	20	1257	fair	poor	significant *P. pini* conks, one sided		retain	
7864	sweet cherry	*Prunus avium*	6	5	79	good	poor	25% live crown ratio		retain	
7865	Douglas-fir	*Pseudotsuga menziesii*	34	25	1963	good	good			retain	
7872	Douglas-fir	*Pseudotsuga menziesii*	27	20	1257	good	fair	bowed trunk, one sided		retain	
7873	Oregon ash	*Fraxinus latifolia*	8	15	707	good	fair	marginal trunk taper		retain	
7874	black hawthorn	*Crataegus douglasii*	7	5	79	fair	fair	multiple leaders, overtopped by adjacent trees		retain	
7878	Oregon ash	*Fraxinus latifolia*	30	30	2827	fair	fair	history of branch failure		retain	
7880	Oregon ash	*Fraxinus latifolia*	16	20	1257	fair	fair	codominant at ground, moderately suppressed		retain	
7881	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7880		n/a	
7882	Oregon ash	*Fraxinus latifolia*	14	20	1257	fair	fair	one sided		retain	
7883	Oregon ash	*Fraxinus latifolia*	36	30	2827	poor	poor	extensive decay at lower trunk		retain	
7884	Douglas-fir	*Pseudotsuga menziesii*	6	8	201	fair	fair	overtopped by adjacent trees, moderately suppressed		retain	
7885	Douglas-fir	*Pseudotsuga menziesii*	31	20	1257	fair	fair	moderately suppressed		retain	
7886	Oregon ash	*Fraxinus latifolia*	11	10	314	good	fair	one sided, codominant at 20'		retain	
7887	cascara	*Rhamnus purshiana*	5	4	50	fair	fair	moderate dieback		retain	x

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
7888	Pacific dogwood	*Cornus nuttallii*	6	5	79	poor	poor	significant lean, overtopped by adjacent trees, suppressed		remove	
7889	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7888		n/a	
7890	Douglas-fir	*Pseudotsuga menziesii*	27	20	1257	poor	fair	*P. pini* on trunk, low vigor		retain	
7891	black hawthorn	*Crataegus douglasii*	5	5	79	poor	poor	overtopped by adjacent trees, suppressed		retain	
7892	Douglas-fir	*Pseudotsuga menziesii*	34	15	707	fair	fair	one sided, extensive ivy at lower trunk		retain	
7893	Douglas-fir	*Pseudotsuga menziesii*	10	10	314	fair	fair	one sided, overtopped by adjacent trees		retain	
7894	Oregon ash	*Fraxinus latifolia*	20	15	707	good	fair	competing upright leaders at lower trunk		retain	
7895	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7894		n/a	
7896	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7894		n/a	
7897	Oregon ash	*Fraxinus latifolia*	36	25	1963	fair	fair	multiple leaders, history of branch failure, trunk decay		retain	
7898	Oregon ash	*Fraxinus latifolia*	29	20	1257	fair	fair	multiple leaders, moderate branch dieback		retain	
7899	red alder	*Alnus rubra*	14	20	1257	fair	fair	moderate branch dieback		remove	
7900	Oregon ash	*Fraxinus latifolia*	14	25	1963	poor	poor	codominant at ground level, extensive decay at base of trunk		retain	
7901	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7900		n/a	
7902	Oregon ash	*Fraxinus latifolia*	33	25	1963	poor	poor	multiple leaders, significant branch dieback		retain	
7903	Oregon ash	*Fraxinus latifolia*	13	20	1257	poor	poor	multiple leaders at ground level, significant branch dieback, overtopped by adjacent trees		retain	
7904	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7903		n/a	
7905	Oregon ash	*Fraxinus latifolia*	17	0	0	very poor	very poor	dead 15' tall snag		retain	
7906	Oregon ash	*Fraxinus latifolia*	25	20	1257	poor	poor	codominant at 5', significant decay at base of trunk		retain	
7907	Oregon ash	*Fraxinus latifolia*	28	20	1257	poor	poor	codominant at 4', significant decay at base of trunk		retain	
7908	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7907		n/a	
7909	Oregon ash	*Fraxinus latifolia*	12	10	314	poor	poor	significant lean, significant branch dieback		retain	
7910	black hawthorn	*Crataegus douglasii*	7	0	0	very poor	very poor	dead		retain	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
7911	black hawthorn	*Crataegus douglasii*	5	5	79	poor	poor	suppressed		retain	
7912	black hawthorn	*Crataegus douglasii*	6	5	79	fair	fair	moderately suppressed		retain	
7913	black hawthorn	*Crataegus douglasii*	9	10	314	poor	poor	suppressed		retain	
7914	Oregon ash	*Fraxinus latifolia*	19	20	1257	poor	poor	significant decay along trunk		retain	
7915	Douglas-fir	*Pseudotsuga menziesii*	21	30	2827	good	fair	one sided, 70% live crown ratio		retain	
7916	sweet cherry	*Prunus avium*	12	10	314	fair	fair	one sided, moderately thin crown		retain	
7917	grand fir	*Abies grandis*	27	20	1257	good	fair	one sided, 60% live crown ratio		retain	
7918	sweet cherry	*Prunus avium*	10	20	1257	good	fair	moderately one sided		retain	x
7919	red alder	*Alnus rubra*	16	10	314	poor	poor	one sided, significant branch dieback		retain	x
7920	Pacific yew	*Taxus brevifolia*	13	13	531	very poor	very poor	dead		remove	
7921	sweet cherry	*Prunus avium*	18	20	1257	good	fair	multiple leaders		remove	
7922	sweet cherry	*Prunus avium*	19	20	1257	good	fair	multiple leaders		remove	
7923	Scouler's willow	*Salix scouleriana*	13	10	314	fair	poor	poor trunk taper		remove	
7924	red alder	*Alnus rubra*	9	10	314	poor	poor	moderately suppressed, poor trunk taper		remove	
7925	red alder	*Alnus rubra*	13	20	1257	poor	poor	moderately suppressed, poor trunk taper		remove	
7926	sweet cherry	*Prunus avium*	12	10	314	poor	poor	poor trunk taper, 25% live crown ratio		retain	x
7927	sweet cherry	*Prunus avium*	10	10	314	fair	fair	one sided, codominant at ground level		retain	x
7928	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7927		n/a	
7929	sweet cherry	*Prunus avium*	5	5	79	fair	poor	extensive lean, overtopped by adjacent trees		retain	x

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
7930	sweet cherry	*Prunus avium*	26	25	1963	fair	fair	codominant at 2', moderately thin crown		retain	x
7931	sweet cherry	*Prunus avium*	7	5	79	fair	fair	one sided, moderately thin crown		retain	x
7932	sweet cherry	*Prunus avium*	6	5	79	fair	fair	one sided, moderately thin crown		retain	x
7933	sweet cherry	*Prunus avium*	12	15	707	fair	fair	one sided, moderately thin crown		retain	x
7934	Scouler's willow	*Salix scouleriana*	7	3	28	poor	poor	suppressed		retain	x
7935	sweet cherry	*Prunus avium*	12	10	314	poor	poor	significant branch dieback		retain	x
7936	sweet cherry	*Prunus avium*	10	10	314	poor	poor	significant branch dieback		retain	x
7937	sweet cherry	*Prunus avium*	15	15	707	fair	fair	one sided, moderately thin crown		retain	
7938	red alder	*Alnus rubra*	13	15	707	fair	fair	codominant at 8', moderately thin crown		retain	
7939	sweet cherry	*Prunus avium*	7	10	314	good	fair	one sided		retain	
7940	sweet cherry	*Prunus avium*	7	10	314	good	fair	one sided		retain	
7941	sweet cherry	*Prunus avium*	5	10	314	fair	fair	overtopped by adjacent trees		remove	
7942	sweet cherry	*Prunus avium*	6	10	314	fair	fair	overtopped by adjacent trees		remove	
7943	red alder	*Alnus rubra*	11	10	314	poor	poor	moderately suppressed, poor trunk taper		remove	
7944	red alder	*Alnus rubra*	9	0	0	very poor	very poor	dead		remove	
7945	sweet cherry	*Prunus avium*	8	10	314	good	fair	moderately one sided		remove	
7946	red alder	*Alnus rubra*	11	10	314	fair	poor	poor trunk taper		remove	
7947	red alder	*Alnus rubra*	10	10	314	fair	poor	poor trunk taper		remove	
7948	red alder	*Alnus rubra*	11	10	314	fair	poor	poor trunk taper		remove	
7949	red alder	*Alnus rubra*	12	15	707	fair	poor	poor trunk taper, significant lean		remove	
7950	red alder	*Alnus rubra*	13	20	1257	fair	poor	poor trunk taper		remove	
7951	red alder	*Alnus rubra*	8	5	79	poor	poor	poor trunk taper, 25% live crown ratio		remove	
7952	red alder	*Alnus rubra*	11	10	314	fair	poor	poor trunk taper		remove	
7953	sweet cherry	*Prunus avium*	5	10	314	good	fair	moderately one sided		remove	
7954	red alder	*Alnus rubra*	8	0	0	very poor	very poor	dead		remove	
7955	red alder	*Alnus rubra*	8	0	0	very poor	very poor	dead		remove	
7956	red alder	*Alnus rubra*	7	0	0	very poor	very poor	dead		remove	
7957	red alder	*Alnus rubra*	9	7	154	poor	poor	moderately suppressed, poor trunk taper		remove	
7958	sweet cherry	*Prunus avium*	18	25	1963	fair	fair	one sided		remove	
7959	red alder	*Alnus rubra*	5	0	0	very poor	very poor	dead		remove	
7960	red alder	*Alnus rubra*	24	30	2827	fair	fair	multiple leader at 7'		remove	
7961	red alder	*Alnus rubra*	12	15	707	poor	poor	poor trunk taper, moderately suppressed		remove	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
7962	red alder	*Alnus rubra*	10	0	0	very poor	very poor	dead		remove	
7963	red alder	*Alnus rubra*	12	10	314	poor	poor	moderately suppressed, history of branch failure		retain	
7964	red alder	*Alnus rubra*	24	25	1963	fair	fair	history of branch failure		remove	
7965	red alder	*Alnus rubra*	26	20	1257	poor	poor	codominant at 2' with swelling indicative of decay, one sided		retain	
7966	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7965		n/a	
7967	Oregon ash	*Fraxinus latifolia*	29	25	1963	good	fair	multiple leaders		retain	
7968	red alder	*Alnus rubra*	23	25	1963	fair	fair	one sided, multiple leaders at ground level		retain	
7969	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7968		n/a	
7970	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7968		n/a	
7971	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7968		n/a	
7972	Douglas-fir	*Pseudotsuga menziesii*	20	20	1257	fair	fair	bowed lower trunk, thin upper crown		retain	
7973	Douglas-fir	*Pseudotsuga menziesii*	26	20	1257	fair	fair	bowed lower trunk, thin upper crown		retain	
7974	Douglas-fir	*Pseudotsuga menziesii*	25	20	1257	good	fair	moderately one sided		retain	
7975	sweet cherry	*Prunus avium*	14	20	1257	good	good			retain	
7976	Oregon ash	*Fraxinus latifolia*	31	30	2827	fair	fair	multiple leaders, history of branch failure		retain	
7977	sweet cherry	*Prunus avium*	7	15	707	good	good			retain	
7978	Oregon ash	*Fraxinus latifolia*	38	40	5027	good	fair	multiple leaders at ground level		retain	
7979	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7978		n/a	
7980	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7978		n/a	
7981	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7978		n/a	
7982	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 7978		n/a	
7989	sweet cherry	*Prunus avium*	7	10	314	good	fair	one sided		retain	
7990	Oregon ash	*Fraxinus latifolia*	36	35	3848	fair	fair	history of scaffold failures		retain	
7991	red alder	*Alnus rubra*	15	16	804	fair	poor	poor trunk taper		remove	
7992	red alder	*Alnus rubra*	8	5	79	poor	poor	suppressed		remove	
7993	red alder	*Alnus rubra*	6	0	0	very poor	very poor	dead		remove	
7995	Douglas-fir	*Pseudotsuga menziesii*	24	20	1257	fair	fair	one sided, moderately thin crown		remove	
7996	Douglas-fir	*Pseudotsuga menziesii*	32	20	1257	fair	fair	one sided, moderately thin crown		remove	
8000	cascara	*Rhamnus purshiana*	9	10	314	fair	fair	significant lean		remove	
8001	Douglas-fir	*Pseudotsuga menziesii*	40	30	2827	good	good			remove	
8006	Douglas-fir	*Pseudotsuga menziesii*	34	25	1963	good	fair	one sided		remove	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
8007	Douglas-fir	*Pseudotsuga menziesii*	33	25	1963	good	fair	one sided		remove	
8009	red alder	*Alnus rubra*	20	25	1963	poor	poor	significant dieback		remove	
8012	Douglas-fir	*Pseudotsuga menziesii*	28	25	1963	good	good			remove	
8013	red alder	*Alnus rubra*	16	15	707	fair	fair	significant epicormic growth		remove	
8014	Douglas-fir	*Pseudotsuga menziesii*	23	20	1257	fair	good	moderately thin crown		remove	
8015	red alder	*Alnus rubra*	17	20	1257	fair	fair	codominant at 1' with included bark, significant epicormic growth		remove	
8016	red alder	*Alnus rubra*	11	10	314	fair	fair	one sided, moderately suppressed		remove	
8017	cascara	*Rhamnus purshiana*	5	5	79	poor	poor	overtopped by adjacent trees, significant lean, dieback		remove	
8019	red alder	*Alnus rubra*	17	15	707	fair	fair	moderately one sided		remove	
8020	red alder	*Alnus rubra*	11	10	314	fair	fair	one sided, epicormic growth		remove	
8021	Douglas-fir	*Pseudotsuga menziesii*	31	20	1257	good	fair	branch failures in mid crown		remove	
8022	sweet cherry	*Prunus avium*	5	5	79	fair	fair	one sided, epicormic growth		remove	
8023	sweet cherry	*Prunus avium*	7	5	79	good	fair	overtopped by adjacent trees		remove	
8024	sweet cherry	*Prunus avium*	6	8	201	good	fair	moderately one sided		remove	
8025	red alder	*Alnus rubra*	7	0	0	very poor	very poor	dead		remove	
8026	Douglas-fir	*Pseudotsuga menziesii*	27	15	707	poor	poor	significant dieback		remove	
8027	vine maple	*Acer circinatum*	9	25	1963	fair	fair	extreme lean		remove	
8028	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 8027		n/a	
8029	western hemlock	*Tsuga heterophylla*	14	15	707	good	fair	moderately one sided		remove	
8030	cascara	*Rhamnus purshiana*	6	15	707	fair	poor	extreme lean, overtopped by adjacent trees		remove	
8031	western hemlock	*Tsuga heterophylla*	25	20	1257	good	good			remove	
8032	Pacific yew	*Taxus brevifolia*	14	20	1257	fair	good	thin crown		remove	
8033	red alder	*Alnus rubra*	14	15	707	poor	poor	one sided, significant lean, significant branch dieback		remove	
8034	red alder	*Alnus rubra*	18	15	707	poor	poor	codominant at ground level, one sided, significant lean, significant dieback		remove	
8035	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 8034		n/a	
8036	western hemlock	*Tsuga heterophylla*	15	10	314	good	fair	one sided		retain	
8037	Pacific dogwood	*Cornus nuttallii*	12	10	314	fair	fair	one sided, codominant at ground level, suspect dogwood anthracnose		retain	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
8038	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 8037		n/a	
8039	Pacific yew	*Taxus brevifolia*	14	15	707	fair	fair	thin crown		retain	
8040	Douglas-fir	*Pseudotsuga menziesii*	42	30	2827	good	fair	moderately one sided, codominant at 35'		retain	
8041	Pacific yew	*Taxus brevifolia*	11	10	314	poor	poor	significant dieback		remove	
8042	red alder	*Alnus rubra*	29	15	707	very poor	very poor	dying from top		remove	
8043	red alder	*Alnus rubra*	13	5	79	poor	poor	suppressed		retain	
8044	Oregon ash	*Fraxinus latifolia*	13	15	707	good	fair	multiple leaders		retain	
8045	red alder	*Alnus rubra*	14	0	0	very poor	very poor	dead		remove	
8046	red alder	*Alnus rubra*	10	15	707	fair	poor	poor trunk taper		remove	
8047	red alder	*Alnus rubra*	16	20	1257	fair	fair	codominant at 15'		remove	
8048	hazelnut	*Corylus cornuta*	n/a	n/a	n/a	n/a	n/a	not a tree species		remove	
8049	western hemlock	*Tsuga heterophylla*	27	25	1963	good	good			remove	
8050	western hemlock	*Tsuga heterophylla*	10	0	0	very poor	very poor	dead		remove	
8051	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 8050		n/a	
8052	western hemlock	*Tsuga heterophylla*	30	20	1257	good	good			remove	
8053	western hemlock	*Tsuga heterophylla*	26	20	1257	fair	fair	moderately one sided, moderately thin crown		retain	
8054	red alder	*Alnus rubra*	16	20	1257	fair	poor	codominant at 5' with included bark, poor trunk taper		remove	
8055	red alder	*Alnus rubra*	13	15	707	fair	poor	poor trunk taper		remove	
8056	red alder	*Alnus rubra*	11	0	0	very poor	very poor	dead		remove	
8057	red alder	*Alnus rubra*	12	20	1257	fair	poor	poor trunk taper		remove	
8058	red alder	*Alnus rubra*	10	10	314	fair	poor	poor trunk taper, 25% live crown ratio		remove	
8059	red alder	*Alnus rubra*	13	10	314	fair	poor	poor trunk taper		remove	
8060	red alder	*Alnus rubra*	14	10	314	fair	poor	poor trunk taper		remove	
8061	western hemlock	*Tsuga heterophylla*	30	20	1257	fair	fair	extensive ivy at lower trunk		remove	
8062	red alder	*Alnus rubra*	13	10	314	fair	poor	one sided, poor trunk taper		remove	
8063	red alder	*Alnus rubra*	17	20	1257	good	fair	one sided		remove	
8109	Douglas-fir	*Pseudotsuga menziesii*	44	30	2827	good	good			remove	
8110	red alder	*Alnus rubra*	13	0	0	very poor	very poor	dead		remove	
8111	red alder	*Alnus rubra*	8	0	0	very poor	very poor	dead		remove	
8112	Pacific yew	*Taxus brevifolia*	12	20	1257	poor	poor	extensive decay at lower trunk		remove	
8118	bigleaf maple	*Acer macrophyllum*	35	30	2827	fair	fair	multiple leaders at ground level		remove	
8119	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 8118		n/a	
8120	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 8118		n/a	
8121	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 8118		n/a	
8122	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 8118		n/a	
8125	Pacific yew	*Taxus brevifolia*	13	15	707	poor	very poor	extensive decay at lower trunk, trunk split		remove	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
8126	Douglas-fir	*Pseudotsuga menziesii*	32	25	1963	good	fair	one sided		remove	
8128	Douglas-fir	*Pseudotsuga menziesii*	35	25	1963	fair	fair	one sided, 40% live crown ratio		remove	
8129	Douglas-fir	*Pseudotsuga menziesii*	26	25	1963	good	fair	one sided, bowed lower trunk, marginal trunk taper		remove	
8133	Pacific dogwood	*Cornus nuttallii*	7	3	28	very poor	very poor	extensive dieback		remove	
8135	Douglas-fir	*Pseudotsuga menziesii*	20	25	1963	fair	fair	50% live crown ratio		remove	
8136	grand fir	*Abies grandis*	37	25	1963	fair	fair	40% live crown ratio		remove	
8138	Douglas-fir	*Pseudotsuga menziesii*	33	20	1257	good	fair	one sided, marginal trunk taper		remove	
8142	Douglas-fir	*Pseudotsuga menziesii*	22	15	707	poor	poor	overtopped by adjacent trees, suppressed		remove	
8143	Douglas-fir	*Pseudotsuga menziesii*	34	20	1257	good	fair	35% live crown ratio		remove	
8144	Douglas-fir	*Pseudotsuga menziesii*	14	10	314	fair	poor	moderately suppressed, poor trunk taper		remove	
8145	Douglas-fir	*Pseudotsuga menziesii*	14	10	314	fair	poor	moderately suppressed, poor trunk taper		remove	
8146	Douglas-fir	*Pseudotsuga menziesii*	10	5	79	poor	poor	suppressed		remove	
8147	Douglas-fir	*Pseudotsuga menziesii*	8	5	79	poor	poor	suppressed		remove	
8148	Douglas-fir	*Pseudotsuga menziesii*	25	20	1257	good	fair	35% live crown ratio		remove	
8150	Douglas-fir	*Pseudotsuga menziesii*	32	30	2827	good	fair	one sided		remove	
8151	Pacific dogwood	*Cornus nuttallii*	11	10	314	poor	poor	significant branch dieback and history of branch failures		remove	
8152	Douglas-fir	*Pseudotsuga menziesii*	8	8	201	fair	fair	one sided, overtopped by adjacent trees		remove	
8153	Douglas-fir	*Pseudotsuga menziesii*	10	3	28	poor	poor	suppressed		remove	
8154	Douglas-fir	*Pseudotsuga menziesii*	23	15	707	fair	poor	25% live crown ratio, poor trunk taper		remove	
8155	Douglas-fir	*Pseudotsuga menziesii*	39	30	2827	good	fair	one sided		remove	
8156	madrone	*Arbutus menziesii*	6	0	0	very poor	very poor	dead		remove	
8157	grand fir	*Abies grandis*	15	10	314	fair	poor	one sided, poor trunk taper		remove	
8158	Douglas-fir	*Pseudotsuga menziesii*	30	20	1257	good	fair	one sided		remove	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
8159	Douglas-fir	*Pseudotsuga menziesii*	8	0	0	very poor	very poor	dead		remove	
8160	Pacific dogwood	*Cornus nuttallii*	5	5	79	fair	fair	bowed lower trunk		remove	
8161	Douglas-fir	*Pseudotsuga menziesii*	14	15	707	fair	fair	one sided, overtopped by adjacent trees		remove	
8162	grand fir	*Abies grandis*	20	15	707	good	fair	one sided		remove	
8163	Douglas-fir	*Pseudotsuga menziesii*	23	20	1257	good	fair	one sided		remove	
8164	red alder	*Alnus rubra*	16	20	1257	fair	poor	poor trunk taper		remove	
8165	red alder	*Alnus rubra*	7	0	0	very poor	very poor	dead		remove	
8166	red alder	*Alnus rubra*	10	5	79	fair	poor	poor trunk taper		remove	
8167	red alder	*Alnus rubra*	8	0	0	very poor	very poor	12' snag		remove	
8168	red alder	*Alnus rubra*	7	0	0	very poor	very poor	dead		remove	
8169	red alder	*Alnus rubra*	8	5	79	fair	poor	poor trunk taper		remove	
8170	red alder	*Alnus rubra*	11	10	314	fair	poor	poor trunk taper		remove	
8171	red alder	*Alnus rubra*	16	15	707	fair	fair	marginal trunk taper, one sided		remove	
8172	red alder	*Alnus rubra*	7	0	0	very poor	very poor	dead		remove	
8173	red alder	*Alnus rubra*	10	0	0	very poor	very poor	dead		remove	
8174	red alder	*Alnus rubra*	6	0	0	very poor	very poor	dead		remove	
8175	red alder	*Alnus rubra*	9	10	314	fair	poor	poor trunk taper		retain	x
8176	western hemlock	*Tsuga heterophylla*	14	15	707	good	fair	codominant at ground level, growing on nurse log		retain	x
8177	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 8176		n/a	
8178	red alder	*Alnus rubra*	12	10	314	fair	poor	poor trunk taper		retain	
8179	Douglas-fir	*Pseudotsuga menziesii*	22	20	1257	good	fair	kinked mid trunk		retain	
8180	Douglas-fir	*Pseudotsuga menziesii*	29	20	1257	fair	fair	one sided		retain	
8181	red alder	*Alnus rubra*	13	0	0	very poor	very poor	dead		retain	
8182	red alder	*Alnus rubra*	9	0	0	very poor	very poor	12' snag		retain	
8183	red alder	*Alnus rubra*	8	5	79	fair	poor	poor trunk taper		retain	
8184	red alder	*Alnus rubra*	13	10	314	fair	poor	poor trunk taper		retain	
8185	red alder	*Alnus rubra*	11	5	79	poor	poor	poor trunk taper, significant dieback		retain	
8186	red alder	*Alnus rubra*	14	10	314	fair	poor	poor trunk taper		retain	
8187	red alder	*Alnus rubra*	15	20	1257	fair	fair	marginal trunk taper		retain	
8188	western hemlock	*Tsuga heterophylla*	16	15	707	good	fair	one sided		retain	
8189	red alder	*Alnus rubra*	30	25	1963	poor	poor	multiple branch failures		retain	
8190	red alder	*Alnus rubra*	22	15	707	very poor	very poor	extensive decay at lower trunk		remove	
8191	red alder	*Alnus rubra*	12	10	314	fair	poor	poor trunk taper		retain	x
8192	red alder	*Alnus rubra*	9	10	314	fair	poor	poor trunk taper		retain	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
8193	Douglas-fir	*Pseudotsuga menziesii*	20	10	314	fair	fair	crown extension suppressed by adjacent trees, marginal trunk taper, kinked trunk		retain	
8194	Douglas-fir	*Pseudotsuga menziesii*	31	20	1257	good	fair	one sided		remove	
8195	western redcedar	*Thuja plicata*	15	10	314	poor	poor	one sided, extensive decay along trunk		remove	
8196	Douglas-fir	*Pseudotsuga menziesii*	26	20	1257	good	fair	one sided		remove	
8197	Douglas-fir	*Pseudotsuga menziesii*	24	10	314	fair	fair	crown extension suppressed by adjacent trees		remove	
8198	Douglas-fir	*Pseudotsuga menziesii*	27	20	1257	good	fair	one sided		remove	
8199	Douglas-fir	*Pseudotsuga menziesii*	25	20	1257	good	fair	one sided		remove	
8200	madrone	*Arbutus menziesii*	9	15	707	fair	fair	significant lean, failed branches		remove	
8203	red alder	*Alnus rubra*	12	10	314	fair	poor	poor trunk taper		remove	
8206	Pacific dogwood	*Cornus nuttallii*	7	0	0	very poor	very poor	dead		remove	
8207	red alder	*Alnus rubra*	14	20	1257	fair	poor	poor trunk taper		remove	
8208	red alder	*Alnus rubra*	8	0	0	very poor	very poor	dead		remove	
8209	red alder	*Alnus rubra*	14	15	707	fair	poor	poor trunk taper		remove	
8210	red alder	*Alnus rubra*	12	15	707	fair	poor	poor trunk taper		remove	
8211	red alder	*Alnus rubra*	10	10	314	fair	poor	poor trunk taper		remove	
8212	red alder	*Alnus rubra*	10	0	0	very poor	very poor	dead		remove	
8213	red alder	*Alnus rubra*	15	15	707	fair	poor	codominant at ground level, poor trunk taper, extensive ivy		remove	
8214	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 8213		n/a	
8215	red alder	*Alnus rubra*	8	5	79	fair	poor	poor trunk taper, extensive ivy		remove	
8216	red alder	*Alnus rubra*	14	15	707	fair	poor	poor trunk taper, 25% live crown ratio		remove	
8217	red alder	*Alnus rubra*	9	10	314	fair	poor	poor trunk taper		remove	
8218	red alder	*Alnus rubra*	10	10	314	fair	poor	poor trunk taper		remove	
8219	red alder	*Alnus rubra*	12	10	314	fair	poor	poor trunk taper, extensive ivy		remove	
8220	red alder	*Alnus rubra*	8	8	201	fair	poor	poor trunk taper, extensive ivy		remove	
8221	red alder	*Alnus rubra*	12	15	707	fair	poor	poor trunk taper, extensive ivy		remove	
8222	red alder	*Alnus rubra*	20	20	1257	fair	poor	extensive ivy throughout crown		remove	
8223	red alder	*Alnus rubra*	12	20	1257	poor	poor	top dieback, poor trunk taper		remove	
8224	red alder	*Alnus rubra*	10	10	314	fair	poor	poor trunk taper		remove	
8225	Douglas-fir	*Pseudotsuga menziesii*	19	15	707	fair	fair	one sided, moderately suppressed		remove	
8226	Douglas-fir	*Pseudotsuga menziesii*	28	25	1963	fair	fair	*P. pini* along trunk, one sided		remove	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
8227	Douglas-fir	*Pseudotsuga menziesii*	31	20	1257	good	fair	one sided, 50% live crown ratio		remove	
8228	Douglas-fir	*Pseudotsuga menziesii*	29	25	1963	good	fair	one sided, lower branch dieback		remove	
8229	Douglas-fir	*Pseudotsuga menziesii*	5	9	254	fair	fair	overtopped by adjacent trees		remove	
8230	Douglas-fir	*Pseudotsuga menziesii*	36	25	1963	fair	fair	one sided, codominant at 15' with included bark		remove	
8231	Douglas-fir	*Pseudotsuga menziesii*	38	25	1963	fair	fair	one sided, codominant at 10'		remove	
8232	Douglas-fir	*Pseudotsuga menziesii*	23	15	707	poor	poor	one sided, significant *P. pini* along trunk		remove	
8233	Douglas-fir	*Pseudotsuga menziesii*	26	15	707	poor	poor	one sided, significant branch dieback		remove	
8234	Douglas-fir	*Pseudotsuga menziesii*	16	10	314	poor	poor	one sided, significant branch dieback, suppressed		remove	
8235	Douglas-fir	*Pseudotsuga menziesii*	26	20	1257	fair	fair	one sided, *P. pini* along trunk		remove	
8236	Douglas-fir	*Pseudotsuga menziesii*	33	20	1257	fair	fair	one sided, moderately suppressed		remove	
8237	Douglas-fir	*Pseudotsuga menziesii*	34	25	1963	good	fair	one sided		remove	
8238	Douglas-fir	*Pseudotsuga menziesii*	23	10	314	poor	poor	suppressed		remove	
8239	Pacific dogwood	*Cornus nuttallii*	5	10	314	fair	fair	one sided, extensive ivy		remove	
8240	Douglas-fir	*Pseudotsuga menziesii*	20	15	707	fair	fair	one sided, extensive ivy at lower trunk		remove	
8241	Douglas-fir	*Pseudotsuga menziesii*	22	20	1257	fair	fair	one sided, extensive ivy at lower trunk		remove	
8242	Douglas-fir	*Pseudotsuga menziesii*	35	25	1963	good	fair	one sided		remove	
8243	Douglas-fir	*Pseudotsuga menziesii*	19	15	707	fair	fair	one sided, moderately suppressed		remove	
8244	Douglas-fir	*Pseudotsuga menziesii*	7	10	314	fair	fair	one sided, overtopped by adjacent trees, previously lost top		remove	
8245	red alder	*Alnus rubra*	8	10	314	fair	poor	poor trunk taper		remove	
8246	red alder	*Alnus rubra*	8	5	79	poor	poor	poor trunk taper, top dieback		remove	
8247	red alder	*Alnus rubra*	8	5	79	fair	poor	poor trunk taper		remove	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
8248	Scouler's willow	*Salix scouleriana*	10	15	707	good	good			remove	
8249	red alder	*Alnus rubra*	14	15	707	fair	poor	poor trunk taper		remove	
8250	red alder	*Alnus rubra*	14	15	707	fair	poor	poor trunk taper, codominant at 15' with included bark		remove	
8251	red alder	*Alnus rubra*	16	10	314	fair	poor	poor trunk taper		retain	x
8252	Douglas-fir	*Pseudotsuga menziesii*	42	25	1963	good	fair	moderately one sided, kinked mid trunk		retain	
8253	Douglas-fir	*Pseudotsuga menziesii*	30	20	1257	good	fair	one sided		retain	
8258	Douglas-fir	*Pseudotsuga menziesii*	7	5	79	poor	poor	suppressed		remove	
8259	Douglas-fir	*Pseudotsuga menziesii*	22	15	707	fair	poor	one sided, lost top at 25' with new top		remove	
8260	Douglas-fir	*Pseudotsuga menziesii*	15	8	201	poor	poor	suppressed		remove	
8261	Douglas-fir	*Pseudotsuga menziesii*	7	5	79	very poor	very poor	suppressed		remove	
8262	Douglas-fir	*Pseudotsuga menziesii*	10	12	452	poor	poor	suppressed		remove	
8264	Douglas-fir	*Pseudotsuga menziesii*	22	15	707	fair	fair	one sided, 35% live crown ratio		remove	
8265	Douglas-fir	*Pseudotsuga menziesii*	28	20	1257	fair	fair	one sided		remove	
8266	Douglas-fir	*Pseudotsuga menziesii*	10	10	314	fair	fair	one sided, marginal trunk taper		remove	
8267	sweet cherry	*Prunus avium*	8	10	314	fair	fair	overtopped by adjacent trees		remove	
8271	Pacific dogwood	*Cornus nuttallii*	7	10	314	poor	poor	suppressed, branch dieback		remove	
8273	Douglas-fir	*Pseudotsuga menziesii*	28	30	2827	fair	fair	one sided, 50% live crown ratio		remove	
8274	Douglas-fir	*Pseudotsuga menziesii*	27	20	1257	fair	fair	one sided, lower branch dieback		remove	
8275	Douglas-fir	*Pseudotsuga menziesii*	25	20	1257	fair	fair	one sided, lower branch dieback		remove	
8276	Douglas-fir	*Pseudotsuga menziesii*	13	10	314	fair	fair	overtopped by adjacent trees, suppressed		remove	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
8280	Douglas-fir	*Pseudotsuga menziesii*	25	20	1257	fair	fair	one sided, lower branch dieback		remove	
8282	Douglas-fir	*Pseudotsuga menziesii*	23	25	1963	fair	fair	one sided, lower branch dieback		remove	
8284	Douglas-fir	*Pseudotsuga menziesii*	25	20	1257	fair	fair	one sided		remove	
8285	Douglas-fir	*Pseudotsuga menziesii*	34	20	1257	poor	poor	extensive *P. pini*		remove	
8286	Pacific dogwood	*Cornus nuttallii*	5	5	79	fair	fair	extreme lean		remove	
8287	Douglas-fir	*Pseudotsuga menziesii*	16	15	707	fair	fair	one sided, previously lost top with new top at 15'		remove	
8288	Douglas-fir	*Pseudotsuga menziesii*	14	10	314	fair	fair	moderately suppressed		remove	
8289	Douglas-fir	*Pseudotsuga menziesii*	8	5	79	poor	poor	suppressed		remove	
8290	Douglas-fir	*Pseudotsuga menziesii*	18	15	707	fair	fair	moderately suppressed		remove	
8291	Douglas-fir	*Pseudotsuga menziesii*	18	15	707	poor	poor	one sided, moderately suppressed		remove	
8292	Douglas-fir	*Pseudotsuga menziesii*	20	20	1257	good	fair	one sided		remove	
8293	Douglas-fir	*Pseudotsuga menziesii*	22	20	1257	fair	fair	one sided, failed leader with decay at 15'		remove	
8294	Douglas-fir	*Pseudotsuga menziesii*	12	15	707	poor	poor	moderately suppressed, codominant at 10'		remove	
8295	Douglas-fir	*Pseudotsuga menziesii*	16	15	707	poor	poor	one sided, moderately suppressed, *P. pini* on trunk		remove	
8296	Douglas-fir	*Pseudotsuga menziesii*	18	15	707	fair	fair	one sided, moderately suppressed, 40% live crown ratio		remove	
8297	Douglas-fir	*Pseudotsuga menziesii*	16	10	314	fair	fair	one sided, moderately suppressed		remove	
8298	Douglas-fir	*Pseudotsuga menziesii*	34	25	1963	good	fair	one sided		remove	
8301	Douglas-fir	*Pseudotsuga menziesii*	20	15	707	fair	fair	one sided, extensive ivy on lower trunk		remove	
8302	Douglas-fir	*Pseudotsuga menziesii*	40	25	1963	fair	fair	one sided, extensive ivy on lower trunk		remove	
8303	red alder	*Alnus rubra*	12	5	79	very poor	very poor	15' snag		remove	
8304	Douglas-fir	*Pseudotsuga menziesii*	24	20	1257	fair	fair	one sided, extensive ivy on lower trunk		remove	
8305	red alder	*Alnus rubra*	13	0	0	very poor	very poor	dead		remove	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
8306	Douglas-fir	*Pseudotsuga menziesii*	21	15	707	fair	fair	one sided, extensive ivy on lower trunk		remove	
8823	cascara	*Rhamnus purshiana*	18	15	707	very poor	very poor	codominant at ground level with significant decay		remove	
8833	Oregon ash	*Fraxinus latifolia*	10	10	314	fair	fair	not maintained for fruit production		remove	
8834	Scouler's willow	*Salix scouleriana*	13	5	79	very poor	very poor	extensive dieback		remove	
8835	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 8834		n/a	
8836	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 8834		n/a	
8841	Oregon ash	*Fraxinus latifolia*	16	15	707	good	fair	multiple leaders		remove	
8853	wild plum	*Prunus americana*	18	20	1257	poor	poor	fallen over		remove	
8854	pear	*Pyrus sp.*	14	10	314	fair	fair	not maintained for fruit production		remove	
10212	Douglas-fir	*Pseudotsuga menziesii*	21	10	314	fair	fair	one sided		remove	
10213	Douglas-fir	*Pseudotsuga menziesii*	29	15	707	good	fair	codominant at 15', crown extension moderately suppressed by adjacent trees		remove	
10214	Douglas-fir	*Pseudotsuga menziesii*	20	10	314	fair	fair	one sided		remove	
10215	Douglas-fir	*Pseudotsuga menziesii*	9	5	79	fair	fair	moderately suppressed, one sided		remove	
10216	Douglas-fir	*Pseudotsuga menziesii*	16	10	314	fair	fair	one sided, marginal trunk taper		remove	
10217	madrone	*Arbutus menziesii*	7	10	314	good	fair	overtopped by adjacent trees, significant lean		remove	
10218	Douglas-fir	*Pseudotsuga menziesii*	14	10	314	fair	poor	bowed trunk, partially uprooted		remove	
10219	Douglas-fir	*Pseudotsuga menziesii*	23	10	314	fair	fair	one sided, marginal trunk taper		remove	
10220	Douglas-fir	*Pseudotsuga menziesii*	23	15	707	good	fair	one sided, marginal trunk taper		remove	
10221	Douglas-fir	*Pseudotsuga menziesii*	34	20	1257	good	fair	one sided		remove	
10223	sweet cherry	*Prunus avium*	9	10	314	fair	fair	marginal trunk taper, crown extension suppressed by adjacent trees		remove	
10225	sweet cherry	*Prunus avium*	7	3	28	poor	poor	suppressed		remove	
10226	sweet cherry	*Prunus avium*	6	0	0	very poor	very poor	dead		remove	
10227	sweet cherry	*Prunus avium*	9	5	79	fair	fair	significant epicormic growth		remove	
10228	sweet cherry	*Prunus avium*	6	5	79	poor	poor	top dieback		remove	
10229	sweet cherry	*Prunus avium*	8	10	314	fair	fair	one sided		remove	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
10230	sweet cherry	*Prunus avium*	16	15	707	fair	fair	extensive ivy, one sided		remove	
10231	Douglas-fir	*Pseudotsuga menziesii*	33	20	1257	good	fair	40% live crown ratio		remove	
10236	Douglas-fir	*Pseudotsuga menziesii*	28	20	1257	good	fair	lower branch dieback		remove	
10249	Douglas-fir	*Pseudotsuga menziesii*	15	10	314	fair	fair	one sided		remove	
10252	Douglas-fir	*Pseudotsuga menziesii*	32	25	1963	good	fair	40% live crown ratio		remove	
10253	Douglas-fir	*Pseudotsuga menziesii*	25	15	707	good	fair	one sided		remove	
10254	Douglas-fir	*Pseudotsuga menziesii*	9	5	79	poor	poor	overtopped by adjacent trees, suppressed		remove	
10255	Douglas-fir	*Pseudotsuga menziesii*	22	15	707	fair	fair	one sided, marginal trunk taper		remove	
10256	Douglas-fir	*Pseudotsuga menziesii*	19	10	314	fair	poor	one sided, poor trunk taper		remove	
10257	Douglas-fir	*Pseudotsuga menziesii*	10	5	79	fair	poor	overtopped by adjacent trees, moderately suppressed		remove	
10258	Douglas-fir	*Pseudotsuga menziesii*	7	5	79	fair	poor	overtopped by adjacent trees, suppressed		remove	
10259	Douglas-fir	*Pseudotsuga menziesii*	13	5	79	fair	fair	one sided, marginal trunk taper		remove	
10260	Douglas-fir	*Pseudotsuga menziesii*	26	15	707	good	fair	one sided, wires embedded in lower trunk		remove	
10262	Douglas-fir	*Pseudotsuga menziesii*	25	15	707	fair	fair	35% live crown ratio		remove	
10263	Douglas-fir	*Pseudotsuga menziesii*	5	5	79	fair	fair	overtopped by adjacent trees, one sided		remove	
10264	Douglas-fir	*Pseudotsuga menziesii*	20	15	707	fair	fair	one sided, marginal trunk taper		remove	
10265	Douglas-fir	*Pseudotsuga menziesii*	25	15	707	good	fair	one sided		remove	
10266	Douglas-fir	*Pseudotsuga menziesii*	22	15	707	fair	fair	one sided, codominant at 10' at point of previous failure		remove	
10267	Douglas-fir	*Pseudotsuga menziesii*	16	10	314	fair	poor	crown extension suppressed by adjacent trees, poor trunk taper		remove	
10268	Douglas-fir	*Pseudotsuga menziesii*	5	5	79	fair	fair	moderately suppressed		remove	
10271	Douglas-fir	*Pseudotsuga menziesii*	27	15	707	good	fair	one sided		remove	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
10272	Douglas-fir	*Pseudotsuga menziesii*	29	20	1257	good	fair	one sided		remove	
10273	Douglas-fir	*Pseudotsuga menziesii*	31	20	1257	good	fair	one sided, kinked trunk at 15'		remove	
10274	Douglas-fir	*Pseudotsuga menziesii*	10	5	79	fair	fair	one sided, overtopped by adjacent trees, moderately suppressed		remove	
10275	Douglas-fir	*Pseudotsuga menziesii*	29	20	1257	good	fair	moderately one sided		remove	
10280	Douglas-fir	*Pseudotsuga menziesii*	32	25	1963	good	good			remove	
10283	Douglas-fir	*Pseudotsuga menziesii*	31	25	1963	good	good	moderately one sided		remove	
10284	Douglas-fir	*Pseudotsuga menziesii*	24	15	707	fair	fair	one sided, marginal trunk taper, 35% live crown ratio		remove	
10285	Douglas-fir	*Pseudotsuga menziesii*	20	15	707	fair	fair	one sided		remove	
10286	Douglas-fir	*Pseudotsuga menziesii*	31	20	1257	fair	fair	one sided		remove	
10287	sweet cherry	*Prunus avium*	13	15	707	good	fair	one sided		remove	
10288	Douglas-fir	*Pseudotsuga menziesii*	15	10	314	poor	poor	suppressed, poor trunk taper		remove	
10289	Douglas-fir	*Pseudotsuga menziesii*	27	20	1257	good	fair	one sided		remove	
10290	Douglas-fir	*Pseudotsuga menziesii*	11	5	79	poor	poor	suppressed, *P. pini* on trunk		remove	
10291	Douglas-fir	*Pseudotsuga menziesii*	32	15	707	fair	fair	one sided		remove	
10295	Douglas-fir	*Pseudotsuga menziesii*	29	25	1963	good	fair	moderately one sided, bowed trunk		remove	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
10297	Douglas-fir	*Pseudotsuga menziesii*	33	25	1963	good	fair	moderately one sided		remove	
10298	Douglas-fir	*Pseudotsuga menziesii*	15	10	314	fair	fair	one sided, overtopped by adjacent trees, moderately suppressed		remove	
10301	Douglas-fir	*Pseudotsuga menziesii*	27	20	1257	fair	fair	previously failed top with new top, one sided, marginal trunk taper		remove	
10302	Douglas-fir	*Pseudotsuga menziesii*	30	20	1257	good	fair	40% live crown ratio, marginal trunk taper		remove	
10303	Oregon ash	*Fraxinus latifolia*	9	10	314	good	good			remove	
10310	Douglas-fir	*Pseudotsuga menziesii*	20	20	1257	good	fair	35% live crown ratio, marginal trunk taper	x	remove	
10311	Douglas-fir	*Pseudotsuga menziesii*	8	5	79	poor	poor	suppressed		remove	
10312	Douglas-fir	*Pseudotsuga menziesii*	21	15	707	fair	poor	crown extension suppressed by adjacent trees, poor trunk taper		remove	
10313	Douglas-fir	*Pseudotsuga menziesii*	5	5	79	poor	poor	suppressed		remove	
10314	Douglas-fir	*Pseudotsuga menziesii*	7	0	0	very poor	very poor	dead		remove	
10315	Douglas-fir	*Pseudotsuga menziesii*	19	15	707	fair	poor	crown extension suppressed by adjacent trees, poor trunk taper		remove	
10316	Douglas-fir	*Pseudotsuga menziesii*	11	5	79	poor	poor	suppressed, poor trunk taper		remove	
10317	Douglas-fir	*Pseudotsuga menziesii*	28	20	1257	good	fair	one sided		remove	
10319	Douglas-fir	*Pseudotsuga menziesii*	10	5	79	poor	poor	suppressed		remove	
10320	Douglas-fir	*Pseudotsuga menziesii*	16	10	314	good	fair	one sided		remove	
10321	Douglas-fir	*Pseudotsuga menziesii*	8	0	0	very poor	very poor	dead, 12' snag		remove	
10322	Douglas-fir	*Pseudotsuga menziesii*	20	15	707	good	fair	one sided		remove	
10323	Douglas-fir	*Pseudotsuga menziesii*	10	5	79	fair	fair	moderately suppressed		remove	
10324	Douglas-fir	*Pseudotsuga menziesii*	16	15	707	good	fair	one sided		remove	
10325	Douglas-fir	*Pseudotsuga menziesii*	16	10	314	fair	fair	crown extension suppressed by adjacent trees, marginal trunk taper		remove	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
10326	Douglas-fir	*Pseudotsuga menziesii*	16	10	314	good	fair	one sided		remove	
10327	Douglas-fir	*Pseudotsuga menziesii*	6	3	28	poor	poor	suppressed		remove	
10328	Douglas-fir	*Pseudotsuga menziesii*	14	0	0	very poor	very poor	8' snag		remove	
10330	Douglas-fir	*Pseudotsuga menziesii*	22	15	707	fair	fair	one sided, marginal trunk taper		remove	
10331	Douglas-fir	*Pseudotsuga menziesii*	18	20	1257	fair	poor	previously lost top with new top at 10', one sided		remove	
10332	Douglas-fir	*Pseudotsuga menziesii*	12	10	314	fair	fair	moderately suppressed		remove	
10333	Douglas-fir	*Pseudotsuga menziesii*	22	15	707	fair	poor	one sided, poor trunk taper		remove	
10339	Douglas-fir	*Pseudotsuga menziesii*	33	25	1963	good	fair	35% live crown ratio		remove	
10342	Douglas-fir	*Pseudotsuga menziesii*	9	5	79	fair	fair	moderately suppressed, 35% live crown ratio		remove	
10345	Douglas-fir	*Pseudotsuga menziesii*	32	20	1257	good	fair	one sided		remove	
10346	Douglas-fir	*Pseudotsuga menziesii*	18	10	314	fair	poor	one sided, overtopped by adjacent trees		remove	
10348	Douglas-fir	*Pseudotsuga menziesii*	14	10	314	fair	poor	one sided, overtopped by adjacent trees, codominant at 15'		remove	
10350	Pacific yew	*Taxus brevifolia*	7	10	314	good	good			remove	
10352	Douglas-fir	*Pseudotsuga menziesii*	29	25	1963	good	fair	35% live crown ratio		remove	
10356	Douglas-fir	*Pseudotsuga menziesii*	8	5	79	poor	poor	suppressed		remove	
10358	Douglas-fir	*Pseudotsuga menziesii*	30	25	1963	fair	fair	35% live crown ratio		remove	
10359	Douglas-fir	*Pseudotsuga menziesii*	15	10	314	good	fair	one sided		remove	
10360	Douglas-fir	*Pseudotsuga menziesii*	10	0	0	very poor	very poor	dead		remove	
10361	Douglas-fir	*Pseudotsuga menziesii*	31	25	1963	good	fair	one sided		remove	
10362	Douglas-fir	*Pseudotsuga menziesii*	10	15	707	fair	poor	overtopped by adjacent trees, moderately suppressed, poor trunk taper		remove	
10363	Douglas-fir	*Pseudotsuga menziesii*	26	20	1257	good	fair	one sided		remove	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
10364	Douglas-fir	*Pseudotsuga menziesii*	6	5	79	fair	poor	overtopped by adjacent trees, suppressed, lost top		remove	
10365	Douglas-fir	*Pseudotsuga menziesii*	10	10	314	fair	fair	one sided, overtopped by adjacent trees		remove	
10374	red alder	*Alnus rubra*	9	10	314	fair	poor	poor trunk taper		remove	
10375	red alder	*Alnus rubra*	13	10	314	fair	poor	poor trunk taper		remove	
10376	red alder	*Alnus rubra*	10	10	314	fair	poor	poor trunk taper		remove	
10377	Douglas-fir	*Pseudotsuga menziesii*	29	15	707	good	fair	one sided		remove	
10379	Douglas-fir	*Pseudotsuga menziesii*	32	20	1257	good	fair	35% live crown ratio		remove	
10380	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 10352		n/a	
10424	Douglas-fir	*Pseudotsuga menziesii*	28	20	1257	good	fair	kinked trunk, marginal trunk taper		remove	
10426	Douglas-fir	*Pseudotsuga menziesii*	29	20	1257	fair	fair	one sided, kinked trunk, marginal trunk taper		remove	
10427	Douglas-fir	*Pseudotsuga menziesii*	22	15	707	fair	fair	one sided, crown extension suppressed by adjacent trees, marginal trunk taper		remove	
10428	Douglas-fir	*Pseudotsuga menziesii*	22	15	707	fair	fair	one sided, marginal trunk taper		remove	
10429	Douglas-fir	*Pseudotsuga menziesii*	21	15	707	fair	fair	one sided, marginal trunk taper		remove	
10431	western hemlock	*Tsuga heterophylla*	7	10	314	good	fair	sweep and kink at lower trunk		remove	
10432	Douglas-fir	*Pseudotsuga menziesii*	21	15	707	good	fair	one sided, 40% live crown ratio		remove	
10433	Douglas-fir	*Pseudotsuga menziesii*	26	20	1257	fair	fair	crown extension suppressed by adjacent trees, marginal trunk taper		remove	
10434	western hemlock	*Tsuga heterophylla*	9	10	314	good	good			remove	
10435	Douglas-fir	*Pseudotsuga menziesii*	16	10	314	fair	fair	one sided, crown extension suppressed by adjacent trees		remove	
10436	Douglas-fir	*Pseudotsuga menziesii*	24	20	1257	fair	fair	one sided, crown extension suppressed by adjacent trees		remove	
10437	bigleaf maple	*Acer macrophyllum*	15	20	1257	fair	fair	codominant at 15', overtopped by adjacent trees		remove	
10438	Douglas-fir	*Pseudotsuga menziesii*	24	25	1963	good	fair	moderately one sided		remove	
10439	Douglas-fir	*Pseudotsuga menziesii*	31	25	1963	good	fair	one sided		remove	
10440	Douglas-fir	*Pseudotsuga menziesii*	27	25	1963	good	fair	35% live crown ratio		remove	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
10444	Douglas-fir	*Pseudotsuga menziesii*	10	10	314	fair	fair	bowed lower trunk, overtopped by adjacent trees		remove	
10445	Douglas-fir	*Pseudotsuga menziesii*	29	25	1963	fair	fair	one sided, significant branch dieback		remove	
10449	Douglas-fir	*Pseudotsuga menziesii*	27	20	1257	fair	fair	one sided, significant branch dieback		remove	
10450	Douglas-fir	*Pseudotsuga menziesii*	33	25	1963	good	fair	one sided		remove	
10451	Douglas-fir	*Pseudotsuga menziesii*	31	30	2827	good	fair	one sided, codominant at 40'		remove	
10459	Douglas-fir	*Pseudotsuga menziesii*	18	10	314	poor	poor	overtopped by adjacent trees, suppressed, lost top with new top at 20'		remove	
10475	Douglas-fir	*Pseudotsuga menziesii*	32	30	2827	good	good			remove	
10476	Pacific yew	*Taxus brevifolia*	10	10	314	poor	poor	significant dieback and sloughing bark at trunk		remove	
10477	red alder	*Alnus rubra*	9	0	0	very poor	very poor	dead		remove	
10478	Douglas-fir	*Pseudotsuga menziesii*	36	30	2827	good	good			remove	
10479	red alder	*Alnus rubra*	9	10	314	fair	poor	overtopped by adjacent trees, poor trunk taper		remove	
10480	madrone	*Arbutus menziesii*	7	8	201	good	fair	overtopped by adjacent trees, significant lean		remove	
10481	red alder	*Alnus rubra*	12	10	314	fair	fair	one sided, marginal trunk taper		remove	
10482	red alder	*Alnus rubra*	11	10	314	fair	poor	poor trunk taper		remove	
10484	red alder	*Alnus rubra*	17	20	1257	fair	fair	marginal trunk taper		remove	
10485	red alder	*Alnus rubra*	14	5	79	fair	poor	poor trunk taper, significant lean		retain	
10489	Oregon ash	*Fraxinus latifolia*	10	20	1257	good	fair	one sided	x	retain	
10491	Pacific yew	*Taxus brevifolia*	16	15	707	fair	fair	codominant at 5'		remove	
10492	Douglas-fir	*Pseudotsuga menziesii*	35	30	2827	good	fair	moderately one sided		remove	
10495	red alder	*Alnus rubra*	8	8	201	fair	poor	one sided, significant lean, poor trunk taper		remove	
10496	sweet cherry	*Prunus avium*	14	15	707	good	fair	one sided		remove	
10497	sweet cherry	*Prunus avium*	17	15	707	good	fair	codominant at 15' with included bark		remove	
10498	red alder	*Alnus rubra*	8	0	0	very poor	very poor	dead		remove	
10501	Douglas-fir	*Pseudotsuga menziesii*	36	30	2827	fair	fair	lower branch dieback		remove	
10502	Pacific yew	*Taxus brevifolia*	7	10	314	fair	fair	overtopped by adjacent trees		remove	
10507	red alder	*Alnus rubra*	15	20	1257	fair	fair	marginal trunk taper		retain	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
10508	Pacific yew	*Taxus brevifolia*	14	15	707	fair	fair	significant decay seam at trunk, multiple tops		retain	
10509	sweet cherry	*Prunus avium*	15	10	314	poor	poor	significant decay at lower trunk, poor trunk taper		retain	
10510	sweet cherry	*Prunus avium*	30	30	2827	good	good			remove	
10511	red alder	*Alnus rubra*	11	5	79	fair	poor	poor trunk taper, 25% live crown ratio		retain	
10519	Douglas-fir	*Pseudotsuga menziesii*	14	20	1257	fair	fair	overtopped by adjacent trees, moderately one sided		remove	
10521	Douglas-fir	*Pseudotsuga menziesii*	17	10	314	poor	poor	suppressed		remove	
10521.1	Douglas-fir	*Pseudotsuga menziesii*	36	30	2827	fair	fair	moderately one sided, moderately thin crown, added to site map by arborist in approximate location		remove	
10522	Douglas-fir	*Pseudotsuga menziesii*	23	15	707	poor	poor	extensive *P. pini* along trunk, one sided, poor trunk taper		remove	
10526	Oregon ash	*Fraxinus latifolia*	38	35	3848	good	fair	multiple leaders at 5' with included bark, decay seam at 12" stem		retain	
10530	Douglas-fir	*Pseudotsuga menziesii*	40	25	1963	good	fair	moderately one sided		remove	
10531	Douglas-fir	*Pseudotsuga menziesii*	33	25	1963	good	good			remove	
10534	red alder	*Alnus rubra*	11	0	0	very poor	very poor	dead		remove	
10536	sweet cherry	*Prunus avium*	20	20	1257	good	fair	moderately one sided, codominant at 40'		retain	
10538	Oregon ash	*Fraxinus latifolia*	37	35	3848	fair	fair	multiple leaders at 8', history of branch failure		retain	
10544	red alder	*Alnus rubra*	15	15	707	fair	poor	branch dieback, partially uprooted		retain	
10549	Douglas-fir	*Pseudotsuga menziesii*	15	20	1257	fair	poor	overtopped by adjacent trees, one sided, suppressed		retain	
10550	Douglas-fir	*Pseudotsuga menziesii*	39	25	1963	good	fair	moderately one sided		retain	
10551	red alder	*Alnus rubra*	10	10	314	fair	poor	poor trunk taper		remove	
10552	red alder	*Alnus rubra*	9	5	79	fair	poor	poor trunk taper		remove	
10553	red alder	*Alnus rubra*	12	10	314	fair	poor	poor trunk taper		remove	
10624	Douglas-fir	*Pseudotsuga menziesii*	26	25	1963	good	fair	new top at 35', moderately one sided		remove	
10639	Douglas-fir	*Pseudotsuga menziesii*	27	20	1257	good	fair	moderately one sided		remove	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
10640	Japanese maple	*Acer palmatum*	10	15	707	good	fair	girdling roots		remove	
10649	black cottonwood	*Populus trichocarpa*	29	30	2827	fair	fair	decay pocket at base of trunk, lower branch dieback		remove	
10668	Douglas-fir	*Pseudotsuga menziesii*	36	30	2827	good	fair	codominant at 8' with included bark		remove	
10669	western hemlock	*Tsuga heterophylla*	32	25	1963	good	fair	one sided, codominant at 7' with included bark		remove	
10753	Douglas-fir	*Pseudotsuga menziesii*	27	20	1257	good	fair	history of branch failure		remove	
10754	Douglas-fir	*Pseudotsuga menziesii*	18	15	707	fair	poor	one sided, overtopped by adjacent trees, moderately suppressed		remove	
10850	Oregon ash	*Fraxinus latifolia*	8	10	314	fair	fair	marginal trunk taper, moderately suppressed		retain	
10851	Oregon ash	*Fraxinus latifolia*	24	25	1963	good	fair	multiple leaders		retain	
10852	Oregon ash	*Fraxinus latifolia*	17	20	1257	fair	poor	multiple leaders, significant decay seam in main leader		retain	
10853	Oregon ash	*Fraxinus latifolia*	21	20	1257	fair	poor	codominant at ground level, significant decay at lower trunk		retain	
10854	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 10853		n/a	
10855	Oregon ash	*Fraxinus latifolia*	13	20	1257	good	fair	one sided, marginal trunk taper, growing on stream bank		retain	
10856	Oregon ash	*Fraxinus latifolia*	46	30	2827	fair	poor	multiple leaders at 2', significant decay at lower trunk		retain	
10857	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 10856		n/a	
10858	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 10856		n/a	
10859	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 10856		n/a	
10860	Oregon ash	*Fraxinus latifolia*	11	15	707	fair	poor	codominant at ground level, significant decay at base of trunk		retain	
10861	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 10860		n/a	
10862	Oregon ash	*Fraxinus latifolia*	12	15	707	fair	poor	extensive decay at lower trunk		retain	
10863	Oregon ash	*Fraxinus latifolia*	18	10	314	fair	poor	previous top failures		retain	
10864	Oregon ash	*Fraxinus latifolia*	17	15	707	fair	poor	significant decay column and trunk		retain	
10865	Oregon ash	*Fraxinus latifolia*	12	5	79	fair	poor	poor trunk taper, moderately suppressed		retain	
10866	Oregon ash	*Fraxinus latifolia*	11	15	707	fair	poor	significant decay at lower trunk		retain	
10867	Oregon ash	*Fraxinus latifolia*	28	30	2827	fair	poor	multiple leaders, significant decay at lower trunk		retain	
10868	Oregon ash	*Fraxinus latifolia*	19	20	1257	fair	poor	multiple leaders at ground level, extensive decay at ground level		retain	
10869	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 10868		n/a	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
10870	Oregon ash	*Fraxinus latifolia*	40	25	1963	fair	fair	history of branch failures, multiple leaders at 2'		retain	
10871	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 10870		n/a	
10872	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 10870		n/a	
10873	western hemlock	*Tsuga heterophylla*	63	30	2827	poor	poor	extensive dieback, codominant at ground level, growing on nurse log		remove	
10874	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as 10873		n/a	
10875	western hemlock	*Tsuga heterophylla*	33	30	2827	good	good			remove	
10876	red alder	*Alnus rubra*	11	10	314	fair	poor	poor trunk taper		remove	
10877	Douglas-fir	*Pseudotsuga menziesii*	21	20	1257	good	fair	one sided		remove	
10878	sweet cherry	*Prunus avium*	8	10	314	good	fair	one sided		remove	
10879	sweet cherry	*Prunus avium*	11	10	314	good	fair	codominant at ground level, one sided		remove	
10880	sweet cherry	*Prunus avium*	10	10	314	good	fair	marginal trunk taper		remove	
10883	Pacific yew	*Taxus brevifolia*	6	10	314	fair	good	thin crown		retain	
10886	Douglas-fir	*Pseudotsuga menziesii*	26	20	1257	good	fair	bowed lower trunk, moderately one sided		retain	
10887	western hemlock	*Tsuga heterophylla*	14	0	0	very poor	very poor	dead 20' snag		retain	
10888	n/a	n/a	n/a	n/a	n/a	n/a	n/a	recently removed		n/a	
10889	Douglas-fir	*Pseudotsuga menziesii*	28	20	1257	fair	poor	poor trunk taper		retain	
10890	red alder	*Alnus rubra*	12	15	707	fair	poor	poor trunk taper		retain	
10891	Oregon ash	*Fraxinus latifolia*	10	10	314	very poor	very poor	dieback and decay		retain	
10892	red alder	*Alnus rubra*	17	15	707	fair	fair	marginal trunk taper		retain	
10893	Oregon ash	*Fraxinus latifolia*	20	20	1257	fair	poor	extensive decay, failure of codominant stem		retain	
10894	Oregon ash	*Fraxinus latifolia*	25	10	314	poor	poor	extensive decay, previous failures		retain	
10895	Oregon ash	*Fraxinus latifolia*	20	5	79	poor	poor	extensive decay, previous failures		retain	
10896	Oregon ash	*Fraxinus latifolia*	9	10	314	poor	poor	extensive decay at lower trunk		retain	
10897	Oregon ash	*Fraxinus latifolia*	18	20	1257	fair	poor	codominant at ground level, split trunk		retain	
10898	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 10897		n/a	
10964	Oregon ash	*Fraxinus latifolia*	24	20	1257	fair	poor	previous failure with decay at 20'		retain	
10966	Oregon ash	*Fraxinus latifolia*	21	15	707	good	good			retain	
10969	Oregon ash	*Fraxinus latifolia*	9	5	79	fair	fair	one sided, moderately suppressed		retain	
10970	Oregon ash	*Fraxinus latifolia*	6	5	79	fair	fair	one sided, moderately suppressed		retain	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
11045	sweet cherry	*Prunus avium*	18	15	707	good	fair	one sided, codominant at 1' with included bark		remove	
11046	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 11045		n/a	
11047	sweet cherry	*Prunus avium*	35	20	1257	good	fair	one sided, multiple leaders at 1' with included bark		remove	
11048	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 11047		n/a	
11049	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 11047		n/a	
11050	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 11047		n/a	
11059	Japanese maple	*Acer palmatum*	12	10	314	good	fair	codominant at 1' with included bark		remove	
11063	Douglas-fir	*Pseudotsuga menziesii*	31	30	2827	good	fair	codominant at 40' with included bark		remove	
11066	western hemlock	*Tsuga heterophylla*	50	25	1963	poor	poor	significant decay, multiple leaders at ground level, growing on nurse log		remove	
11067	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 11066		n/a	
11068	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 11066		n/a	
11069	Douglas-fir	*Pseudotsuga menziesii*	24	15	707	fair	fair	one sided, kinked trunk at 30'		remove	
11074	sweet cherry	*Prunus avium*	13	15	707	good	fair	one sided		remove	
11075	Douglas-fir	*Pseudotsuga menziesii*	11	5	79	poor	poor	suppressed		remove	
11076	Douglas-fir	*Pseudotsuga menziesii*	32	20	1257	good	fair	moderately one sided		remove	
11078	Scouler's willow	*Salix scouleriana*	11	10	314	poor	poor	top dieback		retain	x
11079	Douglas-fir	*Pseudotsuga menziesii*	23	15	707	good	fair	marginal trunk taper		retain	x
11080	Douglas-fir	*Pseudotsuga menziesii*	32	20	1257	good	fair	moderately one sided		remove	x
11083	sweet cherry	*Prunus avium*	11	15	707	fair	fair	moderately one sided, moderate lean		retain	
11085	Douglas-fir	*Pseudotsuga menziesii*	30	25	1963	good	fair	one sided		retain	
11086	red alder	*Alnus rubra*	14	20	1257	fair	poor	codominant at ground level with included bark		retain	
11087	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 11086		n/a	
11088	Douglas-fir	*Pseudotsuga menziesii*	25	15	707	fair	fair	one sided, moderately suppressed		retain	
11089	Douglas-fir	*Pseudotsuga menziesii*	28	10	314	fair	fair	one sided, moderately suppressed		retain	
11090	western hemlock	*Tsuga heterophylla*	24	20	1257	good	fair	moderately one sided		retain	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
11091	Douglas-fir	*Pseudotsuga menziesii*	10	10	314	good	fair	one sided		retain	
11092	Douglas-fir	*Pseudotsuga menziesii*	32	30	2827	good	fair	moderately one sided	x	retain	
11095	Oregon ash	*Fraxinus latifolia*	18	20	1257	good	fair	one sided, multiple leaders	x	retain	
11097	Oregon ash	*Fraxinus latifolia*	37	30	2827	fair	poor	multiple leaders, history of branch failures	x	retain	
11098	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 11097		n/a	
11099	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 11097		n/a	
11103	Oregon ash	*Fraxinus latifolia*	34	40	5027	good	fair	codominant at ground level, multiple leaders	x	retain	
11104	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 11103		n/a	
11106	Oregon ash	*Fraxinus latifolia*	24	20	1257	fair	poor	extensive epicormic growth at base of trunk, history of branch failures		retain	
11106.1	Oregon ash	*Fraxinus latifolia*	19	20	1257	good	fair	35% live crown ratio, added to site map by arborist in approximate location		retain	
11108	Oregon ash	*Fraxinus latifolia*	10	10	314	fair	fair	one sided		retain	
11109	Oregon ash	*Fraxinus latifolia*	15	10	314	poor	poor	extensive trunk decay		retain	
11110	Oregon ash	*Fraxinus latifolia*	20	15	707	poor	poor	extensive trunk decay	x	retain	
11113	Oregon ash	*Fraxinus latifolia*	20	25	1963	fair	fair	multiple leaders at ground level		retain	
11114	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 11113		n/a	
11115	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 11113		n/a	
11116	red alder	*Alnus rubra*	18	20	1257	fair	poor	poor trunk taper		retain	
11117	English hawthorn	*Crataegus monogyna*	7	15	707	fair	poor	codominant at ground level, failed trunks		retain	
11118	Oregon ash	*Fraxinus latifolia*	26	25	1963	fair	poor	significant decay at base of trunk		retain	
11124	Oregon ash	*Fraxinus latifolia*	20	30	2827	fair	fair	multiple leaders, history of branch failures	x	retain	
11137	Oregon ash	*Fraxinus latifolia*	8	15	707	good	fair	one sided	x	retain	
11138	Oregon ash	*Fraxinus latifolia*	20	25	1963	good	fair	moderately one sided		retain	
11139	Oregon ash	*Fraxinus latifolia*	17	15	707	good	fair	wounded at lower trunk		retain	
11167	Oregon ash	*Fraxinus latifolia*	10	10	314	good	fair	one sided		retain	
11171	sweet cherry	*Prunus avium*	16	20	1257	good	good		x	retain	
11176	Oregon ash	*Fraxinus latifolia*	9	10	314	fair	fair	one sided		retain	
11177	Oregon ash	*Fraxinus latifolia*	21	15	707	fair	fair	one sided		retain	
11178	Oregon ash	*Fraxinus latifolia*	20	15	707	poor	poor	one sided, think crown		retain	
11182	Oregon ash	*Fraxinus latifolia*	22	20	1257	fair	fair	one sided		retain	
11184	Douglas-fir	*Pseudotsuga menziesii*	31	25	1963	good	fair	one sided		retain	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
11185	Douglas-fir	*Pseudotsuga menziesii*	28	25	1963	fair	fair	one sided		retain	
11188	Douglas-fir	*Pseudotsuga menziesii*	40	30	2827	good	good			remove	
11189	sweet cherry	*Prunus avium*	7	15	707	good	good			remove	
11191	Douglas-fir	*Pseudotsuga menziesii*	30	20	1257	good	good			retain	
11193	Douglas-fir	*Pseudotsuga menziesii*	22	20	1257	fair	fair	one sided, marginal trunk taper		retain	
11197	Douglas-fir	*Pseudotsuga menziesii*	30	15	707	fair	poor	one sided, bowed trunk, *P. pini* along trunk		retain	
11198	Oregon ash	*Fraxinus latifolia*	7	15	707	good	fair	one sided		retain	
11199	Oregon ash	*Fraxinus latifolia*	13	20	1257	poor	poor	codominant at ground level, extensive decay at lower trunk, stems split		retain	
11200	Oregon ash	*Fraxinus latifolia*	23	15	707	fair	poor	history of branch failure		retain	
11201	Oregon ash	*Fraxinus latifolia*	24	20	1257	fair	poor	moderately one sided, multiple leaders, 25% live crown ratio		retain	
11203	Oregon ash	*Fraxinus latifolia*	25	20	1257	fair	poor	extensive decay at base of trunk, multiple leaders at ground level		retain	
11204	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 11203		n/a	
11205	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 11203		n/a	
11206	Oregon ash	*Fraxinus latifolia*	20	15	707	fair	fair	one sided, marginal trunk taper		retain	
11207	Oregon ash	*Fraxinus latifolia*	14	10	314	fair	fair	one sided, marginal trunk taper, kinked lower trunk with decay pocket		retain	
11208	Oregon ash	*Fraxinus latifolia*	11	10	314	fair	poor	extensive decay at lower trunk		retain	
11210	black hawthorn	*Crataegus douglasii*	6	10	314	poor	poor	top failed		retain	
11211	Oregon ash	*Fraxinus latifolia*	36	25	1963	fair	poor	multiple leaders at 6', dead/decayed leader at 6'		retain	
11213	Oregon ash	*Fraxinus latifolia*	26	10	314	poor	poor	extensive decay at lower trunk		retain	
11214	Oregon ash	*Fraxinus latifolia*	32	20	1257	fair	fair	history of branch failures		retain	
11217	Oregon ash	*Fraxinus latifolia*	29	20	1257	fair	fair	one sided, multiple leaders		retain	
11218	Oregon ash	*Fraxinus latifolia*	16	15	707	fair	poor	history of branch failures, significant epicormic growth at lower trunk		retain	
11219	Oregon ash	*Fraxinus latifolia*	21	15	707	fair	fair	marginal trunk taper, history of branch failures		retain	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
11220	Oregon ash	*Fraxinus latifolia*	15	10	314	fair	poor	multiple leaders at ground level, significant decay at base of trunk		retain	
11221	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 11220		n/a	
11222	Oregon ash	*Fraxinus latifolia*	24	20	1257	fair	fair	history of branch failures		retain	
11223	Oregon ash	*Fraxinus latifolia*	22	8	201	poor	very poor	15' snag		retain	
11226	Oregon ash	*Fraxinus latifolia*	13	15	707	fair	poor	25% live crown ratio		retain	
11227	Oregon ash	*Fraxinus latifolia*	33	20	1257	fair	poor	codominant at ground level, extensive decay at lower trunk		retain	
11228	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 11227		n/a	
11230	Oregon ash	*Fraxinus latifolia*	14	10	314	good	fair	one sided		retain	
11232	Oregon ash	*Fraxinus latifolia*	6	0	0	very poor	very poor	dead		retain	
11234	Douglas-fir	*Pseudotsuga menziesii*	10	10	314	fair	poor	overtopped by adjacent trees, suppressed		remove	
11235	Douglas-fir	*Pseudotsuga menziesii*	29	25	1963	good	fair	one sided		remove	
11236	Douglas-fir	*Pseudotsuga menziesii*	19	15	707	fair	poor	moderately suppressed, poor trunk taper		remove	
11237	Douglas-fir	*Pseudotsuga menziesii*	25	25	1963	good	fair	one sided		remove	
11238	Douglas-fir	*Pseudotsuga menziesii*	9	10	314	fair	poor	overtopped by adjacent trees, suppressed		remove	
11239	ponderosa pine	*Pinus ponderosa*	45	25	1963	good	fair	35% live crown ratio		remove	
11240	Douglas-fir	*Pseudotsuga menziesii*	13	10	314	fair	poor	overtopped by adjacent trees, one sided, suppressed		remove	
11241	Oregon ash	*Fraxinus latifolia*	8	10	314	good	fair	35% live crown ratio		remove	
11244	Douglas-fir	*Pseudotsuga menziesii*	42	25	1963	good	fair	one sided		remove	
11245	Douglas-fir	*Pseudotsuga menziesii*	12	10	314	fair	poor	suppressed		remove	
11246	Douglas-fir	*Pseudotsuga menziesii*	38	25	1963	good	fair	codominant at 5', one sided		remove	
11247	Douglas-fir	*Pseudotsuga menziesii*	10	10	314	poor	poor	suppressed		remove	
11248	Douglas-fir	*Pseudotsuga menziesii*	16	15	707	fair	fair	one sided, moderately suppressed		remove	
11249	Douglas-fir	*Pseudotsuga menziesii*	12	10	314	fair	poor	one sided, overtopped by adjacent trees, suppressed		remove	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
11250	Douglas-fir	*Pseudotsuga menziesii*	16	10	314	fair	poor	one sided, suppressed		remove	
11252	Douglas-fir	*Pseudotsuga menziesii*	26	15	707	poor	poor	significant *P. pini* conks along trunk, thin crown, poor trunk taper		remove	
11253	Douglas-fir	*Pseudotsuga menziesii*	25	0	0	very poor	very poor	dead		remove	
11254	Douglas-fir	*Pseudotsuga menziesii*	25	20	1257	fair	poor	one sided, poor trunk taper		remove	
11255	Douglas-fir	*Pseudotsuga menziesii*	34	25	1963	fair	fair	one sided, large swelling at lower trunk that may be from failed codominant stem		remove	
11260	Oregon ash	*Fraxinus latifolia*	19	15	707	fair	poor	one sided, poor trunk taper		retain	
11263	Oregon ash	*Fraxinus latifolia*	8	10	314	fair	fair	one sided, marginal trunk taper		retain	
11265	Oregon ash	*Fraxinus latifolia*	23	15	707	fair	poor	one sided, significant decay at 6' behind lean		retain	
11266	Oregon ash	*Fraxinus latifolia*	36	20	1257	fair	poor	multiple leaders at 4' with decay		retain	
11267	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 11266		n/a	
11268	Oregon ash	*Fraxinus latifolia*	14	10	314	fair	poor	one sided, multiple leaders, poor trunk taper		retain	
11272	Oregon ash	*Fraxinus latifolia*	36	25	1963	good	fair	multiple leaders at 20'		retain	
11276	Oregon ash	*Fraxinus latifolia*	21	40	5027	fair	poor	extreme lean with multiple upright leaders		retain	
11281	Oregon ash	*Fraxinus latifolia*	27	15	707	fair	fair	one sided, cambium damaged at lower trunk		retain	
11282	Oregon ash	*Fraxinus latifolia*	11	15	707	good	fair	one sided, growing in stream bank		retain	
11299	Oregon ash	*Fraxinus latifolia*	31	20	1257	fair	fair	history of branch failures		retain	
11300	Oregon ash	*Fraxinus latifolia*	15	15	707	good	fair	moderately one sided		retain	
11301	Oregon ash	*Fraxinus latifolia*	20	15	707	fair	poor	one sided, history of branch failures		retain	
11302	Oregon ash	*Fraxinus latifolia*	18	15	707	fair	poor	one sided, history of branch failures		retain	
11307	Oregon ash	*Fraxinus latifolia*	18	15	707	fair	poor	history of branch failures		retain	
11308	sweet cherry	*Prunus avium*	10	10	314	good	fair	moderately one sided		remove	
11309	sweet cherry	*Prunus avium*	9	10	314	good	fair	moderately suppressed		remove	
11312	Douglas-fir	*Pseudotsuga menziesii*	23	20	1257	good	fair	one sided, marginal trunk taper		remove	
11313	Douglas-fir	*Pseudotsuga menziesii*	30	25	1963	good	fair	one sided		remove	
11314	Douglas-fir	*Pseudotsuga menziesii*	24	15	707	fair	fair	one sided, moderately suppressed		remove	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
11315	Douglas-fir	*Pseudotsuga menziesii*	16	10	314	fair	poor	suppressed		remove	
11316	Douglas-fir	*Pseudotsuga menziesii*	20	15	707	fair	poor	suppressed		remove	
11318	sweet cherry	*Prunus avium*	7	5	79	fair	fair	moderately suppressed		remove	
11319	sweet cherry	*Prunus avium*	11	10	314	good	fair	codominant at 20'		remove	
11320	Douglas-fir	*Pseudotsuga menziesii*	36	25	1963	fair	fair	one sided, moderately thin crown		remove	
11321	sweet cherry	*Prunus avium*	8	10	314	fair	fair	moderately suppressed		remove	
11322	sweet cherry	*Prunus avium*	9	5	79	fair	fair	moderately suppressed		remove	
11323	sweet cherry	*Prunus avium*	8	5	79	fair	fair	moderately suppressed		remove	
11324	sweet cherry	*Prunus avium*	5	5	79	fair	fair	moderately suppressed		remove	
11328	black hawthorn	*Crataegus douglasii*	9	0	0	very poor	very poor	dead		remove	
11329	sweet cherry	*Prunus avium*	9	12	452	good	fair	one sided		remove	
11330	sweet cherry	*Prunus avium*	8	10	314	good	good			remove	
11331	Oregon ash	*Fraxinus latifolia*	9	10	314	good	good			remove	
11332	Oregon ash	*Fraxinus latifolia*	8	10	314	good	fair	one sided		remove	
11333	sweet cherry	*Prunus avium*	12	15	707	good	fair	one sided, codominant at 20'		remove	
11335	English hawthorn	*Crataegus monogyna*	14	25	1963	poor	poor	multiple leaders at ground failures, top failures		remove	
11336	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 11335		n/a	
11337	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 11335		n/a	
11340	sweet cherry	*Prunus avium*	10	10	314	good	good			retain	
11341	Douglas-fir	*Pseudotsuga menziesii*	32	20	1257	fair	very poor	lost top at 25'		remove	
11344	Oregon ash	*Fraxinus latifolia*	9	15	707	good	fair	one sided		retain	
11345	Oregon ash	*Fraxinus latifolia*	9	15	707	good	fair	one sided, multiple leaders		retain	
11347	Douglas-fir	*Pseudotsuga menziesii*	33	25	1963	good	fair	moderately one sided		retain	
11348	Douglas-fir	*Pseudotsuga menziesii*	37	25	1963	good	fair	moderately one sided		retain	
11349	Douglas-fir	*Pseudotsuga menziesii*	25	15	707	fair	fair	one sided, marginal trunk taper		retain	
11350	Oregon ash	*Fraxinus latifolia*	18	20	1257	good	fair	multiple leaders at 30'		retain	
11353	sweet cherry	*Prunus avium*	5	8	201	good	fair	one sided		retain	
11357	Oregon ash	*Fraxinus latifolia*	13	15	707	good	fair	codominant at 15'		retain	
11360	Douglas-fir	*Pseudotsuga menziesii*	14	0	0	very poor	very poor	dead		retain	
11361	Douglas-fir	*Pseudotsuga menziesii*	42	35	3848	good	fair	moderately one sided		retain	
11362	sweet cherry	*Prunus avium*	6	10	314	fair	fair	codominant near ground level, moderately suppressed		retain	x

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
11363	Oregon ash	*Fraxinus latifolia*	14	20	1257	good	fair	moderately one sided, multiple leaders		retain	
11364	Douglas-fir	*Pseudotsuga menziesii*	17	0	0	very poor	very poor	dead		retain	
11365	sweet cherry	*Prunus avium*	8	10	314	good	fair	one sided		retain	
11366	Oregon ash	*Fraxinus latifolia*	13	10	314	good	fair	one sided, marginal trunk taper		remove	
11367	sweet cherry	*Prunus avium*	4	4	50	fair	poor	suppressed		remove	
11368	sweet cherry	*Prunus avium*	6	5	79	good	fair	codominant at 1'		remove	
11369	Oregon ash	*Fraxinus latifolia*	7	10	314	poor	poor	suppressed		remove	
11372	cascara	*Rhamnus purshiana*	10	10	314	fair	fair	codominant at ground level, moderately thin crown		remove	
11373	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 11372		n/a	
11374	Douglas-fir	*Pseudotsuga menziesii*	16	15	707	good	good			remove	
11375	Douglas-fir	*Pseudotsuga menziesii*	8	5	79	good	fair	one sided		remove	
11376	Oregon ash	*Fraxinus latifolia*	5	5	79	fair	fair	one sided, moderately suppressed		remove	
11380	Oregon ash	*Fraxinus latifolia*	6	5	79	good	fair	one sided, kinked trunk		remove	
11383	Douglas-fir	*Pseudotsuga menziesii*	37	30	2827	good	fair	one sided		remove	
11384	Douglas-fir	*Pseudotsuga menziesii*	30	25	1963	good	fair	one sided		remove	
11386	Douglas-fir	*Pseudotsuga menziesii*	7	0	0	very poor	very poor	dead		remove	
11390	Oregon ash	*Fraxinus latifolia*	22	20	1257	good	fair	one sided, multiple leaders		remove	
11391	Douglas-fir	*Pseudotsuga menziesii*	18	0	0	very poor	very poor	dead		remove	
11393	Douglas-fir	*Pseudotsuga menziesii*	28	20	1257	fair	fair	one sided, moderately thin crown		remove	
11394	Douglas-fir	*Pseudotsuga menziesii*	22	20	1257	fair	fair	one sided, moderately thin crown		remove	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
11397	Douglas-fir	*Pseudotsuga menziesii*	28	20	1257	good	fair	one sided		remove	
11398	Douglas-fir	*Pseudotsuga menziesii*	20	15	707	fair	fair	one sided, marginal trunk taper		remove	
11400	Douglas-fir	*Pseudotsuga menziesii*	38	25	1963	good	fair	moderately one sided		remove	
11401	Douglas-fir	*Pseudotsuga menziesii*	8	8	201	fair	poor	overtopped by adjacent trees, suppressed		remove	
11402	Douglas-fir	*Pseudotsuga menziesii*	20	15	707	fair	fair	one sided, marginal trunk taper		remove	
11403	Douglas-fir	*Pseudotsuga menziesii*	34	30	2827	fair	fair	multiple leaders at 20', moderately one sided		remove	
11404	Douglas-fir	*Pseudotsuga menziesii*	40	25	1963	good	good			remove	
11406	western hemlock	*Tsuga heterophylla*	22	0	0	very poor	very poor	dead		retain	
11416	Douglas-fir	*Pseudotsuga menziesii*	30	25	1963	good	fair	one sided, bowed trunk		retain	
11417	sweet cherry	*Prunus avium*	9	10	314	fair	fair	swelling at lower trunk indicative of decay		retain	
11424	Oregon ash	*Fraxinus latifolia*	26	20	1257	good	fair	one sided, codominant at 3'		retain	
11425	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 11424		n/a	
11426	Oregon ash	*Fraxinus latifolia*	18	15	707	fair	poor	codominant at ground level, significant decay at lower trunk		retain	
11427	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 11426		n/a	
11428	Oregon ash	*Fraxinus latifolia*	8	0	0	very poor	very poor	dead		retain	
11441	Oregon ash	*Fraxinus latifolia*	27	20	1257	fair	fair	one sided, history of branch failures		retain	
11442	black hawthorn	*Crataegus douglasii*	6	5	79	poor	poor	top failed		retain	
11443	Oregon ash	*Fraxinus latifolia*	36	25	1963	fair	poor	codominant at 10', extensive decay at lower trunk		retain	
11444	Oregon ash	*Fraxinus latifolia*	26	30	2827	good	fair	multiple leaders		retain	
11446	Oregon ash	*Fraxinus latifolia*	28	25	1963	fair	poor	extensive decay at lower trunk		retain	
11448	Oregon ash	*Fraxinus latifolia*	27	30	2827	fair	poor	multiple leaders, history of branch failures		retain	
11451	Oregon ash	*Fraxinus latifolia*	29	15	707	fair	fair	codominant at 1', moderately one sided		retain	
11453	Oregon ash	*Fraxinus latifolia*	22	10	314	poor	poor	lost top at 30'		retain	
11454	Oregon ash	*Fraxinus latifolia*	26	10	314	poor	poor	lost top at 25'		retain	
11455	Oregon ash	*Fraxinus latifolia*	18	20	1257	fair	poor	poor trunk taper		retain	

Attachment 2

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Canopy Area (sq. ft.)	Condition[3]	Structure[3]	Comments	Offsite	Treatment	Retained, Onsite, & Outside Env. Constrained Lands
11458	sweet cherry	*Prunus avium*	5	8	201	good	good			retain	
11463	Oregon ash	*Fraxinus latifolia*	18	20	1257	fair	fair	multiple leaders at ground level		retain	
11464	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 11463		n/a	
11465	n/a	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 11463		n/a	
16994	n/a	n/a	n/a	n/a	n/a	n/a	n/a	not located		n/a	
16995	n/a	n/a	n/a	n/a	n/a	n/a	n/a	not located		n/a	
16998	n/a	n/a	n/a	n/a	n/a	n/a	n/a	not located		n/a	
18864	n/a	n/a	n/a	n/a	n/a	n/a	n/a	not located		n/a	
18867	n/a	n/a	n/a	n/a	n/a	n/a	n/a	not located		n/a	
18869	n/a	n/a	n/a	n/a	n/a	n/a	n/a	not located		n/a	
18870	n/a	n/a	n/a	n/a	n/a	n/a	n/a	not located		n/a	

[1]**DBH** is the trunk diameter measured according to the International Society of Arboriculture standards in inches. In cases where the tree splits into multiple trunks at ground level, DBH is the square root of the sum of the squared DBH of each stem.

[2]**C-rad** is the approximate crown radius in feet.

[3]**Condition** and **Structure** ratings range from very poor, poor, fair, to good.

Attachment 3
Additional Tree Protection Recommendations

The following recommendations meet City of Sherwood Code requirements:

Before Construction Begins

1. Notify all contractors of tree protection procedures. For successful tree protection on a construction site, all contractors must know and understand the goals of tree protection.
    a. Hold a tree protection meeting with all contractors to explain the goals of tree protection.
    c. Have all contractors sign memoranda of understanding regarding the goals of tree protection. The memoranda should include a penalty for violating the tree protection plan. The penalty should equal the resulting fines issued by the local jurisdiction plus the appraised value of the tree(s) within the violated tree protection zone per the current Trunk Formula Method as outline in the current edition of the ***Guide for Plant Appraisal*** by the Council of Tree & Landscape Appraisers. The penalty should be paid to the owner of the property.
2. Fencing
    a. Trees to remain on site should be protected by installation of tree protection fencing at the dripline. Alternatively, tree protection fencing may be set as shown in Attachment 1.
    b. The fencing should be put in place before the ground is cleared in order to protect the trees and the soil around the trees from disturbances.
    c. Fencing should be established by the project arborist based on the needs of the trees to be protected and to facilitate construction.
    d. Fencing should consist of 6-foot high steel fencing on concrete blocks or 6-foot metal fencing secured to the ground with 8-foot metal posts to prevent it from being moved by contractors, sagging, or falling down.
    e. Fencing should remain in the position that is established by the project arborist and not be moved without approval from the project arborist until final project approval.
3. Signage
    a. All tree protection fencing should have signage as follows so that all contractors understand the purpose of the fencing:

> **TREE PROTECTION ZONE**
>
> **DO NOT REMOVE OR ADJUST THE APPROVED LOCATION OF THIS TREE PROTECTION FENCING.**
>
> Please contact the project arborist if alterations to the approved location of the tree protection fencing are necessary.
>
> Todd Prager, Project Arborist - 971-295-4835

    b. Signage should be placed every 75-feet or less.

During Construction

1. Protection Guidelines Within the Tree Protection Zones:
    a. No new buildings; grade change or cut and fill, during or after construction; new impervious surfaces; or utility or drainage field placement should be allowed within the tree protection zones.
    b. No traffic should be allowed within the tree protection zones. This includes but is not limited to vehicle, heavy equipment, or even repeated foot traffic.
    c. No storage of materials including but not limiting to soil, construction material, or waste from the site should be permitted within the tree protection zones. Waste includes but is not limited to concrete wash out, gasoline, diesel, paint, cleaner, thinners, etc.
    d. Construction trailers should not to be parked/placed within the tree protection zones.
    e. No vehicles should be allowed to park within the tree protection zones.
    f. No other activities should be allowed that will cause soil compaction within the tree protection zones.
2. The trees should be protected from any cutting, skinning or breaking of branches, trunks or woody roots.
3. The project arborist should be notified prior to the cutting of woody roots from trees that are to be retained to evaluate and oversee the proper cutting of roots with sharp cutting tools. Cut roots should be immediately covered with soil or mulch to prevent them from drying out.
4. Trees that have roots cut should be provided supplemental water during the summer months.
5. Any necessary passage of utilities through the tree protection zones should be by means of tunneling under woody roots by hand digging or boring with oversight by the project arborist.
6. Any deviation from the recommendations in this section should receive prior approval from the project arborist.

After Construction

1. Carefully landscape the areas within the tree protection zones. Do not allow trenching for irrigation or other utilities within the tree protection zones.
2. Carefully plant new plants within the tree protection zones. Avoid cutting the woody roots of trees that are retained.
3. Do not install permanent irrigation within the tree protection zones unless it is drip irrigation to support a specific planting or the irrigation is approved by the project arborist.
4. Provide adequate drainage within the tree protection zones and do not alter soil hydrology significantly from existing conditions for the trees to be retained.
5. Provide for the ongoing inspection and treatment of insect and disease populations that are capable of damaging the retained trees and plants.
6. The retained trees may need to be fertilized if recommended by the project arborist.
7. Any deviation from the recommendations in this section should receive prior approval from the project arborist.

Attachment 4
Assumptions and Limiting Conditions

1. Any legal description provided to the consultant is assumed to be correct. The site plans and other information provided by David Weekley Homes and their consultants was the basis of the information provided in this report.
2. It is assumed that this property is not in violation of any codes, statutes, ordinances, or other governmental regulations.
3. The consultant is not responsible for information gathered from others involved in various activities pertaining to this project. Care has been taken to obtain information from reliable sources.
4. Loss or alteration of any part of this delivered report invalidates the entire report.
5. Drawings and information contained in this report may not be to scale and are intended to be used as display points of reference only.
6. The consultant's role is only to make recommendations. Inaction on the part of those receiving the report is not the responsibility of the consultant.
7. The purpose of this report is to:
   - Assess the existing trees at the project site;
   - Identify the trees to be removed and retained based on construction impacts;
   - Provide tree protection recommendations for the trees to be retained; and
   - Provide recommendations for meeting the tree canopy requirements in section 16.142.070 of the City of Sherwood Code.

Real-World Geotechnical Solutions
Investigation • Design • Construction Support

September 13, 2019
Project No. 19-5186

Aziz Siddiqui
David Weekley Homes
1905 NW 169th Place, Suite 210
Beaverton, OR 97006
Via email: asiddiqui@dwhomes.com

SUBJECT: GEOTECHNICAL ENGINEERING REPORT
RESERVE AT CEDAR CREEK
17045 AND 17117 SW BROOKMAN ROAD
SHERWOOD, OREGON

This report presents the results of a geotechnical engineering study conducted by GeoPacific Engineering, Inc. (GeoPacific) for the above-referenced project. The purpose of our investigation was to evaluate subsurface conditions at the site and to provide geotechnical recommendations for site development. This geotechnical study was performed in accordance with GeoPacific Proposal No. P-6933, dated March 20, 2019, and your subsequent authorization of our proposal and *General Conditions for Geotechnical Services.*

SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The subject site is composed of two parcels located on the north side of SW Brookman Road in the City of Sherwood, Washington County, Oregon (Figures 1 & 2). The property totals approximately 17 acres in size and topography is predominantly gently to moderately sloping to the southeast, southwest, and north, towards Cedar Creek, with grades of approximately 3 to 10 percent. Cedar Creek bisects the property, and slopes up to approximately 15 percent are present adjacent to the Cedar Creek drainage. Two homes and several outbuildings currently occupy the site. Vegetation consists primarily of short grasses and dense to sparse trees.

Preliminary site plans indicate that the proposed development will consist of a 59 lot subdivision for single family homes, new public streets, a stormwater facility, parks and open space, and associated underground utilities. The structures will likely be wood-framed and supported by conventional spread footing foundations. The existing structures will be removed. A grading plan has not been provided for our review. However, we anticipate maximum cuts and fills will be on the order of 5 feet. It is our understanding that 14 lots will be accessed from SW Brookman Road and the other 44 lots will be accessed by future public streets to the west of the site. No roadway is planned across Cedar Creek, but some utilities may be planned crossing the alignment of Cedar Creek.

REGIONAL AND LOCAL GEOLOGIC SETTING

Regionally, the subject site lies within the Willamette Valley/Puget Sound lowland, a broad structural depression situated between the Coast Range on the west and the Cascade Range on the east. A series of discontinuous faults subdivide the Willamette Valley into a mosaic of fault-bounded, structural blocks (Yeats et al., 1996). Uplifted structural blocks form bedrock highlands, while down-warped structural blocks form sedimentary basins.

The site is underlain by the Quaternary age (last 1.6 million years) Willamette Formation, a catastrophic flood deposit associated with repeated glacial outburst flooding of the Willamette Valley (Yeats et al., 1996; Gannett and Caldwell, 1998). The last of these outburst floods occurred about 10,000 years ago. These deposits typically consist of horizontally layered, micaceous, silt to coarse sand forming poorly-defined to distinct beds less than 3 feet thick.

Published regional geologic mapping indicates that the Willamette Formation is underlain by the Columbia River Basalt Formation (Madin, 1990; Gannett and Caldwell, 1998). The Miocene aged (about 14.5 to 16.5 million years ago) Columbia River Basalts are a thick sequence of lava flows which form the crystalline basement of the Tualatin Valley. The basalts are composed of dense, finely crystalline rock that is commonly fractured along blocky and columnar vertical joints. Individual basalt flow units typically range from 25 to 125 feet thick and interflow zones are typically vesicular, scoriaceous, brecciated, and sometimes include sedimentary rocks.

REGIONAL SEISMIC SETTING

At least three potential source zones capable of generating damaging earthquakes are thought to exist in the region. These include the Portland Hills Fault Zone, the Gales Creek-Newberg-Mt. Angel Structural Zone, and the Cascadia Subduction Zone, as discussed below.

Portland Hills Fault Zone

The Portland Hills Fault Zone is a series of NW-trending faults that include the central Portland Hills Fault, the western Oatfield Fault, and the eastern East Bank Fault. These faults occur in a northwest-trending zone that varies in width between 3.5 and 5.0 miles. The combined three faults vertically displace the Columbia River Basalt by 1,130 feet and appear to control thickness changes in late Pleistocene (approx. 780,000 years) sediment (Madin, 1990). The Portland Hills Fault occurs along the Willamette River at the base of the Portland Hills, and is approximately 13.0 miles northeast of the site. The Oatfield Fault occurs along the western side of the Portland Hills, and is approximately 11.2 miles northeast of the site. The accuracy of the fault mapping is stated to be within 500 meters (Wong, et al., 2000). No historical seismicity is correlated with the mapped portion of the Portland Hills Fault Zone, but in 1991 a M3.5 earthquake occurred on a NW-trending shear plane located 1.3 miles east of the fault (Yelin, 1992). Although there is no definitive evidence of recent activity, the Portland Hills Fault Zone is assumed to be potentially active (Geomatrix Consultants, 1995).

Gales Creek-Newberg-Mt. Angel Structural Zone

The Gales Creek-Newberg-Mt. Angel Structural Zone is a 50-mile-long zone of discontinuous, NW-trending faults that lies approximately 6.3 miles southwest of the subject site. These faults are recognized in the subsurface by vertical separation of the Columbia River Basalt and offset seismic reflectors in the overlying basin sediment (Yeats et al., 1996; Werner et al., 1992). A geologic reconnaissance and photogeologic analysis study conducted for the Scoggins Dam site in the Tualatin Basin revealed no evidence of deformed geomorphic surfaces along the structural zone

(Unruh et al., 1994). No seismicity has been recorded on the Gales Creek Fault or Newberg Fault; however, these faults are considered to be potentially active because they may connect with the seismically active Mount Angel Fault and the rupture plane of the 1993 M5.6 Scotts Mills earthquake (Werner et al. 1992; Geomatrix Consultants, 1995).

Cascadia Subduction Zone

The Cascadia Subduction Zone is a 680-mile-long zone of active tectonic convergence where oceanic crust of the Juan de Fuca Plate is subducting beneath the North American continent at a rate of 4 cm per year (Goldfinger et al., 1996). A growing body of geologic evidence suggests that prehistoric subduction zone earthquakes have occurred (Atwater, 1992; Carver, 1992; Peterson et al., 1993; Geomatrix Consultants, 1995). This evidence includes: (1) buried tidal marshes recording episodic, sudden subsidence along the coast of northern California, Oregon, and Washington, (2) burial of subsided tidal marshes by tsunami wave deposits, (3) paleoliquefaction features, and (4) geodetic uplift patterns on the Oregon coast. Radiocarbon dates on buried tidal marshes indicate a recurrence interval for major subduction zone earthquakes of 250 to 650 years with the last event occurring 300 years ago (Atwater, 1992; Carver, 1992; Peterson et al., 1993; Geomatrix Consultants, 1995). The inferred seismogenic portion of the plate interface lies approximately 50 miles west of the Portland Basin at depths of between 20 and 40 kilometers below the surface.

FIELD EXPLORATION

Our site-specific explorations for this report were conducted on August 13, 2019. Eight exploratory test pits were excavated with a medium sized trackhoe to a maximum depth of 17 feet at the approximate locations indicated on Figure 2. Three hand auger borings were drilled to depths up to 5 feet at the locations indicated on Figure 2. It should be noted that exploration locations were located in the field by pacing or taping distances from apparent property corners and other site features shown on the plans provided. As such, the locations of the explorations should be considered approximate.

A GeoPacific staff member continuously monitored the field exploration program and logged the explorations. Soils observed in the explorations were classified in general accordance with the Unified Soil Classification System (USCS). During exploration, our staff member also noted geotechnical conditions such as soil consistency, moisture and groundwater conditions. Logs of the explorations are attached to this report. The following report sections are based on the exploration program and summarize subsurface conditions encountered at the site.

Undocumented Fill – Undocumented fill was encountered in test pits TP-6A and TP-7A and hand auger boring HA-1A to depths up to 2 feet. TP-6A is adjacent to an old horse barn, where landscaping debris is stored. The undocumented fill contains plant and landscaping debris, bricks, pottery, and cobbles. TP-7A is located at the edge of a formerly landscaped area, and HA-1A is located near an existing house. It is likely that other areas of undocumented fill may exist in the vicinity of the existing structures and driveways.

Topsoil – The ground surface in test pits TP-1A through TP-6A, TP-8A, and hand auger borings HA-2A and HA-3A was directly underlain by a low to highly organic topsoil layer. The topsoil layer consisted of brown SILT (OL-ML) that was loose and contained fine roots throughout. The topsoil layer typically extended to a depth of 6 to 18 inches.

Topsoil Horizon – Test pits TP-1A, TP-3A, TP-4A, and hand auger boring HA-3A contained a topsoil horizon layer beginning at depths of 6 to 16 inches bgs. The topsoil horizon consisted of

brown SILT (ML) that was soft and contained some fine to medium roots throughout, and in some cases had a disturbed texture. The topsoil horizon, where present, typically extended to a depth of 1.5 to 2.5 feet.

Buried Topsoil – Test pit TP-6A had approximately 18 inches of topsoil buried beneath the approximate 2 feet of undocumented fill. This test pit is in an area used to store landscaping debris and was historically used for waste from the adjacent horse barn. The layer of buried topsoil in test pit TP-6A extended to a depth of 3.5 feet.

Recent Alluvium – Test pit TP-2A and hand auger HA-2A contained a layer of alluvium deposits. These explorations are in a historic creek bed, and the alluvium was likely deposited as the Cedar Creek moved over time within its flood plain. Alluvium extended beyond the maximum depth of exploration in test pit TP-2A (17 feet). A large, buried, fallen tree was encountered in test pit TP-2A at a depth of about 10 to 12 feet. Alluvium extended beyond a depth of 5 feet at the location of hand auger boring HA-2A.

Willamette Formation – Underlying the undocumented fill, topsoil, and alluvium in test pits TP-1A through TP-8A and hand auger borings HA-1A and HA-3A were soils belonging to the Willamette Formation. These soils generally consisted of medium stiff to very stiff, micaceous, brown, clayey SILT (ML) or SILT (ML) with trace clay that displayed subtle to strong orange and gray mottling. In test pits TP-1A through TP-8A, the silt extended to a depth of 3 to 11 feet and was underlain by sandy silt (ML) or silt (ML) with trace sand. The sandy silt or silt with trace sand was generally medium to very stiff and extended beyond the maximum depth of exploration in test pits TP-1A, TP-3A, TP-4A, and TP-6A through TP-8A. TP-2A and TP-5A were located in the wetland, and are underlain by very moist and dilatant dark grey slightly to highly organic silty sand. Moderate sidewall caving occurred in test pits TP-2A and TP-5A below a depth of 7 to 9 feet. In explorations, the soils belonging to the Willamette Formation extended beyond the maximum depth of exploration (17 feet).

Soil Moisture and Groundwater

On August 13, 2019, soils encountered in explorations were dry to wet. Groundwater seepage was encountered in test pits TP-2A and TP-5A at depths of 7 to 9 feet below the ground surface. Discharge was visually estimated at less than ¼ to ½ gallon per minute at 7 feet below ground surface in TP-2A, and increased to 1 to 2 gallons per minute at 9 feet below ground surface in TP-2A and in TP-5A. It is anticipated that groundwater conditions will vary depending on the season, local subsurface conditions, changes in site utilization, and other factors.

CONCLUSIONS AND RECOMMENDATIONS

Our investigation indicates that the proposed development is geotechnically feasible, provided that the recommendations of this report are incorporated into the design and construction phases of the project. The primary geotechnical constraints to development are:

- Site Preparation – In our explorations, we encountered layers of topsoil, topsoil horizon, undocumented fill material, and buried topsoil across the site. Approximate depths to competent native soil are shown on the Site Plan (Figure 2). It is possible that some of the topsoil horizon soils and undocumented fill material can be reused, but will need to be root-picked and sorted under the direct observation of the geotechnical engineer.

- Relatively Shallow Groundwater – We encountered groundwater at relatively shallow depths in test pits TP-2A and TP-5A, which were located near Cedar Creek. Groundwater may be encountered in utility trenches, especially, utility trenches in the vicinity of Cedar Creek.

- Liquefaction Hazards – The site is in an area mapped with liquefaction hazards. The vicinity of Cedar Creek is mapped with a high risk of liquefaction and the rest of the site is mapped with a low risk. In test pits TP-2A and TP-5A adjacent to Cedar Creek we observed potentially liquefiable soils below the water table. Since single-family residences are typically lightly loaded and relatively flexible, it is standard engineering practice that special design or construction measures are not required for single-family residences in order to protect life safety due to liquefaction. However, it should be noted that in the event of a large earthquake, some damage might occur to the structures due to differential settlement and/or lateral spreading. Substantial repair costs and/or loss of use may result from a significant earthquake event near the site. GeoPacific may be consulted to perform further study of seismic hazards on the site if desired.

Site Preparation

Areas of proposed construction and areas to receive fill should be cleared of vegetation, and any organic and inorganic debris that may be encountered. Inorganic debris and organic materials from clearing should be removed from the site. Organic-rich root zones should then be stripped from construction areas of the site or where engineered fill is to be placed. Depth of stripping to remove highly organic soil is estimated to be approximately 12 to 18 inches, with an average depth of 12 inches. However, areas where trees are present will likely require additional stripping. Also, beneath the layer of moderately to highly organic topsoil in many of our test pits we encountered a layer designated as the topsoil horizon. This layer is soft and contains fine to medium roots. It may be feasible to reuse the topsoil horizon layer as engineered fill provided that it is root-picked and meets the requirements of engineered fill in this report. The layer may need to be sorted and blended with native soils to yield a soil mixture with an organic content of less than 4 percent. Sorting and blending should be performed under the supervision of the geotechnical engineer.

The final depth of soil removal will be determined on the basis of a site inspection after the stripping/excavation has been performed. Stripped topsoil should be removed from the site. Any remaining topsoil should be stockpiled only in designated areas and stripping operations should be observed and documented by the geotechnical engineer or his representative.

In areas of proposed construction or any areas to receive fill material, any remaining undocumented fills and subsurface structures (tile drains, basements, driveway and landscaping fill, old utility lines, septic leach fields, etc.) should be removed and the excavations backfilled with engineered fill. Undocumented fill material and buried topsoil was encountered in test pit TP-6A to a depth of 3.5 feet. Undocumented fill material was encountered to a depth of 2 feet in test pit TP-7A and hand auger HA-1. Other areas of fill may be present on site in areas beyond our explorations, especially in the vicinities of existing residential structures.

Once stripping of a particular area is approved, the area must be ripped or tilled to a depth of 12 inches, moisture conditioned, root-picked, and compacted in-place prior to the placement of engineered fill or crushed aggregate base for pavement. Exposed subgrade soils should be

evaluated by the geotechnical engineer. For large areas, this evaluation is normally performed by proof-rolling the exposed subgrade with a fully loaded scraper or dump truck. For smaller areas where access is restricted, the subgrade should be evaluated by probing the soil with a steel probe. Soft/loose soils identified during subgrade preparation should be compacted to a firm and unyielding condition, over-excavated and replaced with engineered fill (as described below), or stabilized with rock prior to placement of engineered fill. The depth of over-excavation, if required, should be evaluated by the geotechnical engineer at the time of construction.

Engineered Fill

In general, we anticipate that soils from planned cuts, utility trench excavations, and approved undocumented fill removals will be suitable for use as engineered fill provided they are adequately moisture conditioned prior to compacting. All grading for the proposed construction should be performed as engineered grading in accordance with the applicable building code at time of construction with the exceptions and additions noted herein. Proper test frequency and earthwork documentation usually requires daily observation and testing during stripping, rough grading, and placement of engineered fill. Imported fill material must be approved by the geotechnical engineer prior to being imported to the site. Oversize material greater than 6 inches in size should not be used within 3 feet of foundation footings, and material greater than 12 inches in diameter should not be used in engineered fill.

Engineered fill should be compacted in horizontal lifts not exceeding 8 inches using standard compaction equipment. We recommend that engineered fill be compacted to at least 95% of the maximum dry density determined by ASTM D698 (Standard Proctor) or equivalent. Field density testing should conform to ASTM D2922 and D3017, or D1556. All engineered fill should be observed and tested by the project geotechnical engineer or their representative. Typically, one density test is performed for at least every 2 vertical feet of fill placed or every 500 yd^3, whichever requires more testing. Because testing is performed on an on-call basis, we recommend that the earthwork contractor be held contractually responsible for test scheduling and frequency.

Site earthwork will be impacted by soil moisture and shallow groundwater conditions. Earthwork in wet weather and in shaded areas during dry weather may likely require extensive use of cement or lime treatment, or other special measures, at considerable additional cost compared to earthwork performed under dry-weather conditions.

Excavating Conditions and Utility Trenches

We anticipate that on-site soils can be excavated using conventional heavy equipment such as trackhoes to depths of 12 feet. Soft to medium stiff, near surface soils and perched groundwater conditions experienced sidewall caving in test pits TP-2A and TP5A, adjacent to Cedar Creek. These conditions could make utility trenching and deep excavations difficult, especially in the winter months, and adequate shoring should be maintained.

All temporary cuts in excess of 4 feet in height should be sloped in accordance with U.S. Occupational Safety and Health Administration (OSHA) regulations (29 CFR Part 1926), or be shored. The existing native soil is classified as Type B Soil and temporary excavation side slope inclinations as steep as 1H:1V may be assumed for planning purposes. This cut slope inclination is applicable to excavations above groundwater seepage zones only. Maintenance of safe working conditions, including temporary excavation stability, is the responsibility of the contractor. Actual

slope inclinations at the time of construction should be determined based on safety requirements and actual soil and groundwater conditions.

Soft, saturated soils and groundwater may be encountered in utility trenches, particularly during the wet season. We anticipate that dewatering systems consisting of ditches, sumps and pumps would be adequate for control of perched groundwater. Regardless of the dewatering system used, it should be installed and operated such that in-place soils are prevented from being removed along with the groundwater. Trench bottom stabilization, such as layers or crushed aggregate base, may be necessary in deeper trenches.

Vibrations created by traffic and construction equipment may cause some caving and raveling of excavation walls. In such an event, lateral support for the excavation walls should be provided by the contractor to prevent loss of ground support and possible distress to existing or previously constructed structural improvements.

PVC pipe should be installed in accordance with the procedures specified in ASTM D2321. We recommend that trench backfill be compacted to at least 95% of the maximum dry density obtained by Standard Proctor ASTM D698 or equivalent. Initial backfill lift thickness for a ¾"-0 crushed aggregate base may need to be as great as 4 feet to reduce the risk of flattening underlying flexible pipe. Subsequent lift thickness should not exceed 1 foot. If imported granular fill material is used, then the lifts for large vibrating plate-compaction equipment (e.g. hoe compactor attachments) may be up to 2 feet, provided that proper compaction is being achieved and each lift is tested. Use of large vibrating compaction equipment should be carefully monitored near existing structures and improvements due to the potential for vibration-induced damage.

Adequate density testing should be performed during construction to verify that the recommended relative compaction is achieved. Typically, one density test is taken for every 4 vertical feet of backfill on each 200-lineal-foot section of trench.

Erosion Control Considerations

During our field exploration program, we did not observe soil types that would be considered highly susceptible to erosion. In our opinion, the primary concern regarding erosion potential will occur during construction, in areas that have been stripped of vegetation. Erosion at the site during construction can be minimized by implementing the project erosion control plan, which should include judicious use of straw wattles and silt fences. If used, these erosion control devices should be in place and remain in place throughout site preparation and construction.

Erosion and sedimentation of exposed soils can also be minimized by quickly re-vegetating exposed areas of soil, and by staging construction such that large areas of the project site are not denuded and exposed at the same time. Areas of exposed soil requiring immediate and/or temporary protection against exposure should be covered with either mulch or erosion control netting/blankets. Areas of exposed soil requiring permanent stabilization should be seeded with an approved grass seed mixture, or hydroseeded with an approved seed-mulch-fertilizer mixture.

Wet Weather Earthwork

Soils underlying the site are likely to be moisture sensitive and may be difficult to handle or traverse with construction equipment during periods of wet weather. Earthwork is typically most economical when performed under dry weather conditions. Earthwork performed during the wet-weather season will probably require expensive measures such as cement treatment or imported

granular material to compact fill to the recommended engineering specifications. If earthwork is to be performed or fill is to be placed in wet weather or under wet conditions when soil moisture content is difficult to control, the following recommendations should be incorporated into the contract specifications.

- Earthwork should be performed in small areas to minimize exposure to wet weather. Excavation or the removal of unsuitable soils should be followed promptly by the placement and compaction of clean engineered fill. The size and type of construction equipment used may have to be limited to prevent soil disturbance. Under some circumstances, it may be necessary to excavate soils with a backhoe to minimize subgrade disturbance caused by equipment traffic;

- The ground surface within the construction area should be graded to promote run-off of surface water and to prevent the ponding of water;

- Material used as engineered fill should consist of clean, granular soil containing less than 5 percent fines. The fines should be non-plastic. Alternatively, cement treatment of on-site soils may be performed to facilitate wet weather placement;

- The ground surface within the construction area should be sealed by a smooth drum vibratory roller, or equivalent, and under no circumstances should be left uncompacted and exposed to moisture. Soils which become too wet for compaction should be removed and replaced with clean granular materials;

- Excavation and placement of fill should be observed by the geotechnical engineer to verify that all unsuitable materials are removed and suitable compaction and site drainage is achieved; and

- Straw wattles and/or geotextile silt fences should be strategically located to control erosion.

If cement or lime treatment is used to facilitate wet weather construction, GeoPacific should be contacted to provide additional recommendations and field monitoring.

Spread Foundations

The proposed residential structures may likely be supported on shallow foundations bearing on competent undisturbed, native soils and/or engineered fill, appropriately designed and constructed as recommended in this report. Foundation design, construction, and setback requirements should conform to the applicable building code at the time of construction. For maximization of bearing strength and protection against frost heave, spread footings should be embedded at a minimum depth of 12 inches below exterior grade.

The anticipated allowable soil bearing pressure is 1,500 lbs/ft^2 for footings bearing on competent, native soil and/or engineered fill. A maximum chimney and column load of 40 kips is recommended for the site. For heavier loads, the geotechnical engineer should be consulted. The recommended maximum allowable bearing pressure may be increased by 1/3 for short-term transient conditions such as wind and seismic loading. The coefficient of friction between on-site soil and poured-in-place concrete may be taken as 0.42, which includes no factor of safety. The maximum anticipated total and differential footing movements (generally from soil expansion and/or settlement) are 1

inch and ¾ inch over a span of 20 feet, respectively. We anticipate that the majority of the estimated settlement will occur during construction, as loads are applied. Excavations near structural footings should not extend within a 1H:1V plane projected downward from the bottom edge of footings.

Footing excavations should penetrate through topsoil and any loose soil to competent subgrade that is suitable for bearing support. All footing excavations should be trimmed neat, and all loose or softened soil should be removed from the excavation bottom prior to placing reinforcing steel bars. Due to the moisture sensitivity of on-site native soils, foundations constructed during the wet weather season may require overexcavation of footings and backfill with compacted, crushed aggregate.

Our recommendations are for house construction incorporating raised wood floors and conventional spread footing foundations. If living space of the structures will incorporate basements, a geotechnical engineer should be consulted to make additional recommendations for retaining walls, water-proofing, underslab drainage and wall subdrains. After site development, a Final Soil Engineer's Report should either confirm or modify the above recommendations.

Permanent Below-Grade Walls

Lateral earth pressures against below-grade retaining walls will depend upon the inclination of any adjacent slopes, type of backfill, degree of wall restraint, method of backfill placement, degree of backfill compaction, drainage provisions, and magnitude and location of any adjacent surcharge loads. At-rest soil pressure is exerted on a retaining wall when it is restrained against rotation. In contrast, active soil pressure will be exerted on a wall if its top is allowed to rotate or yield a distance of roughly 0.001 times its height or greater.

If the subject retaining walls will be free to rotate at the top, they should be designed for an active earth pressure equivalent to that generated by a fluid weighing 35 pcf for level backfill against the wall. For restrained wall, an at-rest equivalent fluid pressure of 55 pcf should be used in design, again assuming level backfill against the wall. These values assume that drainage provisions are incorporated, free draining gravel backfill is used, and hydrostatic pressures are not allowed to develop against the wall.

During a seismic event, lateral earth pressures acting on below-grade structural walls will increase by an incremental amount that corresponds to the earthquake loading. Based on the Mononobe-Okabe equation and peak horizontal accelerations appropriate for the site location, seismic loading should be modeled using the active or at-rest earth pressures recommended above, plus an incremental rectangular-shaped seismic load of magnitude 6.5H, where H is the total height of the wall.

We assume relatively level ground surface below the base of the walls. As such, we recommend passive earth pressure of 320 pcf for use in design, assuming wall footings are cast against competent native soils or engineered fill. If the ground surface slopes down and away from the base of any of the walls, a lower passive earth pressure should be used and GeoPacific should be contacted for additional recommendations.

A coefficient of friction of 0.42 may be assumed along the interface between the base of the wall footing and subgrade soils. The recommended coefficient of friction and passive earth pressure values do not include a safety factor, and an appropriate safety factor should be included in design.

The upper 12 inches of soil should be neglected in passive pressure computations unless it is protected by pavement or slabs on grade.

The above recommendations for lateral earth pressures assume that the backfill behind the subsurface walls will consist of properly compacted structural fill, and no adjacent surcharge loading. If the walls will be subjected to the influence of surcharge loading within a horizontal distance equal to or less than the height of the wall, the walls should be designed for the additional horizontal pressure. For uniform surcharge pressures, a uniformly distributed lateral pressure of 0.3 times the surcharge pressure should be added. Traffic surcharges may be estimated using an additional vertical load of 250 psf (2 feet of additional fill), in accordance with local practice.

The recommended equivalent fluid densities assume a free-draining condition behind the walls so that hydrostatic pressures do not build-up. This can be accomplished by placing a 12 to 18-inch wide zone of sand and gravel containing less than 5 percent passing the No. 200 sieve against the walls. A 3-inch minimum diameter perforated, plastic drain pipe should be installed at the base of the walls and connected to a suitable discharge point to remove water in this zone of sand and gravel. The drain pipe should be wrapped in filter fabric (Mirafi 140N or other as approved by the geotechnical engineer) to minimize clogging.

Wall drains are recommended to prevent detrimental effects of surface water runoff on foundations – not to dewater groundwater. Drains should not be expected to eliminate all potential sources of water entering a basement or beneath a slab-on-grade. An adequate grade to a low point outlet drain in the crawlspace is required by code. Underslab drains are sometimes added beneath the slab when placed over soils of low permeability and shallow, perched groundwater.

Water collected from the wall drains should be directed into the local storm drain system or other suitable outlet. A minimum 0.5 percent fall should be maintained throughout the drain and non-perforated pipe outlet. Down spouts and roof drains should not be connected to the wall drains in order to reduce the potential for clogging. The drains should include clean-outs to allow periodic maintenance and inspection. Grades around the proposed structure should be sloped such that surface water drains away from the building.

GeoPacific should be contacted during construction to verify subgrade strength in wall keyway excavations, to verify that backslope soils are in accordance with our assumptions, and to take density tests on the wall backfill materials.

Structures should be located a horizontal distance of at least 1.5H away from the back of the retaining wall, where H is the total height of the wall. GeoPacific should be contacted for additional foundation recommendations where structures are located closer than 1.5H to the top of any wall.

Footing and Roof Drains

Construction should include typical measures for controlling subsurface water beneath the homes, including positive crawlspace drainage to an adequate low-point drain exiting the foundation, visqueen covering the expose ground in the crawlspace, and crawlspace ventilation (foundation vents). The homebuyers should be informed and educated that some slow flowing water in the crawlspaces is considered normal and not necessarily detrimental to the home given these other design elements incorporated into its construction. Appropriate design professionals should be consulting regarding crawlspace ventilation, building material selection and mold prevention issues, which are outside GeoPacific's area of expertise.

Down spouts and roof drains should collect roof water in a system separate from the footing drains to reduce the potential for clogging. Roof drain water should be directed to an appropriate discharge point and storm system well away from structural foundations. Grades should be sloped downward and away from buildings to reduce the potential for ponded water near structures.

If the proposed structures will have a raised floor, and no concrete slab-on-grade floors in living spaces are used, perimeter footing drains would not be required based on soil conditions encountered at the site and experience with standard local construction practices. Where it is desired to reduce the potential for moist crawl spaces, footing drains may be installed. If concrete slab-on-grade floors are used, perimeter footing drains should be installed as recommended below.

Where necessary, perimeter footing drains should consist of 3 or 4-inch diameter, perforated plastic pipe embedded in a minimum of 1 ft^3 per lineal foot of clean, free-draining drain rock. The drain pipe and surrounding drain rock should be wrapped in non-woven geotextile (Mirafi 140N, or approved equivalent) to minimize the potential for clogging and/or ground loss due to piping. A minimum 0.5 percent fall should be maintained throughout the drain and non-perforated pipe outlet. In our opinion, footing drains may outlet at the curb, or on the back sides of lots where sufficient fall is not available to allow drainage to meet the street.

Flexible Pavement Design: Interior Streets

We understand that the planned subdivision will create 59 new lots for residential homes. 15 of the new homes will be accessed from SW Brookman and the other 44 homes will be accessed from future public streets connecting to the west of the site. We anticipate that the traffic within the subdivision, after completion, will include small passenger vehicles, weekly trash and recycling trucks, delivery and moving vehicles, as well as occasional emergency vehicles.

To predict service requirements placed on the roadways during construction of the new homes, we relied on Equivalent Axle Load (EAL) methodology and examples presented in the Asphalt Paving Design Guide prepared for the Asphalt Pavement Association of Oregon (Hicks, et. Al, 1998). Estimates of expected vehicles and numbers of trips to complete construction of one single-family residence result in approximately 54 additional 18-kip Equivalent Single Axle Loads (ESALs). The Reserve at Cedar Creek is planned to construct 59 new single-family homes, totaling 3,186 additional ESALs by the construction vehicles. The additional ESALs from construction traffic were applied to each roadway design based on the number of homes provided access and to the anticipated traffic of SW Brookman Road.

Any additional traffic, other than what was anticipated, may require alteration of the pavement design. We assumed an average daily traffic count of 440 trips per day, based on the number of homes using the interior streets for access, and an assumed 18-kip ESAL count of 367,498. This ESAL count was combined with the estimated construction traffic, previously stated in this report, for a total ESAL count of 375,328.

Table 1 presents our flexible pavement design input factors and required structural number for these public streets. A soil resilient modulus of 7,500, corresponding to a CBR of 5, was used for the interior streets, assuming that the native subgrade soils will be ripped, moisture treated and recompacted to 95% of a Standard Proctor AASHTO T-99.

Table 1. Flexible Pavement Section Design Input Factors for Interior Public Streets

Input Parameter	Design Value
18-kip ESAL Initial Performance Period (20 Years)	80,916
Initial Serviceability	4.2
Terminal Serviceability	2.5
Reliability Level	85 Percent
Overall Standard Deviation	0.4
Roadbed Soil Resilient Modulus (PSI)	7,500
Structural Number	**2.13**

Table 2 presents our recommended minimum dry-weather pavement section, with assumed structural coefficients and compaction standards.

Table 2. Recommended Minimum Dry-Weather Pavement Section for Interior Public Streets

Material Layer	Section Thickness (in)	Structural Coefficient	Compaction Standard
Asphaltic Concrete (AC)	3	0.44	92% of Rice Density AASHTO T-209
Crushed Aggregate Base ¾"-0 (Leveling Course)	4.2	0.10	95% of Modified Proctor AASHTO T-180
1 ½"-0	2.5	0.10	95% of Modified Proctor AASHTO T-180
Subgrade	12	7,500 psi	95% of Standard Proctor AASHTO T-99 or Equivalent
Structural Number			**2.32**

Subgrade should be ripped or tilled to a depth of 12 inches, moisture conditioned, root-picked, and compacted in-place prior to the placement of crushed aggregate base for pavement. Any pockets of organic debris or loose fill encountered during ripping or tilling should be removed and replaced with engineered fill (see *Site Preparation* section). In order to verify subgrade strength, we recommend proof-rolling directly on subgrade with a loaded dump truck during dry weather and on top of base course in wet weather. Soft areas that pump, rut, or weave should be stabilized prior to paving.

If pavement areas are to be constructed during wet weather, the subgrade and construction plan should be reviewed by the project geotechnical engineer at the time of construction so that condition specific recommendations can be provided. The subgrade soils are expected to be moisture sensitive and will make the site a difficult wet weather construction project. General recommendations for wet weather pavement sections are provided below.

During placement of pavement section materials, density testing should be performed to verify compliance with project specifications. Generally, one subgrade, one base course, and one asphalt compaction test is performed for every 100 to 200 linear feet of paving.

Wet Weather Construction Pavement Section

This section presents our recommendations for wet weather pavement section and construction for new pavement sections at the project. These wet weather pavement section recommendations are intended for use in situations where it is not feasible to compact the subgrade soils to Washington County requirements, due to wet subgrade soil conditions, and/or construction during wet weather.

Based on our site review, we recommend a wet weather section with a minimum subgrade deepening of 6 inches to accommodate a working subbase of additional 1½"-0 crushed rock. Geotextile fabric, Mirafi 500x or equivalent, should be placed on subgrade soils prior to placement of base rock.

In some instances, it may be preferable to use Special Treated Base (STB) in combination with overexcavation and increasing the thickness of the rock section. GeoPacific should be consulted for additional recommendations regarding use of STB in wet weather pavement sections if it is desired to pursue this alternative. Cement treatment of the subgrade may also be considered instead of overexcavation. For planning purposes, we anticipate that treatment of the onsite soils would involve mixing cement powder to approximately 6 percent cement content and a mixing depth on the order of 12 inches.

With implementation of the above recommendations, it is our opinion that the resulting pavement section will provide equivalent or greater structural strength than the dry weather pavement section currently planned. However, it should be noted that construction in wet weather is risky and the performance of pavement subgrades depend on a number of factors including the weather conditions, the contractor's methods, and the amount of traffic the road is subjected to. There is a potential that soft spots may develop even with implementation of the wet weather provisions recommended in this letter. If soft spots in the subgrade are identified during roadway excavation, or develop prior to paving, the soft spots should be overexcavated and backfilled with additional crushed rock.

During subgrade excavation, care should be taken to avoid disturbing the subgrade soils. Removals should be performed using an excavator with a smooth-bladed bucket. Truck traffic should be limited until an adequate working surface has been established. We suggest that the crushed rock be spread using bulldozer equipment rather than dump trucks, to reduce the amount of traffic and potential disturbance of subgrade soils.

Care should be taken to avoid overcompaction of the base course materials, which could create pumping, unstable subgrade soil conditions. Heavy and/or vibratory compaction efforts should be applied with caution. Following placement and compaction of the crushed rock to project specifications (95 percent of Modified Proctor), a finish proof-roll should be performed before paving.

The above recommendations are subject to field verification. GeoPacific should be on-site during construction to verify subgrade strength and to take density tests on the engineered fill, base rock and asphaltic pavement materials.

Seismic Design

The Oregon Department of Geology and Mineral Industries (Dogami), Oregon HazVu: 2018 Statewide GeoHazards Viewer indicates that the site is in an area where *very strong to violent* ground shaking is anticipated during an earthquake. Structures should be designed to resist earthquake loading in accordance with the methodology described in the 2015 International Building Code (IBC) with applicable Oregon Structural Specialty Code (OSSC) revisions (current 2014). If the proposed structures have fundamental periods of vibration less than 0.5 seconds, the structures will be exempt from the requirement to perform a site response analysis, per section 20.3.1 of ASCE 7 and the site class may be determined according to Table 20.3-1. If the site is exempt, the site class would be Site Class D. Design values determined for the site using the Applied Technology Council (ATC) 2019 Hazards by Location Online Tool are summarized in Table 3 and are based upon existing soil conditions.

Table 3. Recommended Earthquake Ground Motion Parameters (2019 ATC)

Parameter	Value
Location (Lat, Long), degrees	45.345, -122.858
Mapped Spectral Acceleration Values (MCE):	
Peak Ground Acceleration PGA_M	0.449
Short Period, S_s	0.938 g
1.0 Sec Period, S_1	0.420 g
Soil Factors for Site Class D:	
F_a	1.125
F_v	1.580
Residential Site Value = 2/3 x F_a x S_s	0.703 g
Residential Seismic Design Category	D

Soil liquefaction is a phenomenon wherein saturated soil deposits temporarily lose strength and behave as a liquid in response to earthquake shaking. Soil liquefaction is generally limited to loose, granular soils located below the water table. According to the Oregon HazVu: Statewide Geohazards Viewer, the majority of the subject site is regionally characterized as having a low risk of soil liquefaction with a high risk area mapped along the Cedar Creek drainage (DOGAMI:HazVu, 2018).

Our observations of on-site soil conditions indicate there may be a moderate to high potential for liquefaction. For construction of single family structures, special design or construction measures are not required by code to mitigate the effects of liquefaction. However, GeoPacific may be consulted to perform further study of seismic hazards on the site if desired. If multi-family residential, high occupancy, or critical structures were to be incorporated into plans for site development, further study and evaluation of seismic hazards would be required by code to more fully evaluate the potential adverse effects due to liquefaction, such as vertical settlement, lateral deformation, and lateral spreading adjacent to Cedar Creek. We anticipate that our additional explorations on the site for the purpose of evaluating seismic hazards would include at least two cone penetrometer tests.

UNCERTAINTIES AND LIMITATIONS

We have prepared this report for the owner and their consultants for use in design of this project only. This report should be provided in its entirety to prospective contractors for bidding and estimating purposes; however, the conclusions and interpretations presented in this report should not be construed as a warranty of the subsurface conditions. Experience has shown that soil and groundwater conditions can vary significantly over small distances. Inconsistent conditions can occur between explorations that may not be detected by a geotechnical study. If, during future site operations, subsurface conditions are encountered which vary appreciably from those described herein, GeoPacific should be notified for review of the recommendations of this report, and revision of such if necessary.

Sufficient geotechnical monitoring, testing and consultation should be provided during construction to confirm that the conditions encountered are consistent with those indicated by explorations. Recommendations for design changes will be provided should conditions revealed during construction differ from those anticipated, and to verify that the geotechnical aspects of construction comply with the contract plans and specifications.

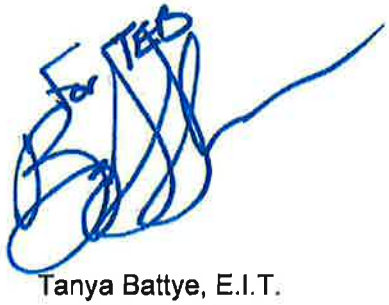
Within the limitations of scope, schedule and budget, GeoPacific attempted to execute these services in accordance with generally accepted professional principles and practices in the fields of geotechnical engineering and engineering geology at the time the report was prepared. No warranty, expressed or implied, is made. The scope of our work did not include environmental assessments or evaluations regarding the presence or absence of wetlands or hazardous or toxic substances in the soil, surface water, or groundwater at this site.

Reserve at Cedar Creek
Project No. 19-5186

We appreciate this opportunity to be of service.

Sincerely,

GEOPACIFIC ENGINEERING, INC.



Tanya Battye, E.I.T.
Geotechnical Staff

Benjamin G. Anderson, P.E.
Senior Engineer

Attachments: References
Figure 1A – Vicinity Map
Figure 1B – LIDAR Based Vicinity Map – with Mapped Landslides
Figure 1C - L LIDAR Based Vicinity Map – with Liquefaction Hazard
Figure 2 – Site Plan and Exploration Locations
Test Pit Logs (TP-1A through TP-8A)
Hand Auger Boring Logs (HA-1A through HA-3A)
Laboratory Test Results

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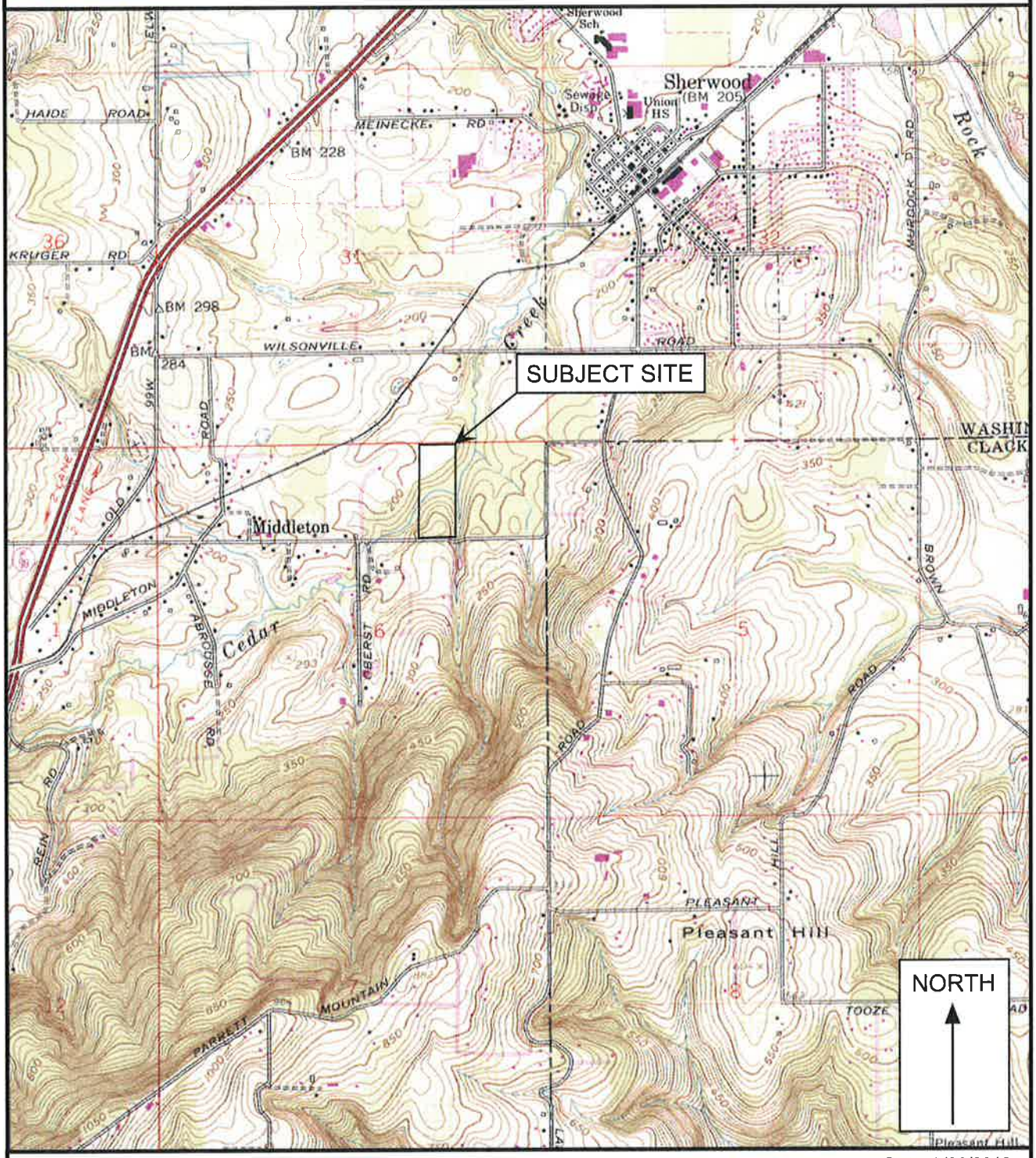
VICINITY MAP



Legend

Approximate Scale 1 in = 2,000 ft

Date: 3/26/2019
Drawn by: EKR

Base map: U.S. Geological Survey 7.5 minute Topographic Map Series, Sherwood, Oregon Quadrangle, 1961 (Revised 1984).

Project: 17045 SW Brookman Road Sherwood, Oregon	Project No. 19-5186	FIGURE 1A

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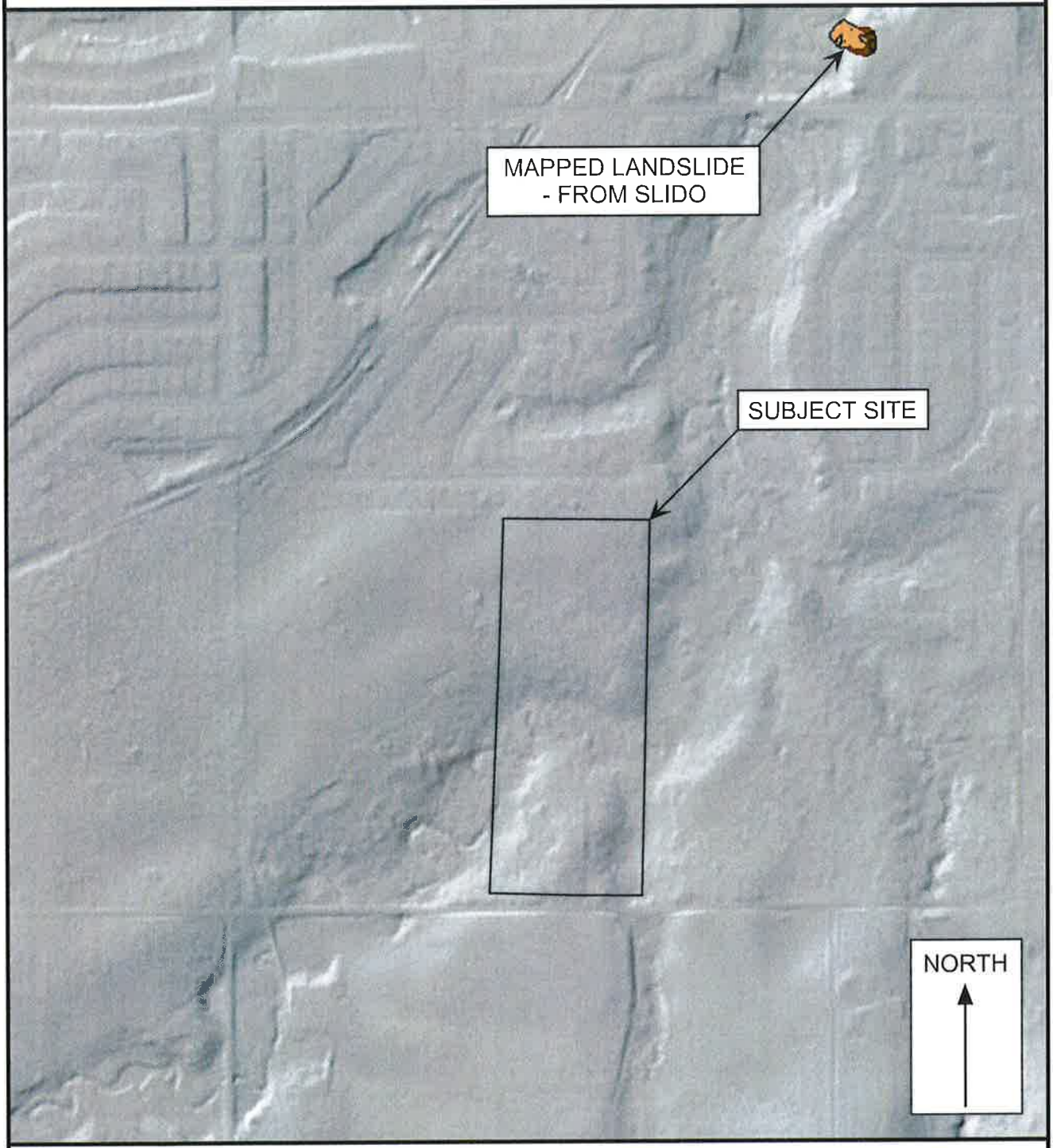
LIDAR BASED VICINITY MAP - WITH MAPPED LANDSLIDES



Legend

Approximate Scale 1 in = 500 ft

Date: 3/26/2019
Drawn by: EKR

Base map: Oregon Department of Geology and Mineral Industries, 2019, Statewide Landslide Information Database for Oregon (SLIDO): https://gis.dogami.oregon.gov/slido/

Project: 17045 SW Brookman Road Sherwood, Oregon	Project No. 19-5186	FIGURE 1B

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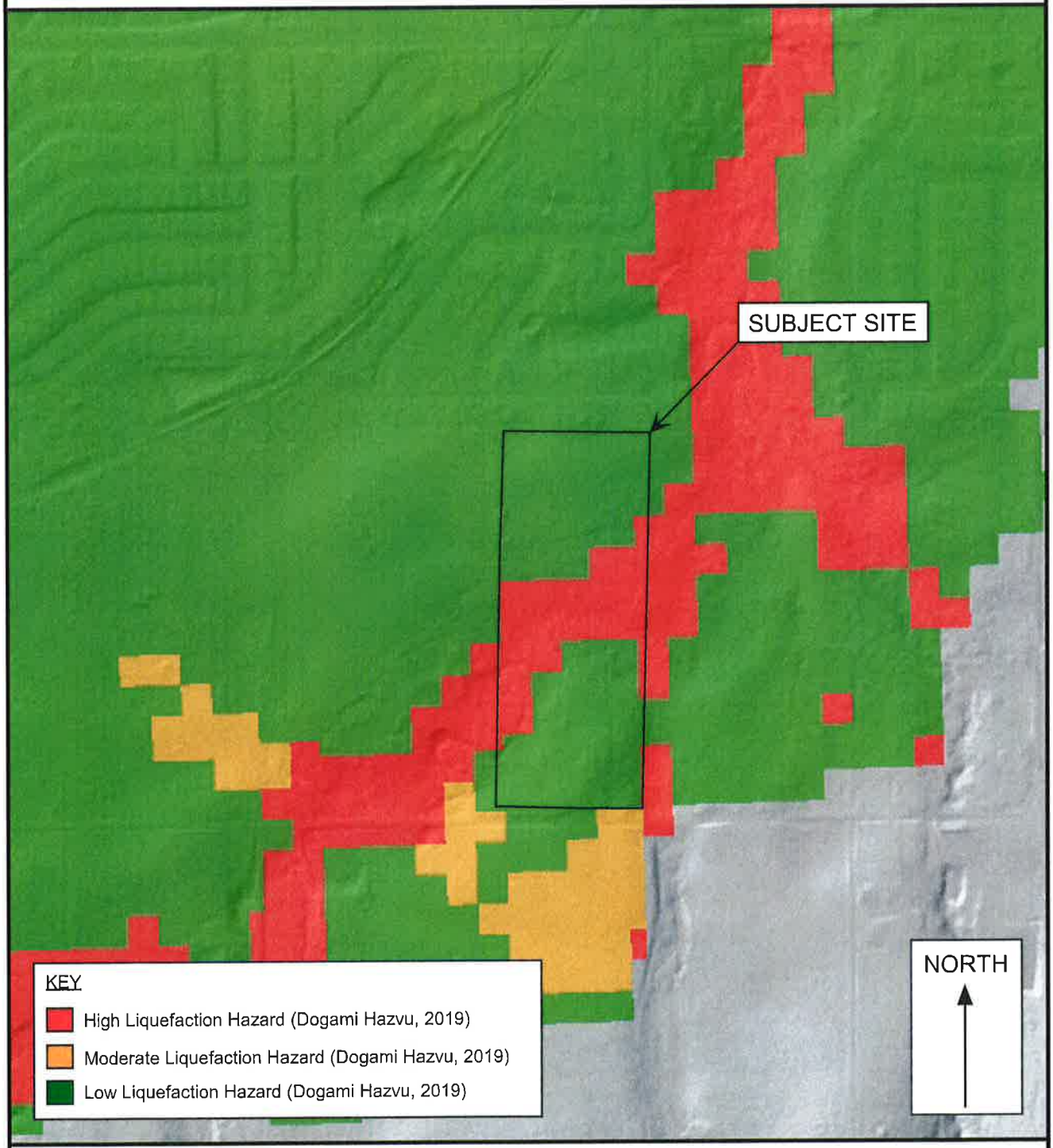
LIDAR BASED VICINITY MAP - WITH LIQUEFACTION HAZARD



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Approximate Scale 1 in = 500 ft

Date: 3/26/2019
Drawn by: EKR

Base map: Oregon Department of Geology and Mineral Industries, 2019, Oregon Hazvu: Statewide Geohazards Viewer: https://gis.dogami.oregon.gov/hazvu/

Project: 17045 SW Brookman Road Sherwood, Oregon	Project No. 19-5186	FIGURE 1C

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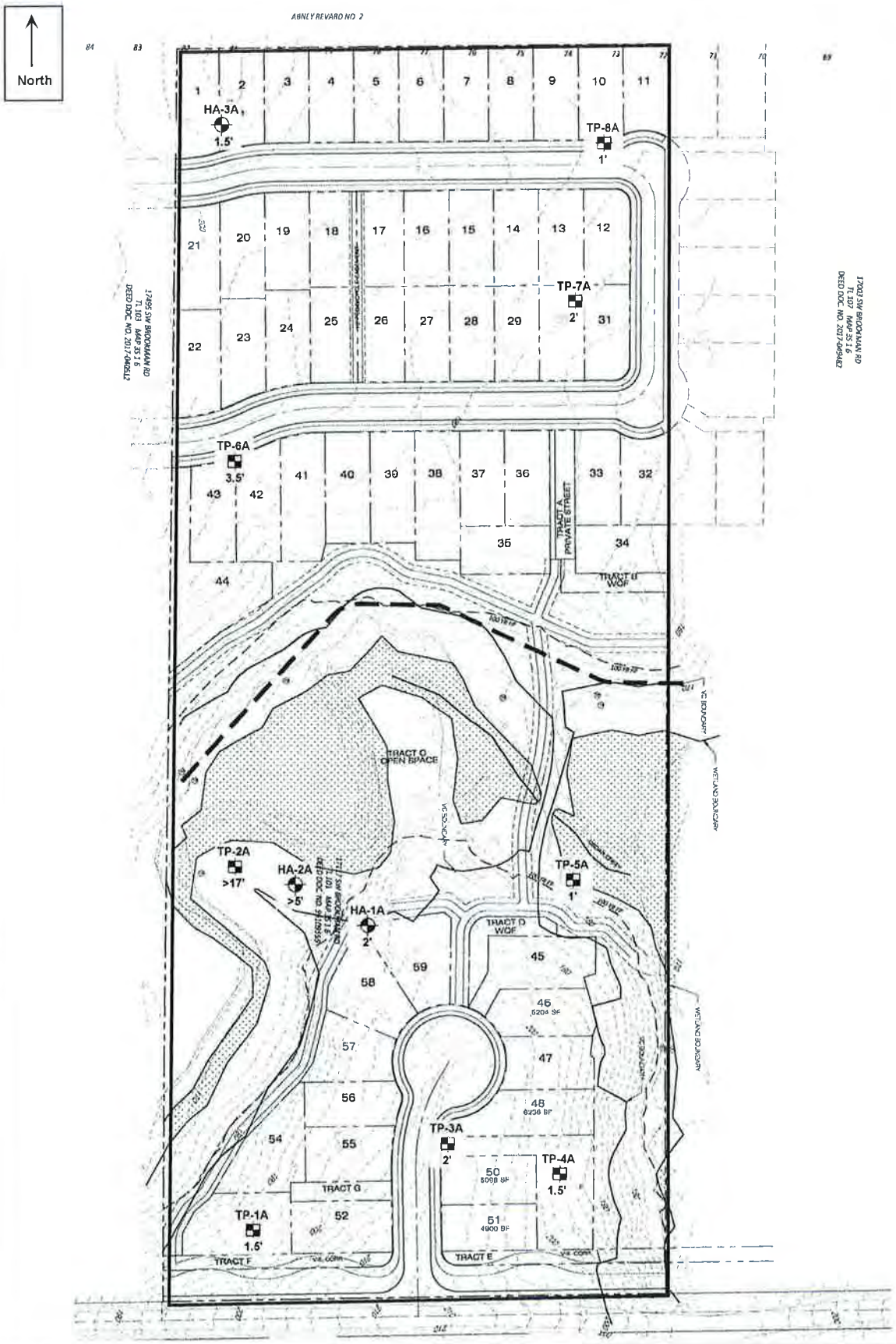
SITE PLAN AND TEST PIT AND HAND AUGER LOCATIONS



Legend

TP-1A / 1' — Test Pit Designation, Approximate Location, and Depth of Topsoil and/or Undocumented Fill Material

HA-1A / 2' — Hand Auger Designation, Approximate Location, and Depth of Topsoil and/or Undocumented Fill Material

0 100'
APPROXIMATE SCALE 1"=100'

Date: 08/14/19
Drawn by: TEB

Project: Reserve at Cedar Creek, Sherwood, Oregon	Project No. 19-5186	FIGURE 2

GeoPacific Engineering, Inc.
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TEST PIT LOG

Project: Reserve at Cedar Creek Sherwood, Oregon	Project No. 19-5186	Exploration No. **TP-1A**

Depth (ft)	Sample Type	tons/sq.ft.	Moisture Content (%)	Water Bearing Zone	Material Description
1					Soft, moderate to highly organic SILT (OL), brown, grass roots and plant litter, dry [Topsoil]
2					Soft, SILT (ML), brown, slightly organic, sparse medium roots, dry [Topsoil Horizon]
3	100 to 1,000 g		14.6		Medium stiff, SILT (ML), brown, slightly micaceous, moist [Willamette Formation]
4					Grades to gray and orange mottling
5	100 to 1,000 g		26.3		
6					
7					
8	100 to 1,000 g		31.5		
9					
10	100 to 1,000 g		34.9		
11					Test Pit terminated at 11 feet. No groundwater encountered in excavation.
12					
13					
14					

LEGEND

100 to 1,000 g Bag Sample | Split-Spoon | Shelby Tube Sample | Seepage | Static Water Table | Water Bearing Zone

Date Excavated: 8/13/19
Logged By: TEB
Surface Elevation: 192 Feet

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TEST PIT LOG

Project: Reserve at Cedar Creek Sherwood, Oregon	Project No. 19-5186	Exploration No. **TP-2A**

Depth (ft)	Sample Type	tons/sq.ft.	Moisture Content (%)	Water Bearing Zone	Material Description
					Soft, highly organic SILT (OL), brown, grass roots throughout, moist [Topsoil Horizon]
1		1.0			Medium stiff, SILT (ML), trace clay, brown, faint orange mottling, trace fine roots, dry [Recent Alluvium]
2		3.0			
3		2.5			Grades to brown with gray mottling
4		2.0			
5					
6					
7	100 to 1,000 g				Grades to medium stiff, clayey with sand, dark grey, anaerobic, low plasticity, homogenous, micaceous, and very moist to wet
8					Grades to very soft, excavation sloughing at 8 feet
9					Water seepage at 9 feet (<0.5 gallons per minute)
10	100 to 1,000 g				Large fallen tree 10 feet long and about 12 inches in diameter
11					Very soft, SILT (ML), dark gray, anaerobic, moderate to highly organic, low plasticity, micaceous, very moist to wet [Recent Alluvium]
12	100 to 1,000 g				Water seepage at 12 feet (1-2 gallons per minute)
13					
14					

LEGEND

Bag Sample (100 to 1,000 g) | Split-Spoon | Shelby Tube Sample | Seepage | Static Water Table | Water Bearing Zone

Date Excavated: 8/13/19
Logged By: TEB
Surface Elevation: 182 Feet

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TEST PIT LOG

Project: Reserve at Cedar Creek Sherwood, Oregon	Project No. 19-5186	Exploration No. **TP-2A**

Depth (ft)	Sample Type	tons/sq.ft.	Moisture Content (%)	Water Bearing Zone	Material Description
15					Medium stiff, SILT (ML), dark grey, anaerobic, moderate to highly organic, low plasticity, micaceous, very moist to wet [Recent Alluvium]
16					
17					Test pit terminated at 17 feet. Groundwater encountered in excavation at 9 feet. Sloughing of excavation sides from 8 to 12 feet.

LEGEND

Bag Sample


Split-Spoon


Shelby Tube Sample


Seepage

Static Water Table


Water Bearing Zone

Date Excavated: 8/13/19
Logged By: TEB
Surface Elevation: 182 Feet

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TEST PIT LOG

Project: Reserve at Cedar Creek Sherwood, Oregon	Project No. 19-5186	Exploration No. **TP-3A**

Depth (ft)	Sample Type	tons/sq.ft.	Moisture Content (%)	Water Bearing Zone	Material Description
0					Soft, highly organic SILT (OL), brown, grass roots throughout, dry to damp [Topsoil]
1					Soft to medium stiff, slightly organic SILT (ML), brown, some medium roots throughout, slightly micaceous, dry [Topsoil Horizon]
2					SILT (ML), brown, trace medium roots throughout, slightly micaceous, hard due to desiccation, dry [Willamette Formation]
3					
4		3.0			Grades to brown with trace red mottling, medium stiff to stiff, no roots present, damp
5					
6					
7					
8					
9					Grades to stiff, with trace fine sand, brown with slight gray mottling
10					
11					Test pit terminated at 11 feet.
12					No groundwater encountered in excavation.
13					
14					

LEGEND

Bag Sample (100 to 1,000 g) | Split-Spoon | Shelby Tube Sample | Seepage | Static Water Table | Water Bearing Zone

Date Excavated: 8/13/19
Logged By: TEB
Surface Elevation: 207 Feet

GeoPacific Engineering, Inc.
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Tel: (503) 598-8445 Fax: (503) 941-9281

TEST PIT LOG

Project: Reserve at Cedar Creek Sherwood, Oregon	Project No. 19-5186	Exploration No. **TP-4A**

Depth (ft)	Sample Type	tons/sq.ft.	Moisture Content (%)	Water Bearing Zone	Material Description
0					Soft, highly organic SILT (OL), brown, grass roots throughout, dry to damp [Topsoil]
1					Soft, slightly organic SILT (ML), brown, trace fine roots, dry [Topsoil Horizon]
2					Medium stiff to stiff, SILT(ML), brown, slightly micaceous, dry [Willamette Formation]
3					
4					
5					
6					
7					Grades to stiff, clayey, slight gray mottling, moist
8					
9					
10					Test pit terminated at 10 feet.
11					No groundwater encountered in excavation.
12					
13					
14					

LEGEND

Bag Sample (100 to 1,000 g) | Split-Spoon | Shelby Tube Sample | Seepage | Static Water Table | Water Bearing Zone

Date Excavated: 8/13/19
Logged By: TEB
Surface Elevation: 199 Feet

GeoPacific Engineering, Inc.
14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

TEST PIT LOG

Project: Reserve at Cedar Creek Sherwood, Oregon	Project No. 19-5186	Exploration No. **TP-5A**

Depth (ft)	Sample Type	tons/sq.ft.	Moisture Content (%)	Water Bearing Zone	Material Description
0					Soft, highly organic SILT (OL), brown, grass roots and leaf litter, dry to damp [Topsoil]
1					Stiff, SILT (ML), brown, gray mottling, micaceous, dry [Willamette Formation]
2		4.0			
3					
4					Grades to very stiff, and with trace black staining
5					
6					Grades to clayey with trace fine-grained sand, and dark gray
7	100 to 1,000 g				
8					
9					Grades to soft, sandy, dark grey, homogenous, dilatant, and very wet
10	100 to 1,000 g				Test pit terminated at 10 feet. Groundwater encountered below depth of 8.5 feet. Seepage visually estimated at 1-2 gallons per minute. Sloughing observed below depth of 8.5 feet.
11					
12					
13					
14					

LEGEND

Bag Sample | Split-Spoon | Shelby Tube Sample | Seepage | Static Water Table | Water Bearing Zone

Date Excavated: 8/13/19
Logged By: TEB
Surface Elevation: 168 Feet

GeoPacific Engineering, Inc.
14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

TEST PIT LOG

Project: Reserve at Cedar Creek Sherwood, Oregon	Project No. 19-5186	Exploration No. **TP-6A**

Depth (ft)	Sample Type	tons/sq.ft.	Moisture Content (%)	Water Bearing Zone	Material Description
1					Soft, highly organic SILT (OL), moderate gravel and cobbles, dark grey, debris, dry [Undocumented Fill]
2					
3					Medium stiff to stiff, SILT (ML), brown, trace medium roots, homogenous, dry to damp [Buried Topsoil]
4					Medium stiff to stiff, SILT (ML), brown, slight gray mottling, micaceous, moist [Willamette Formation]
5					
6					
7					
8					
9					
10					Test pit terminated at 10 feet. No groundwater encountered in excavation.
11					
12					
13					
14					

LEGEND

Bag Sample


Split-Spoon


Shelby Tube Sample


Seepage

Static Water Table


Water Bearing Zone

Date Excavated: 8/13/19
Logged By: TEB
Surface Elevation: 192 Feet

GeoPacific Engineering, Inc.
14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

TEST PIT LOG

Project: Reserve at Cedar Creek Sherwood, Oregon	Project No. 19-5186	Exploration No. **TP-7A**

Depth (ft)	Sample Type	tons/sq.ft.	Moisture Content (%)	Water Bearing Zone	Material Description
1					Medium stiff, SILT (ML), cobbles, brown, fine to medium roots throughout, dry [Undocumented Fill]
2					Stiff, SILT (ML), brown, trace fine roots, dry [Willamette Formation]
3					
4					Test pit terminated at 3.5 feet.
5					No groundwater encountered in excavation.
6					
7					
8					
9					
10					
11					
12					
13					
14					

LEGEND

Bag Sample (100 to 1,000 g) | Split-Spoon | Shelby Tube Sample | Seepage | Static Water Table | Water Bearing Zone

Date Excavated: 8/13/19
Logged By: TEB
Surface Elevation: 190 Feet

GeoPacific Engineering, Inc.
14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

TEST PIT LOG

Project: Reserve at Cedar Creek Sherwood, Oregon	Project No. 19-5186	Exploration No. **TP-8A**

Depth (ft)	Sample Type	tons/sq.ft.	Moisture Content (%)	Water Bearing Zone	Material Description
1					Soft, SILT (ML), brown, moderate to trace organics, fine to medium roots, dry [Topsoil]
2					SILT (ML), hard due to desiccation, brown, homogenous, dry to damp [Willamette Formation]
3		2.0			Grades to medium stiff, and slightly micaceous
4		2.0			
5					
6					
7					
8					
9					
10					
11					Test pit terminated at 11 feet. No groundwater encountered in excavation.
12					
13					
14					

LEGEND

Bag Sample (100 to 1,000 g) | Split-Spoon | Shelby Tube Sample | Seepage | Static Water Table | Water Bearing Zone

Date Excavated: 8/13/19
Logged By: TEB
Surface Elevation: 196 Feet

GeoPacific Engineering, Inc.
14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

HAND AUGER LOG

Project: Reserve at Cedar Creek Sherwood, Oregon	Project No. 19-5186	Exploration No. **HA-1A**

Depth (ft)	Sample Type	Tons/sq.ft.	Moisture Content (%)	Water Bearing Zone	Material Description
1					Soft, SILT (ML), brown, disturbed texture, cracked at surface, dry [Undocumented Fill]
2					Soft to medium stiff, SILT (ML), brown, slightly organic, sparse medium roots, dry [Willamette Formation]
3					Grades to stiff, without roots, and damp
4					
5					Hand auger boring terminated at 5 feet
6					No seepage or static groundwater encountered
7					
8					
9					
10					
11					
12					
13					
14					

LEGEND

100 to 1,000 g Bag Sample | Split-Spoon | Shelby Tube Sample | Seepage | Static Water Table | Water Bearing Zone

Date Excavated: 8/13/19
Logged By: BGA
Surface Elevation:

GeoPacific Engineering, Inc.
14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

HAND AUGER LOG

Project: Reserve at Cedar Creek Sherwood, Oregon	Project No. 19-5186	Exploration No. **HA-2A**

Depth (ft)	Sample Type	Tons/sq.ft.	Moisture Content (%)	Water Bearing Zone	Material Description
1					8" soft, highly organic SILT (OL), dark brown, disturbed texture, with fine roots, dry [Topsoil]
2					Soft, SILT (ML), brown and gray, slightly organic, sparse medium roots, disturbed texture, damp [Alluvium]
3					
4					Grades to dark brown and with some organic content
5					Hand auger boring terminated at 5 feet No seepage or static groundwater encountered
6					
7					
8					
9					
10					
11					
12					
13					
14					

LEGEND

Bag Sample (100 to 1,000 g) | Split-Spoon | Shelby Tube Sample | Seepage | Static Water Table | Water Bearing Zone

Date Excavated: 8/13/19
Logged By: BGA
Surface Elevation:

GeoPacific Engineering, Inc.
14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

HAND AUGER LOG

Project: Reserve at Cedar Creek Sherwood, Oregon	Project No. 19-5186	Exploration No. **HA-3A**

Depth (ft)	Sample Type	Tons/sq.ft.	Moisture Content (%)	Water Bearing Zone	Material Description
1					6" soft, highly organic SILT (OL), brown, disturbed texture, with fine roots, dry [Topsoil]
					Soft, SILT (ML), brown, disturbed texture, with fine roots, dry [Topsoil Horizon]
2					Medium stiff, SILT (ML), brown, slightly organic, sparse medium roots, dry [Willamette Formation]
3					Grades to with gray and orange mottling
4					
5					Hand auger boring terminated at 5 feet
					No seepage or static groundwater encountered
6					
7					
8					
9					
10					
11					
12					
13					
14					

LEGEND

Bag Sample (100 to 1,000 g) | Split-Spoon | Shelby Tube Sample | Seepage | Static Water Table | Water Bearing Zone

Date Excavated: 8/13/19
Logged By: BGA
Surface Elevation:

Project Name: Reserve at Cedar Creek
Client: David Weekley Homes
Date Sampled: 8/3/2019
Sampled By: TEB

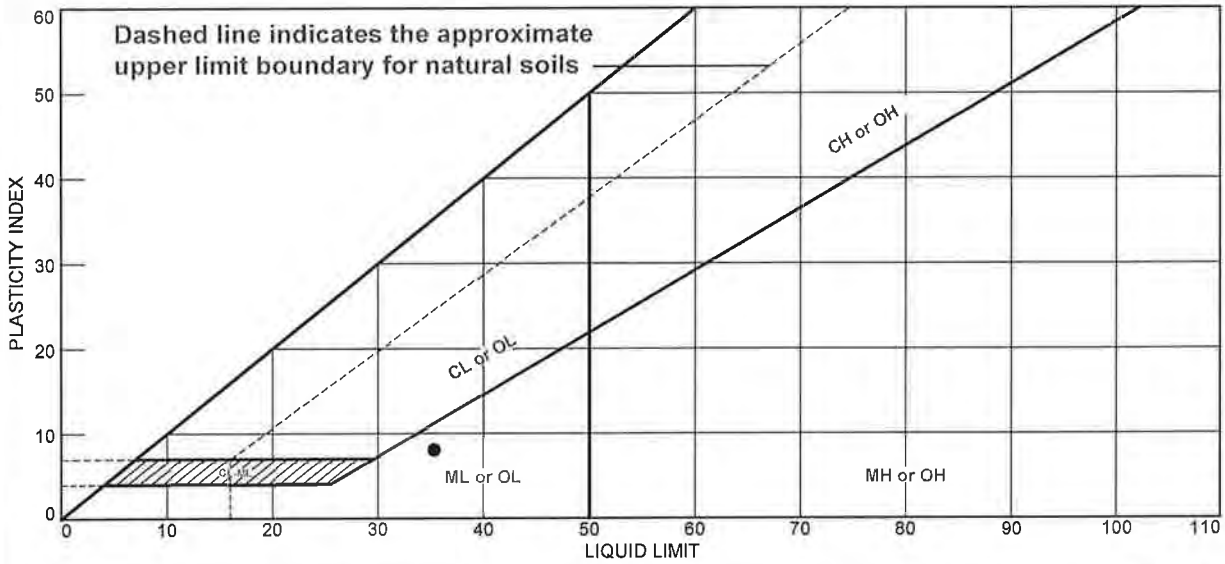
Project No.: 19-5186

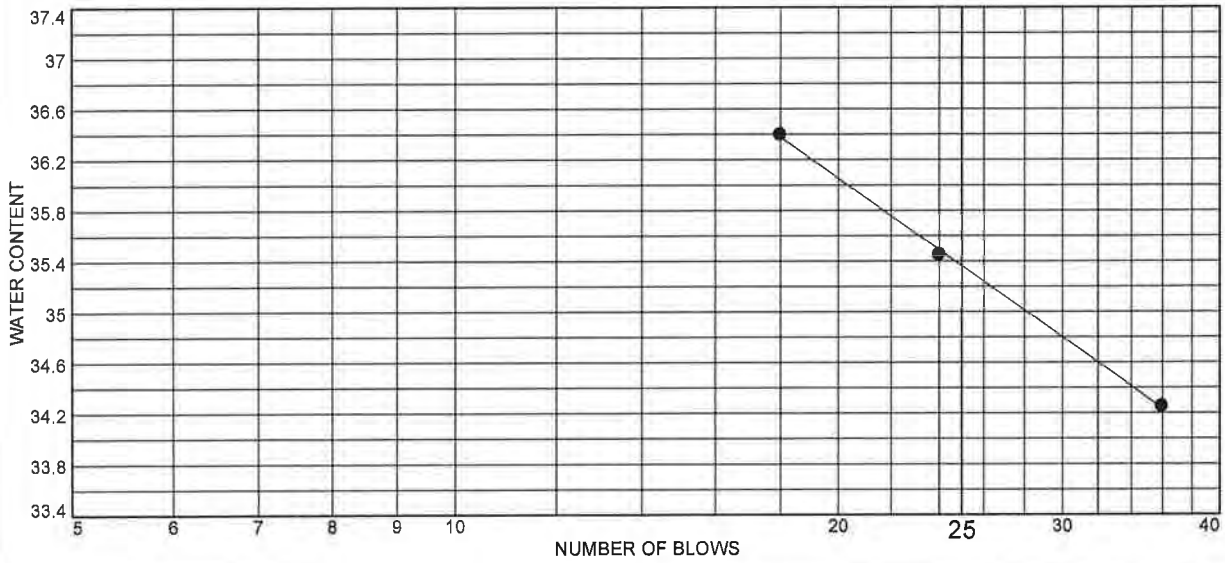
Date Tested: 8/15/2019
Tested By: SJC

Moisture Content

Sample ID:	**S19-175**
Location:	**TP-1A**
Depth (ft.):	2.5'
Tare #:	9
Tare (g):	266.0
Tare + Wet (g):	563.5
Tare + Dry (g):	525.6
Moisture (%):	**14.6**
Sample ID:	**S19-176**
Location:	**TP-1A**
Depth:	5'
Tare #:	15
Tare (g):	272.3
Tare + Wet (g):	481.1
Tare + Dry (g):	437.6
Moisture (%):	**26.3**
Sample ID:	**S19-177**
Location:	**TP-1A**
Depth:	7.5'
Tare #:	11
Tare (g):	264.4
Tare + Wet (g):	463.3
Tare + Dry (g):	415.7
Moisture (%):	**31.5**
Sample ID:	**S19-178**
Location:	**TP-1A**
Depth:	10'
Tare #:	1
Tare (g):	13.7
Tare + Wet (g):	76.7
Tare + Dry (g):	60.4
Moisture (%):	**34.9**

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Silt	35.4	27.4	8.0			

Project No. 19-5186 **Client:** David Weekley Homes

Project: Reserve at Cedar Creek

Location: TP-1A

Sample Number: S19-1748 **Depth:** 10'

Remarks:

GEOPACIFIC ENGINEERING, INC.

Figure

Tested By: SJC

GeoPacific Engineering, Inc.

Real-World Geotechnical Solutions
Investigation • Design • Construction Support

March 26, 2019
Project No. 19-5186

Aziz Siddiqui
David Weekley Homes
1905 NW 169th Pl, Suite 210
Beaverton, Oregon 97006
Via email: asiddiqui@dwhomes.com

CC: Matt Sprague, Pioneer Design Group, Inc. msprague@pd-grp.com

SUBJECT: CLEAN WATER SERVICES SLOPE SETBACKS
17045 SW BROOKMAN ROAD SUBDIVISION
SHERWOOD, OREGON

This letter report presents our review of on-site natural slopes pertaining to Clean Water Services (CWS) slope setbacks. The subject site is located on the north side of SW Brookman Road in the City of Sherwood, Washington County, Oregon (Figures 1A & 1B). The property is approximately 9.9 acres in size. Cedar Creek bisects the property and an unnamed tributary drainage to Cedar Creek is located near the southeastern property line (Figure 2). Natural site grades within the limits of the proposed development range from approximately 3 to 20 percent with steeper grades adjacent to Cedar Creek and the unnamed tributary drainage to Cedar Creek. Based on the site topographic mapping, maximum slopes adjacent to Cedar Creek and the tributary drainage range from 10 to 20 feet and are on the order of 20 to 42 percent grade.

Clean Water Services (CWS) allows a reduction of the 35-foot setback from the break in slope to 15 feet with a geotechnical engineer's review. GeoPacific's evaluation of the slope stability setback was based on a geologic reconnaissance, site specific topographic survey, and published geologic mapping. Visual criterion considered by the geologist when evaluating slope stability included topographic grade and smoothness or regularity; degree of creep; age, density, condition and degree on deformity of native trees; and evidence of erosion and past fill placement.

Our reconnaissance of the moderately to steeply sloping portion of the site (immediately adjacent to Cedar Creek and the unnamed tributary drainage to Cedar Creek) indicates slopes are generally smooth and uniform (Figure 1B) and stable. No springs or seeps were observed. Based on our reconnaissance and information available at present, a 15 foot offset from the break in slope is adequate to maintain slope stability along the vegetated corridor; however, deeper explorations should be considered to evaluate liquefaction and lateral spread risk. According to the Oregon HazVu: Statewide Geohazards Viewer, the subject site is regionally characterized as having a low risk of soil liquefaction with the sloping areas adjacent to the drainages mapped as having a high risk of soil liquefaction, as presented on Figure 1C (DOGAMI:HazVu, 2019).

17045 SW Brookman Road Subdivision
GeoPacific Project No. 19-5186

We appreciate this opportunity to be of service.

Sincerely,

GEOPACIFIC ENGINEERING, INC.

EXPIRES: 06/30/2019

Beth K. Rapp, C.E.G.
Senior Engineering Geologist

James D. Imbrie, P.E., C.E.G.
Geotechnical Engineer

Attachments: Figure 1A - Vicinity Map
Figure 1B - Lidar Based Vicinity Map - with Mapped Landslides
Figure 1C - Lidar Based Vicinity Map - with Liquefaction Hazard
Figure 2 - Site Plan and Existing Conditions

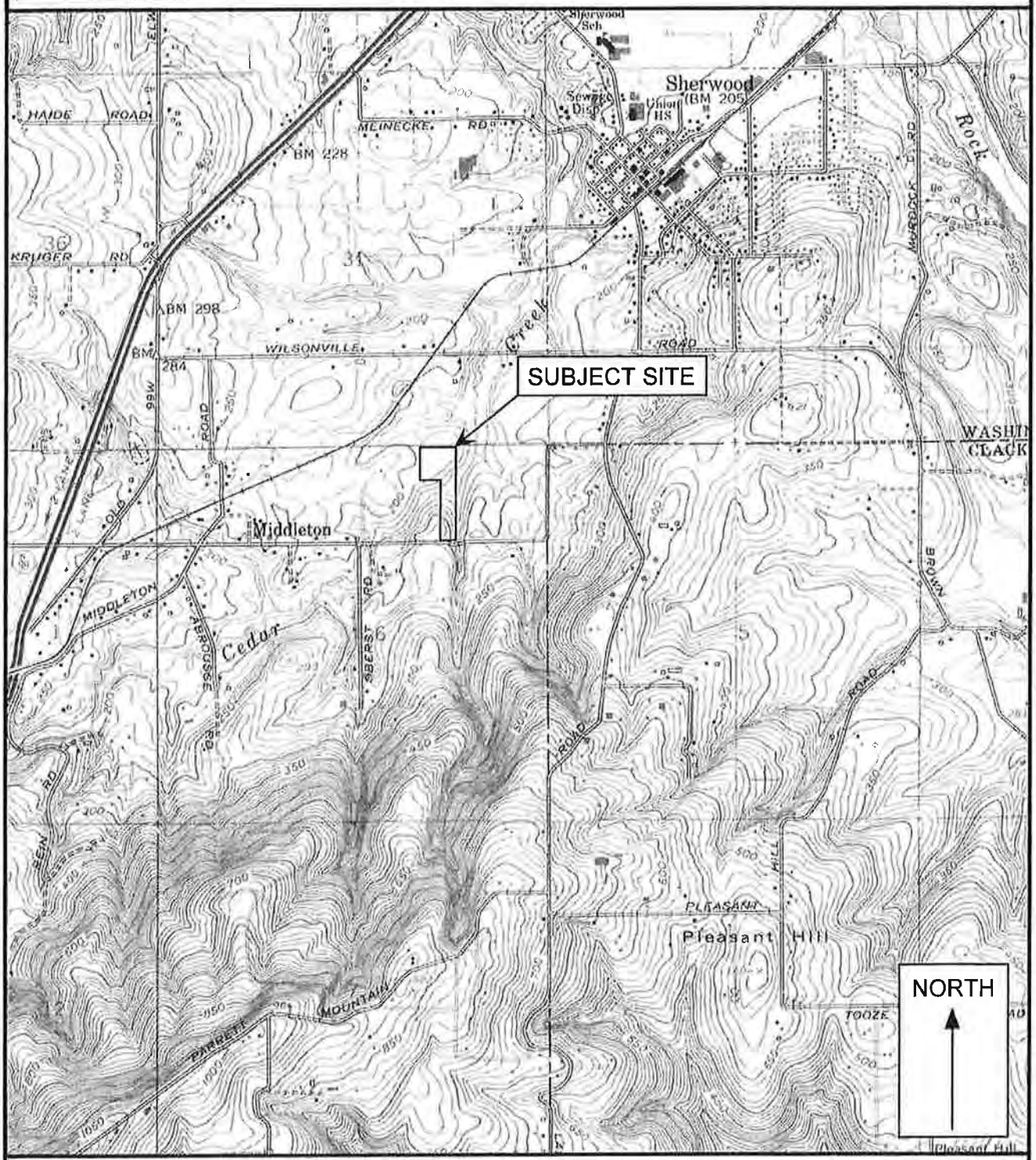
References:

Oregon Department of Geology and Mineral Industries, 2019, Oregon Hazvu: Statewide Geohazards Viewer: https://gis.dogami.oregon.gov/hazvu/

Oregon Department of Geology and Mineral Industries, 2019, SLIDO: Statewide Landslide Information Database for Oregon: https://gis.dogami.oregon.gov/slido/

GeoPacific Engineering, Inc.
14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

VICINITY MAP



Legend

Approximate Scale 1 in = 2,000 ft

Date: 3/26/2019
Drawn by: EKR

Base map: U.S. Geological Survey 7.5 minute Topographic Map Series, Sherwood, Oregon Quadrangle, 1961 (Revised 1984).

Project: 17045 SW Brookman Road Sherwood, Oregon	Project No. 19-5186	FIGURE 1A

GeoPacific Engineering, Inc.
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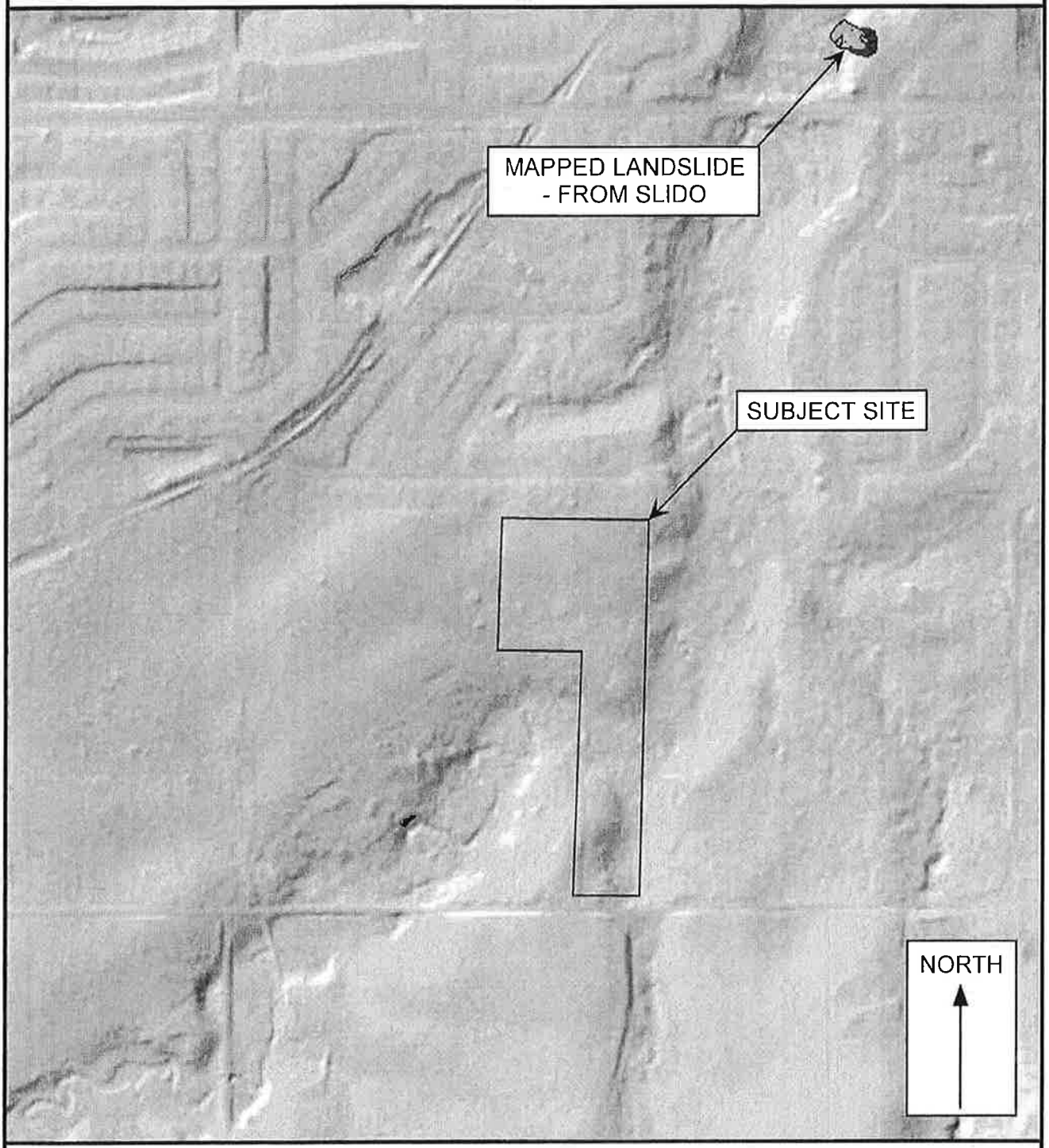
Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

LIDAR BASED VICINITY MAP - WITH MAPPED LANDSLIDES



Legend

Approximate Scale 1 in = 500 ft

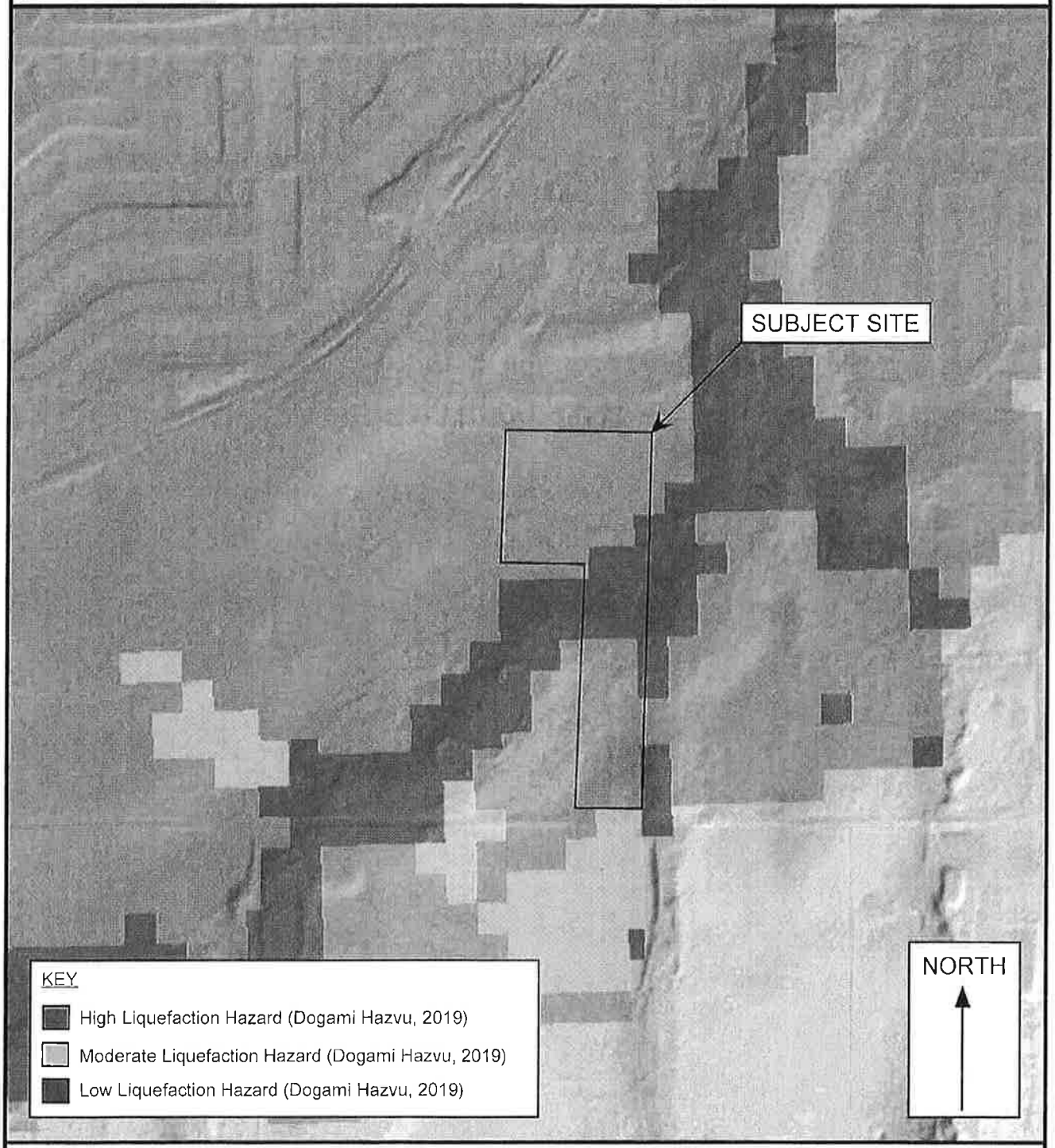
Date: 3/26/2019
Drawn by: EKR

Base map: Oregon Department of Geology and Mineral Industries, 2019, Statewide Landslide Information Database for Oregon (SLIDO): https://gis.dogami.oregon.gov/slido/

Project: 17045 SW Brookman Road Sherwood, Oregon	Project No. 19-5186	FIGURE 1B

GeoPacific Engineering, Inc.
14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

LIDAR BASED VICINITY MAP - WITH LIQUEFACTION HAZARD



Legend

Approximate Scale 1 in = 500 ft

Date: 3/26/2019
Drawn by: EKR

Base map: Oregon Department of Geology and Mineral Industries, 2019, Oregon Hazvu: Statewide Geohazards Viewer: https://gis.dogami.oregon.gov/hazvu/

Project: 17045 SW Brookman Road Sherwood, Oregon	Project No. 19-5186	FIGURE 1C

PIONEER DESIGN GROUP, INC.

CIVIL LAND USE PLANNING SURVEY
P 503.643.8286 F 844.715.4743 www.pd-grp.com
9020 SW Washington Square Rd Suite 170
Portland, Oregon 97223

Preliminary Drainage Report

THE RESERVE AT CEDAR CREEK

Sherwood, Oregon

April 15th, 2019

Prepared By: James Schmitt, P.E.

PDG Job No. 359-003

Applicant: Weekley Homes, LLC
1930 Thoreau Dr.,
Suite 160
Scheumburg, IL 60173

Engineer: Pioneer Design Group, Inc.
9020 SW Washington Sq. Dr.
Suite 170
Portland, OR 97223
(503) 643-8286

TABLE OF CONTENTS

INTRODUCTION

This report represents the preliminary storm drainage and storm water analysis for the Reserve at Cedar Creek project. The basis of this report is to comply with City of Sherwood, Clean Water Services (CWS), and the State of Oregon's regulations and engineering standards as well as the latest edition of the Oregon Plumbing Specialty Code (OPSC). Compiled in this report are the design criteria for the site, the hydrologic methodology, and the preliminary drainage analysis.

SITE DESCRIPTION AND LOCATION

The proposed project is a 58-lot detached single family subdivision located on the north side of SW Brookman Road east of SW Oberst Rd in the City of Sherwood. The subject site is approximately 15.72 acres and is specifically identified as Tax Lot 100 and Tax Lot 101 of Tax Map 3S1 06. The property is zoned Medium Density Residential Low (MDRL).

EXISTING CONDITIONS

The subject site is made of two properties that both have a single-family home with associated garage, sheds and gravel driveways. All existing structures are to be removed as part of this development. There is a mixture of coniferous and deciduous trees located throughout the majority of the property. There is an existing creek that runs through the center of the site that has an existing crossing with a 6' diameter pipe conveying flows. There is also an existing flood plain on the property with a 100-year flood plain elevation of approximately 176. The topography of the site slopes from both the north and south bounders towards creek at the center of the site. Grades across the site range from 1.0% – 25%.

The predominant soils mapped on site with a corresponding hydrologic soil group (HSG) designation are listed below and as shown on the attached Natural Resources Conservation Service (NRCS) soil survey for Washington County.

NRCS SOIL GROUPS		
Map Unit Name	**Map Unit Symbol**	**HSG Rating**
Aloha Silt Loam	1	C/D
Wapato Silty Clay Loam	43	C/D
Willamette Silt Loam	44B,44C	B
Woodburn Silt Loam	45B	C
Verboort Silt Loam	42	D

The site currently drains to Cedar Creek running through the center of the project which conveys storm water easterly and then north eventually releasing into the Tualatin River.

RUNOFF CURVE NUMBERS

Based on the various soils types existing throughout the site, a Predeveloped runoff curve number (RCN) of 78 will be used for pervious areas. Developed pervious areas represent a runoff curve number (RCN) of 79 for "Open Space" cover type in fair hydrologic condition, relative to HSG 'C'. A runoff curve number of 98 will be used for all predeveloped and developed impervious areas (refer to the *Runoff Curve Numbers (TR-55)* and *NRCS Soil Survey*).

RUNOFF CURVE NUMBERS		
Land Description	**Existing RCN**	**Proposed RCN**
Open Space, Fair Hydrologic Condition	78	79
Impervious	98	98

PROPOSED IMPROVEMENTS

Impervious surfaces will be created as a result of public and private streets and sidewalks along with the eventual homes and driveways. The proposed development will create approximately 221,324 square feet (5.08 acres) of impervious area, which comprise 32.3% of the entire site. Public utilities will be extended throughout the site for use by the proposed lots.

Flows generated by the site will be conveyed to swales which will outfall to Cedar Creek. All proposed improvements are to be elevated out of the existing 100-year flood plain.

HYDROLOGY/HYDRAULIC METHODOLOGY

Using the Santa Barbara Urban Hydrograph (SBUH) runoff method based on a Type 1A rainfall distribution, the site has been analyzed to determine the proposed peak runoff rates for the water quality, 2, 10, and 25-year 24-hour storm events. The SBUH method uses runoff curve numbers in conjunction with the property's hydrologic soil group to model the site's permeability.

A pre-developed time of concentration of 33.72 minutes and a developed time of concentration of 10.4 minutes were calculated using the methodology outlined in the TR-55 technical manual *(refer to the Time of Concentration Calculations and Exhibits).*

Rainfall depths for all storm events used in the calculations and design of the proposed storm drainage system are found in latest edition of Clean Water Services (CWS) Design and Construction Standards and as shown below.

24-HOUR RAINFALL DEPTHS (CWS)					
Recurrence Interval, Years	2	5	10	25	100
24-Hour Depths, Inches	2.50	3.10	3.45	3.90	4.50

WATER QUALITY

As required by Clean Water Services, we will treat runoff from any new impervious surface created as a result of the proposed development. All water quality structures shall be designed to treat storm water generated by 0.36 inches of precipitation falling in 4 hours with an average storm return period of 96 hours. The water quality facilities, in conjunction with the sumped catch basins, will remove a minimum of 65% of the Total Phosphorous (TP) from the storm water runoff.

Runoff from the site is conveyed into proposed water quality swales providing treatment for the impervious surfaces relevant to the proposed development in accordance with CWS Design and Construction Standards 4.05 and 4.06 (R&O 17-05). The north and south sections of the site will be conveyed into separate swales that will outfall into Cedar Creek (*refer to the Water Quality Swale Calculations spreadsheet*).

The following summarizes the water quality requirements for the swale:

WATER QUALITY SWALE (North)
• *Minimum Swale Length = 100 ft.*
• *Design width = 4.0 ft. min.*
• *Velocity = 0.18 ft./s. max.*
• *Depth = 0.5 ft. max.*
• *Residence Time = 9.0 minutes*
• *Side Slopes = 4:1 max (in treatment area); 2.5:1 max. (outside treatment area.)*
• *Longitudinal Slope = 0.5% min.*

WATER QUALITY SWALE (South)
• *Minimum Swale Length = 100 ft.*
• *Design width = 2.0 ft. min.*
• *Velocity = 0.17 ft./s. max.*
• *Depth = 0.5 ft. max.*
• *Residence Time = 9.0 minutes*
• *Side Slopes = 4:1 max (in treatment area); 2.5:1 max. (outside treatment area.)*
• *Longitudinal Slope = 0.5% min.*

DETENTION

The water quality facility outfalls into Cedar Creek. Per Clean Water Services' *Design and Construction Standard's for Sanitary and Storm Water Management* (R&O 17-5) Section 4.03.2.b.1, detention is not required as there are no downstream deficiencies identified in the adjacent conveyance system and the creek within ¼ mile of the outfall location.

CONVEYANCE

The conveyance system for the site consists of an underground pipe system with sumped and flow through catch basins. Stormwater will be conveyed through the site via a series of pipes and routed through the stormwater facility before being discharged into Cedar Creek.

A pollution control manhole has been installed upstream of the facility to provide the required stormwater pretreatment. As per the requirements of Clean Water Services, the drainage system has been designed to convey the 25-year storm event.

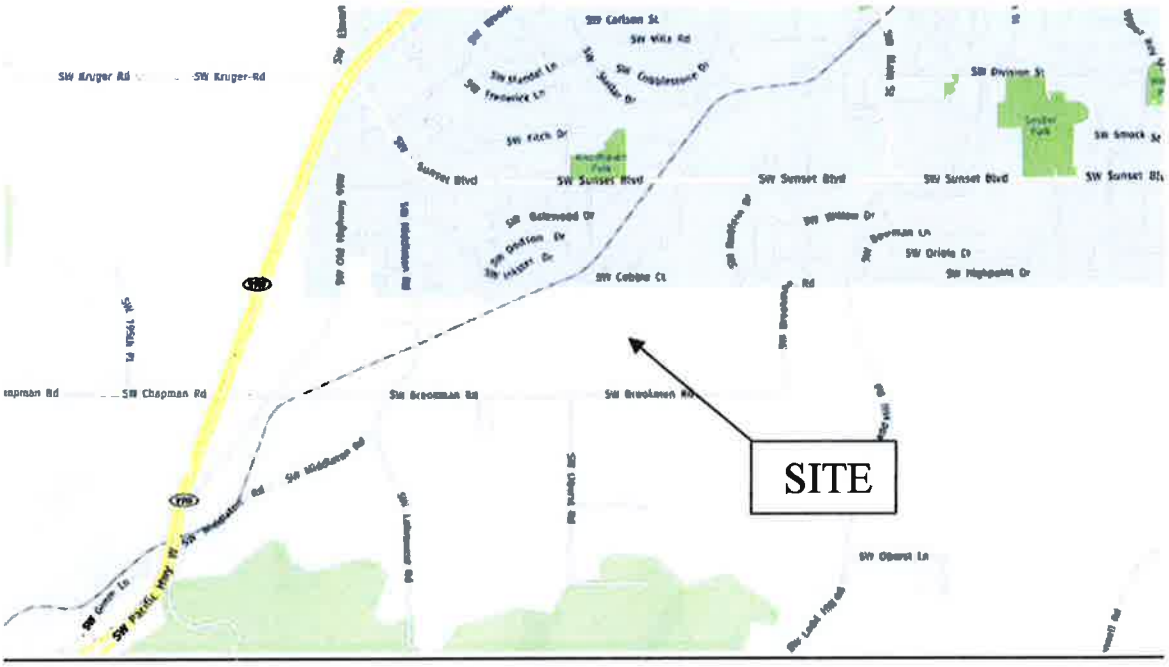
Using a Manning's 'n' value of 0.013, the minimum slope required to convey the 25-year storm event for the south section of the site in a 12" PVC pipe is 0.0050 ft./ft. The minimum slope required for the north section of the site is 0.0150 ft./ft. in a 12" PVC pipe and 0.0150 ft./ft., in a 15" PVC pipe (refer to the *Stormwater Conveyance Calculations).*

CONCLUSION

Based on the supporting storm water calculations and attached analysis, it is the opinion of Pioneer Design Group that the development of the Reserve at Cedar Creek subdivision project will not adversely affect the existing downstream drainage system or adjacent property owners. We have provided water quality treatment for the

development. Therefore, all the requirements associated with Clean Water Services and Washington County have been met for this project.

VICINITY MAP



ENGINEERING CALCULATONS AND SPREADSHEETS

Map Scale: 1:2,410 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Washington County, Oregon
Survey Area Data: Version 16, Sep 18, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 19, 2015—Sep 13, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Aloha silt loam	C/D	2.9	13.8%
43	Wapato silty clay loam	C/D	3.6	17.6%
44B	Willamette silt loam, 3 to 7 percent slopes	B	2.2	10.8%
44C	Willamette silt loam, 7 to 12 percent slopes	B	1.8	8.5%
45B	Woodburn silt loam, 3 to 7 percent slopes	C	9.5	46.1%
2027A	Verboort silty clay loam, 0 to 3 percent slopes	D	0.7	3.3%
Totals for Area of Interest			**20.7**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

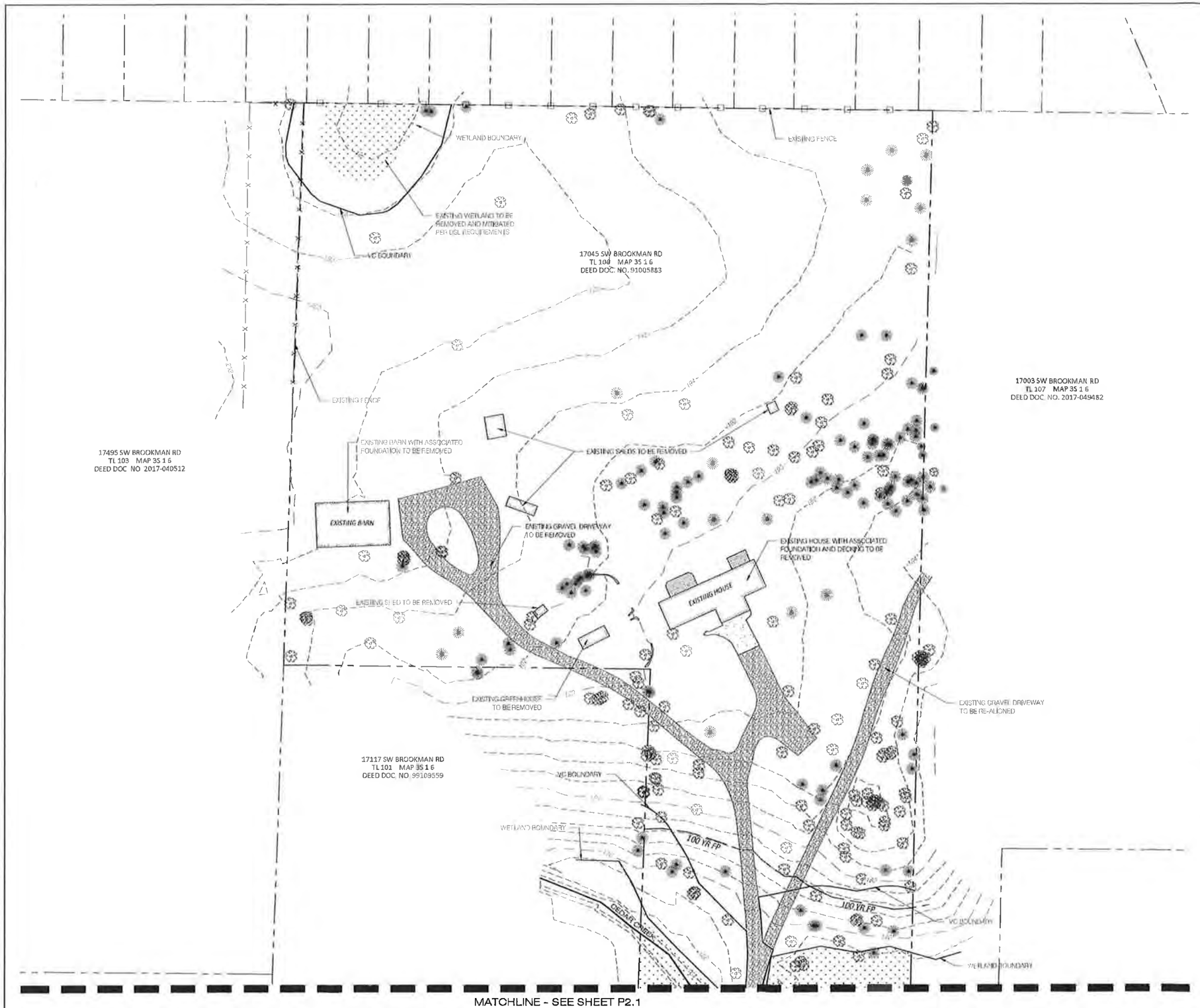
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



LEGEND

- RIGHT-OF-WAY LINE
- BOUNDARY LINE
- EXISTING LOT LINE
- EASEMENT LINE
- CENTER LINE
- STORM DRAINAGE LINE
- SANITARY SEWER LINE
- WATER LINE
- GAS LINE
- COMMUNICATION LINE
- TELEPHONE LINE
- UNDERGROUND POWER LINE
- OVERHEAD WIRE
- FENCE LINE (AS NOTED)
- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- CULVERT
- CONIFEROUS TREE (DBH)
- DECIDUOUS TREE (DBH)
- DIAMETER (INCHES) AT BREAST HEIGHT
- CATCH BASIN/DRAIN INLET
- STORM DITCH INLET
- STORM MANHOLE
- SANITARY MANHOLE
- WATER VALVE
- IRRIGATION VALVE
- GAS VALVE
- GAS METER
- GAS RISER
- FIRE HYDRANT ASSEMBLY
- FIRE DEPARTMENT CONNECTION
- TELEPHONE MH/VAULT
- SIGN
- SURVEY MONUMENT FOUND
- MAILBOX
- JUNCTION BOX
- ELECTRIC VAULT
- ELECTRIC PEDESTAL
- CLEANOUT
- SEPTIC
- LIGHT POLE
- POWER POLE
- GUY WIRE
- POWER POLE W/ LIGHT
- TRAFFIC SIGNAL POLE
- SIGNAL POLE
- WATER METER
- WATER BLOWOFF
- WATER AIR RELEASE VALVE
- TEST PIT
- MONITORING WELL
- GAS VAULT
- UTILITY VAULT
- UTILITY PEDESTAL
- WATER VAULT
- COMMUNICATION VAULT
- TELECOMM PEDESTAL
- UTILITY CAP
- UTILITY EXTENSION
- HANDICAP MARKER
- EXCEPTION NUMBER FOR NOTED EASEMENT PER TITLE REPORT
- EXISTING CONCRETE
- EXISTING ASPHALT PAVEMENT
- EXISTING GRAVEL SURFACE
- EXISTING BRICK SURFACE
- EXISTING BUILDING FOOTPRINT
- EXISTING WOOD DECK

SCALE
40 0 20 40
1 INCH = 40 FEET

PIONEER DESIGN GROUP
OIL PLUMBING • LAND USE PLANNING • LAND SURVEYING • LANDSCAPE ARCHITECTURE
9450 SW WASHINGTON SQUARE RD., SUITE 170 PORTLAND, OREGON 97223
p 503.643.8286

EXISTING CONDITION AND DEMOLITION PLAN (NORTH)

OULETTE PROPERTY
CITY OF SHERWOOD, OREGON

Designed by JLS Date 2/2/18
Drawn by JLS Date 2/2/18
Reviewed by JLS Date 2/2/18
Project No. 329-003 REF.
Horiz. Scale: 1" = 40'
Vert. Scale: N/A

No.	Date	Revision	By

Project
OULETTE PROPERTY
No.
359 003
Type
PLANNING
Sheet
P2.0

LEGEND

- RIGHT-OF-WAY LINE
- BOUNDARY LINE
- EXISTING LOT LINE
- EASEMENT LINE
- CENTER LINE
- STORM DRAINAGE LINE
- SANITARY SEWER LINE
- WATER LINE
- GAS LINE
- COMMUNICATION LINE
- TELEPHONE LINE
- UNDERGROUND POWER LINE
- OVERHEAD WIRE
- FENCE LINE (AS NOTED)
- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- CULVERT
- CONIFEROUS TREE (DBH)
- DECIDUOUS TREE (DBH)
- DIAMETER (INCHES) AT BREAST HEIGHT
- CATCH BASIN/DRAIN INLET
- STORM DITCH INLET
- STORM MANHOLE
- SANITARY MANHOLE
- WATER VALVE
- IRRIGATION VALVE
- GAS VALVE
- GAS METER
- GAS RISER
- FIRE HYDRANT ASSEMBLY
- FIRE DEPARTMENT CONNECTION
- TELEPHONE MH/VAULT
- SIGN
- SURVEY MONUMENT FOUND
- MAILBOX
- JUNCTION BOX
- ELECTRIC VAULT
- ELECTRIC PEDESTAL
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- SEPTIC
- LIGHT POLE
- POWER POLE
- GUY WIRE
- POWER POLE W/ LIGHT
- TRAFFIC SIGNAL POLE
- SIGNAL POLE
- WATER METER
- WATER BLOWOFF
- WATER AIR RELEASE VALVE
- TEST PIT
- MONITORING WELL
- GAS VAULT
- UTILITY VAULT
- UTILITY PEDESTAL
- WATER VAULT
- COMMUNICATION VAULT
- TELECOMM PEDESTAL
- UTILITY CAP
- UTILITY EXTENSION
- HANDICAP MARKER
- EXCEPTION NUMBER FOR NOTED EASEMENT PER TITLE REPORT
- EXISTING CONCRETE
- EXISTING ASPHALT PAVEMENT
- EXISTING GRAVEL SURFACE
- EXISTING BRICK SURFACE
- EXISTING BUILDING FOOTPRINT
- EXISTING WOOD DECK

PIONEER DESIGN GROUP
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9020 S.W. WASHINGTON SQUARE RD., SUITE 170 PORTLAND, OREGON 97223
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EXISTING CONDITION AND DEMOLITION PLAN (SOUTH)

OULETTE PROPERTY
CITY OF SHERWOOD, OREGON

Designed by	JJS	Date	02/19
Drawn by	JJS	Date	02/19
Reviewed by	JJS	Date	02/19
Project No.	329-003	REF.	
Horiz. Scale:	1" = 40'		
Vert. Scale:	N/A		

No.	Date	Revision	By

Project
OULETTE PROPERTY
No.
359-003
Type
PLANNING
Sheet
P2.1

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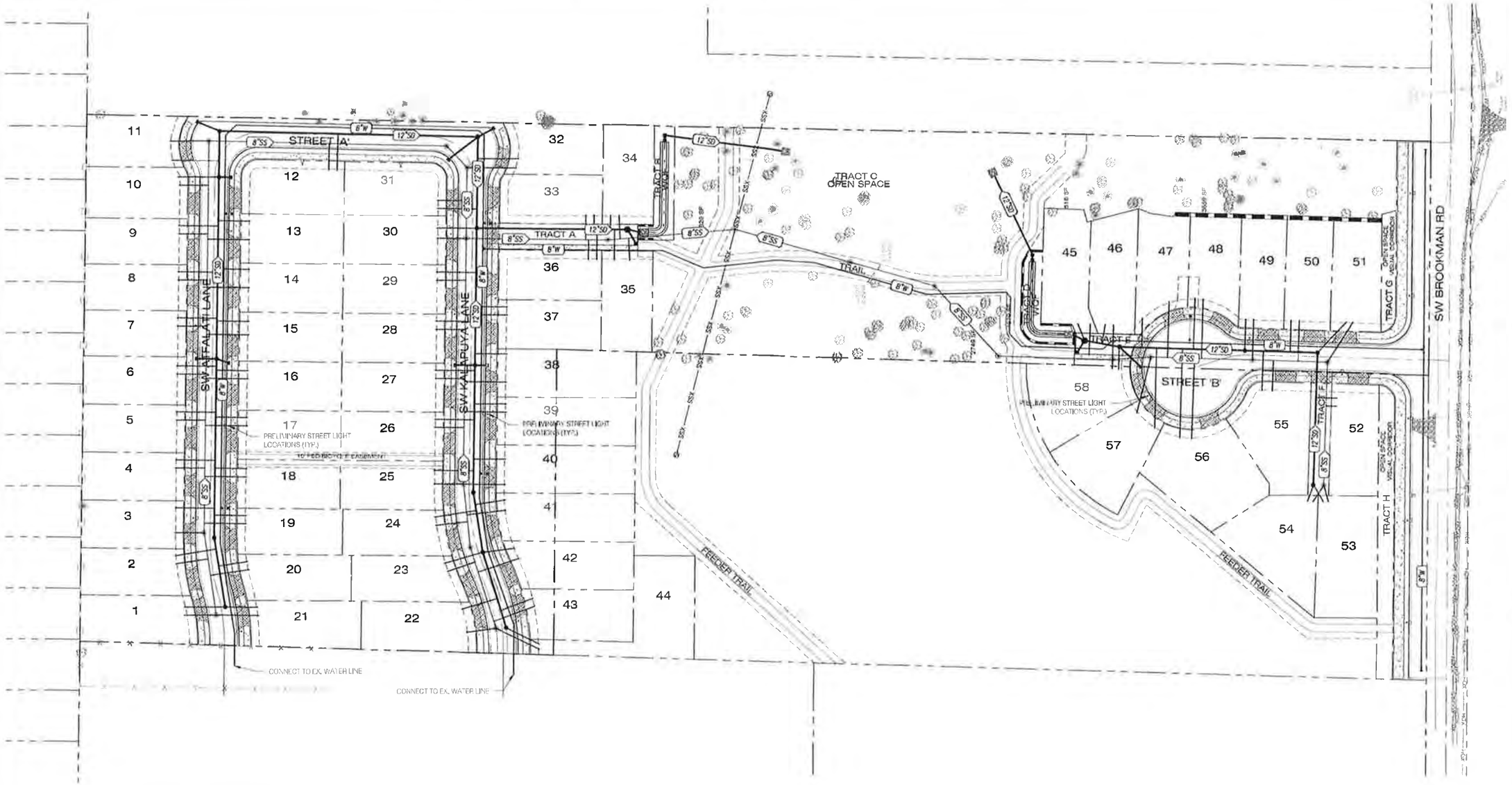

LEGEND

- PROPOSED EASEMENT LINE
- PROPOSED CENTERLINE
- PROPOSED RIGHT OF-WAY
- PROPOSED LOT LINE
- BOUNDARY LINE
- PROPOSED CONCRETE SIDEWALK
- PROPOSED PAVEMENT
- PROPOSED STANDARD CURB
- PROPOSED STORM LINE & MANHOLE
- PROPOSED SANITARY LINE & MANHOLE
- PROPOSED D'WATER SERVICE & METER
- PRELIMINARY STREET LIGHT LOCATIONS

SCALE
50 0 25 50
1 INCH = 50 FEET

PIONEER DESIGN GROUP
9020 SW WASHINGTON SQUARE RD., SUITE 170 PORTLAND, OREGON 97223
p 503.643.3286

PRELIMINARY COMPOSITE UTILITY PLAN

OULETTE PROPERTY
CITY OF SHERWOOD, OREGON

Designed by	JJS	Date	02/19
Drawn by	TLS	Date	02/19
Reviewed by	JJS	Date	02/19
Project No.	339-003	REF.	
Horiz. Scale:	1" = 50'		
Vert. Scale:	N/A		

No	Date	Revision	By

Project: OULETTE PROPERTY
No: 339-003
Type: PLANNING
Sheet: **P6.0**

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SOIL FEATURES FOR WASHINGTON COUNTY

Soil name and map symbol	Hydro-logic group	Flooding		
		Frequency	Duration	Months
Aloha: 1	C	NONE	NONE	NONE
Amity: 2	C	NONE	NONE	NONE
Astoria: 3E, 3F	B	NONE	NONE	NONE
Briedwell: 4B, 5B, 5C, 5D	B	NONE	NONE	NONE
Carlton: 6B, 6C	B	NONE	NONE	NONE
Cascade: 7B, 7C, 7D, 7E, 7F	C	NONE	NONE	NONE
Chehalem: 8C	C	NONE	NONE	NONE
Chehalis: 9, 10	B	COMMON	BRIEF	NOV-MAR
Cornelius: 11B, 11C, 11D, 11E, 11F:				
Cornelius part	C	NONE	NONE	NONE
Kinton part	C	NONE	NONE	NONE
Cornelius Varient: 12A, 12B, 12C	C	NONE	NONE	NONE
Cove: 13, 14	D	COMMON	BRIEF	DEC-APR
Dayton: 15	D	NONE	NONE	NONE
Delena: 16C	D	NONE	NONE	NONE
Goble: 17B, 17C, 17D, 17E, 18E, 18F	C	NONE	NONE	NONE
Helvetia: 19B, 19C, 19D, 19E	C	NONE	NONE	NONE
Hembre: 20E, 20F, 20G	B	NONE	NONE	NONE
Hillsboro: 21A, 21B, 21C, 21D	B	NONE	NONE	NONE
Hubberly: 22	D	NONE	NONE	NONE
Jory: 23B, 23C, 23D, 23E, 23F	C	NONE	NONE	NONE
Kilchis: 24G				
Kilchis part	C	NONE	NONE	NONE
Klickitat part	B	NONE	NONE	NONE

SOIL FEATURES FOR WASHINGTON COUNTY

Soil name and map symbol	Hydro-logic group	Flooding		
		Frequency	Duration	Months
Klickitat: 25E, 25F, 25G	B	NONE	NONE	NONE
Knappa: 26	B	NONE	NONE	NONE
Lablish: 27	D	FREQUENT	VERY LONG	DEC - APR
Laurelwood: 28B, 28C, 28D, 28E, 29E, 29F	B	NONE	NONE	NONE
McBee: 30	B	FREQUENT	BRIEF	NOV - MAY
Melborne: 31B, 31C, 31D, 31E, 31F	B	NONE	NONE	NONE
Melby: 32C, 32D, 32E, 33E, 33F, 33G	C	NONE	NONE	NONE
Olyic: 34C, 34D, 34E, 35E, 35F, 35G	B	NONE	NONE	NONE
Pervina: 36C, 36D, 36E, 36F	C	NONE	NONE	NONE
Quatama: 37A, 37B, 37C, 37D	C	NONE	NONE	NONE
Saum: 38B, 38C, 38D, 38E, 38F	C	NONE	NONE	NONE
Tolke: 39E, 39F	B	NONE	NONE	NONE
Udifluvents: 40	B	FREQUENT	VERY LONG	NOV - APR
Verboot: 42	**D**	**FREQUENT**	**BRIEF**	**DEC - APR**
Wapato: 43	**D**	**FREQUENT**	**BRIEF**	**DEC - APR**
Willamette: 44A, 44B, 44C, 44D	**B**	**NONE**	**NONE**	**NONE**
Woodburn: 45A, 45B, 45C, 45D	**C**	**NONE**	**NONE**	**NONE**
Xerchrepts:				
46F				
Xerochrepts part	B	NONE	NONE	NONE
Haploxerolls part	C	NONE	NONE	NONE
47D				
Xerochrepts part	D	NONE	NONE	NONE
Rock outcrop part				

RUNOFF CURVE NUMBERS (TR55)

Table 2-2a: Runoff curve numbers for urban areas [1]

Cover description		CN for hydrologic soil group			
Cover type and hydrologic condition	Average percent impervious area[2]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3]:					
Poor condition (grass cover <50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover >75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5]	77	86	91	94	
Idle lands (CNs are determined using cover types similar to those in table 2-2c)					

1: Average runoff condition, and $I_a = 0.2S$.

2: The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas hava a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

3: CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

4: Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

5: Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

RUNOFF CURVE NUMBERS (TR55)

Table 2-2b: Runoff curve numbers for cultivated agricultural lands [1]

Cover Description			Curve numbers for hydrologic soil group			
Cover type	Treatment[2]	Hydrologic condition[3]	A	B	C	D
Fallow	Bare soil	--	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured and terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
	C&T + CR	Poor	65	73	79	81
		Good	61	70	77	80
Small grain	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C&T	Poor	61	72	79	82
		Good	59	70	78	81
	C&T + CR	Poor	60	71	78	81
		Good	58	69	77	80
Close-seeded or broadcast legumes or rotation meadow	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
		Good	51	67	76	80

1: Average runoff condition, and $I_a = 0.2S$.

2: Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.

3: Hydraulic condition is based on combination factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes, (d) percent of residue cover on the land surface (good ≥ 20%), and (e) degree of surface roughness.

Poor: Factors impair infiltration and tend to increase runoff.

Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

RUNOFF CURVE NUMBERS (TR55)

Table 2-2c: Runoff curve numbers for other agricultural lands [1]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range -- continuous forage for grazing					
<50% ground cover or heavily grazed with no mulch.	Poor	68	79	86	89
50% to 75% ground cover and not heavily grazed.	Fair	49	69	79	84
>75% ground cover and lightly or only occasionally grazed.	Good	39	61	74	80
Meadow -- continuous grass, protected from grazing and generally mowed for hay	--	30	58	71	78
Brush – weed-grass mixture with brush as the major element					
<50% ground cover	Poor	48	67	77	83
50% to 75% ground cover	Fair	35	56	70	77
>75% ground cover	Good	30 [2]	48	65	73
Woods – grass combination (orchard or tree farm) [3]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods					
Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.	Poor	45	66	77	83
Woods are grazed but not burned, and some forest litter covers the soil.	Fair	36	**60**	**73**	**79**
Woods are protected from grazing, and litter and brush adequately cover the soil.	Good	30 [2]	55	70	77
Farmsteads -- buildings, lanes, driveways, and surrounding lots	--	59	74	82	86

1: Average runoff condition, and $I_a = 0.2S$.

2: Actual curve number is less than 30; use CN = 30 for runoff computations.

3: CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.

RUNOFF CURVE NUMBERS (TR55)

Table 2-2d: Runoff curve numbers for arid and semiarid rangelands [1]

Cover description		Curve numbers for hydrologic soil group			
Cover Type	Hydrologic condition[2]	A[3]	B	C	D
Herbaceous -- mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen -- mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper -- pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub -- major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

1: Average runoff condition, and $I_a = 0.2S$. For range in humid regions, use table 2-2c.

2: Poor: <30% ground cover (litter, grass, and brush overstory)

Fair: 30% to 70% ground cover

Good: >70% ground cover

3: Curve numbers for group A have been developed only for desert shrub.

MANNING'S "n" VALUES

SHEET FLOW EQUATION MANNING'S VALUES	n_s
Smooth Surfaces (concrete, asphault, gravel, or bare hand packed soil)	0.011
Fallow Fields or loose soil surface (no residue)	0.05
Cultivated soil with residue cover (≤ 20%)	0.06
Cultivated soil with residue cover (> 20%)	0.17
Short prairie grass and lawns	0.15
Dense grasses	0.24
Bermuda grasses	0.41
Range (natural)	0.13
Woods or forrest with light underbrush	0.40
Woods or forrest with dense underbrush	0.80

SHALLOW CONCENTRATED FLOW (after initial 300 ft of sheet flow, R = 0.1)	k_s
Forrest with heavy ground litter and meadows (n = 0.010)	3
Brushy ground with some trees (n = 0.060)	5
Fallow or minimum tillage cultivation (n = 0.040)	8
High grass (n = 0.035)	9
Short grass, pasture and lawns (n = 0.030)	11
Nearly bare ground (n = 0.25)	13
Paved and gravel areas (n = 0.012)	27

CHANNEL FLOW (Intermittent) (At the beginning of all visible channels, R = 0.2)	k_c
Forested swale with heavy ground cover (n = 0.10)	5
Forested drainage course/ravine with defined channel bed (n = 0.050)	10
Rock-lined waterway (n = 0.035)	15
Grassed waterway (n = 0.030)	17
Earth-lined waterway (n = 0.025)	20
CMP pipe (n = 0.024)	21
Concrete pipe (n = 0.012)	42
Other waterways and pipe 0.508/n	

CHANNEL FLOW (continuous stream, R = 0.4)	k_c
Meandering stream (n = 0.040)	20
Rock-lined stream (n = 0.035)	23
Grass-lined stream (n = 0.030)	27
Other streams, man-made channels and pipe (n = 0.807/n)	

PIONEER DESIGN GROUP

IMPERVIOUS AREA CALCULATIONS

JOB NUMBER: 359-003
PROJECT: The Reserve at Cedar Creek
FILE: 3593 Prelim Hydro

NEW IMPERVIOUS AREA

NORTH			
# LOTS AT 2,640-SF IMPERVIOUS AREA / LOT		102,960.00 ft²	
SIDEWALKS/CURB		18,305.00 ft²	
STREET PAVEMENT		33,935.00 ft²	
	SUBTOTAL	**155,200.00 ft²**	**3.56 ac**
SOUTH			
14 LOTS AT 2,640-SF IMPERVIOUS AREA / LOT		18,480.00 ft²	
SIDEWALKS/CURB		10,517.00 ft²	
STREET PAVEMENT		30,226.00 ft²	
	SUBTOTAL	**59,223.00 ft²**	**1.36 ac**
PATH			
SIDEWALKS		6,901.00 ft²	
	SUBTOTAL	**6,901.00 ft²**	**0.16 ac**
	TOTAL	**221,324.00 ft²**	**5.08 ac**

EXISTING IMPERVIOUS AREA

BUILDINGS	2,912.00 ft²	
SIDEWALKS	707.00 ft²	
GRAVEL AT 60% IMPERVIOUS	13,570.00 ft²	
STREET PAVEMENT	0.00 ft²	
	17,189.00 ft²	**0.39 ac**

Total Shed Area	**684,557.00 ft²**	**15.72 ac**
Existing Impervious Area	**17,189.00 ft²**	**0.39 ac**
% Impervious		**2.5 %**
Proposed Impervious Area	**221,324.00 ft²**	**5.08 ac**
% Impervious		**32.3 %**

PIONEER DESIGN GROUP

PREDEVELOPED TIME OF CONCENTRATION

JOB NUMBER: 359-003
PROJECT: The Reserve at Cedar Creek
FILE: 3593 Prelim Hydro

			Accum. Tc
LAG ONE: SHEET FLOW (FIRST 300 FEET)			
Tt = Travel time			
Manning's "n " =	0.15		
Flow Length, L =	300 ft	(300 ft. max.)	
P = 2-year, 24hr storm =	2.5 in		
Slope, S_0 =	0.032 ft/ft		
$T_T = \frac{(0.42)(n * L)^{0.8}}{(P)^{0.5}(S_0)^{0.4}}$	22.12 min.		22.12 min.
LAG TWO: SHALLOW CONCENTRATED FLOW (NEXT 294 FEET)			
Tc Velocity factor, k=	3		
Slope, S_0 =	0.021 ft/ft		
$V = k\sqrt{S_0}$	0.43 ft/s		
Flow Length, L =	294 ft		
$T = \frac{L}{(60)(V)}$	11.27 min.		33.39 min.
LAG TWO: SHALLOW CONCENTRATED FLOW (NEXT 85 FEET)			
Tc Velocity factor, k=	3		
Slope, S_0 =	0.214 ft/ft		
$V = k\sqrt{S_0}$	1.39 ft/s		
Flow Length, L =	85 ft		
$T = \frac{L}{(60)(V)}$	1.02 min.		34.41 min.
LAG THREE: CHANNEL FLOW (NEXT 40 FEET)			
Tc Velocity factor, k=	20		
Slope, S_0 =	0.010 ft/ft		
$V = k\sqrt{S_0}$	2.00 ft/s		
Flow Length, L =	40 ft		
$T = \frac{L}{(60)(V)}$	0.33 min.		33.72 min.

TOTAL PREDEVELOPED TIME OF CONCENTRATION (Tc) = 33.72 min.

PREDEVELOPED TIME OF CONCENTRATION

THE RESERVE AT CEDAR CREEK

PIONEER DESIGN GROUP
CIVIL ENGINEERING • LAND USE PLANNING • LAND SURVEYING • LANDSCAPE ARCHITECTURE
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Designed by	JJS	Date	04/19
Drawn by	JJS	Date	04/19
Reviewed by	JJS	Date	04/19
Project No.	359-003	REF.	
Horiz. Scale:			
Vert. Scale:			

PREDEVELOPED TIME OF CONC.

Project
OULLETTE PROPERTY

No.
359-003

Type
PLANNING

Sheet
1 of 1

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PIONEER DESIGN GROUP

DEVELOPED TIME OF CONCENTRATION

JOB NUMBER: 359-003
PROJECT: The Reserve at Cedar Creek
FILE: 3593 Prelim Hydro

Catchment Time	5	min.
Longest Run of Pipe	967	ft
Velocity of Flow	3	ft/s
Time in Pipe = (967 ft)/(3.00 ft/s) =	322	s
TOTAL DEVELOPED Tc =	**10.4**	**min.**

PIONEER DESIGN GROUP

WATER QUALITY SWALE CALCULATIONS (NORTH)

JOB NUMBER: 359-003
PROJECT: The Reserve at Cedar Creek
FILE: 3593 Prelim Hydro

REFERENCES:
1. Clean Water Services R&O 17-05.
2. Discussions with Clean Water Services.

REQUIRED WATER QUALITY TREATMENT: 65% Phosphorus Removal.

PROPOSED TREATMENT METHODS:

1. Sumped Catch Basins	15%
2. Bio-Filtration Swale	50%
total	65%

DESIGN STORM:

Precipitation:	0.36 inches
Storm Duration:	4 hours
Storm Return Period:	96 hours
Storm Window:	2 weeks

IMPERVIOUS AREA:

Watershed Area:	6 acres
Percent imp:	59 %
Impervious Area:	3.54 acres

Design Inflow = (3.54 ac)*(43560 ft^2/ac)*(0.36 in / 4.0 hrs) = **0.32 cfs**

BIOFILTRATION SWALE DESIGN CRITERIA:

Max Velocity:	0.9 ft/s
Side Slopes:	4 :1 (treatment area)
Base:	2 feet (2' min)
n Factor:	0.24 (plantings)

SWALE CHARACTERISTICS:

Q=	0.32	Design Storm Discharge (determined above)
N=	0.24	Plantings
B=	4 ft	Base width of channel
Z=	4 :1	Side slopes
SLOPE=	0.005 ft/ft	Slope of channel (0.005 minimum)
ASS. Y=	0.5 ft	Assumed depth to begin analysis (0.5 ft maximum)

ITERATIVE SOLUTION OF MANNING'S EQUATION FOR NORMAL DEPTH:

ITERATION	Y (FT)	P (FT)	A(FT^2)	R	Q (CFS)	% ERROR	V (FPS)
1	0.50	8.12	3.00	0.37	0.68	111.85	0.23
2	0.30	6.50	1.58	0.24	0.27	-15.57	0.17
3	0.34	6.80	1.82	0.27	0.33	3.51	0.18
4	0.33	6.73	1.77	0.26	0.32	-0.72	0.18
5	0.33	6.75	1.78	0.26	0.32	0.15	0.18
6	0.33	6.74	1.77	0.26	0.32	-0.03	0.18
7	0.33	6.75	1.78	0.26	0.32	0.01	0.18
8	0.33	6.75	1.78	0.26	0.32	0.00	0.18
9	0.33	6.75	1.78	0.26	0.32	0.00	0.18
10	0.33	6.75	1.78	0.26	0.32	0.00	0.18
11	0.33	6.75	1.78	0.26	0.32	0.00	0.18
12	0.33	6.75	1.78	0.26	0.32	0.00	0.18
13	0.33	6.75	1.78	0.26	0.32	0.00	0.18
14	0.33	6.75	1.78	0.26	0.32	0.00	0.18
15	0.33	6.75	1.78	0.26	0.32	0.00	0.18

NORMAL DEPTH =	0.33 ft
FLOW WIDTH =	6.66 ft
VELOCITY =	0.18 ft/s
TREATMENT TIME =	9.00 min
TREATMENT LENGTH =	**97.35 ft**
DESIGN LENGTH=	**100.00 ft**

PIONEER DESIGN GROUP

WATER QUALITY SWALE CALCULATIONS (SOUTH)

JOB NUMBER: 359-003
PROJECT: The Reserve at Cedar Creek
FILE: 3593 Prelim Hydro

REFERENCES:
1. Clean Water Services R&O 17-05.
2. Discussions with Clean Water Services.

REQUIRED WATER QUALITY TREATMENT: 65% Phosphorus Removal.

PROPOSED TREATMENT METHODS:

1. Sumped Catch Basins	15%
2. Bio-Filtration Swale	50%
total	65%

DESIGN STORM:

Precipitation:	0.36 inches
Storm Duration:	4 hours
Storm Return Period:	96 hours
Storm Window:	2 weeks

IMPERVIOUS AREA:

Watershed Area:	2.54 acres
Percent imp:	34 %
Impervious Area:	0.86 acres

Design Inflow = (0.86 ac)*(43560 ft^2/ac)*(0.36 in / 4.0 hrs) = **0.08 cfs**

BIOFILTRATION SWALE DESIGN CRITERIA:

Max Velocity:	0.9 ft/s
Side Slopes:	4 :1 (treatment area)
Base:	2 feet (2' min)
n Factor:	0.24 (plantings)

SWALE CHARACTERISTICS:

Q=	0.08 Design Storm Discharge (determined above)
N=	0.24 Plantings
B=	2 ft Base width of channel
Z=	4 :1 Side slopes
SLOPE=	0.01 ft/ft Slope of channel (0.005 minimum)
ASS. Y=	0.5 ft Assumed depth to begin analysis (0.5 ft maximum)

ITERATIVE SOLUTION OF MANNING'S EQUATION FOR NORMAL DEPTH:

ITERATION	Y (FT)	P (FT)	A(FT^2)	R	Q (CFS)	% ERROR	V (FPS)
1	0.50	6.12	2.00	0.33	0.59	636.13	0.29
2	0.13	3.09	0.33	0.11	0.05	-41.15	0.14
3	0.19	3.55	0.52	0.15	0.09	11.35	0.17
4	0.18	3.44	0.47	0.14	0.08	-2.30	0.17
5	0.18	3.47	0.48	0.14	0.08	0.50	0.17
6	0.18	3.46	0.48	0.14	0.08	-0.11	0.17
7	0.18	3.46	0.48	0.14	0.08	0.02	0.17
8	0.18	3.46	0.48	0.14	0.08	0.00	0.17
9	0.18	3.46	0.48	0.14	0.08	0.00	0.17
10	0.18	3.46	0.48	0.14	0.08	0.00	0.17
11	0.18	3.46	0.48	0.14	0.08	0.00	0.17
12	0.18	3.46	0.48	0.14	0.08	0.00	0.17
13	0.18	3.46	0.48	0.14	0.08	0.00	0.17
14	0.18	3.46	0.48	0.14	0.08	0.00	0.17
15	0.18	3.46	0.48	0.14	0.08	0.00	0.17

NORMAL DEPTH =	0.18 ft
FLOW WIDTH =	3.42 ft
VELOCITY =	0.17 ft/s
TREATMENT TIME =	9.00 min
TREATMENT LENGTH =	**89.88 ft**
DESIGN LENGTH=	**100.00 ft**

PIONEER DESIGN GROUP

SANTA BARBARA URBAN HYDROGRAPHS

JOB NUMBER: 359-003
PROJECT: The Reserve at Cedar Creek
FILE: 3593 Prelim Hydro

DESCRIPTION	DESIGN STORM (YR)	DURATION (HR)	PRECIP (IN)	AREA TOTAL (AC)	% IMP	AREA PERV. (AC)	CN PER.	AREA IMP. (AC)	CN IMP.	TIME (MIN)	Q (CFS)
PREDEVELOPED 2-YEAR PEAK DISCHARGE	2	24	2.5	15.72	2.50	15.33	78	0.39	98	33.72	1.53
DEVELOPED 2-YEAR PEAK DISCHARGE	2	24	2.5	15.72	32.30	10.64	79	5.08	98	10.40	4.58
PREDEVELOPED 10-YEAR PEAK DISCHARGE	10	24	3.45	15.72	2.50	15.33	78	0.39	98	33.72	3.37
DEVELOPED 10-YEAR PEAK DISCHARGE	10	24	3.45	15.72	32.30	10.64	79	5.08	98	10.40	7.67
PREDEVELOPED 25-YEAR PEAK DISCHARGE	25	24	3.9	15.72	2.50	15.33	78	0.39	98	33.72	4.38
DEVELOPED 25-YEAR PEAK DISCHARGE	25	24	3.9	15.72	32.30	10.64	79	5.08	98	10.40	9.22
PREDEVELOPED 100-YEAR PEAK DISCHARGE	100	24	4.5	15.72	2.50	15.33	78	0.39	98	33.72	5.81
DEVELOPED 100-YEAR PEAK DISCHARGE	100	24	4.5	15.72	32.30	10.64	79	5.08	98	10.40	11.36

PIONEER DESIGN GROUP

STORMWATER CONVEYANCE CALCULATIONS

JOB NUMBER: 359-003
PROJECT: The Reserve at Cedar Creek

FILE: 3593 Prelim Hydro
Design Storm: 25 YR
Storm Duration: 24 HRS
Precipitation: 3.9 IN
Manning's "n" 0.013

LINE	INC. AREA (AC)	AREA TOTAL (AC)	% IMP.	AREA PERV. (AC)	CN PER.	AREA IMP. (AC)	CN IMP.	TIME (MIN)	Q (CFS)	PIPE SIZE (IN)	SLOPE (FT/FT)	Qf (CFS)	Q/Qf (%)	Vf (FPS)	V/Vf (%)	ACTUAL V (FPS)
NORTH BASIN	6	6	55	2.70	79	3.30	98	10.64	4.15	12	0.0150	4.38	0.95	5.57	1.15	6.40
NORTH BASIN	6	6	55	2.70	79	3.30	98	10.64	4.15	15	0.0050	4.58	0.91	3.73	1.11	4.13
SOUTH BASIN	2.54	2.54	34	1.68	79	0.86	98	10.64	1.51	12	0.0050	2.53	0.60	3.22	0.80	2.56

KITTELSON & ASSOCIATES

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PORTLAND, OR 97204
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September 19, 2019 Project #: 24316

Bob Galati, PE
City of Sherwood
22560 SW Pine Street
Sherwood, OR 97140

RE: The Reserve at Cedar Creek Transportation Impact Analysis – Sherwood, Oregon

Dear Bob:

This letter presents the transportation impact analysis prepared for The Reserve at Cedar Creek project. This study concludes that the proposed residential subdivision can be developed in accordance with traffic operations requirements of the City of Sherwood Municipal Code as well as applicable Washington County and Oregon Department of Transportation (ODOT) mobility targets assuming provision of recommended transportation mitigation measures.

Four off-site study intersections were identified that require mitigation to comply with applicable agency requirements in the future. These mitigation measures are not triggered by the proposed development but rather by growth in regional traffic. As discussed herein, the proposed homes have an incremental additional traffic impact at each of the four intersections. The recommended mitigation associated with The Reserve development is:

- With site development and subject to City review, pay a proportionate share contribution (estimated to be $106,947 in total) towards future improvements at the following intersections:
  - SW Sunset Boulevard/SW Woodhaven Drive (study intersection #2): $19,849 toward the construction of a planned future traffic signal;
  - SW Sunset Boulevard/SW Timbrel Lane (study intersection #3): $14,858 toward the construction of a planned future mini-roundabout;
  - SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard (study intersection #4): $17,025 toward the construction of a planned future traffic signal; and
  - SW Baker Road-SW Murdock Road/SW Sunset Boulevard (study intersection #5): $55,215 toward the construction of planned future north and southbound turn lanes.

In addition to the proportional share mitigation payments listed above, trips from the proposed homes were found to trigger the need for providing an eastbound left-turn lane on SW Brookman Road at the west site access (shared access to the previously approved Middlebrook Residential Subdivision, Reference 1). SW Brookman Road is planned to have a center left-turn lane at its ultimate configuration; however, widening and tapers needed to provide the eastbound left-turn lane in conjunction with site development require off-site property acquisition that may not be possible. Accordingly, it is

recommended the Applicant coordinate with City of Sherwood and Washington County staff to assess the potential for constructing an eastbound left-turn lane at the west access with site development and/or to pay a fee-in-lieu of the turn lane construction (with the fee intended to be used to construct the turn lane in conjunction with a future public road project).

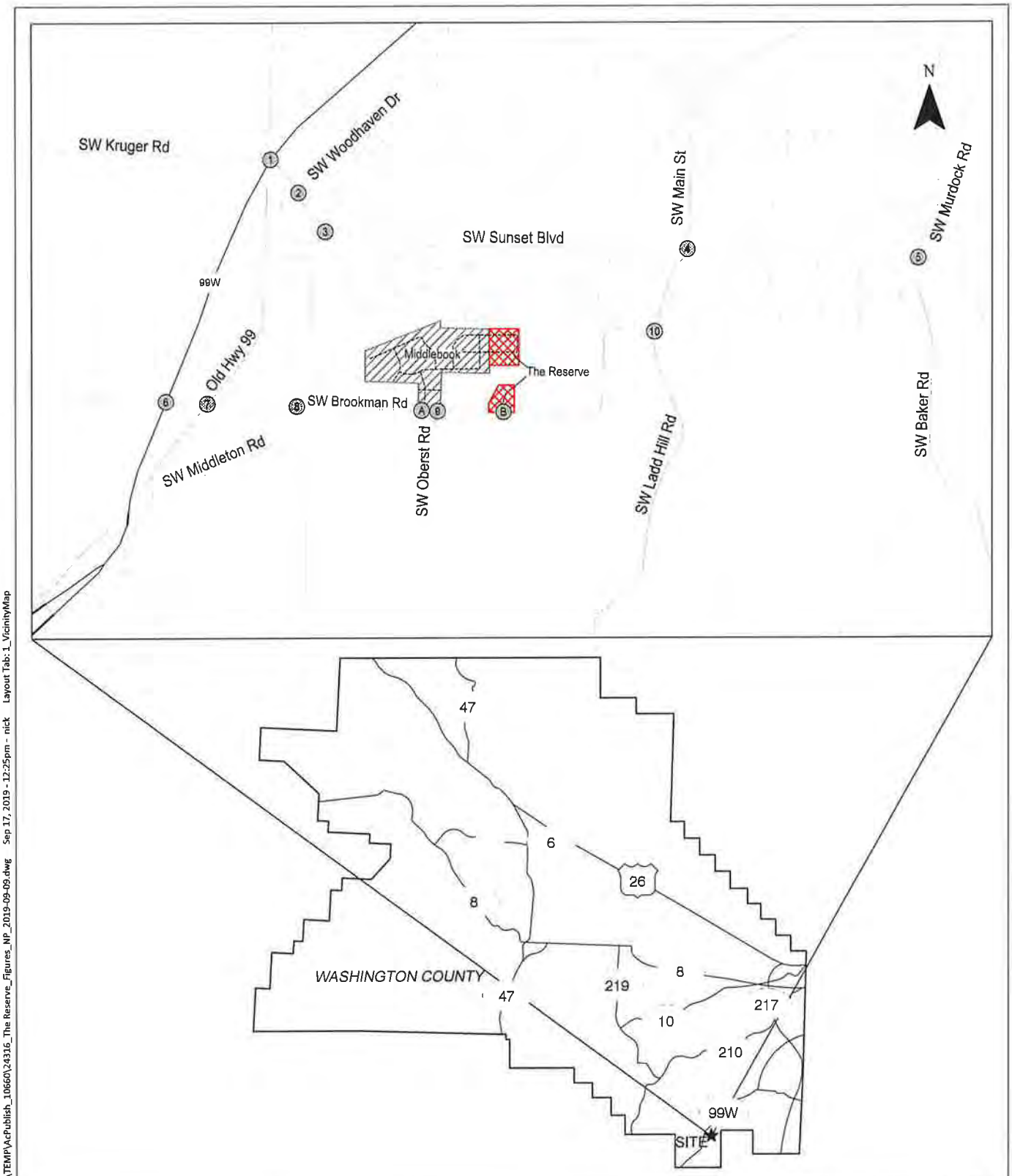
Additional details of the study methodology, findings, and recommendations are provided herein.

INTRODUCTION

The Applicant, David Weekley Homes, is proposing to develop up to 59 detached single-family homes within a residential subdivision on land located along the north side of SW Brookman Road that is within the City limits. The site vicinity is shown in Figure 1 and a conceptual site plan is provided in Figure 2.

The site is separated by Cedar Creek with 44 homes located north of the creek and 15 homes to the south. Access to the 44 homes on the northern portion of the site would be provided via new public roadway connections to the recently approved Middlebrook Residential Subdivision located to the west of the proposed homes. These connections will provide the proposed development with access to a planned new public roadway connection to SW Brookman Road through Middlebrook (see Intersection A in Figure 1). Access to the southern 15 homes is proposed at a new public street connection to SW Brookman Road (Intersection B in Figure 1). This new connection will have a cul-de-sac on the north end of the street due to the inability to feasibly cross Cedar Creek at this location.

Construction is expected to begin in 2021 (after completion of the approved Middlebrook Residential Subdivision) with buildout and occupancy anticipated by 2024.



##- Study Intersections

Site Vicinity Map
Sherwood, Oregon

Figure
1

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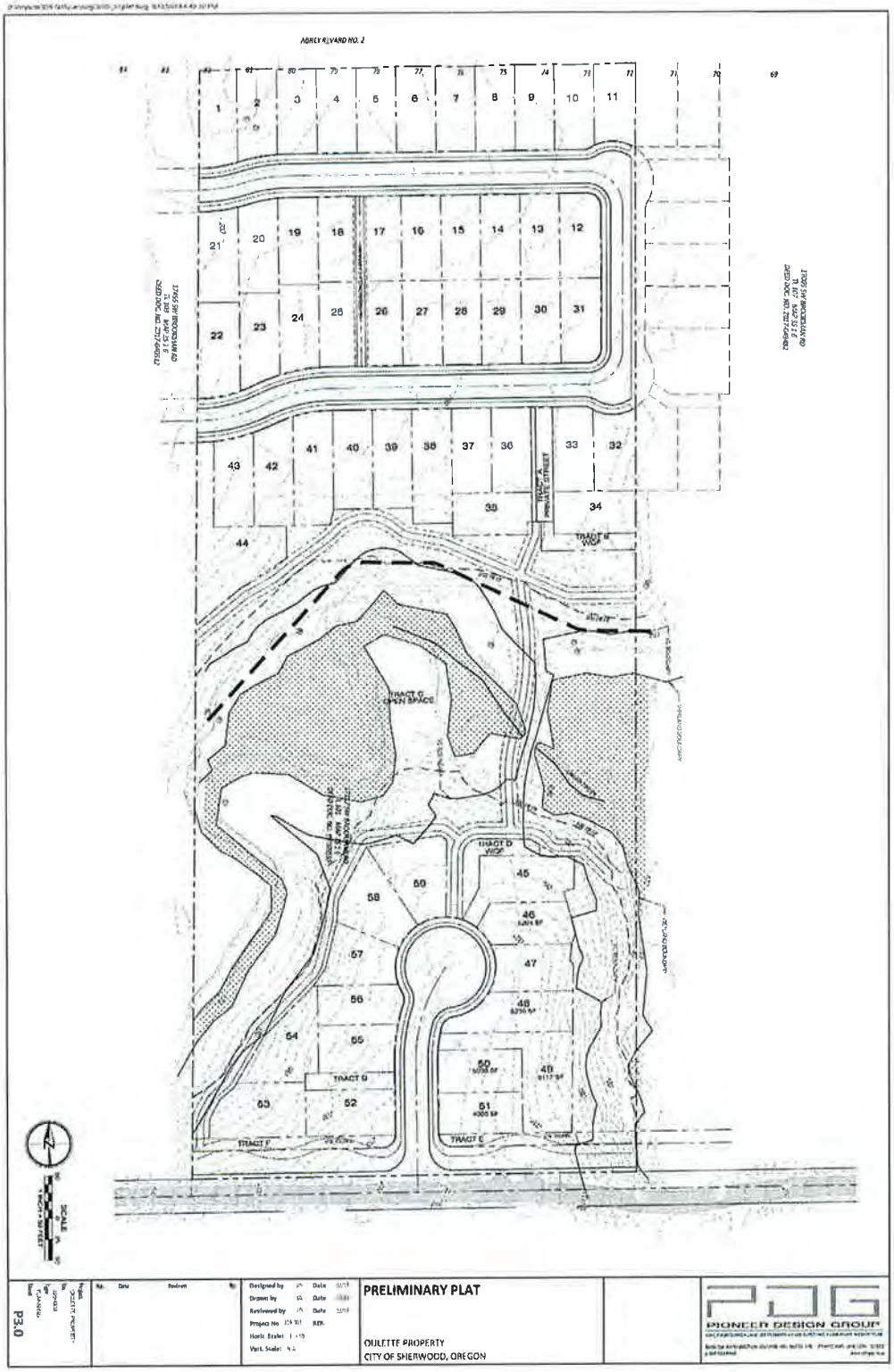


Site Plan provided by PDG, dated August 15, 2019.

Proposed Site Plan
Sherwood, Oregon

Figure
2

KITTELSON & ASSOCIATES

STUDY METHODOLOGY

The Traffic Impact Analysis (TIA) addresses the requirements of City of Sherwood Municipal Code Section 16.106.080 as well as applicable Washington County and ODOT review requirements. The study methodology, assumptions and scope were determined based on a review of existing travel patterns, the City of Sherwood's Development Code and direction provided by DKS Associates (the City's traffic engineer). The study intersections and requirements are the same as was required for the recently approved Middlebrook Residential Subdivision.

Analysis Scenarios

Weekday AM and PM peak hour traffic conditions were assessed for the following analysis scenarios:

- Existing conditions
- Year 2024 background conditions (without the proposed homes)
- Year 2024 total conditions (with buildout of the proposed homes)

Study Intersections

City of Sherwood Municipal Code Section 16.106.080 requires analysis of all intersections where fifty (50) or more peak hour vehicle trips can be expected to result from the development. The intersections included in this study are identical to the Middlebrook Subdivision study for consistency; however, only the proposed shared site driveway on SW Brookman Road is projected to experience 50 or more peak hour vehicle trips.

The study intersections are listed below, including a numerical ID corresponding with report figures:

1. Highway 99W/SW Elwert Road-SW Sunset Boulevard
2. SW Woodhaven Drive/SW Sunset Boulevard
3. SW Timbrel Lane/SW Sunset Boulevard
4. SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard
5. SW Baker Road-SW Murdock Road/SW Sunset Boulevard
6. Highway 99W/SW Brookman Road-SW Chapman Road
7. Old Highway 99 W/SW Brookman Road
8. SW Middleton Road/SW Brookman Road
9. SW Oberst Road/SW Brookman Road
10. SW Ladd Hill Road/SW Brookman Road

A. Middlebrook Subdivision Access-Future Shared Northern Site Access/SW Brookman Road

B. Future Southern Site Access/SW Brookman Road

All level-of-service analyses described in this report were performed in accordance with the procedures stated in the *Highway Capacity Manual* (HCM). The 6th Edition of the HCM (Reference 2) was used to assess unsignalized[1] study intersection operations while the 2000 Edition of the HCM (Reference 3) was used to assess signalized intersection performance. The operational analysis presented in this report was competed using Synchro software.

Performance Measures & Operating Standards

The volume-to-capacity (V/C) ratio is the principle performance measure documented in this report. V/C operating standards adopted by Washington County, ODOT and the City are summarized below.

Washington County Operating Standards

Washington County has jurisdiction over SW Brookman Road. The County has defined operating standards for signalized and stop controlled intersections assuming a peak hour (60-minute analysis) period as follows:

- **Signalized intersections:** the maximum peak hour intersection V/C ratio shall be no greater than 0.99.
- **Unsignalized intersections:** no movement shall experience a V/C ratio greater than 0.99.

ODOT Mobility Targets

ODOT operates and maintains Highway 99W (Pacific Highway West). ODOT's operating mobility target for signalized intersections along Highway 99W in the study area is an intersection V/C ratio no greater than 0.99 during the peak 15-minutes per Table 7 of the *Oregon Highway Plan* (Reference 4). For unsignalized intersections, the target for the state highway approaches is a V/C ratio no greater than 0.99 during the peak 15-minutes. Non-state highway approaches are expected to operate at a V/C ratio no greater than identified in Table 6 of the *Oregon Highway Plan* for district/local interest roads. The target for the Brookman Road and Chapman Road approaches to Highway 99W is a V/C ratio no greater than 0.95.

Sherwood Operating Standards

The City defers to ODOT and Washington County standards for facilities under their jurisdiction. For intersections in the City but on the Metro-designated Arterial and Throughway Network, the applicable standard is a V/C ratio less than or equal to 0.99 in both the highest hour and the second hour during the PM peak period. Roadways on the Arterial and Throughway Network include SW Sunset Boulevard, SW Murdock Road, SW Elwert Road, SW Main Street, and SW Ladd Hill Road (*City of Sherwood Transportation System Plan,* Reference 5). Table 1 summarizes the minimum operating thresholds by study intersection.

[1] HCM 2000 procedures were used to assess intersection operations under existing conditions. The existing conditions analysis for this study are reported directly from the Middlebrook Subdivision traffic study (Reference 1).

Table 1: Study Intersection Performance Standard

	Intersection	Traffic Control	Responsible Agency	Performance Standard
1	Highway 99W/ SW Elwert Road-SW Sunset Boulevard	Signal	ODOT	Intersection V/C ≤ 0.99
2	SW Woodhaven Drive/ SW Sunset Boulevard	TWSC	City	Movement V/C ≤ 0.99[1]
3	SW Timbrel Lane/SW Sunset Boulevard	TWSC	City	Movement V/C ≤ 0.99[1]
4	SW Ladd Hill Road-SW Main Street/ SW Sunset Boulevard	AWSC	City	Movement V/C ≤ 0.99[1]
5	SW Baker Road-SW Murdock Road/ SW Sunset Boulevard	AWSC	City	Movement V/C ≤ 0.99[1]
6	Highway 99W/SW Brookman Road-SW Chapman Road	TWSC	ODOT	Movement V/C ≤ 0.99 for Highway 99W approaches, movement V/C ≤ 0.95 for SW Brookman Road and SW Chapman Road
7	Old Highway 99 W/SW Brookman Road	TWSC	County	Movement V/C ≤ 0.99
8	SW Middleton Road/SW Brookman Road	TWSC	County	Movement V/C ≤ 0.99
9	SW Oberst Rd/SW Brookman Road	TWSC	County	Movement V/C ≤ 0.99
10	SW Ladd Hill Road/SW Brookman Road	TWSC	County	Movement V/C ≤ 0.99[1]
A	Middlebrook Access-Future Northern Site Shared Access/SW Brookman Road	TWSC (Proposed)	County	Movement V/C ≤ 0.99
B	Future Southern Site Access/ SW Brookman Road	TWSC (Proposed)	County	Movement V/C ≤ 0.99

[1]These roadways are located on the Arterial and Throughway Network (Metro Designation,)
TWSC = Two-way stop-control, AWSC = All-way stop-control

Turn Lane Warrants

Left-turn lane needs along SW Brookman Road were assessed using turn lane warrants contained in the *ODOT Analysis Procedures Manual* (*APM*, Reference 6). Washington County policy's is to require a right-turn deceleration lane on roadways with a daily traffic volume greater than 10,000 and with a posted speed of 35 miles per hour (mph) or more in situations where the inbound right-turn movement exceeds 40 vehicles during the AM or PM peak hour.

REPORT FORMAT

This report addresses the following transportation issues:

- Existing land use and transportation system conditions within the site vicinity;
- Planned developments and transportation improvements in the study area;
- Forecast year 2024 background peak hour traffic conditions (prior to site development);
- Site trip generation and trip distribution estimates;
- Forecast year 2024 total traffic peak hour conditions (with site development);
- Turn lane and vehicle queuing needs at key study area intersections;
- Site access compliance with Washington County access management requirements; and
- Conclusions and recommendations.

EXISTING CONDITIONS

The existing conditions analysis identifies site conditions and the current operational and geometric characteristics of roadways within the study area. The purpose of this section is to set the stage for a basis of comparison to future conditions.

Site Conditions and Adjacent Land Uses

Today, the parcels comprising the site include a combination of properties occupied by two single-family homes with private driveway access to SW Brookman Road.

The site is bordered primarily by undeveloped lands and single family subdivisions. Cedar Creek bisects the property today.

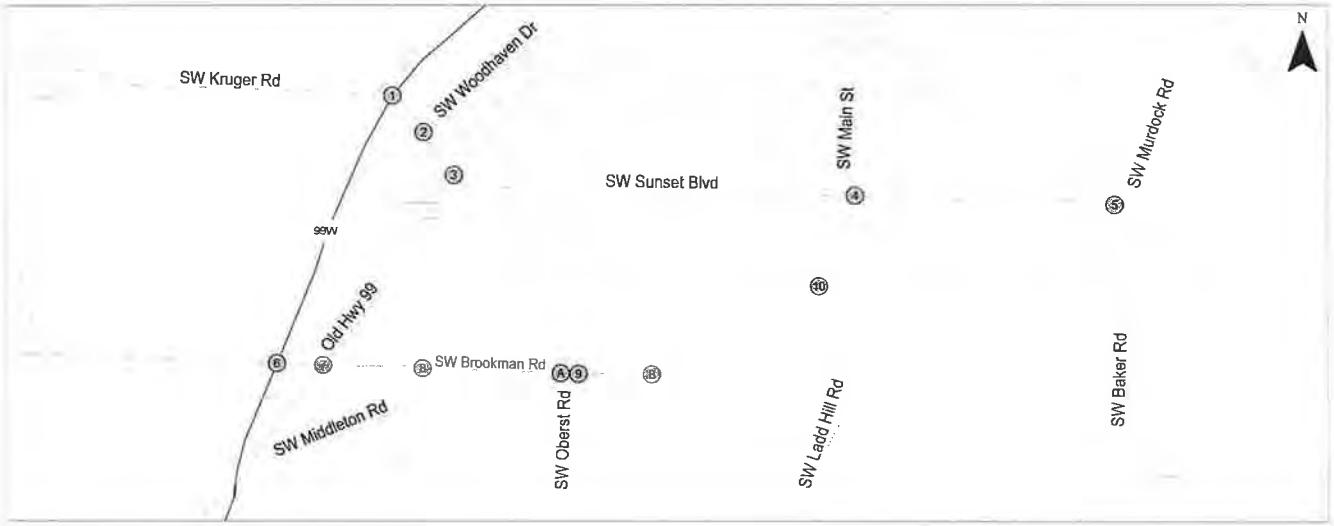
Transportation Facilities

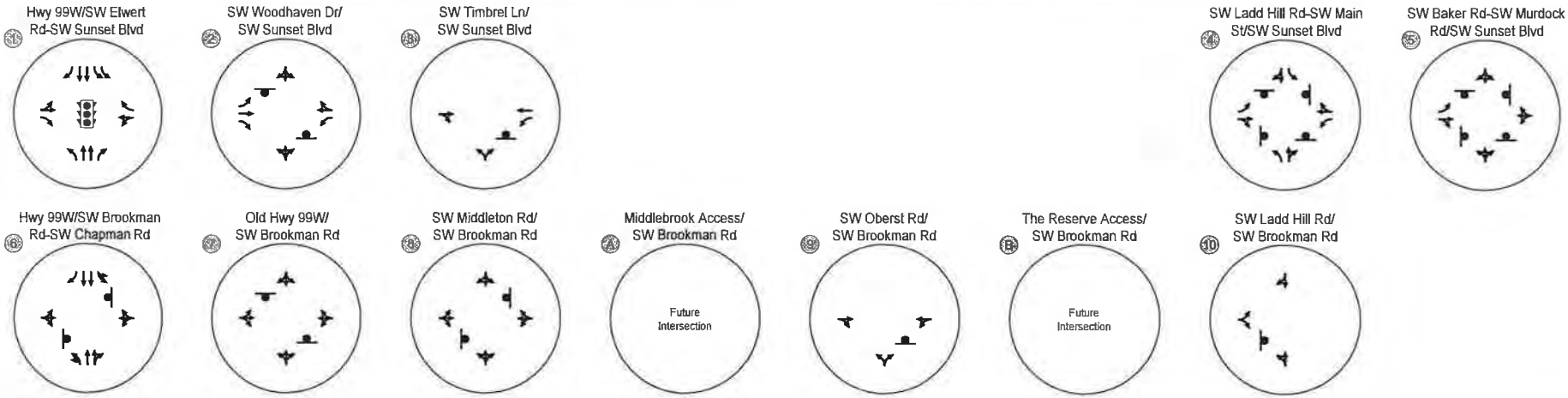
Table 2 provides a summary of transportation facilities (including pedestrian and bicycle facilities) in the site vicinity while Figure 3 illustrates the existing lane configurations and traffic control devices at the study intersections.

Table 2: Existing Transportation Facilities

Roadway	Classification[1]	Jurisdiction	Vehicle Lanes	Posted Speed	Sidewalks Present?	Bike Lanes Present?	On-Street Parking Allowed?
SW Pacific Highway 99W	Principal Arterial	ODOT	4 lanes	45-55 mph[2]	No	Yes	No
SW Sunset Boulevard	Arterial	City	2 lanes	35 mph	Yes	Yes	No
SW Woodhaven Drive	Neighborhood[3]	City	2 lanes	25 mph	Partial[4]	No	Yes
SW Timbrel Lane	Collector	City	2 lanes	Unposted	Yes	No	No
SW Main Street	Arterial	City	2 lanes	20 mph	Yes	No	No
SW Ladd Hill Road	Arterial	City	2 lanes	25 mph	Yes	Partial[5]	No
SW Murdock Road	Arterial	City	2 lanes	35 mph	Partial[6]	No	No
SW Baker Road	Arterial	City	2 lanes	35 mph	Partial[7]	No	No
SW Brookman Road	Arterial	County	2 lanes	35 mph	No	No	No
Old Highway 99W	Collector	City	2 lanes	35 mph	No	No	No
SW Middleton Road	Neighborhood[8]	City	2 lanes	Unposted	No	No	No
SW Oberst Road	Local	City	2 lanes	Unposted	No	No	No

[1]Source: *City of Sherwood Transportation System Plan*.
[2]The speed limit on SW Pacific Highway 99W changes between SW Sunset Boulevard and SW Brookman Road. The posted speed is 45 miles per hour at the intersection of SW Sunset Boulevard and 55 miles per hour at the intersection of SW Brookman Road.
[3]SW Woodhaven Drive is classified as a neighborhood roadway north of SW Sunset Boulevard. It is designated a local street to the south.
[4]There is a gap in sidewalk on the north side of SW Woodhaven Drive between SW Sunset Boulevard and SW Fitch Drive.
[5]There are bike lanes on SW Ladd Hill Road between SW Willow Drive and SW Sunset Boulevard.
[6]There are sidewalks on the west side of SW Murdock Road.
[7]There are sidewalks on the west side of SW Baker Road.
[8]SW Middleton Road is classified as a neighborhood roadway north of SW Brookman Road. It is designated a local street to the south.





- STOP SIGN
- TRAFFIC SIGNAL

Existing Lane Configurations and Traffic Control Devices
Sherwood, Oregon

Figure 3

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Pedestrian and Bicycle Facilities

Table 2 highlights pedestrian and bicycle facilities available in the larger area surrounding the site. There are no sidewalks or bicycle lanes provided along SW Brookman Road serving the site today, though the proposed development and the previously approved Middlebrook Residential Subdivision will provide frontage improvements.

Transit Facilities

Transit service in Sherwood is currently provided by TriMet; however, there is no scheduled fixed route service in walking or cycling distance of the site nor along SW Brookman Road or Highway 99W.. The closest fixed route transit service is currently available at the Sherwood Park and Ride located in the downtown area north of SW Sunset Boulevard (Reference 7).

TRAFFIC SAFETY

Crash history was reviewed for the study intersections in an effort to identify potential intersection safety issues. Crash data for the study intersections were obtained from ODOT for the five-year period from January 1, 2013 through December 31, 2017. Table 3 illustrates the crashes reported at the study intersections. *Appendix A* contains the ODOT crash data.

Table 3: Intersection Crash History (January 1, 2013 through December 31, 2017)

Location		Collision Type						Severity		Total
		Rear-end	Turning	Angle	Backing	Bicyclist	Fixed Object	PDO[1]	Injury	
1	Highway 99W/SW Elwert Road-SW Sunset Boulevard	22	6	1	0	0	0	15	14	29
2	SW Woodhaven Drive/SW Sunset Boulevard	1	1	0	0	0	0	2	0	2
3	SW Timbrel Lane/SW Sunset Boulevard	0	0	0	0	0	0	0	0	0
4	SW Ladd Hill Rd.-SW Main St./SW Sunset Boulevard	2	2	1	0	0	1	3	3	6
5	SW Baker Road-SW Murdock Road/SW Sunset Boulevard	2	0	0	0	0	0	1	1	2
6	Highway 99W/SW Brookman Road-SW Chapman Road	1	7	9	0	0	0	12	5	17
7	Old Highway 99 W/SW Brookman Road	0	0	0	0	0	0	0	0	0
8	SW Middleton Road/SW Brookman Road	0	0	0	0	1	0	0	1	1
9	SW Oberst Road/SW Brookman Road	0	0	0	0	0	0	0	0	0
10	SW Ladd Hill Road/SW Brookman Road	0	0	0	0	0	0	0	0	0
A	Middlebrook Access-Future Northern Site Access/SW Brookman Road	Future Intersection								
B	Future Southern Site Access/ SW Brookman Road	Future Intersection								

[1]PDO – Property damage only

Critical crash rates were calculated for each of the study intersections following the analysis methodology presented in ODOT's *SPR 667 Assessment of Statewide Intersection Safety Performance* (Reference 8). SPR 667 provided average crash rates at a variety of intersection configurations in Oregon based on number of approaches and traffic control types. The average crash rate represents the approximate number of crashes that are "expected" at a study intersection. Additionally, this average crash rate was used to calculate the critical crash rate for each study intersection, based on the *Highway Safety Manual* methodology (Reference 9). The critical crash rate is calculated for each intersection based on the average crash rate for each facility and serves as a threshold for further analysis.

Table 4 summarizes the critical crash rate for each intersection and compares those values to the observed crash rate. Per ODOT, if the observed crash rate at the study location exceeds the critical rate, it is a possible indication that the location is exceeding average crash rates.

Table 4: Intersection Crash Rate Assessment (January 1, 2013 through December 31, 2017)

	Location	Total Crashes	Observed Crash Rate	Critical Crash Rate by Intersection Type	Observed Crash Rate > Critical Crash Rate by Intersection	Critical Crash Rate by Volume	Observed Crash Rate > Critical Crash Rate by Volume	90th Percentile Rate by Intersection Type	Observed Crash Rate > 90th Percentile Rate
1	Highway 99W/SW Elwert Road-SW Sunset Boulevard	29	0.39	0.62	No	0.53	No	0.86	No
2	SW Woodhaven Drive/ SW Sunset Boulevard	2	0.11	0.40	No	0.40	No	0.41	No
3	SW Timbrel Lane/ SW Sunset Boulevard	0	0.00	0.41	No	0.42	No	0.41	No
4	SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard	6	0.27	0.38	No	0.38	No	0.41	No
5	SW Baker Road-SW Murdock Road/SW Sunset Boulevard	2	0.10	0.38	No	0.39	No	0.41	No
6	Highway 99W/SW Brookman Road-SW Chapman Road	17	0.26	0.63	No	0.54	No	0.86	No
7	Old Highway 99 W/ SW Brookman Road	0	0.00	0.85	No	0.72	No	0.41	No
8	SW Middleton Road/ SW Brookman Road	1	0.33	0.78	No	0.66	No	0.41	No
9	SW Oberst Road/ SW Brookman Road	0	0.00	0.74	No	0.77	No	0.29	No
10	SW Ladd Hill Road/ SW Brookman Road	0	0.00	0.49	No	0.51	No	0.29	No

Crash rate – Crashes per million entering vehicles

As shown in Table 4, the observed crash rate is below the critical crash rate by the intersection type at all of the study intersections.

ODOT SPIS List

ODOT provides an annual list of safety priority index system (SPIS) locations which are based on reported crash data. The intent of the SPIS list is to identify roadway segments exhibiting an unusually high occurrence of crashes and is used to select locations for investigation. The segment on Highway 99W in the vicinity of SW Elwert Road-SW Sunset Boulevard is listed in the top 5% SPIS sites and the

Highway 99W/SW Brookman Road-SW Chapman Road intersection is listed as a top 10% SPIS location (both listings appear in the year 2017 SPIS list, the version available at the time this report was prepared).

Washington County SPIS List

Washington County also maintains a SPIS list to identify existing hazardous intersections for potential safety improvements. Intersections are included in the County SPIS list if they have three or more crashes or if they have one or more severe injury or fatal crashes within three consecutive years. The intersection of Highway 99W/SW Brookman Road-SW Chapman Road appears on the most recent Washington County SPIS list (2013-2015).

SW Elwert Road-SW Sunset Boulevard Intersection Configuration Changes

Washington County is reconstructing the SW Elwert Road-SW Sunset Boulevard intersection in conjunction with a Major Streets Transportation Improvement Program (MSTIP) project. The intersection reconstruction includes new turn lanes, traffic signal changes, as well as reconstruction of the west approach.

Highway 99W/SW Brookman Road-SW Chapman Road Intersection Configuration Changes

The City of Sherwood TSP includes an unfunded project to realign SW Brookman Road to intersect with Highway 99W approximately ¼ mile north of its current location and signalize the intersection. A corridor study was underway at the time this report was being prepared to further evaluate future intersection and roadway alignment options. In the interim, the approved Middlebrook Residential Subdivision development is required to restrict turn movements at the intersection to right-turns only as a safety mitigation measure.

No new safety-based mitigation needs were identified at the study intersections based on the crash data review. The City may want to consider modifying the existing north-south stop control at the SW Middleton Road/SW Brookman Road intersection to east-west stop control or all-way stop control as traffic volumes on SW Brookman Road continue to grow and recognizing the existing east-west sight distance limitations at the intersection.

TRAFFIC VOLUMES AND PEAK HOUR OPERATIONS

Traffic counts were obtained at the study intersections on a typical mid-week day in 2017[2] for the Middlebrook Residential Subdivision and were re-used in this study with approval by City staff. These counts were conducted during the morning (7:00 – 9:00 AM) and evening (4:00 – 6:00 PM) hours. *Appendix B* contains the traffic count sheets used in this study.

An assessment of 95th percentile queues under all scenarios is provided in *Appendix D*. Queues were reported from Synchro. As indicated in the summary, all but the following 95th percentile queues can be accommodated within available storage:

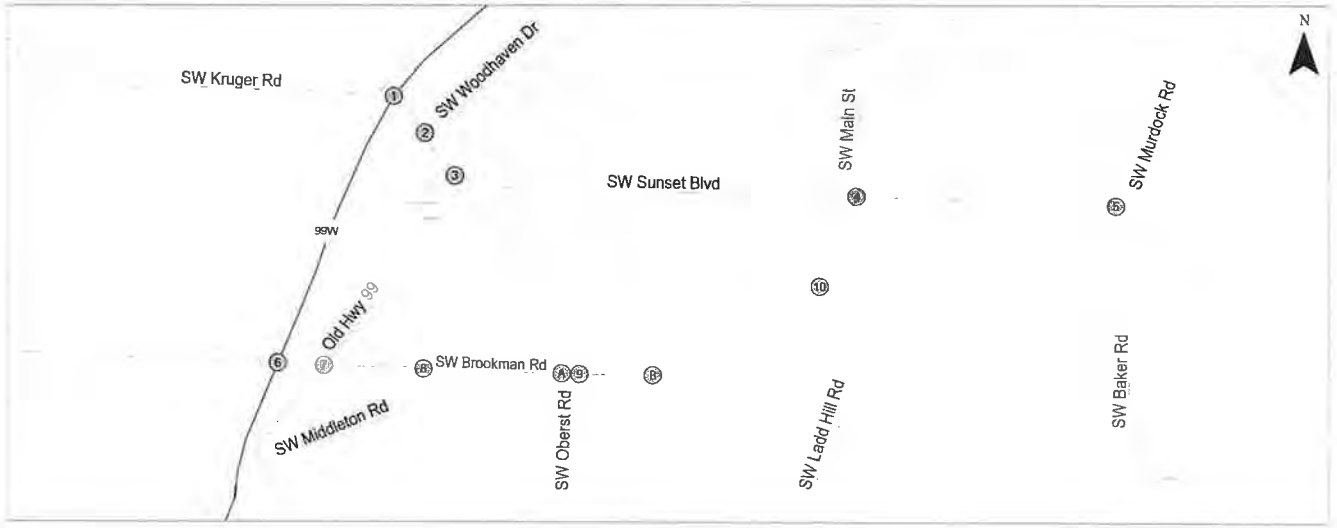
- The eastbound left-turn/through movement and eastbound right-turn movement at the intersection of Highway 99W/SW Elwert Road-SW Sunset Boulevard (study intersection #1) extend beyond the adjacent intersection at SW Kruger Road/SW Elwert Road during the weekday AM and weekday PM peak hour.
- The northbound left-turn movement at the intersection of Highway 99W/SW Elwert Road-SW Sunset Boulevard (study intersection #1) exceeds the available striped storage by one to two vehicles during the weekday PM peak hour.
- The 95th percentile queue for the southbound through/right-turn movement at the intersection of SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard (study intersection #4) extends beyond the adjacent intersection at SW Cornerstone Lane during the weekday PM peak hour.

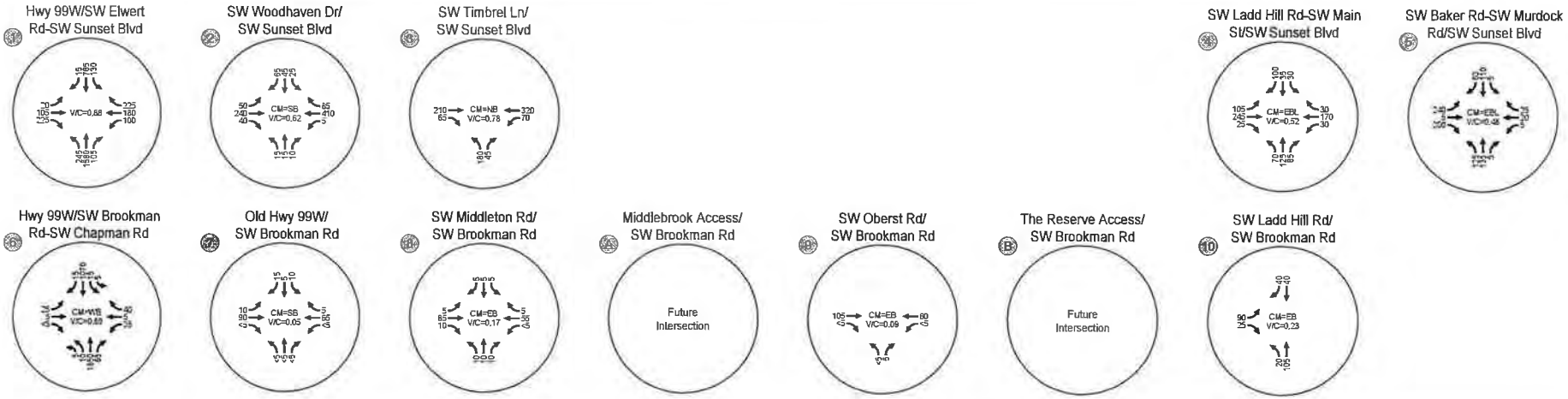
[2] Refer to the traffic count summaries in *Appendix B* for specific count dates which occurred in May, September, October and November of 2017.

Figure 4 and Figure 5 present the existing traffic conditions for the weekday AM and PM peak hours, respectively. Each of the study intersections operate in compliance with the respective mobility standards today, though the Highway 99W/SW Elwert Road-SW Sunset Boulevard intersection is approaching capacity during the weekday PM peak hour. *Appendix C* includes the existing conditions level-of-service worksheets.

An assessment of 95th percentile queues under all scenarios is provided in *Appendix D*. Queues were reported from Synchro. As indicated in the summary, all but the following 95th percentile queues can be accommodated within available storage:

- The eastbound left-turn/through movement and eastbound right-turn movement at the intersection of Highway 99W/SW Elwert Road-SW Sunset Boulevard (study intersection #1) extend beyond the adjacent intersection at SW Kruger Road/SW Elwert Road during the weekday AM and weekday PM peak hour.
- The northbound left-turn movement at the intersection of Highway 99W/SW Elwert Road-SW Sunset Boulevard (study intersection #1) exceeds the available striped storage by one to two vehicles during the weekday PM peak hour.
- The 95th percentile queue for the southbound through/right-turn movement at the intersection of SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard (study intersection #4) extends beyond the adjacent intersection at SW Cornerstone Lane during the weekday PM peak hour.





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TWSC = TWO-WAY STOP CONTROL
AWSC= ALL-WAY STOP CONTROL

Existing Intersection Operations
Weekday AM Peak Hour
Sherwood, Oregon

Figure 4

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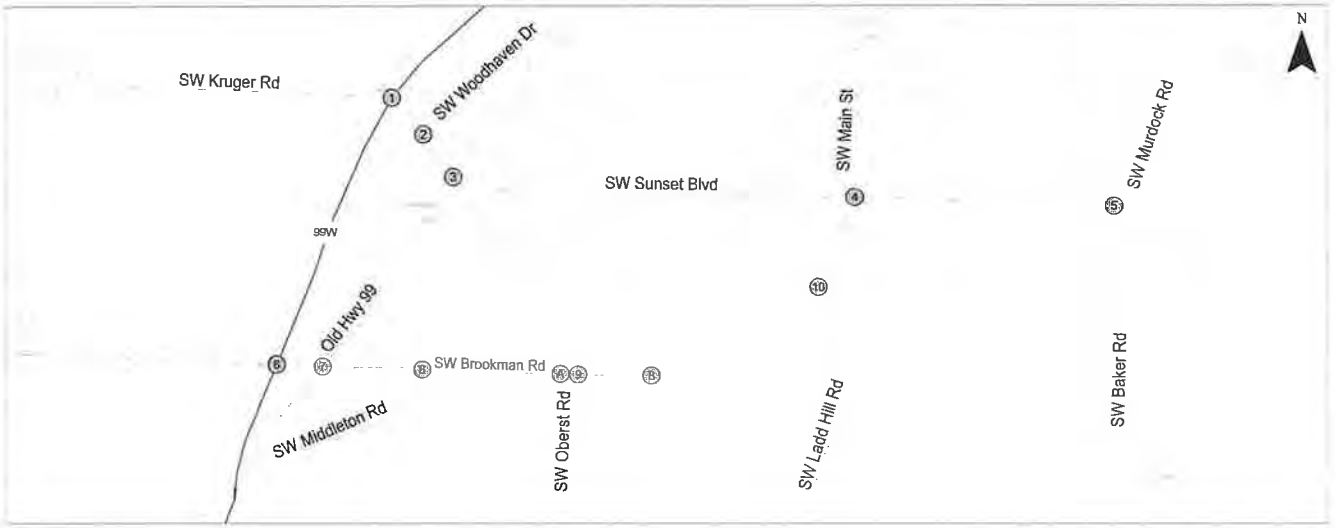

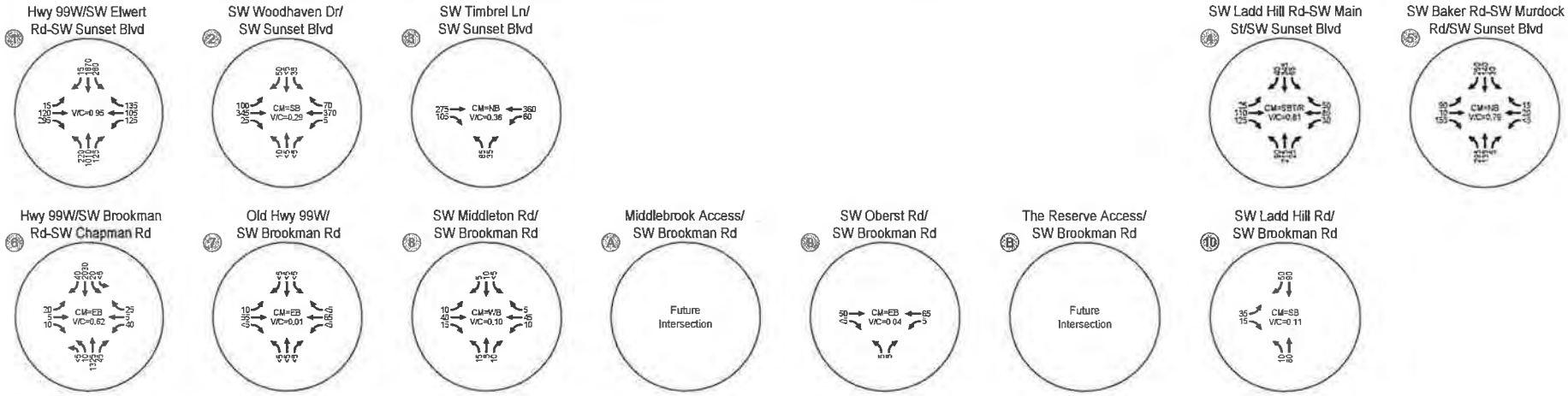

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Existing Intersection Operations
Weekday PM Peak Hour
Sherwood, Oregon

Figure 5

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YEAR 2024 BACKGROUND TRAFFIC CONDITIONS

The background traffic analysis identifies how the study area's transportation system will operate in 2024, the year the proposed homes are expected to be built out. This analysis includes traffic growth due to development within the study area but does not include traffic from the proposed development.

Approved In-Process Developments

Three in-process developments were identified by City staff including:

- The Sherwood Hotel located on SW Meinecke Road at Highway 99W;
- The Sherwood High School relocation to a site northeast of the intersection of SW Elwert Road and SW Kruger Road, east of Highway 99W; and
- The Middlebrook Residential Subdivision development directly west of the proposed development.

All three developments were included as in-process as part of this study under 2024 background traffic.

Planned Transportation Improvements

The following improvements at the Highway 99W/SW Elwert Road-SW Sunset Boulevard intersection (study intersection #1) were included in the year 2024 background and total traffic conditions scenarios per City staff direction:

- Addition of a second northbound left turn lane (required as part of the *Sherwood High School Transportation Planning Rule Analysis*, as documented in the Sherwood High School Transportation Impact Study, Reference 10);
- Widening the west leg of the intersection to provide a left-turn, through lane, and through/right-turn lane (per preliminary drawings provided by County staff); and
- Widening the east leg of the intersection to provide a left-turn, through lane, and through/right-turn lane (per preliminary drawings provided by County staff).

In addition, the Highway 99W/SW Brookman Road-SW Chapman Road intersection (study intersection #6) will be restricted to right-turns only (Right-in, Right-out only – RIRO) as required of the Middlebrook Subdivision development.

Figure 6 shows the assumed 2024 background lane configurations and traffic control devices.

Background Traffic Volumes and Conditions

Year 2024 background traffic volumes were developed by rerouting left-turn movements from the Highway 99W/SW Brookman Road-SW Chapman Road intersection reflective of the planned RIRO improvements (study intersection #6) and then increasing the traffic volumes by 1% annually along Highway 99W and 2% annually on all other approaches as per City direction. Traffic volumes from the

in-process hotel development, the high school relocation, and the Middlebrook development were then added, assuming rerouting where appropriate due to the RIRO turn restrictions at Highway 99W.

Figure 7 and Figure 8 report the 2024 background traffic volumes and operating conditions at the study intersections during the weekday AM and PM peak hours, respectively. As seen in the figures, the following intersections are projected to exceed operational standards:

- The signalized Highway 99W/SW Elwert Road-SW Sunset Boulevard intersection (study intersection #1) will exceed ODOT's standard of a V/C ratio less than or equal to 0.99 during both the weekday AM (V/C = 1.01) and PM (V/C = 1.04) peak hours.
- The southbound approach to the stop-controlled SW Woodhaven Drive/SW Sunset Boulevard intersection (study intersection #2) is projected to operate with a V/C ratio of over 1.0 during the weekday AM peak hour, exceeding the City's 0.99 V/C ratio standard for the first hour.
- The northbound approach to the stop-controlled SW Timbrel Lane/SW Sunset Boulevard intersection (study intersection #3) is projected to operate with a V/C ratio over 1.0 during the weekday AM peak hour, exceeding the City's 0.99 V/C standard.
- The southbound through/right lane at the all-way stop controlled SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard intersection (study intersection #4) is projected to operate with a V/C ratio of 1.11, exceeding the City's 0.99 V/C standard.
- The northbound approach to the all-way stop controlled SW Baker Road-SW Murdock Road/SW Sunset Boulevard intersection (study intersection #5) is projected to operate with a V/C ratio of 1.02 during the weekday PM peak hour, exceeding the City's 0.99 V/C ratio standard.

Potential future mitigations are further discussed under total traffic conditions. *Appendix E* includes the year 2024 background conditions level-of-service worksheets.

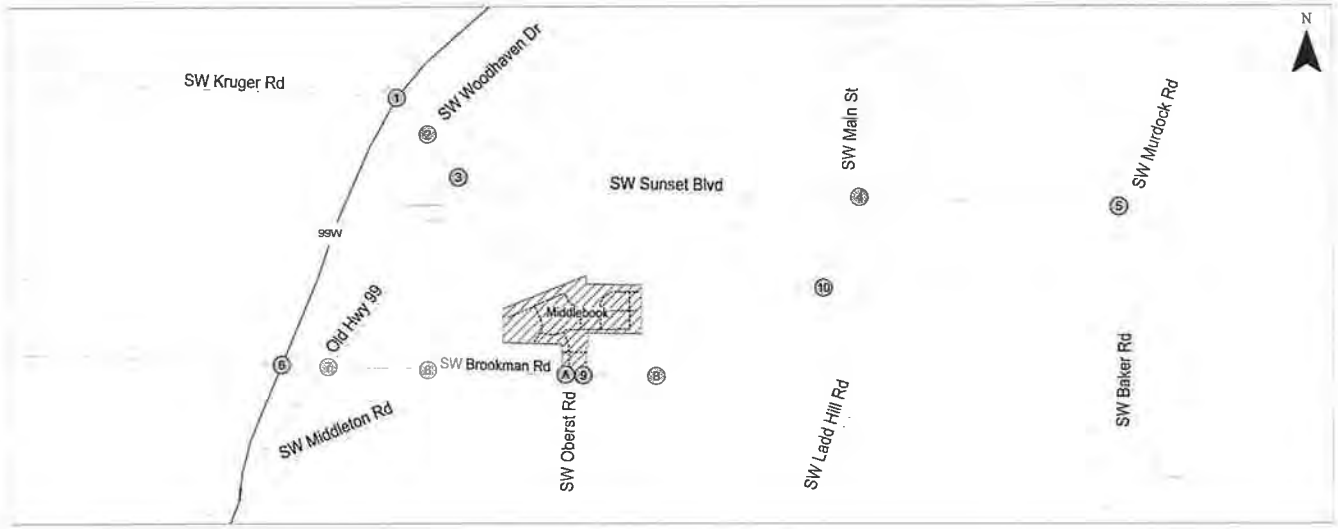
An assessment of 95th percentile queues under all scenarios is provided in *Appendix D*. Queues were reported from Synchro. As indicated in the summary, beyond the locations discussed under existing conditions, 95th percentile queues can be accommodated within available storage except for the following:

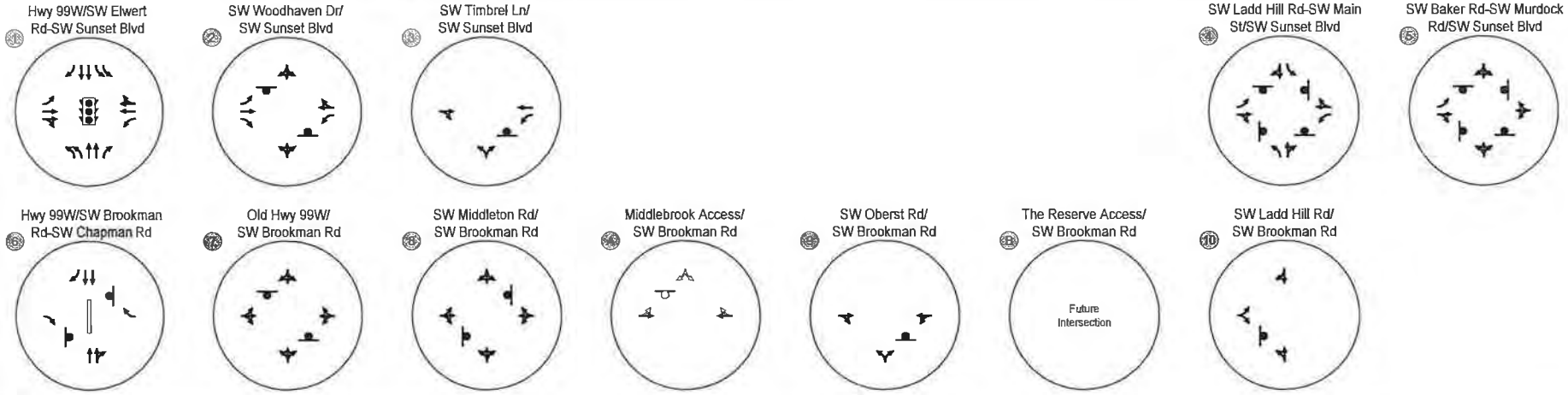
- The westbound left-turn movement at the intersection of Highway 99W/SW Elwert Road-SW Sunset Boulevard (study intersection #1) extends beyond the 185 foot storage during the weekday AM and PM peak hour.
- The 95th percentile queue for the southbound approach at the intersection of SW Woodhaven Drive/SW Sunset Boulevard (study intersection #2) extends beyond adjacent intersection at SW Fitch Drive during the weekday AM peak hour.
- The 95th percentile queue for the northbound left-turn/through movement at the intersection of SW Timbrel Lane/SW Sunset Boulevard (study intersection #3) extends beyond the adjacent intersection at SW Middleton Road during the weekday AM peak hour.

- The 95th percentile queue for the eastbound left turn at the intersection of SW Baker Road-SW Murdock Road/SW Sunset Boulevard (study intersection #5) extends beyond the available striped turn lane storage by one to two vehicles during the weekday AM peak hour.

- The 95th percentile queue for the eastbound left turn at the intersection of SW Baker Road-SW Murdock Road/SW Sunset Boulevard (study intersection #5) extends beyond the adjacent intersection at SW Cornerstone Lane by one vehicle during the weekday PM peak hour.

Compared to existing conditions, the queue for the northbound left-turn movement at the intersection of Highway 99W/SW Elwert Road-SW Sunset Boulevard (#1) is no longer projected to exceed storage with the planned second turn-lane in place (i.e., the Washington County MSTIP project mitigates the existing northbound left-turn lane storage issue).





- STOP SIGN
- TRAFFIC SIGNAL
- RAISED MEDIAN
- EXISTING
- PLANNED IMPROVEMENT
- MOVEMENT/IMPROVEMENT ADDED WITH MIDDLEBROOK DEVELOPMENT

Year 2024 Background Assumed Lane Configurations and Traffic Control Devices
Sherwood, Oregon

Figure 6

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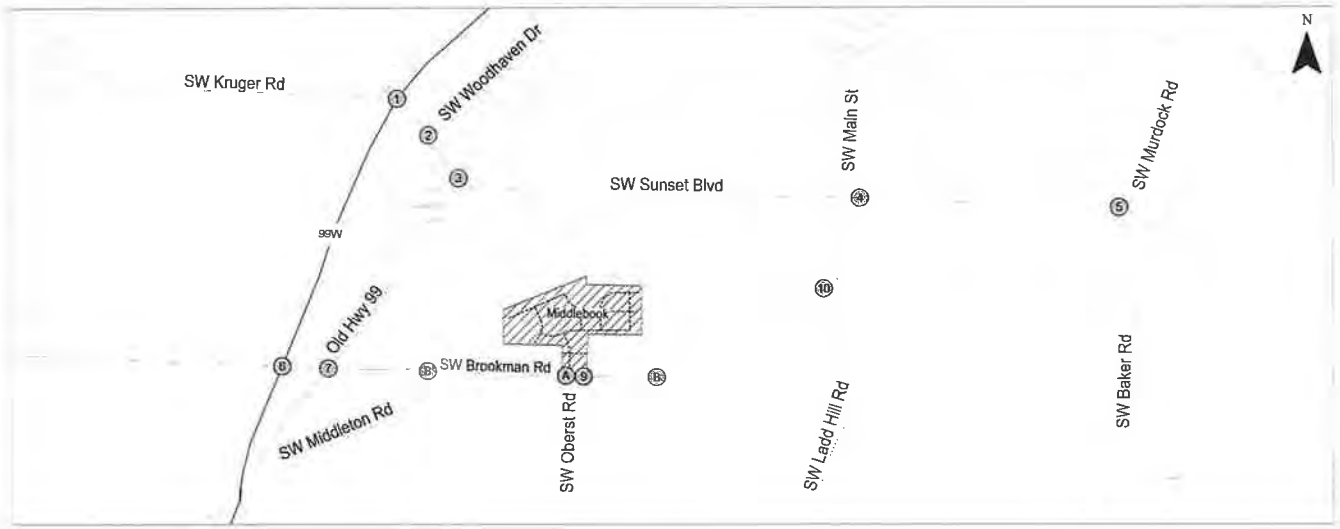

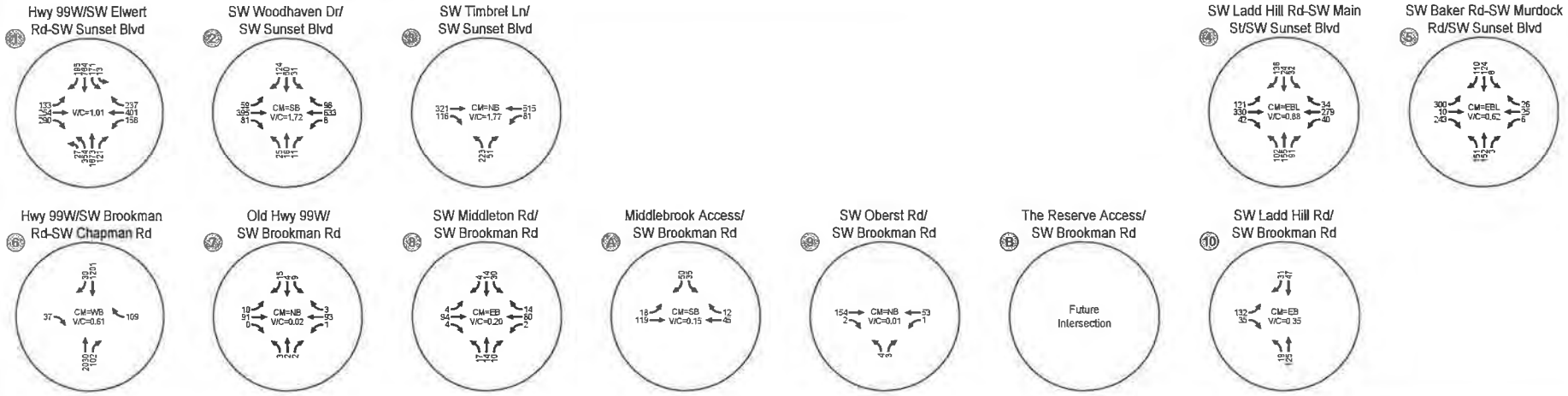

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AWSC= ALL-WAY STOP CONTROL

Year 2024 Background Intersection Operations
Weekday AM Peak Hour
Sherwood, Oregon

Figure 7

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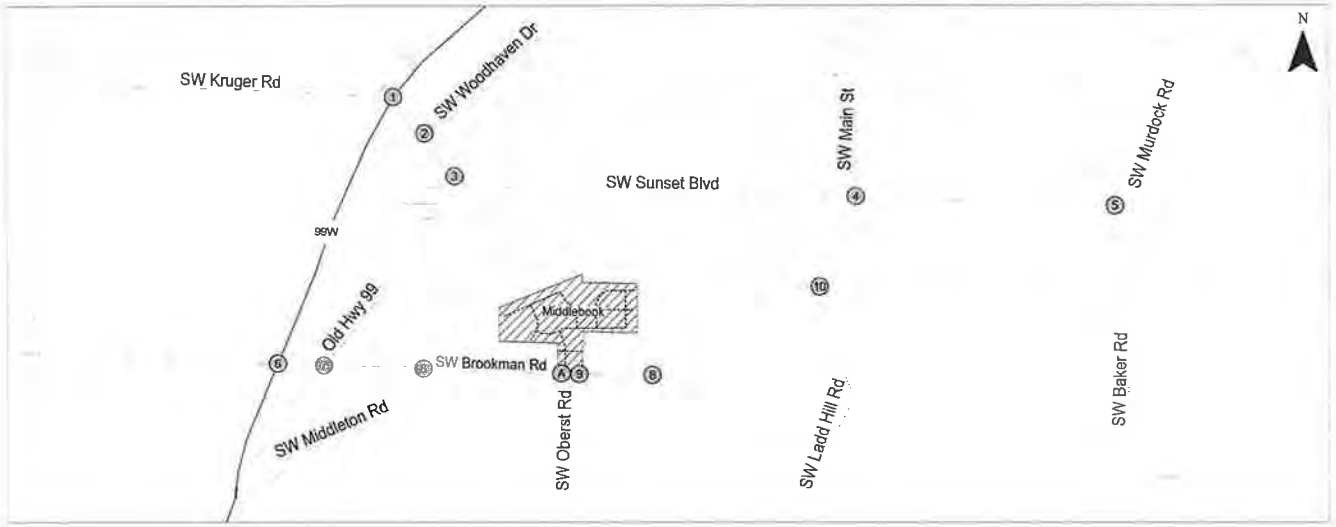

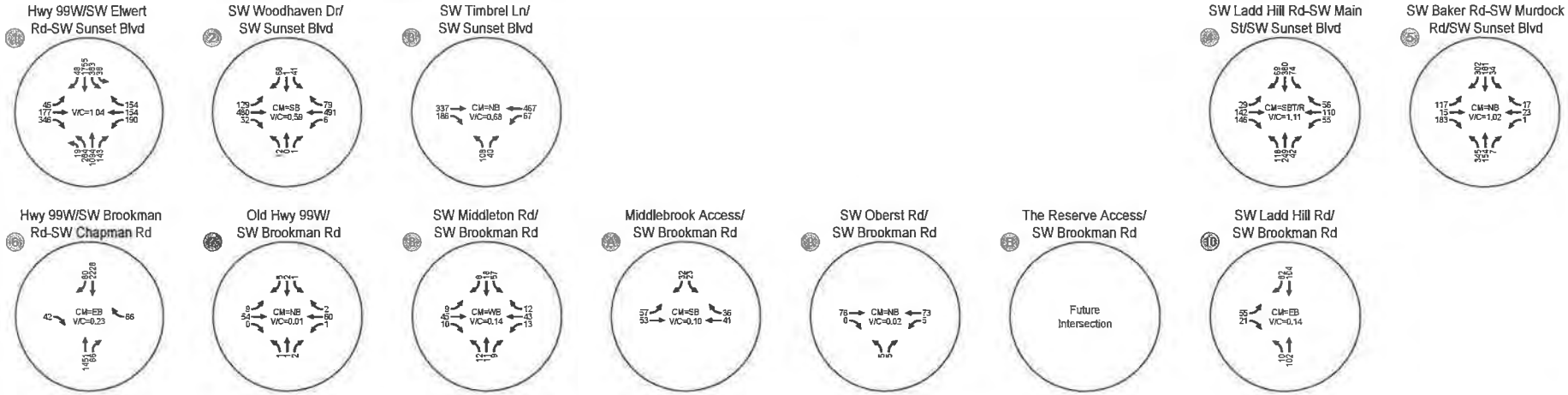

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Year 2024 Background Intersection Operations
Weekday PM Peak Hour
Sherwood, Oregon

Figure 8

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PROPOSED DEVELOPMENT PLAN

The proposed subdivision consists of 59 detached single-family homes. Access to 44 of the homes on the north portion of the site is proposed via a public street connection on SW Brookman Road to be shared with the previously approved Middlebrook Residential Subdivision (Study Intersection A in Figure 9). A second public street connection to SW Brookman Road is proposed to provide access to 15 homes located on the southern side of Cedar Creek and will replace two existing site driveways (Study Intersection B). The lane configurations and traffic control devices assumed for the year 2024 total traffic conditions are shown in Figure 9. The two existing single-family homes on site will be removed and the existing accesses to SW Brookman Road vacated.

Trip Generation Estimate

Trip generation estimates for the proposed subdivision were prepared based on information presented in the *Trip Generation Manual* (Reference 10) and are shown in Table 5. Note that the estimates in Table 5 are presented assuming a trip credit for the two existing homes on site today.

Table 5: Trip Generation Estimate

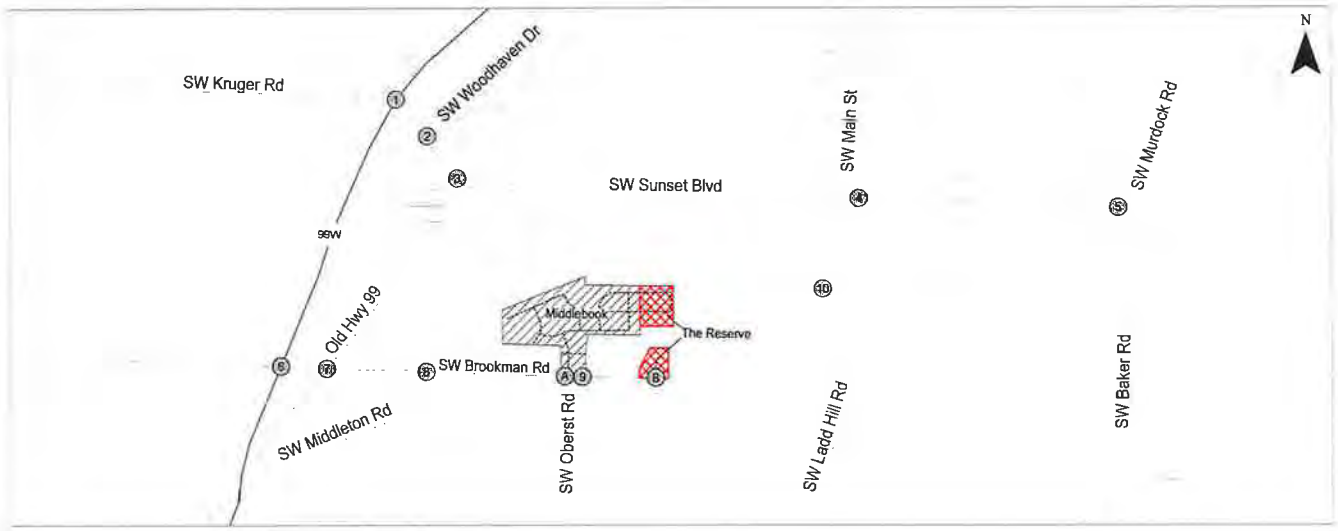
Land Use	ITE Code	Size	Daily Trips	Weekday AM Peak Hour			Weekday PM Peak Hour		
				Total	In	Out	Total	In	Out
Single-Family Detached (lots 1 to 44)	210	43 units[1]	406	38	10	28	45	28	17
Single-Family Detached (lots 45 to 59)	210	14 units[2]	132	12	3	9	15	9	6
TOTAL		**57 units**	**538**	**50**	**13**	**37**	**60**	**37**	**23**

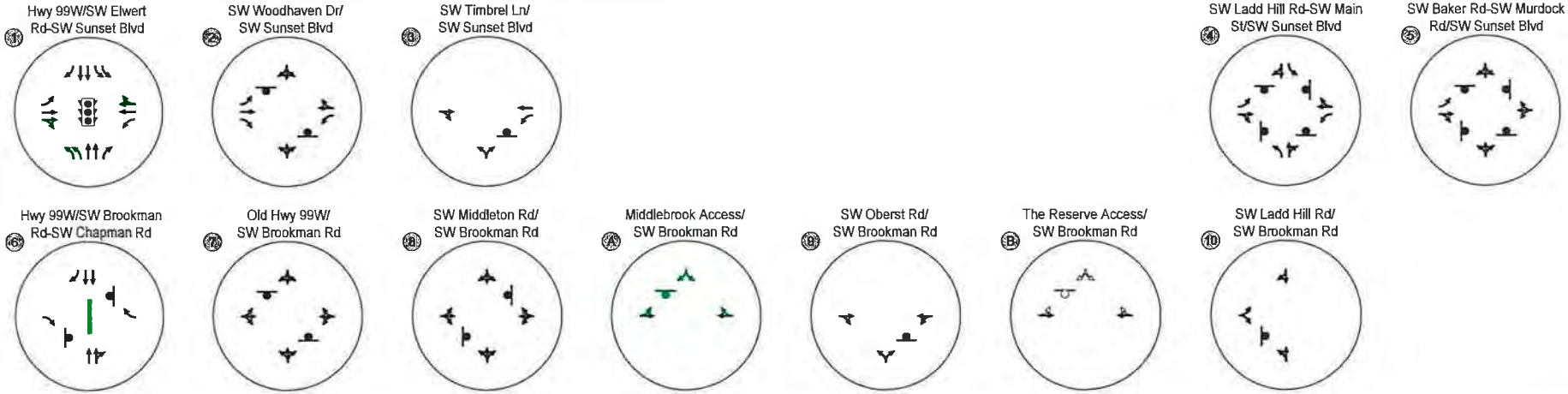
Note: Per direction from ODOT and the City, the average rate was used for the daily trip generation and the fitted curve equation for the weekday AM and PM peak hour trip generation.
[1]There is one single-family detached home on-site currently, so the trip generation is based on 43 units (44 proposed units minus 1 existing unit).
[2]There is one single-family detached home on-site currently, so the trip generation is based on 14 units (15 proposed units minus 1 existing unit).

As shown in Table 5, the proposed development is estimated to generate an additional 538 daily trips, including 50 trips during the weekday AM peak hour and 60 trips during the weekday PM peak after accounting for the two existing homes on site.

Trip Distribution & Assignment

The assumed site trip distribution pattern is identical to the pattern previously assumed for the Middlebrook Residential Subdivision Study, which was developed considering existing traffic patterns and roadway connectivity (including the planned RIRO at Highway 99W/SW Brookman Road/SW Chapman Road intersection). The trip distribution pattern was used to assign the weekday AM and PM peak hour site trips to the study intersections as shown in Figure 10 and Figure 11.



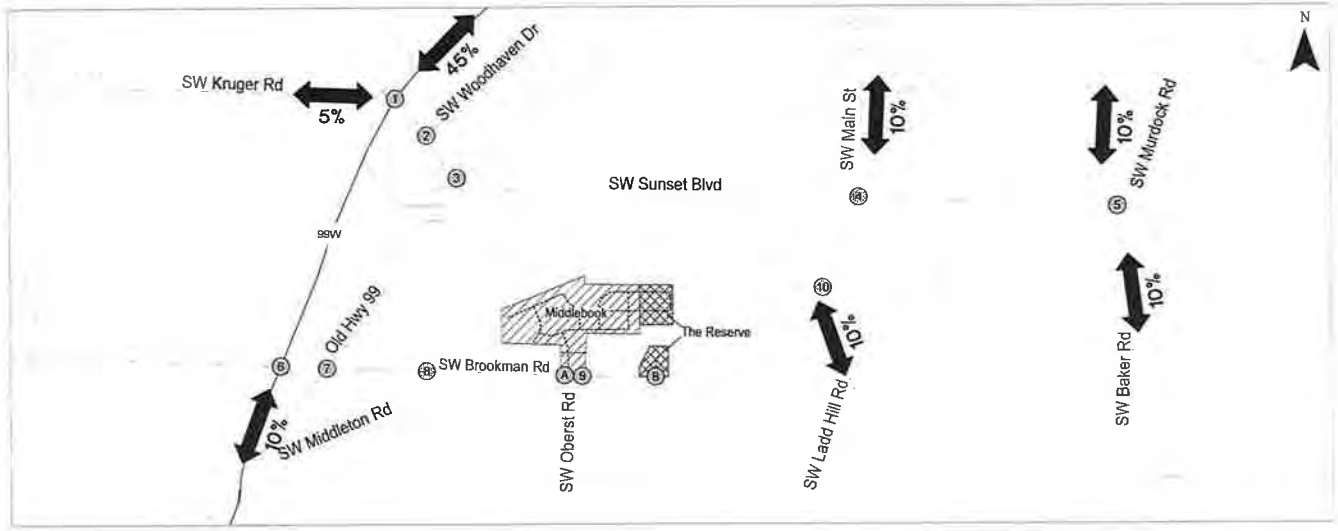


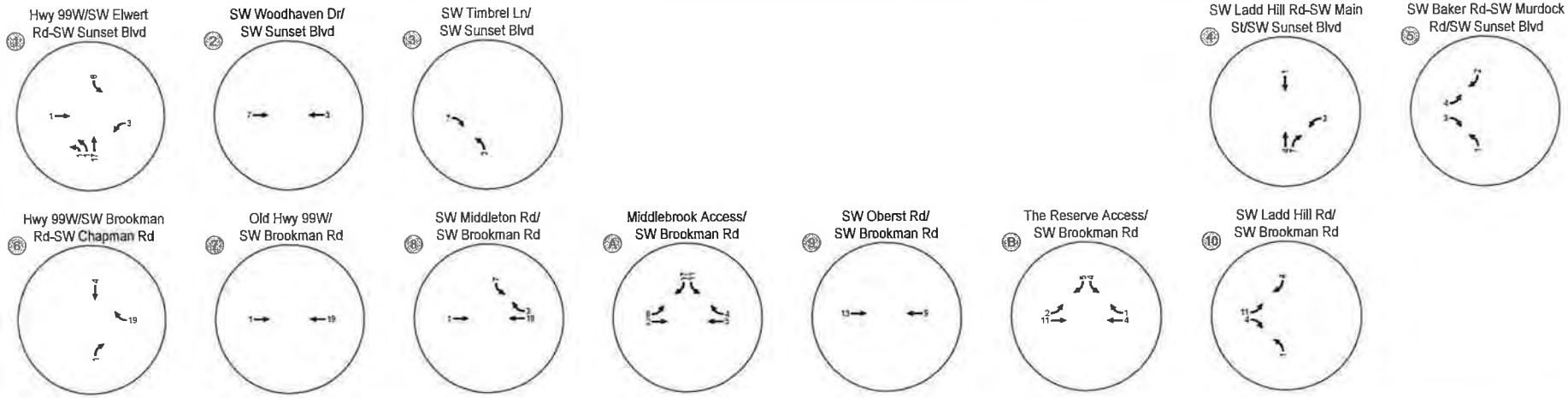
- STOP SIGN
- TRAFFIC SIGNAL
- RAISED MEDIAN
- EXISTING
- PLANNED IMPROVEMENT
- MOVEMENT ADDED WITH THE RESERVE DEVELOPMENT

Year 2024 Background Assumed Lane Configurations and Traffic Control Devices
Sherwood, Oregon

Figure 9

KITTELSON & ASSOCIATES





Assumed Trip Distribution and Assignment with RIRO at Highway 99W/SW Brookman Road-SW Chapman Road
Weekday AM Peak Hour
Sherwood, Oregon

Figure 10

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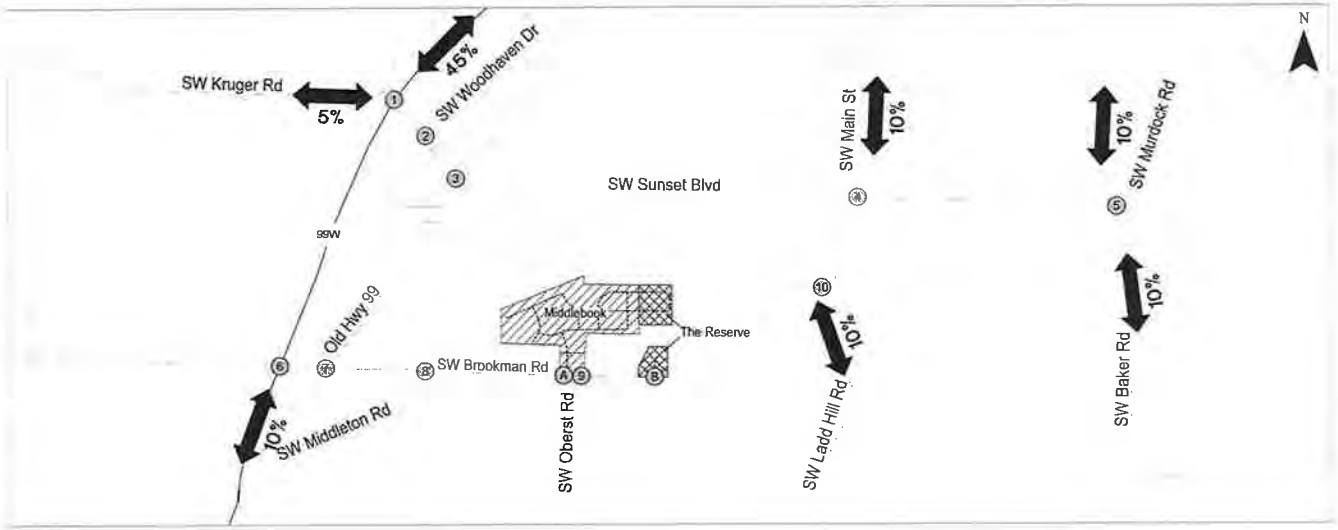
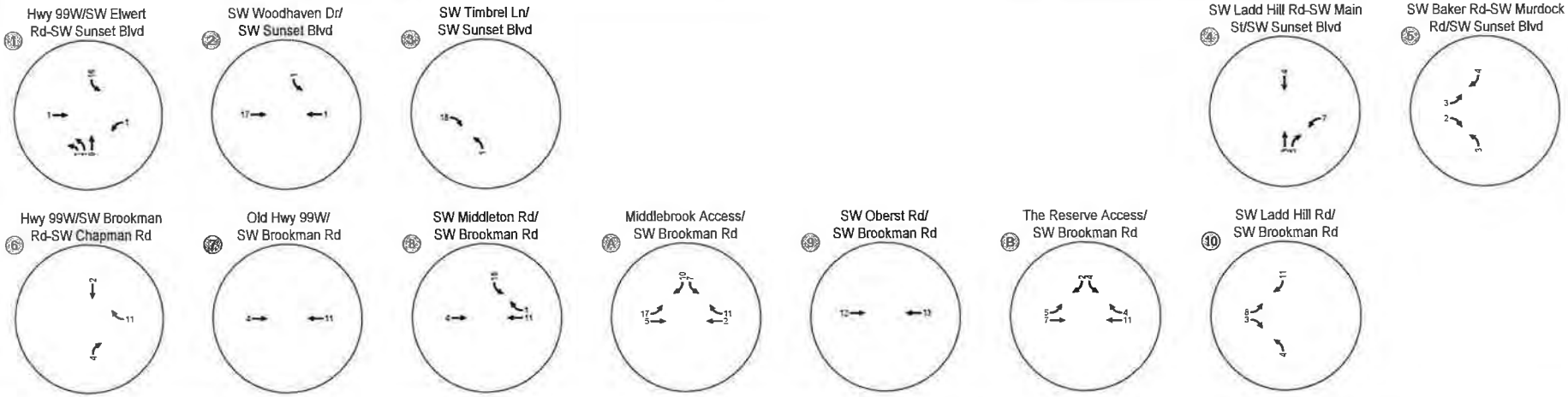




Assumed Trip Distribution and Assignment with RIRO at Highway 99W/SW Brookman Road-SW Chapman Road
Weekday PM Peak Hour
Sherwood, Oregon

Figure 11

KITTELSON & ASSOCIATES

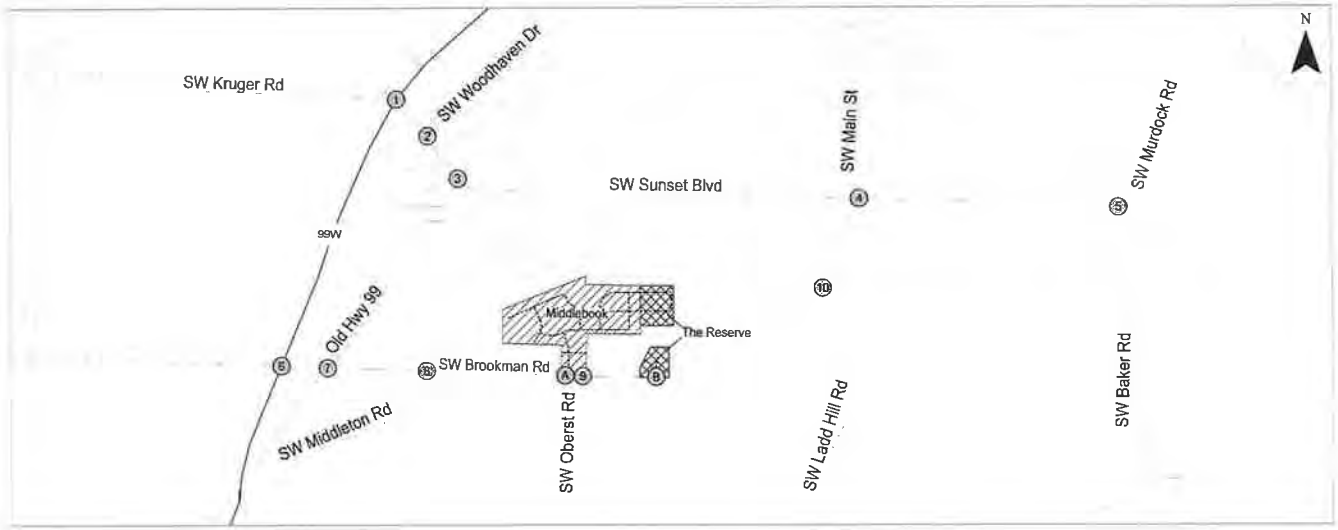
YEAR 2024 TOTAL TRAFFIC CONDITIONS

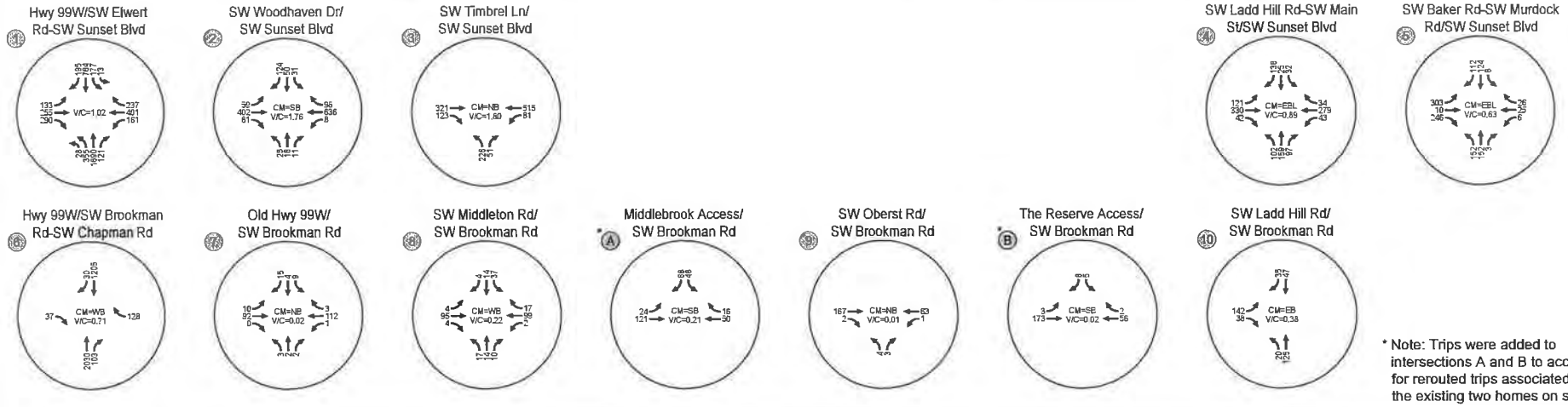
The 2024 total traffic conditions analysis forecasts how the study area's transportation system will operate with the inclusion of traffic from the proposed development and identifies traffic mitigation measures required to support the site. Future traffic conditions were estimated by adding site-generated traffic to the 2024 background traffic volumes for the weekday AM and PM peak hours to arrive at the 2024 total traffic volumes.

Figure 12 and Figure 13 report the 2024 total traffic volumes and operating conditions for the weekday AM and PM peak hours with site development. As seen in the figures, consistent with background conditions, the following intersections are projected to continue to exceed operational standards:

- The signalized Highway 99W/SW Elwert Road-SW Sunset Boulevard intersection (study intersection #1) will continue to exceed capacity during both weekday AM and PM peak hours (AM peak hour V/C ratio change from 1.01 under background traffic to 1.02 under total traffic and PM peak hour V/C ratio change from 1.04 under background traffic to 1.05 under total traffic).
- The southbound approach to the stop-controlled SW Woodhaven Drive/SW Sunset Boulevard intersection (study intersection #2) is projected to operate with a V/C ratio of 1.76 during the weekday AM peak hour. The proposed development adds no trips to the southbound approach.
- The northbound approach to the stop-controlled SW Timbrel Lane/SW Sunset Boulevard intersection (study intersection #3) is projected to operate with a V/C ratio of 1.80 during the weekday AM peak hour. The proposed development adds three trips to the northbound approach.
- The southbound through/right lane at the all-way stop controlled SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard intersection (study intersection #4) is projected to operate with a V/C ratio of 1.13 during the weekday PM peak hour.
- The northbound approach to the all-way stop controlled SW Baker Road-SW Murdock Road/SW Sunset Boulevard intersection (study intersection #5) is projected to operate with a V/C ratio of 1.04 during the weekday PM peak hour.

Operations and mitigation opportunities at these five intersections are discussed further below. *Appendix F* includes the year 2024 total traffic conditions level-of-service worksheets.





* Note: Trips were added to intersections A and B to account for rerouted trips associated with the existing two homes on site.

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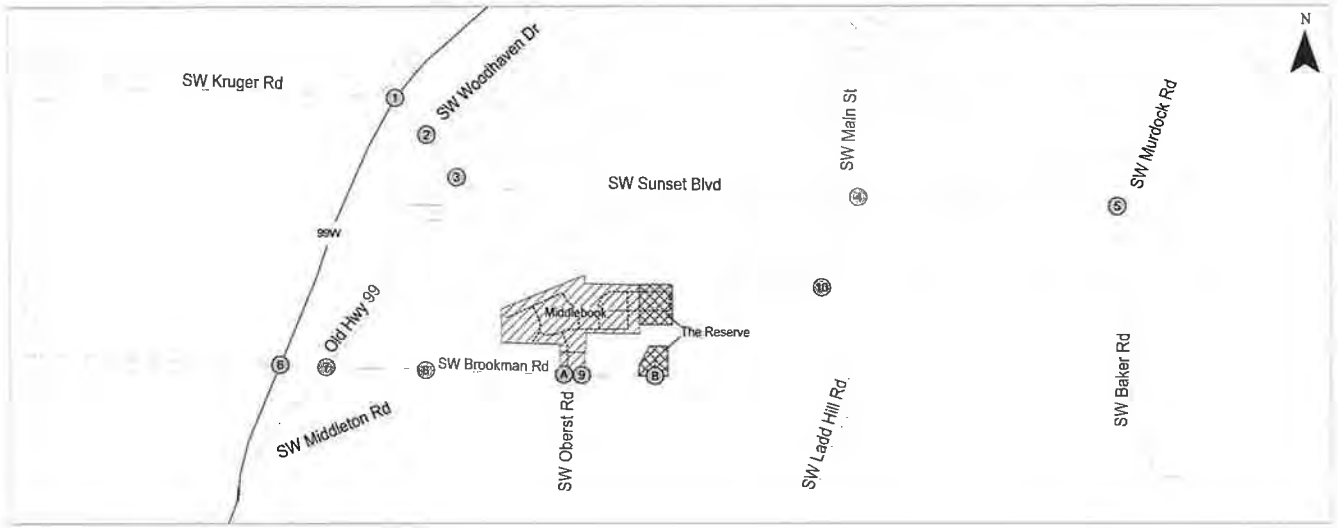
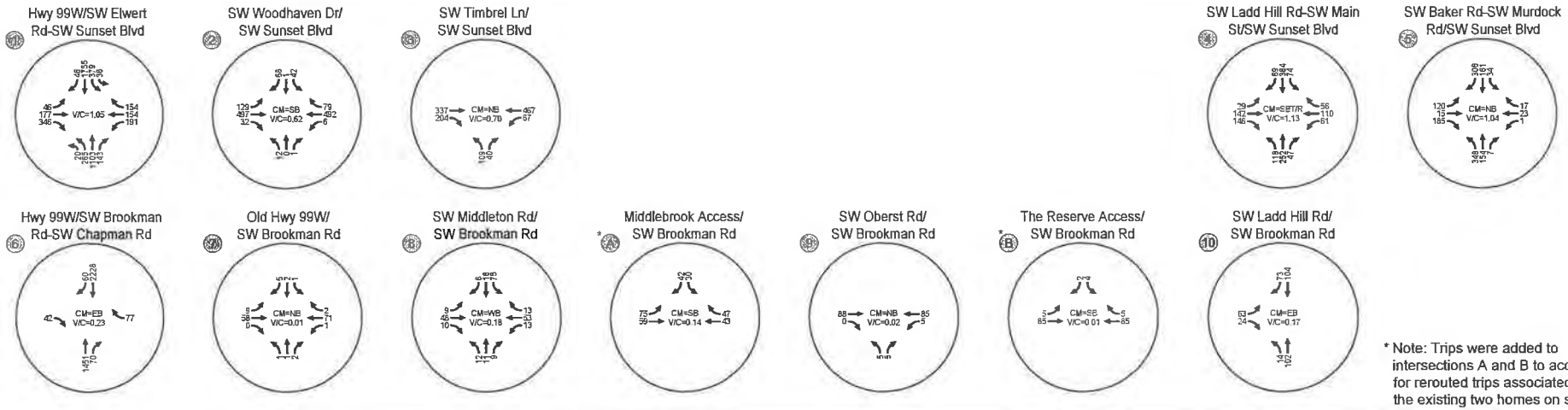
Year 2024 Total Intersection Operations
Weekday AM Peak Hour
Sherwood, Oregon

Figure 12

KITTELSON & ASSOCIATES





* Note: Trips were added to intersections A and B to account for rerouted trips associated with the existing two homes on site.

CM = CRITICAL MOVEMENT (TWSC)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED/AWSC) / CRITICAL MOVEMENT LEVEL OF SERVICE (TWSC)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED/AWSC) / CRITICAL MOVEMENT CONTROL DELAY (TWSC)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO
TWSC = TWO-WAY STOP CONTROL
AWSC= ALL-WAY STOP CONTROL

Year 2024 Total Intersection Operations
Weekday PM Peak Hour
Sherwood, Oregon

Figure 13

KITTELSON & ASSOCIATES

Highway 99W/SW Elwert Road-SW Sunset Boulevard intersection (Study Intersection #1)

This intersection is projected to continue to exceed ODOT's 0.99 V/C mobility standard under weekday AM and PM peak hour conditions under total traffic assuming completion of Washington County's MSTIP project. The proposed development results in the following projected southbound V/C ratio changes relative to the background conditions: weekday AM peak hour 1.01 to 1.02, weekday PM peak hour 1.04 to 1.05. Given that the already over-capacity V/C ratio change is less than 0.03[3] assuming no signal timing change, the City of Sherwood could make a finding that site development impacts do not require mitigation per ODOT Policy Statement findings relative to the change in V/C ratio.

SW Woodhaven Drive/SW Sunset Boulevard (Study Intersection #2)

The southbound approach to this stop-controlled intersection is projected to operate at a V/C ratio of 1.72 under background traffic and a V/C ratio of 1.76 under total traffic conditions during the weekday AM peak hour. This intersection is identified for signalization in the City TSP.

Given that the intersection does not meet City operating standards under background conditions, no site trips are added to the critical stop-controlled approach and the planned future signalization cost is not proportionate to site trip impacts, site-impact mitigation is recommended through payment of a proportionate share contribution to the planned future signalization. The proposed proportionate share mitigation is discussed later in this report.

SW Timbrel Lane/SW Sunset Boulevard (Study Intersection #3)

The weekday AM peak hour V/C ratio of the northbound approach to this stop-controlled intersection is projected to change from 1.77 prior to site development to 1.80 with site development. The City plans construction of a roundabout at this intersection in the future.

Given that the intersection does not meet City operating standards under background conditions, the site adds three trips to the critical movement during the weekday AM peak hour and the planned future signalization cost is not proportionate to site trip impacts, site-impact mitigation is recommended through payment of a proportionate share contribution to the planned future roundabout. The proposed proportionate share mitigation is discussed later in this report.

[3] A May 25, 2011 Oregon Highway Plan Policy intent statement issued by ODOT indicates that "In applying OHP mobility standards to analyze mitigation, ODOT recognizes that there are many variables and levels of uncertainty in calculating volume-to-capacity ratios, particularly over the planning horizon. In applying the standards after negotiating reasonable levels of mitigation for actions required under OAR 660-012-0060, ODOT considers calculated values for volume-to-capacity ratios that are within 0.03 of the adopted standard in the OHP to be considered in compliance with the standard."

SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard (Study Intersection #4)

The weekday PM peak hour V/C ratio on the southbound approach to this all-way stop-controlled intersection is projected to change from 1.11 under background traffic to 1.13 with site traffic. This intersection is identified for signalization in the City TSP.

Given that the intersection does not meet City operating standards under background conditions and the planned future signalization cost is not proportionate to site trip impacts, site-impact mitigation is recommended through payment of a proportionate share contribution to the planned future signalization. The proposed proportionate share mitigation is discussed later in this report.

SW Baker Road-SW Murdock Road/SW Sunset Boulevard (Study Intersection #5)

The weekday AM peak hour V/C ratio on the northbound approach to this all-way stop-controlled intersection is projected to change from 1.02 before site development to 1.04 with site development. Construction of a northbound left turn lane and a southbound right turn lane is planned in the Sherwood TSP.

Given that the intersection does not meet City operating standards under background conditions and the planned turn lane cost is not proportionate to site trip impacts, site-impact mitigation is recommended through payment of a proportionate share contribution to the planned future turn lane project. The proposed proportionate share mitigation is discussed later in this report.

Proportionate Share Mitigation Assessment

Proportional share mitigation calculations for both the SW Woodhaven Drive/SW Sunset Boulevard and SW Timbrel Lane/SW Sunset Boulevard intersections were prepared following the methodology used by the City of Sherwood to assess impacts of the previously approved Middlebrook Residential Subdivision. The same methodology was prepared for the other two intersections for City consideration. Table 6 presents the assumed mitigation measures and costs as well as the trip components and assessment methodology for the four study intersections.

Table 6: Proportional Share Methodology

	SW Sunset Blvd/ SW Woodhaven Dr (#2)	SW Sunset Blvd/ SW Timbrel Ln (#3)	SW Ladd Hill Rd.-SW Main St./SW Sunset Boulevard (#4)	SW Baker Rd.-SW Murdock Rd./ SW Sunset Boulevard (#5)
Mitigation Project Summary	Construct Traffic Signal	Construct Mini Roundabout	Construct Traffic Signal	Construct Northbound Left Turn lane & Southbound Right Turn lane
City TSP Project ID	Not applicable	D28	D26	D33
Peak Hour	Weekday AM	Weekday AM	Weekday PM	Weekday PM
Scenario when mitigation is triggered	No Build (2024)	No Build (2024)	No Build (2024)	No Build (2024)
Existing Total Entering Volume, TEV (X)	1,012	894	1,208	1,208
2024 No Build (Background with RIRO, Y)	1,531	1,308	1,468	1,359
2024 Project Trips (PT)	10	10	19	12
Background Growth (Z = Y – X)	519	414	260	151
Proportional Share (%)*	1.89%	2.36%	6.81%	7.36%
Mitigation Cost Estimate ($)	$1,050,000	$630,000	$250,000	$750,000
Cost Estimate Reference	DKS (Ref 10)	DKS (Ref 10)	TSP (Ref 5)	TSP (Ref 5)
Proportional Share Cost ($)**	$19,849	$14,858	$17,025	$55,215

*if 2024 mitigation is triggered in: Existing — Proportional Share % = PT / X
No Build/Build — Proportional Share % = PT / (PT+ Z)

** If intersection fails in AM and PM, use average of AM and PM proportional share (%) to estimate share cost ($)

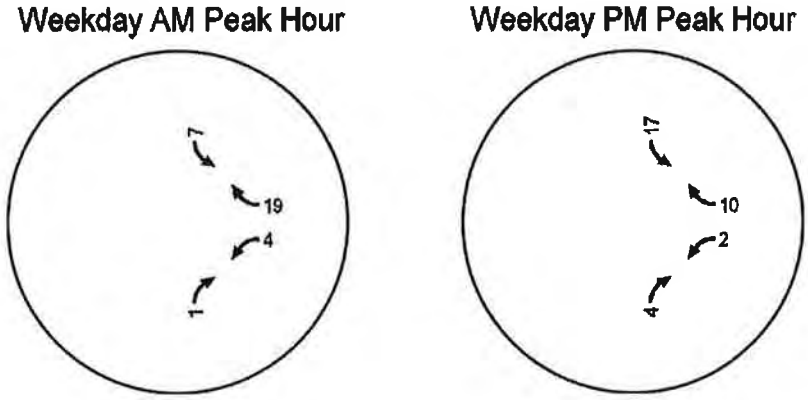
Source: *Sherwood High School Transportation Impact Study* (Reference 10)

In reviewing the proportional share estimates in Table 6, the City could consider:

- The extent to which the proportional share contributions will be Transportation Development Tax creditable (both the SW Woodhaven Drive/SW Sunset Boulevard and SW Timbrel Lane/SW Sunset Boulevard intersections were determined to be fully creditable for the previously approved Middlebrook Residential Subdivision).
- While the Reserve at Cedar Creek trip impacts at the two Sunset Boulevard study intersections can be mitigated through payment of a proportional share, the site-generated trips are expected to shift back to the Highway 99W/SW Brookman Road-SW Chapman Road intersection once the ultimate mitigation is implemented on Highway 99W and full turn movements are again provided at the Highway connection. Site mitigation would then no longer be required on Sunset Boulevard.

Exhibit 1 illustrates the projected number of site-generated peak hour trips that are expected to travel through the Highway 99W/SW Brookman Road-SW Chapman Road intersection once the ultimate mitigation is implemented at that location. This trip assignment is provided for informational purposes in case the City determines that proportional share payments are required at the Highway 99W/SW Brookman Road-SW Chapman Road.

Exhibit 1: Site Trips though Highway 99W/SW Brookman Road upon Ultimate Mitigation



SW Brookman Road Intersection Turn Lane Considerations at Site Access Points

In the future, SW Brookman Road is planned to be widened to a three- or five-lane arterial with a center left-turn lane. Each development fronting SW Brookman Road is currently expected to provide half-street right-of-way dedication to Washington County consistent with a future five-lane arterial.

Left-Turn Lane Needs Assessment

The location and configuration of the public street providing access to SW Brookman Road for both the Middlebrook Residential Subdivision and the 44 homes in the northern portion of the new residential subdivision (Study Intersection A) along with the Middlebrook Residential Subdivision frontage widening was previously approved with the Middlebrook Residential Subdivision. Although SW Brookman Road is being widened to provide half of the ultimate five-lane section along the Middlebrook Residential Subdivision frontage, the new frontage section SW Brookman Road is planned to be striped as a two-lane roadway (one lane in each direction) initially due to the relatively short frontage length and an inability to transition to a three-lane section within the frontage paving area.

While the two-lane roadway section was sufficient to support the Middlebrook Residential Subdivision, the need for an eastbound left-turn lane on SW Brookman Road into the shared access was re-assessed assuming the proposed new homes. The turn lane assessment was prepared using ODOT APM volume-based criterion for left-turn lanes. The projected weekday PM peak hour volumes with site development of the Reserve at Cedar Creek indicate that it would be appropriate to construct an eastbound left-turn lane with site development at the shared site access (Study Intersection A).

While provision of a left-turn lane is desirable from a traffic volume perspective, widening and tapers needed to provide the eastbound left-turn lane in conjunction with site development require off-site property acquisition that may not be possible. Accordingly, it is recommended the Applicant coordinate with City of Sherwood and Washington County staff to assess the potential for constructing an eastbound left-turn lane at the west access with site development and/or to pay a fee-in-lieu of the turn lane construction (with the fee intended to be used to construct the turn lane in conjunction with a future public road project).

The potential need for an eastbound left-turn lane on SW Brookman Road at the east site access (Study Intersection B) was also evaluated and determined that the projected traffic volumes do not suggest the need for a turn lane using ODOT APM volume-based criterion.

Right-turn Lane Needs Assessment

The projected westbound right-turn traffic volumes (well below 40 vehicles per hour) do not justify right-turn deceleration lanes at either of the site accesses on SW Brookman Road per Washington County criteria.

The turn lane warrant analysis worksheets are provided in *Appendix G.*

SW BROOKMAN ROAD ACCESS MANAGEMENT

Washington County *Community Development Code* (Reference 12) Section 501 provides standards for access spacing along arterial roads. Per the code, when allowed, accesses to arterial facilities such as SW Brookman Road should be spaced at least 600 feet apart. Figure 14 is an influence area map that shows existing site driveways, the proposed site access as well as other existing accesses in the vicinity within 600 feet of the site frontage. The existing site driveways serving the two single family homes on the project site will each be closed as noted.

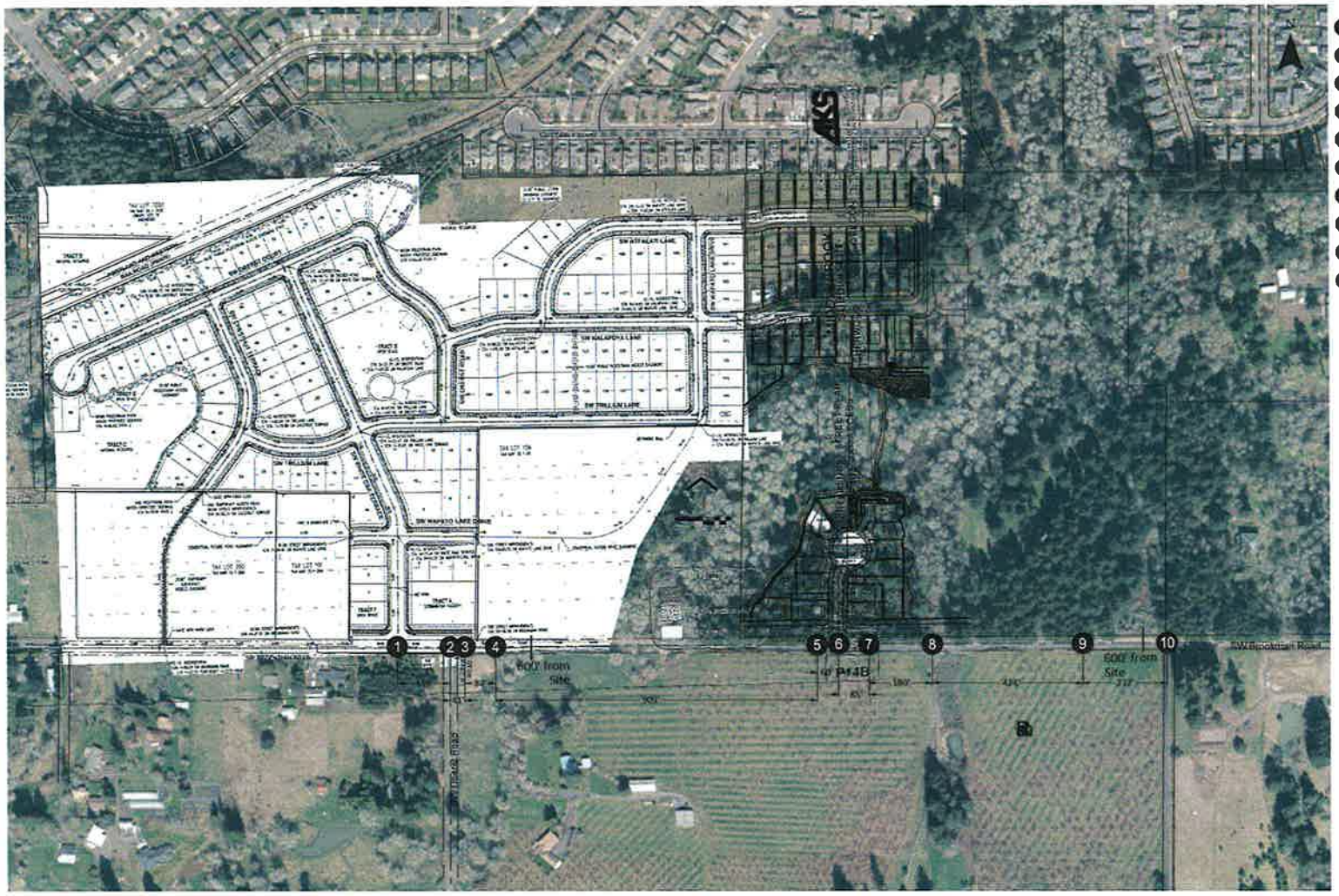
Middlebrook Shared Site Access (Study Intersection A)

The location of the proposed new connection to SW Brookman Road is situated west of the SW Oberst Road and was previously approved by both the City of Sherwood and Washington County. No additional analysis is required to support this access location.

The Reserve at Cedar Creek East Access (Study Intersection B)

The proposed eastern site access satisfies Washington County's minimum 600-foot spacing standard west of the site frontage along SW Brookman Road (the nearest driveway to the west is located over 900 feet away from Study Intersection B). The nearest driveway to the east of the access is located approximately 265 feet to the east, serving a single family home to the south (Driveway 8 on Figure 14)[4]. The next closest driveway is located over 600 feet to the east. Based on this review, the eastern proposed site access can satisfy the *Community Development Code* spacing requirements.

[4] Note that the existing site driveways identified as #5 and #7 in Figure 14 will be closed with the proposed development.



1. Future Site Access/SW Brookman Road
2. SW Oberst Road/SW Brookman Road
3. Existing Access - Private (To Be Closed)
4. Existing Access - Private
5. Existing Access - Private (To Be Closed)
6. Future Site Access/SW Brookman Road
7. Existing Access - Private (To Be Closed)
8. Existing Access - Private
9. Existing Access - Private
10. Existing Access - Private

Influence Area Map
Sherwood, Oregon

Figure
14

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Local Street Exception

Washington County previously approved the Middlebrook Shared Site Access (Study Intersection A). We expect the County will need to process an exception to allow the proposed eastern site access (Study Intersection B) local street connection to SW Brookman Road per CDC Section 501-8.5 which requires that direct access to arterials be from collector and other streets. Per the CDC 501-8.5, exceptions for local streets may be allowed through a Type II process when collector access is found to be unavailable and impracticable by the Director.

Support for granting the proposed local street connection is provided by multiple adopted documents guiding local area transportation needs. First, the City of Sherwood's adopted *Brookman Addition Concept Plan* (Reference 13) identifies only local street connections to SW Brookman Road in the area of the site. Further, the City's *Transportation System Plan* as well as the recently adopted minor amendments to the Transportation System Plan (Ordinance 2018-03) each show local street connections to SW Brookman Road along the site frontage as well as to the east and west. No planned north-south collector or arterial through the proposed site area is identified in any of the City's guiding documents. Considering the adopted planning documents and the creek crossing that would be required to connect the northern and southern portions of the site, the Washington County Director should make a determination that collector access is both unavailable and impracticable and that local access can be allowed as proposed in accordance with CDC 501-8.5. As noted above, the proposed local access (Study Intersection B) can satisfy County access spacing standards for SW Brookman Road.

QUEUING ASSESSMENT

A table summarizing the queueing assessment under all traffic scenarios is provided in Appendix D. Each location where the 95th percentile queue is projected to exceed storage under total traffic conditions is discussed below.

Highway 99W/SW Elwert Road-SW Sunset Boulevard (Study Intersection #1)

The 95th percentile queue for the eastbound left-turn and westbound left-turn at the signalized intersection of Highway 99W/SW Elwert Road-SW Sunset Boulevard are projected to exceed storage during the weekday AM and/or weekday PM peak hour.

Consistent with background conditions, the eastbound left-turn movement is projected to have a 95th percentile queue of 300 feet during the weekday AM peak hour, in excess of the 260 feet of storage planned for the intersection[5]. The proposed Reserve at Cedar Creek subdivision is not projected to add any trips to the eastbound left-turn.

[5] The analysis assumes the planned improvements at the intersection of Highway 99W/SW Elwert Road-SW Sunset Boulevard with the Sherwood High School project, including a second northbound left-turn lane, extended storage for the northbound and southbound left-turns, and exclusive eastbound and westbound left-turn lanes. In addition, the project relocated the intersection of SW Kruger Road and SW Elwert Road to provide additional storage on the eastbound approach to 99W.

The 95th percentile queue for the westbound left-turn is expected to exceed the proposed 185 feet of queue storage during both the weekday AM and PM peak hour under background and total traffic conditions. The increase in queue during the weekday AM peak hour is in part due to the interim RIRO restriction at Highway 99W and SW Brookman Road-SW Chapman Road, which is expected to add vehicles to the westbound left-turn movement. The site is projected to add 3 westbound left-turns (of a total projected westbound left-turn volume of 161) during the weekday AM peak hour and 1 during the weekday PM peak hour. Once the interim RIRO restriction is removed, the proposed residential development would not contribute any westbound left-turns to the intersection.

No mitigation is recommended at the Highway 99W/SW Elwert Road-SW Sunset Boulevard in conjunction with the proposed site development.

SW Woodhaven Drive/SW Sunset Boulevard (Study Intersection #2)

The 95th percentile queue for the southbound movement at the two-way stop-controlled intersection of SW Woodhaven Drive/SW Sunset Boulevard is projected to extend beyond the adjacent intersection of SW Fitch Drive during the weekday AM peak hour under background and total traffic conditions. No change in the queue is projected with site development. As illustrated in Exhibit 2, there is approximately 460 feet between the intersections.

Exhibit 2: SW Woodhaven Drive/SW Sunset Boulevard

The site is not projected to contribute any new trips of the projected 205 southbound approach traffic volumes during the weekday AM peak hour. The projected site-generated trips are expected to travel west and east along SW Sunset Boulevard to travel south on Highway 99W and to the site, given the RIRO restriction at Highway 99W and SW Brookman Road-SW Chapman Road. Once the interim RIRO restriction is removed, the proposed residential development would not contribute any trips to the intersection.

As previously documented in Table 6, it is recommended that the proposed development pay a proportional share contribution towards capacity mitigation of the SW Woodhaven Drive/SW Sunset Boulevard intersection. No additional mitigation beyond the proportional share payment is recommended.

SW Timbrel Lane/SW Sunset Boulevard (Study Intersection #3)

The 95th percentile queue for the northbound through/left-turn movement at the two-way stop-controlled intersection of SW Timbrel Lane/SW Sunset Boulevard is projected to extend beyond the adjacent intersection of SW Middleton Road during the weekday AM peak hour under both background and total traffic conditions. No change in queue length is projected with site development. As illustrated in Exhibit 3, there is approximately 215 feet between the intersections.

Exhibit 3: SW Timbrel Lane/SW Sunset Boulevard

The site is projected to contribute 3 of the projected 226 northbound left-turns during the weekday AM peak hour. The projected site-generated trips are expected to travel north on SW Middleton Road and west of SW Sunset Boulevard to travel south on Highway 99W, given the RIRO restriction at Highway 99W and SW Brookman Road-SW Chapman Road. Once the interim RIRO restriction is removed, the proposed residential development would not contribute any northbound left-turns to the intersection.

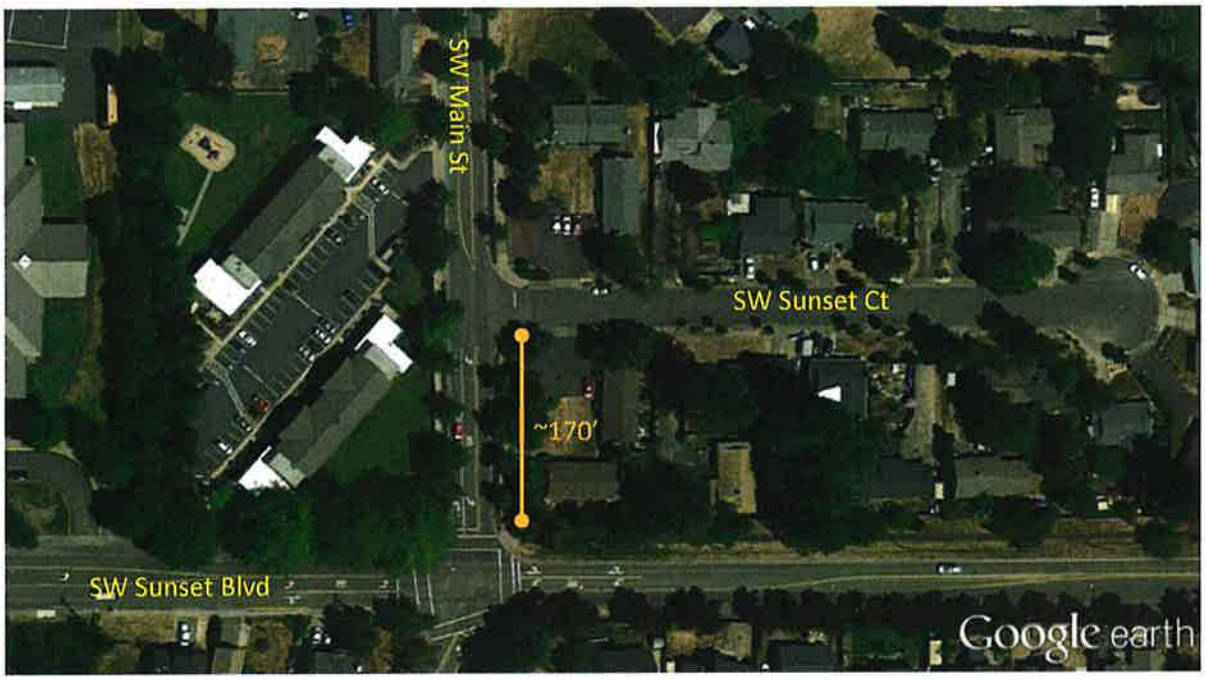
As previously documented in Table 6, it is recommended that the proposed development pay a proportional share contribution towards capacity mitigation of the SW Timbrel Lane/SW Sunset Boulevard intersection. No additional mitigation beyond the proportional share payment is recommended.

SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard (Study Intersection #4)

The 95th percentile queue for the southbound through/right-turn movement at the all-way stop-controlled intersection of SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard is projected to

extend beyond the adjacent intersection of SW Sunset Court (north of SW Sunset Boulevard) during the weekday PM peak hour under all scenarios studied. As illustrated in Exhibit 4, there is approximately 170 feet between the two intersections. The 95th percentile queue for the southbound through/right-turn during the weekday PM peak hour is projected to be 450 feet under both background and total traffic conditions. The site is anticipated to add 4 southbound vehicles to the intersection (of a total 453 southbound through and right-turns on the approach) over the course of the PM peak hour, having minimal impact to the queue. During the weekday PM peak hour, vehicles turning left from SW Sunset Court onto SW Main Street may experience incrementally longer delays waiting for a gap in traffic on SW Main Street as a result.

Exhibit 4: SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard



As previously documented in Table 6, it is recommended that the proposed development pay a proportional share contribution towards capacity mitigation of the SW Main Street/SW Sunset Boulevard intersection. No additional mitigation beyond the proportional share payment is recommended.

SW Baker Road-SW Murdock Road/SW Sunset Boulevard (Study Intersection #5)

The 95th percentile queue for the northbound movement at the all-way stop-controlled intersection of SW Baker Road-SW Murdock Road/SW Sunset Boulevard is projected to extend to adjacent intersection of SW Cornerstone Lane during the weekday PM peak hour under background and total traffic conditions. As illustrated in Exhibit 5, there is approximately 390 feet between the two intersections. The 95th percentile queue for the northbound approach during the weekday PM peak hour is projected to be 400 feet under both background and total traffic conditions. The site is anticipated to add 3

northbound left vehicles to the intersection (of a total 509 northbound vehicles on the approach) over the course of the weekday PM peak hour.

Exhibit 5: SW Baker Road-SW Murdock Road/SW Sunset Boulevard

As previously documented in Table 6, it is recommended that the proposed development pay a proportional share contribution towards capacity mitigation of the SW Baker Road-SW Murdock Road/SW Sunset Boulevard intersection. No additional mitigation beyond the proportional share payment is recommended.

Site Accesses/SW Brookman Road

Vehicle queuing conditions were assessed on the stop controlled approaches to both proposed site access connections to SW Brookwood Road as shown in Table 7. The queuing results indicate there will be adequate southbound queue storage at both proposed site access connections upon site development.

Table 7: Projected 95th Percentile Vehicle Queues for 2020 Total Traffic Conditions

	Intersection	Movement	Assumed Storage Length	Weekday AM Peak Queue	Weekday PM Peak Queue	Storage Adequate? (Yes/No)
A	Future Site Access/ SW Brookman Road	Southbound	250[1] feet	25 feet	<25 feet	Yes
B	Future Site Access/ SW Brookman Road	Southbound	50[2] feet	<25 feet	<25 feet	Yes

Queues rounded up to the nearest 25 feet
[1]Approximate distance to first internal intersection
[2]Anticipated distance to first on-site residential driveway

COMPLIANCE WITH REQUIREMENTS IN THE SHERWOOD MUNICIPAL CODE

Section 16.106.080 of the Sherwood Municipal Code outlines the purpose, applicability, requirements, and approval criteria for a traffic impact analysis. The approval criteria provided in 16.106.080F are listed below with specific application to the proposed development.

1. The analysis complies with the requirements of 16.106.080.C

   Per 16.106.080.C:

   - *A pre-application conference was held involving the City, Washington County and ODOT (on July 21, 2018)*
   - *This TIA has been prepared by an Oregon Registered Professional Engineer*
   - *The latest edition of the Trip Generation Manual (10th Edition) was used. Per direction from ODOT and the City, the average rate was used for the daily trip generation and the fitted curve equation for the weekday AM and PM peak hour trip generation.*
   - *Intersection-level analysis was conducted at 12 study intersections identified in coordination with City staff and based on historic traffic impact studies in the area. These study intersections were analyzed even though only the western shared site access (Study Intersection A) was impacted by 50 or more peak hour trips.*
   - *The Transportation Planning Rule is not applicable to a land division application, per OAR 660-012-0060.*

2. The analysis demonstrates that adequate transportation facilities exist to serve the proposed development or identifies mitigation measures that resolve identified traffic safety problems in a manner that is satisfactory to the City Engineer and, when County or State highway facilities are affected, to Washington County and ODOT.

   This study addresses the adequacy of the transportation facilities and recommends mitigation at the impacted intersections through payment of proportionate share contributions.

3. For affected non-highway facilities, the TIA demonstrates that mobility and other applicable performance standards established in the adopted City TSP have been met.

The City's mobility performance standards have been applied, as documented in this study.

4. Proposed public improvements are designed and will be constructed to the street standards specified in Section 16.106.010 and the Engineering Design Manual, and to the access standards in Section 16.106.040.

   The appropriate street and access standards will be applied to the development. The development plans will be subject to review and approval by the City.

5. Proposed public improvements and mitigation measures will provide safe connections across adjacent right-of-way (e.g., protected crossings) when pedestrian or bicycle facilities are present or planned on the far side of the right-of-way.

   The project will provide a sidewalk and pavement widening for a future bike lane along the site frontage on Brookman Road. Off-site bicycle and pedestrian facilities are expected to be constructed in conjunction with future off-site development by others consistent with County and City frontage improvement requirements.

FINDINGS AND RECOMMENDATIONS

Based on the results of the transportation impact analysis, the proposed subdivision can be developed while maintaining acceptable operations at the study intersections. The analysis developed the following findings and recommendations.

Findings

- All study intersection operations currently satisfy City, County, and ODOT standards.
- All future scenarios evaluated in this study assume implementation of right-turn only restrictions at the Highway 99W/SW Brookman Road-SW Chapman Road intersection in conjunction with the previously approved Middlebrook Residential Subdivision.
- The proposed residential development is estimated to generate approximately 538 daily trips, including 50 trips during the weekday AM peak hour and 60 weekday PM peak trips after accounting for the two existing detached single-family homes on the site.
- Under background and total traffic conditions, five of the study intersections were found to not operate in accordance with the applicable standards:
  - The signalized Highway 99W/SW Elwert Road-SW Sunset Boulevard intersection (study intersection #1) will continue to exceed ODOT's 0.99 V/C threshold during both the weekday AM and PM peak hours.
    - The site development impacts do not require mitigation per ODOT Policy Statement findings relative to the change in V/C ratio.

- The southbound approach V/C ratio at the stop-controlled SW Woodhaven Drive/SW Sunset Boulevard intersection (study intersection #2) is projected to exceed City V/C ratio standards during the weekday AM peak hour.
- The northbound approach V/C ratio at the stop-controlled SW Timbrel Lane/SW Sunset Boulevard intersection (study intersection #3) is projected to exceed City V/C ratio standards during the weekday AM peak hour.
- The southbound through/right lane V/C ratio at the all-way stop controlled SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard intersection (study intersection #4) is projected to exceed City V/C ratio standards during the weekday PM peak hour.
- The northbound approach V/C ratio at the all-way stop controlled SW Baker Road-SW Murdock Road/SW Sunset Boulevard intersection (study intersection #5) is projected to exceed City V/C ratio standards during the weekday PM peak hour.

- The proposed new east site access on SW Brookman Road can comply with the Washington County *Community Development Code* minimum access spacing requirements.
- The volume based criteria for providing an eastbound left-turn are satisfied under weekday PM total traffic conditions at Site Access A (shared Middlebrook Residential Subdivision Access).

Recommendations

Recommended transportation improvements to be implemented with site development include:

- With site development and subject to City review, pay a proportionate share contribution (estimated to be $106,947 in total) towards planned future improvements at the following study intersections:
  - Sunset Boulevard/Woodhaven Drive (study intersection #2): $19,849 toward the construction of a planned future traffic signal.
  - Sunset Boulevard/Timbrel Lane (study intersection #3): $14,858 toward the construction of a planned future mini-roundabout.
  - SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard (study intersection #4): $17,025 toward the construction of a planned future traffic signal.
  - SW Baker Road-SW Murdock Road/SW Sunset Boulevard (study intersection #5): $55,215 toward the construction of planned future north and southbound turn lanes.

- Coordinate with City of Sherwood and Washington County staff to assess the potential for constructing an eastbound left-turn lane at the west access (shared with Middlebrook Residential Subdivision) with site development and/or to pay a fee-in-lieu of the turn lane construction (with the fee intended to be used to construct the turn lane in conjunction with a future public road project).

We trust that this letter adequately documents the transportation impacts associated with the proposed development. Please contact us if you have any questions or comments regarding the contents of this letter or the analyses performed.

Sincerely,
KITTELSON & ASSOCIATES, INC.

Chris Brehmer, PE
Senior Principal Engineer

Julia Kuhn, PE
Senior Principal Engineer

Expires: 12-31-2019

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Appendix A
ODOT Crash Data

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

99W Pacific Highway West (091) & SW Elwert Rd / SW Sunset Blvd
January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2017														
ANGLE	0	1	0	1	0	2	0	1	0	1	0	1	0	0
REAR-END	0	1	2	3	0	2	0	3	0	2	1	3	0	0
TURNING MOVEMENTS	0	1	1	2	0	2	0	2	0	1	1	2	0	0
2017 TOTAL	0	3	3	6	0	6	0	6	0	4	2	6	0	0
YEAR: 2016														
REAR-END	0	4	1	5	0	7	0	4	1	5	0	5	0	0
2016 TOTAL	0	4	1	5	0	7	0	4	1	5	0	5	0	0
YEAR: 2015														
REAR-END	0	0	3	3	0	0	0	3	0	3	0	3	0	0
TURNING MOVEMENTS	0	3	0	3	0	6	0	3	0	2	1	3	0	0
2015 TOTAL	0	3	3	6	0	6	0	6	0	5	1	6	0	0
YEAR: 2014														
REAR-END	0	2	5	7	0	3	1	4	3	7	0	7	0	0
TURNING MOVEMENTS	0	0	1	1	0	0	0	0	1	1	0	1	0	0
2014 TOTAL	0	2	6	8	0	3	1	4	4	8	0	8	0	0
YEAR: 2013														
REAR-END	0	2	2	4	0	5	0	4	0	3	1	4	0	0
2013 TOTAL	0	2	2	4	0	5	0	4	0	3	1	4	0	0
FINAL TOTAL	0	14	15	29	0	27	1	24	5	25	4	29	0	0

Disclaimers: *Effective 2016,* ***collection of "Property Damage Only" (PDO) crash data elements was reduced for vehicles and participants.*** *Age, Gender, License, Error and other elements are no longer available for PDO crash reporting. Please keep this in mind when comparing 2016 PDO crash data to prior years.*

A higher number of crashes may be reported as of 2011 compared to prior years. This does not necessarily reflect an increase in annual crashes. The higher numbers may result from a change to an internal departmental process that allows the Crash Analysis and Reporting Unit to add previously unavailable, non-fatal crash reports to the annual data file. Please be aware of this change when comparing pre-2011 crash statistics. For all disclaimers, see https://www.oregon.gov/ODOT/Data/documents/Crash_Data_Disclaimers.pdf.

TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CONTINUOUS SYSTEM CRASH LISTING

091 PACIFIC HIGHWAY WEST

99W Pacific Highway West (091) & SW Elwert Rd / SW Sunset Blvd
January 1, 2013 through December 31, 2017

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             D
             R
         S   U
         P   G S W                                                                   INT-TYP                                           SPCL USE
SER#     E A / C O  DATE          COUNTY          RD#  FC    CONN #                      (MEDIAN) INT-REL  OFFRD WTHR  CRASH TYP    TRLR QTY   MOVE                      A  S
INVEST   E L M H R  DAY/TIME      CITY            CMPT/MLG   FIRST  STREET      RD CHAR   LEGS    TRAF-    RNDBT SURF  COLL TYP     OWNER      FROM       PRTC INJ       G  E  LICNS PED
UNLOC?   D C J L K  LAT/LONG      URBAN AREA      MILEPNT    SECOND STREET      DIRECT  (#LANES)  CNTL     DRVWY LIGHT SVRTY     V# VEH TYPE  TO      P# TYPE SVRTY    E  X  RES   LOC ERROR      ACTN EVENT   CAUSE
                                                  LRS        INTERSECTION SEQ#  LOCTN
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
07197  N N N N N 10/23/2014  WASHINGTON      1    14                           INTER     CROSS   N          N RAIN S-1STOP   01 NONE    0 STRGHT                                                    27,29
CITY       N     Thu     4P  SHERWOOD        MN   0   SW PACIFIC HY 99W        NE                TRF SIGNAL N WET  REAR         PRVTE     NE SW                                         000          00
                             PORTLAND UA     16.66    SW SUNSET BLVD           06          0                N DAY  PDO          PSNGR CAR          01 DRVR NONE  33 F SUSP    016,026       038          27,29
No      45 21  11.85 -122 52   4.18          009100100S00                 1                                                                                            OR<25

                                                                                                                          02 NONE    0 STOP
                                                                                                                             PRVTE     NE SW                                         011          00
                                                                                                                             PSNGR CAR          01 DRVR NONE  43 F OR-Y    000           000          00
                                                                                                                                                                       OR<25

04491  N N N     04/13/2016  WASHINGTON      2    14                           INTER     CROSS   N          N CLR  S-1STOP   01 NONE    9 STRGHT                                                    29
NONE       N     Wed     5P  SHERWOOD        MN   0   SW PACIFIC HY 99W        NE                TRF SIGNAL N DRY  REAR         N/A       NE SW                                         000          00
                             PORTLAND UA     16.66    SW SUNSET BLVD           06          0                N DAY  PDO          PSNGR CAR          01 DRVR NONE  00 U UNK     000           000          00
No      45 21  11.45 -122 52   3.31          009100200S00                 1                                                                                            UNK

                                                                                                                          02 NONE    9 STOP
                                                                                                                             N/A       NE SW                                         011          00
                                                                                                                             PSNGR CAR          01 DRVR NONE  00 U UNK     000           000          00
                                                                                                                                                                       UNK

04670  N N N N N 07/31/2017  WASHINGTON      2    14                           INTER     CROSS   N          N CLR  S-STRGHT  01 NONE    0 STRGHT                                                    07
CITY       N     Mon     4P  SHERWOOD        MN   0   SW ELWERT RD             NE                UNKNOWN    N DRY  REAR         PRVTE     NE SW                                         000          00
                             PORTLAND UA     16.66    SW PACIFIC HY 99W        06          0                N DAY  INJ          PSNGR CAR          01 DRVR NONE  16 M OR-Y    043           000          07
No      45 21  11.45 -122 52   3.31          009100200S00                 1                                                                                            OR<25
                                                                                                                                                02 PSNG INJC  18 F         000           000          00

                                                                                                                          02 NONE    0 STRGHT
                                                                                                                             PRVTE     NE SW                                         006          00
                                                                                                                             PSNGR CAR          01 DRVR INJC  18 F OR-Y    000           000          00
                                                                                                                                                                       OR<25

04289  N N N     04/27/2017  WASHINGTON      2    14                           INTER     CROSS   N          N CLR  S-1STOP   01 NONE    9 STRGHT                                                    29
NONE       N     Thu     7A  SHERWOOD        MN   0   SW PACIFIC HY 99W        E                 TRF SIGNAL N DRY  REAR         N/A       SE NW                                         000          00
                             PORTLAND UA     16.66    SW SUNSET BLVD           06          0                N DAY  PDO          PSNGR CAR          01 DRVR NONE  00 U UNK     000           000          00
No      45 21  11.45 -122 52   3.31          009100200S00                 1                                                                                            UNK

                                                                                                                          02 NONE    9 STOP
                                                                                                                             N/A       SE NW                                         013          00
                                                                                                                             PSNGR CAR          01 DRVR NONE  00 U UNK     000           000          00
                                                                                                                                                                       UNK

02885  N N N     05/22/2014  WASHINGTON      2    14                           INTER     CROSS   N          N CLR  S-1STOP   01 NONE    0 STRGHT                                                    07
NONE       N     Thu     7A                  MN   0                            S                 TRF SIGNAL N DRY  REAR         PRVTE     S  N                                          000          00
                             PORTLAND UA     16.66                             06          0                N DAY  PDO          PSNGR CAR          01 DRVR NONE  42 M OR-Y    026           000          07
No      45 21  11.45 -122 52   3.31          009100200S00                                                                                                              OR<25
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TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CONTINUOUS SYSTEM CRASH LISTING

091 PACIFIC HIGHWAY WEST

99W Pacific Highway West (091) & SW Elwert Rd / SW Sunset Blvd
January 1, 2013 through December 31, 2017

```
                D
                R
         S      U
         P    G S W                                 RD#  FC    CONN #                           INT-TYP                                        SPCL USE
SER#     E A / C O  DATE           COUNTY           CMPT/MLG   FIRST  STREET          RD CHAR   (MEDIAN)  INT-REL  OFFRD WTHR  CRASH TYP    TRLR QTY   MOVE                         A  S
INVEST   E L M H R  DAY/TIME       CITY             MILEPNT    SECOND STREET          DIRECT      LEGS    TRAF-    RNDBT SURF  COLL TYP     OWNER      FROM          PRTC  INJ     G  E  LICNS PED
UNLOC?   D C J L K  LAT/LONG       URBAN AREA       LRS        INTERSECTION SEQ#      LOCTN    (#LANES)   CNTL     DRVWY LIGHT SVRTY     V# VEH TYPE   TO       P#   TYPE  SVRTY   E  X  RES   LOC  ERROR          ACTN EVENT     CAUSE
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
                                                                                                                                          02 NONE    0   STOP
                                                                                                                                             PRVTE       S  N                                                      011            00
                                                                                                                                             PSNGR CAR              01  DRVR  NONE   43 M  OR-Y         000            000            00
                                                                                                                                                                                          OR<25

04595    N N N N N  08/11/2014     WASHINGTON       2    14                           INTER      CROSS    N          N CLR   S-1STOP      01 NONE    0   STRGHT                                                                    07
CITY         N      Mon     8A                      MN    0                           S                   TRF SIGNAL N DRY   REAR            PRVTE       S  N                                                      000            00
                                   PORTLAND UA       16.66                            06           0                 N DAY   INJ             PSNGR CAR              01  DRVR  INJC   25 F  OR-Y         026            000            07
No       45 21  11.45 -122 52   3.31                009100200S00                                                                                                                          OR<25

                                                                                                                                          02 NONE    0   STOP
                                                                                                                                             PRVTE       S  N                                                      011            00
                                                                                                                                             PSNGR CAR              01  DRVR  INJC   17 F  OR-Y         000            000            00
                                                                                                                                                                                          OR<25

03115    N N N      06/12/2013     WASHINGTON       2    14                           INTER      CROSS    N          N CLR   S-1STOP      01 NONE    0   STRGHT                                                                    07
NONE         N      Wed     9A     SHERWOOD         MN    0    LEG TO ELWERT          SW                  TRF SIGNAL N DRY   REAR            PRVTE       SW NE                                                     000            00
                                   PORTLAND UA       16.66     SW PACIFIC HY 99W      06           0                 N DAY   PDO             PSNGR CAR              01  DRVR  NONE   00 F  UNK          043            000            07
No       45 21  11.45 -122 52   3.31                009100200S00                  1                                                                                                       UNK

                                                                                                                                          02 NONE    0   STOP
                                                                                                                                             PRVTE       SW NE                                                     011            00
                                                                                                                                             PSNGR CAR              01  DRVR  NONE   50 F  OR-Y         000            000            00
                                                                                                                                                                                          OR<25

05133    N N N N N  09/13/2013     WASHINGTON       2    14                           INTER      CROSS    N          N CLR   S-1STOP      01 NONE    0   STRGHT                                                                    27,07
CITY         N      Fri     9P     SHERWOOD         MN    0    SW PACIFIC HY 99W      SW                  TRF SIGNAL N DRY   REAR            PRVTE       SW NE                                                     000            00
                                   PORTLAND UA       16.66     SW SUNSET BLVD         06           0                 N DLIT  INJ             PSNGR CAR              01  DRVR  NONE   22 M  OR-Y         016,043,026    038            27,07
No       45 21  11.45 -122 52   3.31                009100200S00                  1                                                                                                       OR<25

                                                                                                                                          02 NONE    0   STOP
                                                                                                                                             PRVTE       SW NE                                                     011            00
                                                                                                                                             PSNGR CAR              01  DRVR  INJC   79 M  OR-Y         000            000            00
                                                                                                                                                                                          OR<25
                                                                                                                                                                    02  PSNG  INJC   60 F               000            000            00
                                                                                                                                                                    03  PSNG  INJC   77 F               000            000            00

07058    N N N N N  12/04/2013     WASHINGTON       2    14                           INTER      CROSS    N          N CLR   S-1STOP      01 NONE    0   STRGHT                                                         013        27,07
CITY         N      Wed     8A     SHERWOOD         MN    0    SW PACIFIC HY 99W      SW                  TRF SIGNAL N DRY   REAR            PRVTE       SW NE                                                     000            00
                                   PORTLAND UA       16.66     SW SUNSET BLVD         06           0                 N DAY   INJ             PSNGR CAR              01  DRVR  NONE   61 M  OR-Y         016,043,026    038            27,07
No       45 21  11.45 -122 52   3.31                009100200S00                  1                                                                                                       OR<25

                                                                                                                                          02 NONE    0   STOP
                                                                                                                                             PRVTE       SW NE                                                     011  013       00
                                                                                                                                             PSNGR CAR              01  DRVR  INJC   64 F  OR-Y         000            000            00
                                                                                                                                                                                          OR<25
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TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CONTINUOUS SYSTEM CRASH LISTING

091 PACIFIC HIGHWAY WEST

99W Pacific Highway West (091) & SW Elwert Rd / SW Sunset Blvd
January 1, 2013 through December 31, 2017

```
                D
                R
         S      U
         P    G S W                                                                                          INT-TYP                                              SPCL USE
SER#     E A / C O  DATE         COUNTY          RD#  FC    CONN #                    RD CHAR  (MEDIAN) INT-REL  OFFRD WTHR  CRASH TYP   TRLR QTY  MOVE                        A  S
INVEST   E L M H R  DAY/TIME     CITY            CMPT/MLG   FIRST STREET              DIRECT     LEGS   TRAF-    RNDBT SURF  COLL TYP    OWNER     FROM       PRTC INJ         G  E  LICNS PED
UNLOC?   D C J L K  LAT/LONG     URBAN AREA      MILEPNT    SECOND STREET             LOCTN   (#LANES)  CNTL     DRVWY LIGHT SVRTY    V# VEH TYPE    TO      P# TYPE SVRTY    E  X  RES   LOC ERROR   ACTN EVENT   CAUSE
                                                 LRS        INTERSECTION SEQ#
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
                                                                                                                                     03 NONE    0 STOP
                                                                                                                                        PRVTE     SW NE                                                  022  013     00
                                                                                                                                        PSNGR CAR          01 DRVR NONE   20 F  OR-Y        000          000          00
                                                                                                                                                                                OR<25

                                                                                                                                     04 NONE    0 STOP
                                                                                                                                        PRVTE     SW NE                                                  022          00
                                                                                                                                        PSNGR CAR          01 DRVR INJC   49 F  OR-Y        000          000          00
                                                                                                                                                                                OR<25

01988    N N N N N  03/05/2014   WASHINGTON      2    14                              INTER    CROSS    N        N CLD  S-1STOP      01 NONE    0 STRGHT                                                              29
CITY         N      Wed     3P   SHERWOOD        MN    0    SW PACIFIC HY 99W         SW                TRF SIGNAL N WET REAR           PRVTE     SW NE                                                  000          00
                                 PORTLAND UA     16.66      SW SUNSET BLVD            06         0               N DAY  PDO             PSNGR CAR          01 DRVR NONE   51 M  SUSP        026          000          29
No       45 21  11.45 -122 52  3.31              009100200S00                  1                                                                                                OR<25

                                                                                                                                     02 NONE    0 STOP
                                                                                                                                        PRVTE     SW NE                                                  011          00
                                                                                                                                        PSNGR CAR          01 DRVR NONE   42 F  EXP         000          000          00
                                                                                                                                                                                OR<25

06054    N N N      10/15/2014   WASHINGTON      2    14                              INTER    CROSS    N        N RAIN S-1STOP      01 NONE    0 STRGHT                                                              29
NO RPT       N      Wed     7A   SHERWOOD        MN    0    SW PACIFIC HY 99W         SW                TRF SIGNAL N WET REAR           PRVTE     SW NE                                                  000          00
                                 PORTLAND UA     16.66      SW SUNSET BLVD            06         0               N DAY  INJ             PSNGR CAR          01 DRVR NONE   00 M  OR-Y        026          000          29
No       45 21  11.45 -122 52  3.31              009100200S00                  1                                                                                                OR<25

                                                                                                                                     02 NONE    0 STOP
                                                                                                                                        PRVTE     SW NE                                                  011          00
                                                                                                                                        PSNGR CAR          01 DRVR INJC   39 M  OR-Y        000          000          00
                                                                                                                                                                                OR<25

04990    N N N N N  07/21/2015   WASHINGTON      2    14                              INTER    CROSS    N        N CLR  S-1STOP      01 NONE    0 STRGHT                                                              07
CITY         N      Tue     4P   SHERWOOD        MN    0    SW ELWERT RD              SW                TRF SIGNAL N DRY REAR           PRVTE     SW NE                                                  000          00
                                 PORTLAND UA     16.66      SW PACIFIC HY 99W         06         0               N DAY  PDO             PSNGR CAR          01 DRVR NONE   29 F  SUSP        043          000          07
No       45 21  11.45 -122 52  3.31              009100200S00                  1                                                                                                OR<25

                                                                                                                                     02 NONE    0 STOP
                                                                                                                                        PRVTE     SW NE                                                  011          00
                                                                                                                                        PSNGR CAR          01 DRVR NONE   61 M  OR-Y        000          000          00
                                                                                                                                                                                OR<25

05463    N N N      09/04/2015   WASHINGTON      2    14                              INTER    CROSS    N        N CLR  S-1STOP      01 NONE    0 STRGHT                                                              29
NONE         N      Fri    11A   SHERWOOD        MN    0    SW PACIFIC HY 99W         SW                TRF SIGNAL N DRY REAR           PRVTE     SW NE                                                  000          00
                                 PORTLAND UA     16.66      SW SUNSET BLVD            06         0               N DAY  PDO             PSNGR CAR          01 DRVR NONE   18 M  OR-Y        026          000          29
No       45 21  11.45 -122 52  3.31              009100200S00                  1                                                                                                OR<25
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091 PACIFIC HIGHWAY WEST                 99W Pacific Highway West (091) & SW Elwert Rd / SW Sunset Blvd
                                                January 1, 2013 through December 31, 2017
            D
            R
        S   U
        P   G S W                                                     INT-TYP                                        SPCL USE
SER#    E A / C O  DATE                   RD#  FC   CONN #                     (MEDIAN) INT-REL OFFRD WTHR  CRASH TYP  TRLR QTY  MOVE                        A S
INVEST  E L M H R  DAY/TIME   COUNTY      CMPT/MLG  FIRST  STREET      RD CHAR   LEGS   TRAF-   RNDBT SURF  COLL TYP   OWNER     FROM        PRTC INJ      G E LICNS PED
UNLOC?  D C J L K  LAT/LONG   CITY        MILEPNT   SECOND STREET      DIRECT  (#LANES) CNTL    DRVWY LIGHT SVRTY   V# VEH TYPE  TO       P# TYPE SVRTY  E X RES   LOC ERROR   ACTN EVENT   CAUSE
                              URBAN AREA  LRS       INTERSECTION SEQ#  LOCTN
                                                                                                            02 NONE    0 STOP
                                                                                                               PRVTE     SW NE                                         011           00
                                                                                                               PSNGR CAR           01 DRVR NONE  00 M OR-Y      000    000           00
                                                                                                                                                      OR<25
01834   Y Y N N N  03/19/2016 WASHINGTON  2    14                     INTER    CROSS   N        N CLD S-1STOP   01 NONE    0 STRGHT                                             013      07,30
CITY        N      Sat    6P  SHERWOOD    MN   0   SW PACIFIC HY 99W  SW               TRF SIGNAL N DRY REAR       PRVTE     SW NE                                         000           00
                              PORTLAND UA  16.66   SW SUNSET BLVD     06         0              N DAY INJ          PSNGR CAR           01 DRVR NONE  23 M NONE   043,050   000           07,30
No        45 21  11.45 -122 52   3.31     009100200S00            1                                                                                   OR<25
                                                                                                            02 NONE    0 STOP
                                                                                                               PRVTE     SW NE                                         012  013      00
                                                                                                               PSNGR CAR           01 DRVR INJC  46 M OR-Y      000    000           00
                                                                                                                                                      OR<25
                                                                                                                                   02 PSNG INJC  28 F           000    000           00
                                                                                                            03 NONE    0 STOP
                                                                                                               PRVTE     SW NE                                         022           00
                                                                                                               PSNGR CAR           01 DRVR NONE  34 M OR-Y      000    000           00
                                                                                                                                                      OR<25
02965   N N N      05/06/2016 WASHINGTON  2    14                     INTER    CROSS   N        N CLR S-1STOP   01 NONE    0 STRGHT                                                      29
NONE        N      Fri    8A  SHERWOOD    MN   0   SW PACIFIC HY 99W  SW               TRF SIGNAL N DRY REAR       PRVTE     SW NE                                         000           00
                              PORTLAND UA  16.66   SW SUNSET BLVD     06         0              N DAY INJ          PSNGR CAR           01 DRVR NONE  32 M OR-Y      026    000           29
No        45 21  11.45 -122 52   3.31     009100200S00            1                                                                                   OR<25
                                                                                                            02 NONE    0 STOP
                                                                                                               PRVTE     SW NE                                         011           00
                                                                                                               PSNGR CAR           01 DRVR INJC  40 M OR-Y      000    000           00
                                                                                                                                                      OR<25
06420   N N N N N  09/22/2016 WASHINGTON  2    14                     INTER    CROSS   N        N CLD S-STRGHT  01 NONE    0 STRGHT                                             087      07
CITY        N      Thu    5P  SHERWOOD    MN   0   SW PACIFIC HY 99W  SW               TRF SIGNAL N SNO REAR       PRVTE     SW NE                                         000  087      00
                              PORTLAND UA  16.66   SW SUNSET BLVD     06         0              N DAY INJ          PSNGR CAR           01 DRVR NONE  17 M OR-Y      043    000           07
No        45 21  11.45 -122 52   3.31     009100200S00            1                                                                                   OR<25
                                                                                                            02 NONE    0 STRGHT
                                                                                                               PRVTE     SW NE                                         006  087      00
                                                                                                               PSNGR CAR           01 DRVR INJC  28 F OR-Y      000    000           00
                                                                                                                                                      OR<25
08928   N N N      12/25/2016 WASHINGTON  2    14                     INTER    CROSS   N        N CLR S-1STOP   01 NONE    0 STRGHT                                                      29
NONE        N      Sun   12P  SHERWOOD    MN   0   SW PACIFIC HY 99W  SW               TRF SIGNAL N DRY REAR       PRVTE     SW NE                                         000           00
                              PORTLAND UA  16.66   SW SUNSET BLVD     06         0              N DAY INJ          PSNGR CAR           01 DRVR NONE  58 M OR-Y      026    000           29
No        45 21  11.45 -122 52   3.31     009100200S00            1                                                                                   OR<25
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091 PACIFIC HIGHWAY WEST

99W Pacific Highway West (091) & SW Elwert Rd / SW Sunset Blvd
January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	S P E D	A L C	G M J	S H L	W O R K	DATE / DAY/TIME / *LAT/LONG*	COUNTY / CITY / URBAN AREA	RD# / CMPT/MLG / MILEPNT / LRS	FC / CONN # / FIRST STREET / SECOND STREET / INTERSECTION SEQ#	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CNTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / VEH TYPE	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	A G E	S E X	LICNS RES	PED LOC	ERROR	ACTN EVENT	CAUSE
																02	NONE 0 PRVTE	STOP SW NE									011	00
																	PSNGR CAR		01	DRVR	INJC	59	F	OR-Y OR<25		000	000	00
																			02	PSNG	INJC	40	M			000	000	00
																			03	PSNG	INJC	54	M			000	000	00
07321	N	N	N	N	N	11/18/2017	WASHINGTON	2 14		INTER	CROSS	N	N	FOG	S-STRGHT	01	NONE 9	STRGHT										07
CITY		N		Sat	8P	SHERWOOD	MN 0	SW PACIFIC HY 99W		SW		TRF SIGNAL	N	DRY	REAR		N/A	SW NE									000	00
							PORTLAND UA	16.66	SW SUNSET BLVD	06	0		N	DARK	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK	000	000	000	00
No	*45*	*21*	*11.45*	*-122*	*52*	*3.31*	009100200S00		1									UNK										
																02	NONE 9 N/A	STRGHT SW NE									006	00
																	PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK	000	000	000	00
04827	N	N	N	N	N	08/24/2015	WASHINGTON	2 14		INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE 0	STRGHT										04
CITY		N		Mon	1P	SHERWOOD	MN 0	SW PACIFIC HY 99W		CN		TRF SIGNAL	N	DRY	TURN		PRVTE	SW NE									000	00
							PORTLAND UA	16.66	SW SUNSET BLVD	02	0		N	DAY	INJ		PSNGR CAR		01	DRVR	INJB	93	F	OR-Y OR<25	020	000	000	04
No	*45*	*21*	*11.45*	*-122*	*52*	*3.31*	009100200S00		1																			
																02	NONE 0 PRVTE	TURN-L SE SW									000	00
																	PSNGR CAR		01	DRVR	INJB	35	F	OR-Y OR<25	000	000	000	00
																			02	PSNG	INJC	05	M		000	000	000	00
06861	N	N	N	N	N	10/30/2017	WASHINGTON	2 14		INTER	CROSS	N	N	CLR	O-1 L-TURN	01	NONE 9	TURN-L										04
CITY		N		Mon	6A	SHERWOOD	MN 0	SW ELWERT RD		CN		TRF SIGNAL	N	DRY	TURN		N/A	SE SW									000	00
							PORTLAND UA	16.66	SW PACIFIC HY 99W	03	0		N	DLIT	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK	000	000	000	00
No	*45*	*21*	*11.45*	*-122*	*52*	*3.31*	009100200S00		1									UNK										
																02	NONE 9 N/A	STRGHT NW SE									000	00
																	PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK	000	000	000	00
00574	N	N	N	N	N	01/31/2014	WASHINGTON	2 14		INTER	CROSS	N	N	CLD	O-1 L-TURN	01	NONE 0	STRGHT										04
CITY		N		Fri	2P	SHERWOOD	MN 0	SW PACIFIC HY 99W		CN		L-GRN-SIG	N	WET	TURN		PRVTE	SW NE									000	00
							PORTLAND UA	16.66	SW SUNSET BLVD	04	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	16	F	OR-Y OR<25	020	000	000	04
No	*45*	*21*	*11.45*	*-122*	*52*	*3.31*	009100200S00		1																			
																02	NONE 0 PRVTE	TURN-L NE SE									000	00
																	PSNGR CAR		01	DRVR	NONE	37	F	OR-Y OR<25	000	000	000	00

091 PACIFIC HIGHWAY WEST

99W Pacific Highway West (091) & SW Elwert Rd / SW Sunset Blvd
January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	S P E D	A L C	D R U G / M J	S W C H K	O R	DATE / DAY/TIME / *LAT/LONG*	COUNTY / CITY / URBAN AREA	RD# FC / CMPT/MLG / MILEPNT / LRS	CONN # / FIRST STREET / SECOND STREET / INTERSECTION SEQ#	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CNTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / VEH TYPE	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	A G E	S E X	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
05152	N	N	N	N N		08/23/2017	WASHINGTON	2 14		INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE 0	STRGHT										04
CITY		N				Wed 12P	SHERWOOD	MN 0	SW PACIFIC HY 99W	CN		TRF SIGNAL	N	DRY	ANGL		PRVTE	SW NE									000		00
							PORTLAND UA	16.66	SW SUNSET BLVD	04	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	59	M	EXP	020		000		04
No						*45 21 11.45 -122 52 3.31*		009100200S00	1															OR<25					
																02	NONE 0	STRGHT									000		00
																	PRVTE	NW SE											
																	PSNGR CAR		01	DRVR	INJC	36	F	OR-Y	000		000		00
																								OR<25					
																03	NONE 0	TURN-R									022		00
																	PRVTE	SE NE											
																	PSNGR CAR		01	DRVR	INJC	19	F	OR-Y	000		000		00
																								OR<25					
06134	N	N	N	N N		10/21/2013	WASHINGTON	1 14		INTER	CROSS	N	N	CLR	S-1STOP	01	NONE 0	STRGHT										002	27,07
CITY		N				Mon 4P		MN 0		NE		TRF SIGNAL	N	DRY	REAR		PRVTE	NE SW									000		00
							PORTLAND UA	16.67		06	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	23	F	OR-Y	016,043,026		038	002	27,07
No						*45 21 11.85 -122 52 4.18*		009100100S00																OR<25					
																			02	PSNG	NO<5	03	M		000		010		00
																02	NONE 0	STOP									011		00
																	PRVTE	NE SW											
																	PSNGR CAR		01	DRVR	NONE	64	F	OR-Y	000		000		00
																								OR<25					
03548	N	N	N	N N		06/25/2014	WASHINGTON	1 14		INTER	CROSS	N	N	CLR	S-1STOP	01	NONE 1	STRGHT											07
CITY		N				Wed 9A		MN 0		NE		TRF SIGNAL	N	DRY	REAR		PRVTE	NE SW									000		00
							PORTLAND UA	16.67		06	0		N	DAY	PDO		SEMI TOW		01	DRVR	NONE	63	M	OTH-Y	043,026		000		07
No						*45 21 11.85 -122 52 4.18*		009100100S00																N-RES					
																02	NONE 0	STOP									011		00
																	PRVTE	NE SW											
																	PSNGR CAR		01	DRVR	NONE	39	F	OR-Y	000		000		00
																								OR<25					
00404	N	N	N	N N		01/23/2015	WASHINGTON	1 14		INTER	CROSS	N	N	CLR	O-1 L-TURN	01	NONE 0	STRGHT											04
COUNTY		N				Fri 6A		MN 0		CN		TRF SIGNAL	N	DRY	TURN		PRVTE	N S									000		00
							PORTLAND UA	16.67		01	0		N	DLIT	INJ		PSNGR CAR		01	DRVR	INJC	26	M	OR-Y	020		000		04
No						*45 21 11.85 -122 52 4.18*		009100100S00																OR<25					
																02	NONE 0	TURN-L									000		00
																	PRVTE	S W											
																	PSNGR CAR		01	DRVR	INJC	29	M	OR-Y	000		000		00
																								OR>25					

091 PACIFIC HIGHWAY WEST

99W Pacific Highway West (091) & SW Elwert Rd / SW Sunset Blvd
January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	S P E D	A L C	D R U G M J	S H K	W O R	DATE / DAY/TIME / *LAT/LONG*	COUNTY / CITY / URBAN AREA	RD# / CMPT/MLG / MILEPNT / LRS	FC / CONN # / FIRST STREET / SECOND STREET / INTERSECTION SEQ#	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CNTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / VEH TYPE	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	A G E	S E X	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
03342	N	N	N	N	N	06/06/2017	WASHINGTON	1 14		INTER	CROSS	N	N	CLR	O-1 L-TURN	01	NONE 0	TURN-L										087	27,04
CITY		N				Tue 2P		MN 0		CN		TRF SIGNAL	N	DRY	TURN		PRVTE	S W									000		00
							PORTLAND UA	16.67		01	0		N	DAY	INJ		PSNGR CAR		01	DRVR	INJB	21	M	OR-Y		016,004,020	038		27,04
No		*45 21*	*11.85*	*-122 52*	*4.18*			009100100S00																OR>25				
																02	NONE 0	STRGHT									000	087	00
																	PRVTE	N S											
																	PSNGR CAR		01	DRVR	INJC	25	F	OR-Y		000	000		00
																								OR<25					
																			02	PSNG	NO<5	01	F			000	000		00
																			03	PSNG	NO<5	02	F			000	000		00
03825	N	N	N			07/08/2015	WASHINGTON	1 14		INTER	CROSS	N	N	CLR	BIKE	01	NONE 0	TURN-L											02
NONE		N				Wed 7P		MN 0		CN		TRF SIGNAL	N	DRY	TURN		PRVTE	SE SW									000		00
							PORTLAND UA	16.67		03	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	25	F	OTH-Y		027	000		02
No		*45 21*	*11.85*	*-122 52*	*4.18*			009100100S00																OR<25				
																		STRGHT	01	BIKE	INJB	23	M		02	000	035		00
																		NW SE											

OREGON DEPARTMENT OF TRANSPORTATION – TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION – CRASH ANALYSIS AND REPORTING UNIT
COUNTY ROAD CRASH LISTING

WASHINGTON COUNTY

99W Pacific Highway West (091) & SW Elwert Rd / SW Sunset Blvd
January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	SPEED	ALC	DRUGS	SCHL	WORK	DATE / DAY/TIME / LAT/LONG	MILEPNT / DIST FROM / INTERSECT	COUNTY ROADS / FIRST STREET / SECOND STREET / INTERSECTION SEQ #	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS / (#LANES)	INT-REL / TRAF- / CONTL	OFF-RD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
04232	N	N	N			7/9/2014		SW ELWERT RD	INTER	CROSS	N		N	CLR	S-1STOP	01	NONE 0	STRGHT											07
NONE			N			Wed 4P	0	SW PACIFIC HY 99W	NW		TRF SIGNAL		N	DRY	REAR		PRVTE	NW SE										000	00
No						45 21 11.85 -122 52 4.18		1	06	0			N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	M	OR-Y OR<25		026	000	07
																02	NONE 0	STOP											
																	PRVTE	NW SE										011	00
																	PSNGR CAR		01	DRVR	NONE	40	M	OR-Y OR<25		000	000	00

CITY OF SHERWOOD, WASHINGTON COUNTY

99W Pacific Highway West (091) & SW Elwert Rd / SW Sunset Blvd
January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	SPEED	ALC	DRUG / MJ	SCHL	WORK	DATE / DAY/TIME / *LAT/LONG*	FC / DISTNC	CITY STREET / FIRST STREET / SECOND STREET / INTERSECTION SEQ #	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS / (#LANES)	INT-REL / TRAF- / CONTL	OFF-RD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
02740	N	N	N			05/20/2015	17	SW PACIFIC HY 99W	INTER	CROSS	N	N	CLR	S-1STOP	01	NONE 0	STRGHT											29
NONE			N			Wed 1P	0	SW SUNSET BLVD	SE		TRF SIGNAL	N	DRY	REAR		PRVTE	SE NW										000		00
No						*45 21 11.45*		1	06	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	M	UNK UNK		026	000		29
															02	NONE 0	STOP											
																PRVTE	SE NW										011		00
																PSNGR CAR		01	DRVR	NONE	23	F	OR-Y OR>25		000	000		00

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

SW Woodhaven Dr & SW Sunset Blvd
January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2017														
REAR-END	0	0	1	1	0	0	0	0	1	1	0	1	0	0
TURNING MOVEMENTS	0	0	1	1	0	0	0	0	1	1	0	1	0	0
2017 TOTAL	0	0	2	2	0	0	0	0	2	2	0	2	0	0
FINAL TOTAL	0	0	2	2	0	0	0	0	2	2	0	2	0	0

Disclaimers: *Effective 2016,* ***collection of "Property Damage Only" (PDO) crash data elements was reduced for vehicles and participants.*** *Age, Gender, License, Error and other elements are no longer available for PDO crash reporting. Please keep this in mind when comparing 2016 PDO crash data to prior years.*

A higher number of crashes may be reported as of 2011 compared to prior years. This does not necessarily reflect an increase in annual crashes. The higher numbers may result from a change to an internal departmental process that allows the Crash Analysis and Reporting Unit to add previously unavailable, non-fatal crash reports to the annual data file. Please be aware of this change when comparing pre-2011 crash statistics. For all disclaimers, see ***https://www.oregon.gov/ODOT/Data/documents/Crash_Data_Disclaimers.pdf.***

CITY OF SHERWOOD, WASHINGTON COUNTY

SW Woodhaven Dr & SW Sunset Blvd

January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	SPEED	ALC	DRUG/ MJ	SCHL	SWORK	DATE / DAY/TIME / *LAT/LONG*	FC / DISTNC	CITY STREET / FIRST STREET / SECOND STREET / INTERSECTION SEQ #	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CONTL	OFF-RD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
06431	N	N	N	N	N	10/14/2017	17	SW SUNSET BLVD	INTER	CROSS	N	N	CLD	S-1STOP	01	NONE 9	STRGHT											27,07
CITY			N			Sat 4P	0	SW WOODHAVEN DR	N		STOP SIGN	N	WET	REAR		N/A	N S										000		00
No	45	21	6.37	-122	51	57.09	1	06	0			N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
															02	NONE 9	STOP										011		00
																N/A	N S												
																PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
01904	N	N	N	N	N	04/06/2017	17	SW SUNSET BLVD	INTER	CROSS	N	N	CLD	ANGL-OTH	01	NONE 9	STRGHT											03
CITY			N			Thu 1P	0	SW WOODHAVEN DR	CN		STOP SIGN	N	WET	TURN		N/A	S N									000		00
No	45	21	6.37	-122	51	57.09	1	03	0			N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
															02	NONE 9	TURN-L										000		00
																N/A	W N												
																PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

SW Timbrel Ln & SW Sunset Blvd
January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR:														
TOTAL														
FINAL TOTAL														

Disclaimers: *Effective 2016,* ***collection of "Property Damage Only" (PDO) crash data elements was reduced for vehicles and participants.*** *Age, Gender, License, Error and other elements are no longer available for PDO crash reporting. Please keep this in mind when comparing 2016 PDO crash data to prior years.*

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OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

SW Ladd Hill Rd / SW Main St & SW Sunset Blvd
January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2017														
ANGLE	0	0	1	1	0	0	0	0	1	0	1	1	0	0
2017 TOTAL	0	0	1	1	0	0	0	0	1	0	1	1	0	0
YEAR: 2016														
REAR-END	0	0	1	1	0	0	0	1	0	1	0	1	0	0
TURNING MOVEMENTS	0	1	0	1	0	1	0	1	0	0	1	1	0	0
2016 TOTAL	0	1	1	2	0	1	0	2	0	1	1	2	0	0
YEAR: 2015														
REAR-END	0	1	0	1	0	1	0	1	0	0	1	1	0	0
TURNING MOVEMENTS	0	0	1	1	0	0	0	1	0	1	0	1	0	0
2015 TOTAL	0	1	1	2	0	1	0	2	0	1	1	2	0	0
YEAR: 2013														
FIXED / OTHER OBJECT	0	1	0	1	0	1	0	1	0	0	1	1	0	1
2013 TOTAL	0	1	0	1	0	1	0	1	0	0	1	1	0	1
FINAL TOTAL	0	3	3	6	0	3	0	5	1	2	4	6	0	1

Disclaimers: *Effective 2016,* ***collection of "Property Damage Only" (PDO) crash data elements was reduced for vehicles and participants.*** *Age, Gender, License, Error and other elements are no longer available for PDO crash reporting. Please keep this in mind when comparing 2016 PDO crash data to prior years.*

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CITY OF SHERWOOD, WASHINGTON COUNTY

SW Ladd Hill Rd / SW Main St & SW Sunset Blvd

January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	SPEED	ALC	DRUG/MJ	SCHL	SWORK	DATE / DAY/TIME / LAT/LONG	FC / DISTNC	CITY STREET / FIRST STREET / SECOND STREET / INTERSECTION SEQ #	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CONTL	OFF-RD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
06745	N	N	N			04/20/2013	16	SW LADD HILL RD	INTER	CROSS	N	Y	CLR	FIX OBJ	01	NONE 0	TURN-L										079	08
NO RPT			N			Sat 9P	0	SW SUNSET BLVD	S		STOP SIGN	N	DRY	FIX		PRVTE	E S									000	079	00
No	45	2C	59.00	-122	50 29.11		1		05	0		N	DLIT	INJ		PSNGR CAR		01	DRVR	INJB	18	M	OR-Y OR<25		001	000		08
00519	N	Y	N	N	N	01/22/2016	17	SW LADD HILL RD	INTER	CROSS	N	N	CLR	ANGL-STP	01	NONE 0	TURN-R											08
CITY			N			Fri 8P	0	SW SUNSET BLVD	S		STOP SIGN	N	DRY	TURN		PRVTE	W S									000		00
No	45	2C	59.00	-122	50 29.11		1		06	0		N	DLIT	INJ		PSNGR CAR		01	DRVR	NONE	44	F	OR-Y OR<25		001	000		08
															02	NONE 0	STOP									012		00
																PRVTE	S N											
																PSNGR CAR		01	DRVR	NONE	37	M	OTH-Y N-RES		000	000		00
															03	NONE 0	STOP									012		00
																PRVTE	S N											
																PSNGR CAR		01	DRVR	INJC	38	M	OR-Y OR<25		000	000		00
05834	N	N	N			08/30/2016	16	SW LADD HILL RD	INTER	CROSS	N	N	CLR	S-1STOP	01	NONE 9	STRGHT											29
NONE			N			Tue 7A	0	SW SUNSET BLVD	W		STOP SIGN	N	DRY	REAR		N/A	W E									000		00
No	45	2C	59.00	-122	50 29.11		1		06	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
															02	NONE 9	STOP									011		00
																N/A	W E											
																PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
01656	N	N	N	N	N	03/30/2015	16	SW MAIN ST	INTER	CROSS	N	N	CLR	S-1STOP	01	NONE 0	STRGHT											29
CITY			N			Mon 7P	0	SW SUNSET BLVD	E		STOP SIGN	N	DRY	REAR		PRVTE	E W									000		00
No	45	2C	59.00	-122	50 29.11		1		06	0		N	DLIT	INJ		PSNGR CAR		01	DRVR	NONE	22	F	OR-Y OR<25		026	000		29
															02	NONE 0	STOP									011		00
																PRVTE	E W											
																PSNGR CAR		01	DRVR	INJC	37	F	OR-Y OR<25		000	000		00
06555	N	N	N			10/19/2017	16	SW MAIN ST	INTER	CROSS	N	N	RAIN	ANGL-OTH	01	NONE 9	STRGHT											02
NO RPT			N			Thu 6A	0	SW SUNSET BLVD	CN		STOP SIGN	N	WET	ANGL		N/A	S N									000		00
No	45	2C	59.00	-122	50 29.11		1		02	0		N	DLIT	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
															02	NONE 9	STRGHT									000		00
																N/A	E W											
																PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00

CITY OF SHERWOOD, WASHINGTON COUNTY

SW Ladd Hill Rd / SW Main St & SW Sunset Blvd
January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	SPEED	ALC	DRUG / JML	SCHL	WORK	DATE / DAY/TIME / *LAT/LONG*	FC / DISTNC	CITY STREET / FIRST STREET / SECOND STREET / INTERSECTION SEQ #	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CONTL	OFF-RD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
03798	N	N	N	N	N	07/07/2015	16	SW MAIN ST	INTER	CROSS	N	N	CLR	O-1 L-TURN	01	NONE 0	STRGHT											02
CITY			N			Tue 5P	0	SW SUNSET BLVD	CN		STOP SIGN	N	DRY	TURN		PRVTE	W E									015		00
No	*45 20 59.00*					*-122 50 29.11*		1	03	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	50	F	OR-Y OR<25		000	000		00
															02	NONE 0	TURN-L											
																PRVTE	E S									015		00
																PSNGR CAR		01	DRVR	NONE	61	F	OR-Y OR<25		004,028	000		02

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

SW Baker Rd / SW Murdock Rd & SW Sunset Blvd
January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2017														
REAR-END	0	1	1	2	0	4	1	1	1	2	0	2	0	0
2017 TOTAL	0	1	1	2	0	4	1	1	1	2	0	2	0	0
FINAL TOTAL	0	1	1	2	0	4	1	1	1	2	0	2	0	0

Disclaimers: *Effective 2016,* ***collection of "Property Damage Only" (PDO) crash data elements was reduced for vehicles and participants.*** *Age, Gender, License, Error and other elements are no longer available for PDO crash reporting. Please keep this in mind when comparing 2016 PDO crash data to prior years.*

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CITY OF SHERWOOD, WASHINGTON COUNTY

SW Baker Rd / SW Murdock Rd & SW Sunset Blvd
January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	SPEED	ALC	DRUG / MC	SCHL	WORK	DATE / DAY/TIME / *LAT/LONG*	FC / DISTNC	CITY STREET / FIRST STREET / SECOND STREET / INTERSECTION SEQ #	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CONTL	OFF-RD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
03869	N	N	N	N	N	06/27/2017	16	MURDOCK RD	INTER	CROSS	N	N	CLR	S-1STOP	01	NONE 0	STRGHT											07
CITY			N			Tue 4P	0	SUNSET BLVD	N		STOP SIGN	N	DRY	REAR		PRVTE	N S										000		00
No	*45 2C 58.65*					*-122 49 36.96*		1	06	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	19	F	OR-Y OR<25		043	000		07
															02	NONE 0	STOP										011		00
																PRVTE	N S												
																PSNGR CAR		01	DRVR	INJC	29	F	OR-Y OR<25		000	000		00
																		02	PSNG	INJC	01	M			000	000		00
																		03	PSNG	INJC	05	F			000	000		00
																		04	PSNG	INJC	03	M			000	000		00
06072	N	N	N			09/30/2017	16	MURDOCK RD	INTER	CROSS	N	N	CLD	S-1STOP	01	NONE 9	STRGHT											29
CITY			N			Sat 1P	0	SUNSET BLVD	N		STOP SIGN	N	WET	REAR		N/A	N S									000		00
No	*45 2C 58.65*					*-122 49 36.96*		1	06	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
															02	NONE 9	STOP										011		00
																N/A	N S												
																TRUCK		01	DRVR	NONE	00	U	UNK UNK		000	000		00

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

99W Pacific Highway West (091) & SW Brookman Rd / SW Chapman Rd
January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2017														
ANGLE	0	2	2	4	0	2	0	1	3	1	3	4	0	0
REAR-END	0	0	1	1	0	0	0	0	1	1	0	1	0	0
TURNING MOVEMENTS	0	0	3	3	0	0	0	2	1	3	0	3	0	0
2017 TOTAL	0	2	6	8	0	2	0	3	5	5	3	8	0	0
YEAR: 2016														
ANGLE	0	0	1	1	0	0	0	0	1	1	0	1	0	0
TURNING MOVEMENTS	0	0	1	1	0	0	0	1	0	1	0	1	0	0
2016 TOTAL	0	0	2	2	0	0	0	1	1	2	0	2	0	0
YEAR: 2015														
ANGLE	0	1	0	1	0	1	0	1	0	1	0	1	0	0
TURNING MOVEMENTS	0	0	2	2	0	0	0	1	1	1	1	2	0	0
2015 TOTAL	0	1	2	3	0	1	0	2	1	2	1	3	0	0
YEAR: 2014														
ANGLE	0	2	0	2	0	3	0	1	1	1	1	2	0	0
TURNING MOVEMENTS	0	0	1	1	0	0	0	1	0	1	0	1	0	0
2014 TOTAL	0	2	1	3	0	3	0	2	1	2	1	3	0	0
YEAR: 2013														
ANGLE	0	0	1	1	0	0	0	0	1	1	0	1	0	0
2013 TOTAL	0	0	1	1	0	0	0	0	1	1	0	1	0	0
FINAL TOTAL	0	5	12	17	0	6	0	8	9	12	5	17	0	0

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OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CONTINUOUS SYSTEM CRASH LISTING

091 PACIFIC HIGHWAY WEST

99W Pacific Highway West (091) & SW Brookman Rd / SW Chapman Rd
January 1, 2013 through December 31, 2017

```
            D
            R
        S   U
        P   G S W                                                               INT-TYP                                         SPCL USE
SER#    E A / C O  DATE           COUNTY         RD#  FC    CONN #               RD CHAR  (MEDIAN)  INT-REL  OFFRD WTHR  CRASH TYP  TRLR QTY  MOVE                     A  S
INVEST  E L M H R  DAY/TIME       CITY           CMPT/MLG   FIRST  STREET        DIRECT     LEGS    TRAF-    RNDBT SURF  COLL TYP   OWNER     FROM      PRTC INJ      G  E LICNS PED
UNLOC?  D C J L K  LAT/LONG       URBAN AREA     MILEPNT    SECOND STREET        LOCTN   (#LANES)   CNTL     DRVWY LIGHT SVRTY   V# VEH TYPE  TO     P# TYPE SVRTY  E  X RES   LOC  ERROR   ACTN EVENT   CAUSE
                                                 LRS        INTERSECTION SEQ#
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
00536   Y N N N N  01/28/2017     WASHINGTON     2    14                         INTER    CROSS     N        N CLR   ANGL-STP   01 NONE   9 TURN-R                                                        01,08
COUNTY      N      Sat     4P                    MN    0                         E                  STOP SIGN N DRY  TURN          N/A      S  E                                               000      00
                                  PORTLAND UA    17.46                           06         0                N DAY   PDO          PSNGR CAR          01 DRVR NONE  00 U UNK         000        000      00
No      45 20  32.90 -122 52  24.87              009100200S00                                                                                                  UNK

                                                                                                                                02 NONE   9 STOP
                                                                                                                                   N/A      E  W                                               011      00
                                                                                                                                  PSNGR CAR          01 DRVR NONE  00 U UNK         000        000      00
                                                                                                                                                                   UNK

05762   N N N N N  09/18/2017     WASHINGTON     2    14                         INTER    CROSS     N        N RAIN  ANGL-OTH   01 NONE   9 STRGHT                                                        27,02
COUNTY      N      Mon    10A                    MN    0                         S                  STOP SIGN N WET  TURN          N/A      N  S                                               000      00
                                  PORTLAND UA    17.46                           03         0                N DAY   PDO          PSNGR CAR          01 DRVR NONE  00 U UNK         000        000      00
No      45 20  32.90 -122 52  24.87              009100200S00                                                                                                  UNK

                                                                                                                                02 NONE   9 TURN-R
                                                                                                                                   N/A      W  S                                               000      00
                                                                                                                                  PSNGR CAR          01 DRVR NONE  00 U UNK         000        000      00
                                                                                                                                                                   UNK

02243   N N N N N  04/27/2015     WASHINGTON     2    14                         INTER    CROSS     N        N CLR   ANGL-OTH   01 NONE   0 STRGHT                                                        02
COUNTY      N      Mon     2P                    MN    0                         CN                 STOP SIGN N DRY  ANGL          PRVTE    S  N                                               000      00
                                  PORTLAND UA    17.46                           01         0                N DAY   INJ          MTRCYCLE           01 DRVR INJA  68 M OTH-Y       000        000      00
No      45 20  32.90 -122 52  24.87              009100200S00                                                                                                  N-RES

                                                                                                                                02 NONE   0 STRGHT
                                                                                                                                   PRVTE    E  W                                               015      00
                                                                                                                                  PSNGR CAR          01 DRVR NONE  74 F OR-Y        028        000      02
                                                                                                                                                                   OR<25

05349   N N N      09/22/2013     WASHINGTON     2    14                         INTER    CROSS     N        N RAIN  ANGL-OTH   01 NONE   0 STRGHT                                                        02
NONE        N      Sun    11A                    MN    0                         CN                 STOP SIGN N WET  ANGL          PRVTE    E  W                                               000      00
                                  PORTLAND UA    17.46                           02         0                N DAY   PDO          PSNGR CAR          01 DRVR NONE  00 F OR-Y        028        000      02
No      45 20  32.90 -122 52  24.87              009100200S00                                                                                                  OR>25

                                                                                                                                02 NONE   0 STRGHT
                                                                                                                                   PRVTE    S  N                                               000      00
                                                                                                                                  PSNGR CAR          01 DRVR NONE  73 F OR-Y        000        000      00
                                                                                                                                                                   OR<25
                                                                                                                                                     02 PSNG NO<5  03 F             000        000      00

03099   N N N      06/03/2014     WASHINGTON     2    14                         INTER    CROSS     N        N CLR   ANGL-OTH   01 NONE   0 TURN-L                                                        08
NO RPT      N      Tue     5P                    MN    0                         CN                 STOP SIGN N DRY  TURN          PRVTE    W  N                                               000      00
                                  PORTLAND UA    17.46                           02         0                N DAY   PDO          PSNGR CAR          01 DRVR NONE  00 F UNK         001        000      08
No      45 20  32.90 -122 52  24.87              009100200S00                                                                                                  OR<25
```

091 PACIFIC HIGHWAY WEST

99W Pacific Highway West (091) & SW Brookman Rd / SW Chapman Rd
January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	P E D	A L R	G M U	S H	W R	C K	O	DATE / DAY/TIME / *LAT/LONG*	COUNTY / CITY / URBAN AREA	RD# FC / CMPT/MLG / MILEPNT / LRS	CONN # / FIRST STREET / SECOND STREET / INTERSECTION SEQ#	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CNTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / VEH TYPE	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	A G E	S E X	LICNS RES	PED LOC	ERROR	ACTN EVENT	CAUSE
																		02	NONE 0 PRVTE	STRGHT S N									000	00
																			PSNGR CAR		01	DRVR	NONE	32	F	OTH-Y N-RES	000		000	00
03254	N	N	N					05/18/2016	WASHINGTON	2 14		INTER	CROSS	N		N	CLR	O-1 L-TURN	01	NONE 9 N/A	TURN-L W N										02
NO RPT			N					Wed 6A		MN 0		CN		STOP SIGN		N	DRY	TURN												000	00
									PORTLAND UA	17.46		02	0			N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK	000		000	00
No	*45*	*20*	*32.90*	*-122*	*52*	*24.87*				009100200S00																					
																		02	NONE 9 N/A	STRGHT E W									000	00
																			PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK	000		000	00
07481	N	N	N	N	N	N		11/25/2017	WASHINGTON	2 14		INTER	CROSS	N		N	CLD	ANGL-OTH	01	NONE 9 N/A	STRGHT W E										02,32
COUNTY			N					Sat 8P		MN 0		CN		STOP SIGN		N	WET	ANGL												000	00
									PORTLAND UA	17.46		04	0			N	DARK	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK	000		000	00
No	*45*	*20*	*32.90*	*-122*	*52*	*24.87*				009100200S00																					
																		02	NONE 9 N/A	STRGHT S N									000	00
																			PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK	000		000	00
06064	N	N	N					09/29/2017	WASHINGTON	1 14		INTER	CROSS	N		N	RAIN	S-1STOP	01	NONE 9 N/A	STRGHT N S										29
NONE			N					Fri 2P		MN 0		N		STOP SIGN		N	WET	REAR												000	00
									PORTLAND UA	17.47		06	0			N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK	000		000	00
No	*45*	*20*	*32.89*	*-122*	*52*	*26.13*				009100100S00																					
																		02	NONE 9 N/A	STRGHT N S									000	00
																			PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK	000		000	00
00236	N	N	N					01/15/2015	WASHINGTON	1 14		INTER	CROSS	N		N	RAIN	ANGL-OTH	01	NONE 0 PRVTE	STRGHT N S										02
COUNTY			N					Thu 5P		MN 0		CN		STOP SIGN		N	WET	TURN												000	00
									PORTLAND UA	17.47		01	0			N	DARK	PDO		PSNGR CAR		01	DRVR	NONE	20	M	OR-Y OR<25	000		000	00
No	*45*	*20*	*32.89*	*-122*	*52*	*26.13*				009100100S00																					
																		02	NONE 0 PRVTE	TURN-L E S									015	00
																			PSNGR CAR		01	DRVR	NONE	25	F	OR-Y OR<25	028		000	02

091 PACIFIC HIGHWAY WEST

99W Pacific Highway West (091) & SW Brookman Rd / SW Chapman Rd
January 1, 2013 through December 31, 2017

SER# INVEST UNLOC?	S P E E A L D C (DRUG, / M J, G C H L, S O R K, W)	DATE DAY/TIME LAT/LONG	COUNTY CITY URBAN AREA	RD# FC CMPT/MLG MILEPNT LRS	CONN # FIRST STREET SECOND STREET INTERSECTION SEQ#	RD CHAR DIRECT LOCTN	INT-TYP (MEDIAN) LEGS (#LANES)	INT-REL TRAF- CNTL	OFFRD RNDBT DRVWY	WTHR SURF LIGHT	CRASH TYP COLL TYP SVRTY	V#	SPCL USE TRLR QTY OWNER VEH TYPE	MOVE FROM TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN EVENT	CAUSE
08443	N N N N N	12/09/2016	WASHINGTON	1 14		INTER	CROSS	N	N	RAIN	ANGL-OTH	01	NONE 9	STRGHT										03
COUNTY	N	Fri 3P		MN 0		CN		STOP SIGN	N	WET	ANGL		N/A	N S									000	00
			PORTLAND UA	17.47		01	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK		000	000	00
No		45 20 32.89 -122 52 26.13		009100100S00																UNK				
												02	NONE 9	STRGHT										
													N/A	E W									000	00
													PSNGR CAR		01	DRVR	NONE	00	U	UNK		000	000	00
																				UNK				
01598	N N N	03/21/2017	WASHINGTON	1 14		INTER	CROSS	N	N	RAIN	ANGL-OTH	01	NONE 9	STRGHT										02
NO RPT	N	Tue 7A		MN 0		CN		STOP SIGN	N	WET	ANGL		N/A	E W									000	00
			PORTLAND UA	17.47		01	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK		000	000	00
No		45 20 32.89 -122 52 26.13		009100100S00																UNK				
												02	NONE 9	STRGHT										
													N/A	N S									000	00
													PSNGR CAR		01	DRVR	NONE	00	U	UNK		000	000	00
																				UNK				
07975	N N N	12/13/2017	WASHINGTON	1 14		INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE 0	STRGHT										03
COUNTY	N	Wed 7P		MN 0		CN		STOP SIGN	N	DRY	ANGL		PRVTE	E W									000	00
			PORTLAND UA	17.47		01	0		N	DARK	INJ		PSNGR CAR		01	DRVR	NONE	48	M	OR-Y		021	000	03
No		45 20 32.89 -122 52 26.13		009100100S00																OR<25				
												02	NONE 0	STRGHT										
													PRVTE	N S									000	00
													PSNGR CAR		01	DRVR	INJC	56	F	OR-Y		000	000	00
																				OR<25				
07202	N N N N N	12/01/2014	WASHINGTON	1 14		INTER	CROSS	N	N	CLD	ANGL-OTH	01	NONE 0	STRGHT										02
COUNTY	N	Mon 10A		MN 0		CN		STOP SIGN	N	DRY	ANGL		PRVTE	W E									015	00
			PORTLAND UA	17.47		03	0		N	DAY	INJ		PSNGR CAR		01	DRVR	INJA	56	F	OR-Y		028	000	02
No		45 20 32.89 -122 52 26.13		009100100S00																OR>25				
												02	NONE 0	STRGHT										
													PRVTE	N S									000	00
													PSNGR CAR		01	DRVR	NONE	29	F	OR-Y		000	000	00
																				OR<25				
															02	PSNG	INJC	00	F			000	000	00
02701	N N N	05/18/2015	WASHINGTON	1 14		INTER	CROSS	N	N	CLR	O-1 L-TURN	01	NONE 0	STRGHT										02
NO RPT	N	Mon 5P		MN 0		CN		STOP SIGN	N	DRY	TURN		PRVTE	W E									000	00
			PORTLAND UA	17.47		03	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	40	F	OR-Y		000	000	00
No		45 20 32.89 -122 52 26.13		009100100S00																OR<25				

091 PACIFIC HIGHWAY WEST

99W Pacific Highway West (091) & SW Brookman Rd / SW Chapman Rd
January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	SPEED / ALC / DRG / CMH / SWK	DATE / DAY/TIME / *LAT/LONG*	COUNTY / CITY / URBAN AREA	RD# FC CMPT/MLG MILEPNT LRS	CONN # FIRST STREET SECOND STREET INTERSECTION SEQ#	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) LEGS (#LANES)	INT-REL / TRAF- / CNTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / VEH TYPE	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
												02	NONE 0 PRVTE	TURN-L E S									000		00
													PSNGR CAR		01	DRVR	NONE	30	M	OR-Y OR<25		004,028	000		02
01335 COUNTY	N N N N N N	03/08/2017 Wed 5P	WASHINGTON	1 14 MN 0		INTER CN	CROSS	N STOP SIGN		N RAIN N WET	ANGL-OTH ANGL	01	NONE 0 PRVTE	STRGHT W E										058 000 053	02 00
No	*45 20 32.89 -122 52 26.13*	PORTLAND UA		17.47 009100100S00		03	0			N DUSK	INJ		PSNGR CAR		01	DRVR	INJB	27	M	OR-Y OR<25		000	000		00
												02	NONE 0 PRVTE	STRGHT N S									000		00
													PSNGR CAR		01	DRVR	NONE	18	F	OR-Y OR<25		028	000		02
05249 NONE	N N N N	08/27/2017 Sun 12P	WASHINGTON	1 14 MN 0		INTER CN	CROSS	N STOP SIGN		N CLR N DRY	O-1 L-TURN TURN	01	NONE 9 N/A	TURN-L E S											02 00
No	*45 20 32.89 -122 52 26.13*	PORTLAND UA		17.47 009100100S00		03	0			N DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
												02	NONE 9 N/A	STRGHT W E									000		00
													PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
00180 COUNTY	N N N N N N	01/11/2014 Sat 11P	WASHINGTON	1 14 MN 0		INTER CN	CROSS	N STOP SIGN		N RAIN N WET	ANGL-OTH ANGL	01	NONE 0 PRVTE	STRGHT S N											02 00
No	*45 20 32.89 -122 52 26.13*	PORTLAND UA		17.47 009100100S00		04	0			N DARK	INJ		PSNGR CAR		01	DRVR	INJC	30	F	OR-Y OR<25		000	000		00
												02	NONE 0 PRVTE	STRGHT W E									015		00
													PSNGR CAR		01	DRVR	NONE	16	M	OR-Y OR<25		028	000		02

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

SW Brookman Rd & SW Old Pacific Hwy 99W
January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR:														
TOTAL														
FINAL TOTAL														

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OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

SW Brookman Rd & SW Middleton Rd
January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2016														
TURNING MOVEMENTS	0	1	0	1	0	1	0	1	0	0	1	1	0	0
2016 TOTAL	0	1	0	1	0	1	0	1	0	0	1	1	0	0
FINAL TOTAL	0	1	0	1	0	1	0	1	0	0	1	1	0	0

Disclaimers: *Effective 2016,* ***collection of "Property Damage Only" (PDO) crash data elements was reduced for vehicles and participants.*** *Age, Gender, License, Error and other elements are no longer available for PDO crash reporting. Please keep this in mind when comparing 2016 PDO crash data to prior years.*

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CDS380 9/10/2019

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
COUNTY ROAD CRASH LISTING

SW Brookman Rd & SW Middleton Rd
January 1, 2013 through December 31, 2017

WASHINGTON COUNTY

SER# INVEST UNLOC?	S P E E D	A L C	D R U G / M J	S C H L	W O R K	DATE DAY/TIME *LAT/LONG*	MILEPNT DIST FROM INTERSECT	COUNTY ROADS FIRST STREET SECOND STREET INTERSECTION SEQ #	RD CHAR DIRECT LOCTN	INT-TYP (MEDIAN) LEGS (#LANES)	INT-REL TRAF-CONTL	OFF-RD RNDBT DRVWY	WTHR SURF LIGHT	CRASH TYP COLL TYP SVRTY	V#	SPCL USE TRLR QTY OWNER	MOVE FROM TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
08516	N	N	N	N	N	12/12/2016		SW BROOKMAN RD	INTER	CROSS	N	N	CLR	BIKE	01	NONE 0	TURN-L											02
COUNTY			N			Mon 6P	0	SW MIDDLETON RD	SW		STOP SIGN	N	DRY	TURN		PRVTE	SE SW									000		00
No						*45 20 32.70 -122 51 55.93*		1	05	0		N	DLIT	INJ		PSNGR CAR		01	DRVR	NONE	40	M	OR-Y OR<25		027	000		02
																	STRGHT NW SE	01	BIKE	INJB	15	M		01	000	035		00

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

SW Brookman Rd & SW Oberst Rd
January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR:														
TOTAL														
FINAL TOTAL														

Disclaimers: *Effective 2016,* ***collection of "Property Damage Only" (PDO) crash data elements was reduced for vehicles and participants.*** *Age, Gender, License, Error and other elements are no longer available for PDO crash reporting. Please keep this in mind when comparing 2016 PDO crash data to prior years.*

A higher number of crashes may be reported as of 2011 compared to prior years. This does not necessarily reflect an increase in annual crashes. The higher numbers may result from a change to an internal departmental process that allows the Crash Analysis and Reporting Unit to add previously unavailable, non-fatal crash reports to the annual data file. Please be aware of this change when comparing pre-2011 crash statistics. For all disclaimers, see https://www.oregon.gov/ODOT/Data/documents/Crash_Data_Disclaimers.pdf.

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

SW Brookman Rd & SW Ladd Hill Rd
January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR:														
TOTAL														
FINAL TOTAL														

Disclaimers: *Effective 2016,* ***collection of "Property Damage Only" (PDO) crash data elements was reduced for vehicles and participants.*** *Age, Gender, License, Error and other elements are no longer available for PDO crash reporting. Please keep this in mind when comparing 2016 PDO crash data to prior years.*

A higher number of crashes may be reported as of 2011 compared to prior years. This does not necessarily reflect an increase in annual crashes. The higher numbers may result from a change to an internal departmental process that allows the Crash Analysis and Reporting Unit to add previously unavailable, non-fatal crash reports to the annual data file. Please be aware of this change when comparing pre-2011 crash statistics. For all disclaimers, see https://www.oregon.gov/ODOT/Data/documents/Crash_Data_Disclaimers.pdf.

ACTION CODE TRANSLATION LIST

ACTION CODE	SHORT DESCRIPTION	LONG DESCRIPTION
000	NONE	NO ACTION OR NON-WARRANTED
001	SKIDDED	SKIDDED
002	ON/OFF V	GETTING ON OR OFF STOPPED OR PARKED VEHICLE
003	LOAD OVR	OVERHANGING LOAD STRUCK ANOTHER VEHICLE, ETC.
006	SLOW DN	SLOWED DOWN
007	AVOIDING	AVOIDING MANEUVER
008	PAR PARK	PARALLEL PARKING
009	ANG PARK	ANGLE PARKING
010	INTERFERE	PASSENGER INTERFERING WITH DRIVER
011	STOPPED	STOPPED IN TRAFFIC NOT WAITING TO MAKE A LEFT TURN
012	STP/L TRN	STOPPED BECAUSE OF LEFT TURN SIGNAL OR WAITING, ETC.
013	STP TURN	STOPPED WHILE EXECUTING A TURN
014	EMR V PKD	EMERGENCY VEHICLE LEGALLY PARKED IN THE ROADWAY
015	GO A/STOP	PROCEED AFTER STOPPING FOR A STOP SIGN/FLASHING RED.
016	TRN A/RED	TURNED ON RED AFTER STOPPING
017	LOSTCTRL	LOST CONTROL OF VEHICLE
018	EXIT DWY	ENTERING STREET OR HIGHWAY FROM ALLEY OR DRIVEWAY
019	ENTR DWY	ENTERING ALLEY OR DRIVEWAY FROM STREET OR HIGHWAY
020	STR ENTR	BEFORE ENTERING ROADWAY, STRUCK PEDESTRIAN, ETC. ON SIDEWALK OR SHOULDER
021	NO DRVR	CAR RAN AWAY - NO DRIVER
022	PREV COL	STRUCK, OR WAS STRUCK BY, VEHICLE OR PEDESTRIAN IN PRIOR COLLISION BEFORE ACC. STABILIZED
023	STALLED	VEHICLE STALLED OR DISABLED
024	DRVR DEAD	DEAD BY UNASSOCIATED CAUSE
025	FATIGUE	FATIGUED, SLEEPY, ASLEEP
026	SUN	DRIVER BLINDED BY SUN
027	HDLGHTS	DRIVER BLINDED BY HEADLIGHTS
028	ILLNESS	PHYSICALLY ILL
029	THRU MED	VEHICLE CROSSED, PLUNGED OVER, OR THROUGH MEDIAN BARRIER
030	PURSUIT	PURSUING OR ATTEMPTING TO STOP A VEHICLE
031	PASSING	PASSING SITUATION
032	PRKOFFRD	VEHICLE PARKED BEYOND CURB OR SHOULDER
033	CROS MED	VEHICLE CROSSED EARTH OR GRASS MEDIAN
034	X N/SGNL	CROSSING AT INTERSECTION - NO TRAFFIC SIGNAL PRESENT
035	X W/ SGNL	CROSSING AT INTERSECTION - TRAFFIC SIGNAL PRESENT
036	DIAGONAL	CROSSING AT INTERSECTION - DIAGONALLY
037	BTWN INT	CROSSING BETWEEN INTERSECTIONS
038	DISTRACT	DRIVER'S ATTENTION DISTRACTED
039	W/TRAF-S	WALKING, RUNNING, RIDING, ETC., ON SHOULDER WITH TRAFFIC
040	A/TRAF-S	WALKING, RUNNING, RIDING, ETC., ON SHOULDER FACING TRAFFIC
041	W/TRAF-P	WALKING, RUNNING, RIDING, ETC., ON PAVEMENT WITH TRAFFIC
042	A/TRAF-P	WALKING, RUNNING, RIDING, ETC., ON PAVEMENT FACING TRAFFIC
043	PLAYINRD	PLAYING IN STREET OR ROAD
044	PUSH MV	PUSHING OR WORKING ON VEHICLE IN ROAD OR ON SHOULDER
045	WORK ON	WORKING IN ROADWAY OR ALONG SHOULDER
046	W/ TRAFIC	NON-MOTORIST WALKING, RUNNING, RIDING, ETC. WITH TRAFFIC
047	A/ TRAFIC	NON-MOTORIST WALKING, RUNNING, RIDING, ETC. FACING TRAFFIC
050	LAY ON RD	STANDING OR LYING IN ROADWAY
051	ENT OFFRD	ENTERING / STARTING IN TRAFFIC LANE FROM OFF ROAD
052	MERGING	MERGING

ACTION CODE TRANSLATION LIST

ACTION CODE	SHORT DESCRIPTION	LONG DESCRIPTION
055	SPRAY	BLINDED BY WATER SPRAY
088	OTHER	OTHER ACTION
099	UNK	UNKNOWN ACTION

CAUSE CODE TRANSLATION LIST

CAUSE CODE	SHORT DESCRIPTION	LONG DESCRIPTION
00	NO CODE	NO CAUSE ASSOCIATED AT THIS LEVEL
01	TOO-FAST	TOO FAST FOR CONDITIONS (NOT EXCEED POSTED SPEED
02	NO-YIELD	DID NOT YIELD RIGHT-OF-WAY
03	PAS-STOP	PASSED STOP SIGN OR RED FLASHER
04	DIS SIG	DISREGARDED TRAFFIC SIGNAL
05	LEFT-CTR	DROVE LEFT OF CENTER ON TWO-WAY ROAD; STRADDLING
06	IMP-OVER	IMPROPER OVERTAKING
07	TOO-CLOS	FOLLOWED TOO CLOSELY
08	IMP-TURN	MADE IMPROPER TURN
09	DRINKING	ALCOHOL OR DRUG INVOLVED
10	OTHR-IMP	OTHER IMPROPER DRIVING
11	MECH-DEF	MECHANICAL DEFECT
12	OTHER	OTHER (NOT IMPROPER DRIVING)
13	IMP LN C	IMPROPER CHANGE OF TRAFFIC LANES
14	DIS TCD	DISREGARDED OTHER TRAFFIC CONTROL DEVICE
15	WRNG WAY	WRONG WAY ON ONE-WAY ROAD; WRONG SIDE DIVIDED RO/
16	FATIGUE	DRIVER DROWSY/FATIGUED/SLEEPY
17	ILLNESS	PHYSICAL ILLNESS
18	IN RDWY	NON-MOTORIST ILLEGALLY IN ROADWAY
19	NT VISBL	NON-MOTORIST NOT VISIBLE; NON-REFLECTIVE CLOTHIN(
20	IMP PKNG	VEHICLE IMPROPERLY PARKED
21	DEF STER	DEFECTIVE STEERING MECHANISM
22	DEF BRKE	INADEQUATE OR NO BRAKES
24	LOADSHFT	VEHICLE LOST LOAD OR LOAD SHIFTED
25	TIREFAIL	TIRE FAILURE
26	PHANTOM	PHANTOM / NON-CONTACT VEHICLE
27	INATTENT	INATTENTION
28	NM INATT	NON-MOTORIST INATTENTION
29	F AVOID	FAILED TO AVOID VEHICLE AHEAD
30	SPEED	DRIVING IN EXCESS OF POSTED SPEED
31	RACING	SPEED RACING (PER PAR)
32	CARELESS	CARELESS DRIVING (PER PAR)
33	RECKLESS	RECKLESS DRIVING (PER PAR)
34	AGGRESV	AGGRESSIVE DRIVING (PER PAR)
35	RD RAGE	ROAD RAGE (PER PAR)
40	VIEW OBS	VIEW OBSCURED
50	USED MDN	IMPROPER USE OF MEDIAN OR SHOULDER
51	FAIL LN	FAILED TO MAINTAIN LANE
52	OFF RD	RAN OFF ROAD

COLLISION TYPE CODE TRANSLATION LIST

COLL CODE	SHORT DESCRIPTION	LONG DESCRIPTION
&	OTH	MISCELLANEOUS
-	BACK	BACKING
0	PED	PEDESTRIAN
1	ANGL	ANGLE
2	HEAD	HEAD-ON
3	REAR	REAR-END
4	SS-M	SIDESWIPE - MEETING
5	SS-O	SIDESWIPE - OVERTAKING
6	TURN	TURNING MOVEMENT
7	PARK	PARKING MANEUVER
8	NCOL	NON-COLLISION
9	FIX	FIXED OBJECT OR OTHER OBJECT

CRASH TYPE CODE TRANSLATION LIST

CRASH TYPE	SHORT DESCRIPTION	LONG DESCRIPTION
&	OVERTURN	OVERTURNED
0	NON-COLL	OTHER NON-COLLISION
1	OTH RDWY	MOTOR VEHICLE ON OTHER ROADWAY
2	PRKD MV	PARKED MOTOR VEHICLE
3	PED	PEDESTRIAN
4	TRAIN	RAILWAY TRAIN
6	BIKE	PEDALCYCLIST
7	ANIMAL	ANIMAL
8	FIX OBJ	FIXED OBJECT
9	OTH OBJ	OTHER OBJECT
A	ANGL-STP	ENTERING AT ANGLE - ONE VEHICLE STOPPED
B	ANGL-OTH	ENTERING AT ANGLE - ALL OTHERS
C	S-STRGHT	FROM SAME DIRECTION - BOTH GOING STRAIGHT
D	S-1TURN	FROM SAME DIRECTION - ONE TURN, ONE STRAIGHT
E	S-1STOP	FROM SAME DIRECTION - ONE STOPPED
F	S-OTHER	FROM SAME DIRECTION-ALL OTHERS, INCLUDING PARKING
G	O-STRGHT	FROM OPPOSITE DIRECTION - BOTH GOING STRAIGHT
H	O-1 L-TURN	FROM OPPOSITE DIRECTION-ONE LEFT TURN,ONE STRAIGHT
I	O-1STOP	FROM OPPOSITE DIRECTION - ONE STOPPED
J	O-OTHER	FROM OPPOSITE DIRECTION-ALL OTHERS INCL. PARKING

DRIVER LICENSE CODE TRANSLATION LIST

LIC CODE	SHORT DESC	LONG DESCRIPTION
0	NONE	NOT LICENSED (HAD NEVER BEEN LICENSED)
1	OR-Y	VALID OREGON LICENSE
2	OTH-Y	VALID LICENSE, OTHER STATE OR COUNTRY
3	SUSP	SUSPENDED/REVOKED
4	EXP	EXPIRED
8	N-VAL	OTHER NON-VALID LICENSE
9	UNK	UNKNOWN IF DRIVER WAS LICENSED AT TIME OF CRASH

DRIVER RESIDENCE CODE TRANSLATION LIST

RES CODE	SHORT DESC	LONG DESCRIPTION
1	OR<25	OREGON RESIDENT WITHIN 25 MILE OF HOME
2	OR>25	OREGON RESIDENT 25 OR MORE MILES FROM HOME
3	OR-?	OREGON RESIDENT - UNKNOWN DISTANCE FROM HOME
4	N-RES	NON-RESIDENT
9	UNK	UNKNOWN IF OREGON RESIDENT

ERROR CODE TRANSLATION LIST

ERROR CODE	SHORT DESCRIPTION	FULL DESCRIPTION
000	NONE	NO ERROR
001	WIDE TRN	WIDE TURN
002	CUT CORN	CUT CORNER ON TURN
003	FAIL TRN	FAILED TO OBEY MANDATORY TRAFFIC TURN SIGNAL, SIGN OR LANE MARKINGS
004	L IN TRF	LEFT TURN IN FRONT OF ONCOMING TRAFFIC
005	L PROHIB	LEFT TURN WHERE PROHIBITED
006	FRM WRNG	TURNED FROM WRONG LANE
007	TO WRONG	TURNED INTO WRONG LANE
008	ILLEG U	U-TURNED ILLEGALLY
009	IMP STOP	IMPROPERLY STOPPED IN TRAFFIC LANE
010	IMP SIG	IMPROPER SIGNAL OR FAILURE TO SIGNAL
011	IMP BACK	BACKING IMPROPERLY (NOT PARKING)
012	IMP PARK	IMPROPERLY PARKED
013	UNPARK	IMPROPER START LEAVING PARKED POSITION
014	IMP STRT	IMPROPER START FROM STOPPED POSITION
015	IMP LGHT	IMPROPER OR NO LIGHTS (VEHICLE IN TRAFFIC)
016	INATTENT	INATTENTION (FAILURE TO DIM LIGHTS PRIOR TO 4/1/97)
017	UNSF VEH	DRIVING UNSAFE VEHICLE (NO OTHER ERROR APPARENT)
018	OTH PARK	ENTERING/EXITING PARKED POSITION W/ INSUFFICIENT CLEARANCE; OTHER IMPROPER PARKING MANEUVER
019	DIS DRIV	DISREGARDED OTHER DRIVER'S SIGNAL
020	DIS SGNL	DISREGARDED TRAFFIC SIGNAL
021	RAN STOP	DISREGARDED STOP SIGN OR FLASHING RED
022	DIS SIGN	DISREGARDED WARNING SIGN, FLARES OR FLASHING AMBER
023	DIS OFCR	DISREGARDED POLICE OFFICER OR FLAGMAN
024	DIS EMER	DISREGARDED SIREN OR WARNING OF EMERGENCY VEHICLE
025	DIS RR	DISREGARDED RR SIGNAL, RR SIGN, OR RR FLAGMAN
026	REAR-END	FAILED TO AVOID STOPPED OR PARKED VEHICLE AHEAD OTHER THAN SCHOOL BUS
027	BIKE ROW	DID NOT HAVE RIGHT-OF-WAY OVER PEDALCYCLIST
028	NO ROW	DID NOT HAVE RIGHT-OF-WAY
029	PED ROW	FAILED TO YIELD RIGHT-OF-WAY TO PEDESTRIAN
030	PAS CURV	PASSING ON A CURVE
031	PAS WRNG	PASSING ON THE WRONG SIDE
032	PAS TANG	PASSING ON STRAIGHT ROAD UNDER UNSAFE CONDITIONS
033	PAS X-WK	PASSED VEHICLE STOPPED AT CROSSWALK FOR PEDESTRIAN
034	PAS INTR	PASSING AT INTERSECTION
035	PAS HILL	PASSING ON CREST OF HILL
036	N/PAS ZN	PASSING IN "NO PASSING" ZONE
037	PAS TRAF	PASSING IN FRONT OF ONCOMING TRAFFIC
038	CUT-IN	CUTTING IN (TWO LANES - TWO WAY ONLY)
039	WRNGSIDE	DRIVING ON WRONG SIDE OF THE ROAD (2-WAY UNDIVIDED ROADWAYS)

ERROR CODE TRANSLATION LIST

ERROR CODE	SHORT DESCRIPTION	FULL DESCRIPTION
040	THRU MED	DRIVING THROUGH SAFETY ZONE OR OVER ISLAND
041	F/ST BUS	FAILED TO STOP FOR SCHOOL BUS
042	F/SLO MV	FAILED TO DECREASE SPEED FOR SLOWER MOVING VEHICLE
043	TOO CLOSE	FOLLOWING TOO CLOSELY (MUST BE ON OFFICER'S REPORT)
044	STRDL LN	STRADDLING OR DRIVING ON WRONG LANES
045	IMP CHG	IMPROPER CHANGE OF TRAFFIC LANES
046	WRNG WAY	WRONG WAY ON ONE-WAY ROADWAY; WRONG SIDE DIVIDED ROAD
047	BASCRULE	DRIVING TOO FAST FOR CONDITIONS (NOT EXCEEDING POSTED SPEED)
048	OPN DOOR	OPENED DOOR INTO ADJACENT TRAFFIC LANE
049	IMPEDING	IMPEDING TRAFFIC
050	SPEED	DRIVING IN EXCESS OF POSTED SPEED
051	RECKLESS	RECKLESS DRIVING (PER PAR)
052	CARELESS	CARELESS DRIVING (PER PAR)
053	RACING	SPEED RACING (PER PAR)
054	X N/SGNL	CROSSING AT INTERSECTION, NO TRAFFIC SIGNAL PRESENT
055	X W/SGNL	CROSSING AT INTERSECTION, TRAFFIC SIGNAL PRESENT
056	DIAGONAL	CROSSING AT INTERSECTION - DIAGONALLY
057	BTWN INT	CROSSING BETWEEN INTERSECTIONS
059	W/TRAF-S	WALKING, RUNNING, RIDING, ETC., ON SHOULDER WITH TRAFFIC
060	A/TRAF-S	WALKING, RUNNING, RIDING, ETC., ON SHOULDER FACING TRAFFIC
061	W/TRAF-P	WALKING, RUNNING, RIDING, ETC., ON PAVEMENT WITH TRAFFIC
062	A/TRAF-P	WALKING, RUNNING, RIDING, ETC., ON PAVEMENT FACING TRAFFIC
063	PLAYINRD	PLAYING IN STREET OR ROAD
064	PUSH MV	PUSHING OR WORKING ON VEHICLE IN ROAD OR ON SHOULDER
065	WORK IN RD	WORKING IN ROADWAY OR ALONG SHOULDER
070	LAY ON RD	STANDING OR LYING IN ROADWAY
071	NM IMP USE	IMPROPER USE OF TRAFFIC LANE BY NON-MOTORIST
073	ELUDING	ELUDING / ATTEMPT TO ELUDE
079	F NEG CURV	FAILED TO NEGOTIATE A CURVE
080	FAIL LN	FAILED TO MAINTAIN LANE
081	OFF RD	RAN OFF ROAD
082	NO CLEAR	DRIVER MISJUDGED CLEARANCE
083	OVRSTEER	OVER-CORRECTING
084	NOT USED	CODE NOT IN USE
085	OVRLOAD	OVERLOADING OR IMPROPER LOADING OF VEHICLE WITH CARGO OR PASSENGERS
097	UNA DIS TC	UNABLE TO DETERMINE WHICH DRIVER DISREGARDED TRAFFIC CONTROL DEVICE

EVENT CODE TRANSLATION LIST

EVENT CODE	SHORT DESCRIPTION	LONG DESCRIPTION
001	FEL/JUMP	OCCUPANT FELL, JUMPED OR WAS EJECTED FROM MOVING VEHICLE
002	INTERFER	PASSENGER INTERFERED WITH DRIVER
003	BUG INTF	ANIMAL OR INSECT IN VEHICLE INTERFERED WITH DRIVER
004	INDRCT PED	PEDESTRIAN INDIRECTLY INVOLVED (NOT STRUCK)
005	SUB-PED	"SUB-PED": PEDESTRIAN INJURED SUBSEQUENT TO COLLISION, ETC.
006	INDRCT BIK	PEDALCYCLIST INDIRECTLY INVOLVED (NOT STRUCK)
007	HITCHIKR	HITCHHIKER (SOLICITING A RIDE)
008	PSNGR TOW	PASSENGER OR NON-MOTORIST BEING TOWED OR PUSHED ON CONVEYANCE
009	ON/OFF V	GETTING ON/OFF STOPPED/PARKED VEHICLE (OCCUPANTS ONLY; MUST HAVE PHYSICAL CONTACT W/ VEHIC
010	SUB OTRN	OVERTURNED AFTER FIRST HARMFUL EVENT
011	MV PUSHD	VEHICLE BEING PUSHED
012	MV TOWED	VEHICLE TOWED OR HAD BEEN TOWING ANOTHER VEHICLE
013	FORCED	VEHICLE FORCED BY IMPACT INTO ANOTHER VEHICLE, PEDALCYCLIST OR PEDESTRIAN
014	SET MOTN	VEHICLE SET IN MOTION BY NON-DRIVER (CHILD RELEASED BRAKES, ETC.)
015	RR ROW	AT OR ON RAILROAD RIGHT-OF-WAY (NOT LIGHT RAIL)
016	LT RL ROW	AT OR ON LIGHT-RAIL RIGHT-OF-WAY
017	RR HIT V	TRAIN STRUCK VEHICLE
018	V HIT RR	VEHICLE STRUCK TRAIN
019	HIT RR CAR	VEHICLE STRUCK RAILROAD CAR ON ROADWAY
020	JACKNIFE	JACKKNIFE; TRAILER OR TOWED VEHICLE STRUCK TOWING VEHICLE
021	TRL OTRN	TRAILER OR TOWED VEHICLE OVERTURNED
022	CN BROKE	TRAILER CONNECTION BROKE
023	DETACH TRL	DETACHED TRAILING OBJECT STRUCK OTHER VEHICLE, NON-MOTORIST, OR OBJECT
024	V DOOR OPN	VEHICLE DOOR OPENED INTO ADJACENT TRAFFIC LANE
025	WHEELOFF	WHEEL CAME OFF
026	HOOD UP	HOOD FLEW UP
028	LOAD SHIFT	LOST LOAD, LOAD MOVED OR SHIFTED
029	TIREFAIL	TIRE FAILURE
030	PET	PET: CAT, DOG AND SIMILAR
031	LVSTOCK	STOCK: COW, CALF, BULL, STEER, SHEEP, ETC.
032	HORSE	HORSE, MULE, OR DONKEY
033	HRSE&RID	HORSE AND RIDER
034	GAME	WILD ANIMAL, GAME (INCLUDES BIRDS; NOT DEER OR ELK)
035	DEER ELK	DEER OR ELK, WAPITI
036	ANML VEH	ANIMAL-DRAWN VEHICLE
037	CULVERT	CULVERT, OPEN LOW OR HIGH MANHOLE
038	ATENUATN	IMPACT ATTENUATOR
039	PK METER	PARKING METER
040	CURB	CURB (ALSO NARROW SIDEWALKS ON BRIDGES)
041	JIGGLE	JIGGLE BAR OR TRAFFIC SNAKE FOR CHANNELIZATION
042	GDRL END	LEADING EDGE OF GUARDRAIL
043	GARDRAIL	GUARD RAIL (NOT METAL MEDIAN BARRIER)
044	BARRIER	MEDIAN BARRIER (RAISED OR METAL)
045	WALL	RETAINING WALL OR TUNNEL WALL
046	BR RAIL	BRIDGE RAILING OR PARAPET (ON BRIDGE OR APPROACH)
047	BR ABUTMNT	BRIDGE ABUTMENT (INCLUDED "APPROACH END" THRU 2013)
048	BR COLMN	BRIDGE PILLAR OR COLUMN
049	BR GIRDR	BRIDGE GIRDER (HORIZONTAL BRIDGE STRUCTURE OVERHEAD)
050	ISLAND	TRAFFIC RAISED ISLAND
051	GORE	GORE
052	POLE UNK	POLE - TYPE UNKNOWN
053	POLE UTL	POLE - POWER OR TELEPHONE
054	ST LIGHT	POLE - STREET LIGHT ONLY
055	TRF SGNL	POLE - TRAFFIC SIGNAL AND PED SIGNAL ONLY
056	SGN BRDG	POLE - SIGN BRIDGE
057	STOPSIGN	STOP OR YIELD SIGN

EVENT CODE TRANSLATION LIST

EVENT CODE	SHORT DESCRIPTION	LONG DESCRIPTION
058	OTH SIGN	OTHER SIGN, INCLUDING STREET SIGNS
059	HYDRANT	HYDRANT
060	MARKER	DELINEATOR OR MARKER (REFLECTOR POSTS)
061	MAILBOX	MAILBOX
062	TREE	TREE, STUMP OR SHRUBS
063	VEG OHED	TREE BRANCH OR OTHER VEGETATION OVERHEAD, ETC.
064	WIRE/CBL	WIRE OR CABLE ACROSS OR OVER THE ROAD
065	TEMP SGN	TEMPORARY SIGN OR BARRICADE IN ROAD, ETC.
066	PERM SGN	PERMANENT SIGN OR BARRICADE IN/OFF ROAD
067	SLIDE	SLIDES, FALLEN OR FALLING ROCKS
068	FRGN OBJ	FOREIGN OBSTRUCTION/DEBRIS IN ROAD (NOT GRAVEL)
069	EQP WORK	EQUIPMENT WORKING IN/OFF ROAD
070	OTH EQP	OTHER EQUIPMENT IN OR OFF ROAD (INCLUDES PARKED TRAILER, BOAT)
071	MAIN EQP	WRECKER, STREET SWEEPER, SNOW PLOW OR SANDING EQUIPMENT
072	OTHER WALL	ROCK, BRICK OR OTHER SOLID WALL
073	IRRGL PVMT	OTHER BUMP (NOT SPEED BUMP), POTHOLE OR PAVEMENT IRREGULARITY (PER PAR)
074	OVERHD OBJ	OTHER OVERHEAD OBJECT (HIGHWAY SIGN, SIGNAL HEAD, ETC.); NOT BRIDGE
075	CAVE IN	BRIDGE OR ROAD CAVE IN
076	HI WATER	HIGH WATER
077	SNO BANK	SNOW BANK
078	LO-HI EDGE	LOW OR HIGH SHOULDER AT PAVEMENT EDGE
079	DITCH	CUT SLOPE OR DITCH EMBANKMENT
080	OBJ FRM MV	STRUCK BY ROCK OR OTHER OBJECT SET IN MOTION BY OTHER VEHICLE (INCL. LOST LOADS)
081	FLY-OBJ	STRUCK BY ROCK OR OTHER MOVING OR FLYING OBJECT (NOT SET IN MOTION BY VEHICLE)
082	VEH HID	VEHICLE OBSCURED VIEW
083	VEG HID	VEGETATION OBSCURED VIEW
084	BLDG HID	VIEW OBSCURED BY FENCE, SIGN, PHONE BOOTH, ETC.
085	WIND GUST	WIND GUST
086	IMMERSED	VEHICLE IMMERSED IN BODY OF WATER
087	FIRE/EXP	FIRE OR EXPLOSION
088	FENC/BLD	FENCE OR BUILDING, ETC.
089	OTHR CRASH	CRASH RELATED TO ANOTHER SEPARATE CRASH
090	TO 1 SIDE	TWO-WAY TRAFFIC ON DIVIDED ROADWAY ALL ROUTED TO ONE SIDE
091	BUILDING	BUILDING OR OTHER STRUCTURE
092	PHANTOM	OTHER (PHANTOM) NON-CONTACT VEHICLE
093	CELL PHONE	CELL PHONE (ON PAR OR DRIVER IN USE)
094	VIOL GDL	TEENAGE DRIVER IN VIOLATION OF GRADUATED LICENSE PGM
095	GUY WIRE	GUY WIRE
096	BERM	BERM (EARTHEN OR GRAVEL MOUND)
097	GRAVEL	GRAVEL IN ROADWAY
098	ABR EDGE	ABRUPT EDGE
099	CELL WTNSD	CELL PHONE USE WITNESSED BY OTHER PARTICIPANT
100	UNK FIXD	FIXED OBJECT, UNKNOWN TYPE.
101	OTHER OBJ	NON-FIXED OBJECT, OTHER OR UNKNOWN TYPE
102	TEXTING	TEXTING
103	WZ WORKER	WORK ZONE WORKER
104	ON VEHICLE	PASSENGER RIDING ON VEHICLE EXTERIOR
105	PEDAL PSGR	PASSENGER RIDING ON PEDALCYCLE
106	MAN WHLCHR	PEDESTRIAN IN NON-MOTORIZED WHEELCHAIR
107	MTR WHLCHR	PEDESTRIAN IN MOTORIZED WHEELCHAIR
108	OFFICER	LAW ENFORCEMENT / POLICE OFFICER
109	SUB-BIKE	"SUB-BIKE": PEDALCYCLIST INJURED SUBSEQUENT TO COLLISION, ETC.
110	N-MTR	NON-MOTORIST STRUCK VEHICLE
111	S CAR VS V	STREET CAR/TROLLEY (ON RAILS OR OVERHEAD WIRE SYSTEM) STRUCK VEHICLE
112	V VS S CAR	VEHICLE STRUCK STREET CAR/TROLLEY (ON RAILS OR OVERHEAD WIRE SYSTEM)
113	S CAR ROW	AT OR ON STREET CAR OR TROLLEY RIGHT-OF-WAY

EVENT CODE TRANSLATION LIST

EVENT CODE	SHORT DESCRIPTION	LONG DESCRIPTION
114	RR EQUIP	VEHICLE STRUCK RAILROAD EQUIPMENT (NOT TRAIN) ON TRACKS
115	DSTRCT GPS	DISTRACTED BY NAVIGATION SYSTEM OR GPS DEVICE
116	DSTRCT OTH	DISTRACTED BY OTHER ELECTRONIC DEVICE
117	RR GATE	RAIL CROSSING DROP-ARM GATE
118	EXPNSN JNT	EXPANSION JOINT
119	JERSEY BAR	JERSEY BARRIER
120	WIRE BAR	WIRE OR CABLE MEDIAN BARRIER
121	FENCE	FENCE
123	OBJ IN VEH	LOOSE OBJECT IN VEHICLE STRUCK OCCUPANT
124	SLIPPERY	SLIDING OR SWERVING DUE TO WET, ICY, SLIPPERY OR LOOSE SURFACE (NOT GRAVEL)
125	SHLDR	SHOULDER GAVE WAY
126	BOULDER	ROCK(S), BOULDER (NOT GRAVEL; NOT ROCK SLIDE)
127	LAND SLIDE	ROCK SLIDE OR LAND SLIDE
128	CURVE INV	CURVE PRESENT AT CRASH LOCATION
129	HILL INV	VERTICAL GRADE / HILL PRESENT AT CRASH LOCATION
130	CURVE HID	VIEW OBSCURED BY CURVE
131	HILL HID	VIEW OBSCURED BY VERTICAL GRADE / HILL
132	WINDOW HID	VIEW OBSCURED BY VEHICLE WINDOW CONDITIONS
133	SPRAY HID	VIEW OBSCURED BY WATER SPRAY
134	TORRENTIAL	TORRENTIAL RAIN (EXCEPTIONALLY HEAVY RAIN)

FUNCTIONAL CLASSIFICATION TRANSLATION LIST

FUNC CLASS	DESCRIPTION
01	RURAL PRINCIPAL ARTERIAL - INTERSTATE
02	RURAL PRINCIPAL ARTERIAL - OTHER
06	RURAL MINOR ARTERIAL
07	RURAL MAJOR COLLECTOR
08	RURAL MINOR COLLECTOR
09	RURAL LOCAL
11	URBAN PRINCIPAL ARTERIAL - INTERSTATE
12	URBAN PRINCIPAL ARTERIAL - OTHER FREEWAYS AND EXP
14	URBAN PRINCIPAL ARTERIAL - OTHER
16	URBAN MINOR ARTERIAL
17	URBAN MAJOR COLLECTOR
18	URBAN MINOR COLLECTOR
19	URBAN LOCAL
78	UNKNOWN RURAL SYSTEM
79	UNKNOWN RURAL NON-SYSTEM
98	UNKNOWN URBAN SYSTEM
99	UNKNOWN URBAN NON-SYSTEM

HIGHWAY COMPONENT TRANSLATION LIST

CODE	DESCRIPTION
0	MAINLINE STATE HIGHWAY
1	COUPLET
3	FRONTAGE ROAD
6	CONNECTION
8	HIGHWAY - OTHER

INJURY SEVERITY CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
1	KILL	FATAL INJURY (K)
2	INJA	SUSPECTED SERIOUS INJURY (A)
3	INJB	SUSPECTED MINOR INJURY (B)
4	INJC	POSSIBLE INJURY (C)
5	PRI	DIED PRIOR TO CRASH
7	NO<5	NO INJURY - 0 TO 4 YEARS OF AGE
9	NONE	NO APPARENT INJURY (O)

LIGHT CONDITION CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	UNK	UNKNOWN
1	DAY	DAYLIGHT
2	DLIT	DARKNESS - WITH STREET LIGHTS
3	DARK	DARKNESS - NO STREET LIGHTS
4	DAWN	DAWN (TWILIGHT)
5	DUSK	DUSK (TWILIGHT)

MEDIAN TYPE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	NONE	NO MEDIAN
1	RSDMD	SOLID MEDIAN BARRIER
2	DIVMD	EARTH, GRASS OR PAVED MEDIAN

MILEAGE TYPE CODE TRANSLATION LIST

CODE	LONG DESCRIPTION
0	REGULAR MILEAGE
T	TEMPORARY
Y	SPUR
Z	OVERLAPPING

MOVEMENT TYPE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	UNK	UNKNOWN
1	STRGHT	STRAIGHT AHEAD
2	TURN-R	TURNING RIGHT
3	TURN-L	TURNING LEFT
4	U-TURN	MAKING A U-TURN
5	BACK	BACKING
6	STOP	STOPPED IN TRAFFIC
7	PRKD-P	PARKED - PROPERLY
8	PRKD-I	PARKED - IMPROPERLY
9	PARKNG	PARKING MANEUVER

NON-MOTORIST LOCATION CODE TRANSLATION LIST

CODE	LONG DESCRIPTION
00	AT INTERSECTION - NOT IN ROADWAY
01	AT INTERSECTION - INSIDE CROSSWALK
02	AT INTERSECTION - IN ROADWAY, OUTSIDE CROSSWALK
03	AT INTERSECTION - IN ROADWAY, XWALK AVAIL UNKNWN
04	NOT AT INTERSECTION - IN ROADWAY
05	NOT AT INTERSECTION - ON SHOULDER
06	NOT AT INTERSECTION - ON MEDIAN
07	NOT AT INTERSECTION - WITHIN TRAFFIC RIGHT-OF-WAY
08	NOT AT INTERSECTION - IN BIKE PATH OR PARKING LANE
09	NOT-AT INTERSECTION - ON SIDEWALK
10	OUTSIDE TRAFFICWAY BOUNDARIES
13	AT INTERSECTION - IN BIKE LANE
14	NOT AT INTERSECTION - IN BIKE LANE
15	NOT AT INTERSECTION - INSIDE MID-BLOCK CROSSWALK
16	NOT AT INTERSECTION - IN PARKING LANE
18	OTHER, NOT IN ROADWAY
99	UNKNOWN LOCATION

ROAD CHARACTER CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	UNK	UNKNOWN
1	INTER	INTERSECTION
2	ALLEY	DRIVEWAY OR ALLEY
3	STRGHT	STRAIGHT ROADWAY
4	TRANS	TRANSITION
5	CURVE	CURVE (HORIZONTAL CURVE)
6	OPENAC	OPEN ACCESS OR TURNOUT
7	GRADE	GRADE (VERTICAL CURVE)
8	BRIDGE	BRIDGE STRUCTURE
9	TUNNEL	TUNNEL

PARTICIPANT TYPE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	OCC	UNKNOWN OCCUPANT TYPE
1	DRVR	DRIVER
2	PSNG	PASSENGER
3	PED	PEDESTRIAN
4	CONV	PEDESTRIAN USING A PEDESTRIAN CONVEYA
5	PTOW	PEDESTRIAN TOWING OR TRAILERING AN OB
6	BIKE	PEDALCYCLIST
7	BTOW	PEDALCYCLIST TOWING OR TRAILERING AN
8	PRKD	OCCUPANT OF A PARKED MOTOR VEHICLE
9	OTHR	OTHER TYPE OF NON-MOTORIST

TRAFFIC CONTROL DEVICE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
000	NONE	NO CONTROL
001	TRF SIGNAL	TRAFFIC SIGNALS
002	FLASHBCN-R	FLASHING BEACON - RED (STOP)
003	FLASHBCN-A	FLASHING BEACON - AMBER (SLOW)
004	STOP SIGN	STOP SIGN
005	SLOW SIGN	SLOW SIGN
006	REG-SIGN	REGULATORY SIGN
007	YIELD	YIELD SIGN
008	WARNING	WARNING SIGN
009	CURVE	CURVE SIGN
010	SCHL X-ING	SCHOOL CROSSING SIGN OR SPECIAL SIGNAL
011	OFCR/FLAG	POLICE OFFICER, FLAGMAN - SCHOOL PATROL
012	BRDG-GATE	BRIDGE GATE - BARRIER
013	TEMP-BARR	TEMPORARY BARRIER
014	NO-PASS-ZN	NO PASSING ZONE
015	ONE-WAY	ONE-WAY STREET
016	CHANNEL	CHANNELIZATION
017	MEDIAN BAR	MEDIAN BARRIER
018	PILOT CAR	PILOT CAR
019	SP PED SIG	SPECIAL PEDESTRIAN SIGNAL
020	X-BUCK	CROSSBUCK
021	THR-GN-SIG	THROUGH GREEN ARROW OR SIGNAL
022	L-GRN-SIG	LEFT TURN GREEN ARROW, LANE MARKINGS, OR SIGNAL
023	R-GRN-SIG	RIGHT TURN GREEN ARROW, LANE MARKINGS, OR SIGNAL
024	WIGWAG	WIGWAG OR FLASHING LIGHTS W/O DROP-ARM GATE
025	X-BUCK WRN	CROSSBUCK AND ADVANCE WARNING
026	WW W/ GATE	FLASHING LIGHTS WITH DROP-ARM GATES
027	OVRHD SGNL	SUPPLEMENTAL OVERHEAD SIGNAL (RR XING ONLY)
028	SP RR STOP	SPECIAL RR STOP SIGN
029	ILUM GRD X	ILLUMINATED GRADE CROSSING
037	RAMP METER	METERED RAMPS
038	RUMBLE STR	RUMBLE STRIP
090	L-TURN REF	LEFT TURN REFUGE (WHEN REFUGE IS INVOLVED)
091	R-TURN ALL	RIGHT TURN AT ALL TIMES SIGN, ETC.
092	EMR SGN/FL	EMERGENCY SIGNS OR FLARES
093	ACCEL LANE	ACCELERATION OR DECELERATION LANES
094	R-TURN PRO	RIGHT TURN PROHIBITED ON RED AFTER STOPPING
095	BUS STPSGN	BUS STOP SIGN AND RED LIGHTS
099	UNKNOWN	UNKNOWN OR NOT DEFINITE

VEHICLE TYPE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
00	PDO	NOT COLLECTED FOR PDO CRASHES
01	PSNGR CAR	PASSENGER CAR, PICKUP, LIGHT DELIVERY, ETC.
02	BOBTAIL	TRUCK TRACTOR WITH NO TRAILERS (BOBTAIL)
03	FARM TRCTR	FARM TRACTOR OR SELF-PROPELLED FARM EQUIPMENT
04	SEMI TOW	TRUCK TRACTOR WITH TRAILER/MOBILE HOME IN TOW
05	TRUCK	TRUCK WITH NON-DETACHABLE BED, PANEL, ETC.
06	MOPED	MOPED, MINIBIKE, SEATED MOTOR SCOOTER, MOTOR BIKE
07	SCHL BUS	SCHOOL BUS (INCLUDES VAN)
08	OTH BUS	OTHER BUS
09	MTRCYCLE	MOTORCYCLE, DIRT BIKE
10	OTHER	OTHER: FORKLIFT, BACKHOE, ETC.
11	MOTRHOME	MOTORHOME
12	TROLLEY	MOTORIZED STREET CAR/TROLLEY (NO RAILS/WIRES)
13	ATV	ATV
14	MTRSCTR	MOTORIZED SCOOTER (STANDING)
15	SNOWMOBILE	SNOWMOBILE
99	UNKNOWN	UNKNOWN VEHICLE TYPE

WEATHER CONDITION CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	UNK	UNKNOWN
1	CLR	CLEAR
2	CLD	CLOUDY
3	RAIN	RAIN
4	SLT	SLEET
5	FOG	FOG
6	SNOW	SNOW
7	DUST	DUST
8	SMOK	SMOKE
9	ASH	ASH

Appendix B
Traffic Counts

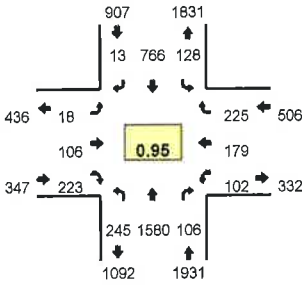
Type of peak hour being reported: Intersection Peak

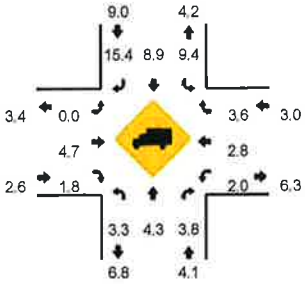
Method for determining peak hour: Total Entering Volume

LOCATION: SW Pacific Hwy -- SW Elwert Rd/SW Sunset Blvd
CITY/STATE: Sherwood, OR

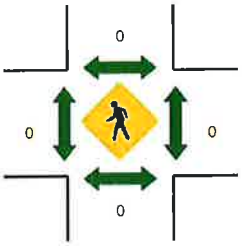
QC JOB #: 14401717
DATE: Thu, May 11 2017

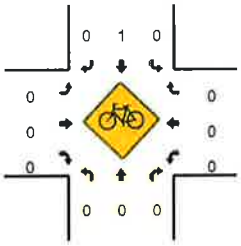
Peak-Hour: 7:05 AM -- 8:05 AM
Peak 15-Min: 7:40 AM -- 7:55 AM

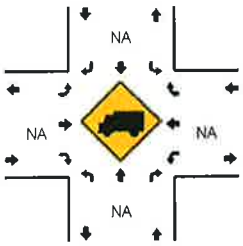


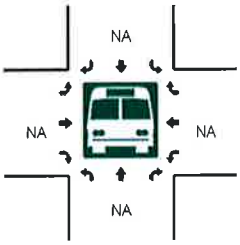


Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES









5-Min Count Period Beginning At	SW Pacific Hwy (Northbound)				SW Pacific Hwy (Southbound)				SW Elwert Rd/SW Sunset Blvd (Eastbound)				SW Elwert Rd/SW Sunset Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	22	126	6	0	2	43	0	1	0	5	15	0	11	13	12	0	256	
7:05 AM	10	136	9	0	3	71	2	0	3	5	19	0	8	8	17	0	291	
7:10 AM	20	118	8	0	8	54	1	1	1	7	25	0	14	19	12	0	288	
7:15 AM	34	127	9	0	6	44	1	1	1	9	17	0	9	15	19	0	292	
7:20 AM	23	140	8	0	5	60	0	0	3	5	16	0	16	8	16	0	300	
7:25 AM	22	154	14	0	7	76	1	0	0	5	14	0	3	15	16	0	327	
7:30 AM	19	119	7	0	11	50	1	1	4	14	20	0	4	21	17	0	288	
7:35 AM	22	123	5	0	12	52	1	1	1	9	14	0	13	25	16	0	294	
7:40 AM	20	139	9	0	13	64	0	1	1	9	14	0	7	19	19	0	315	
7:45 AM	23	122	7	0	20	69	2	2	2	9	21	0	7	15	23	0	322	
7:50 AM	14	121	8	0	11	100	2	0	0	13	24	0	8	14	23	0	338	
7:55 AM	26	115	10	0	17	59	1	1	2	10	20	0	7	11	29	0	308	3619
8:00 AM	11	166	12	1	7	67	1	0	0	11	19	0	6	9	18	0	328	3691
8:05 AM	8	79	9	0	8	63	0	1	1	5	26	0	10	5	15	0	230	3630
8:10 AM	16	81	4	0	6	48	0	3	2	2	11	0	7	14	12	0	206	3548
8:15 AM	12	133	6	0	6	83	0	1	1	4	12	0	5	7	12	0	282	3538
8:20 AM	23	98	8	0	6	40	0	4	0	6	16	0	7	8	7	0	223	3461
8:25 AM	11	110	9	0	6	55	0	2	2	2	19	0	7	8	9	0	240	3374
8:30 AM	16	76	5	0	13	51	0	3	0	3	10	0	7	6	14	0	204	3290
8:35 AM	17	128	7	0	7	66	2	1	1	8	13	0	5	9	11	0	275	3271
8:40 AM	9	112	11	0	9	62	1	1	1	3	10	0	3	4	3	0	229	3185
8:45 AM	8	93	8	0	7	60	0	0	1	4	10	0	11	8	17	0	227	3090
8:50 AM	9	96	11	0	3	59	0	1	1	7	23	0	7	6	12	0	235	2987
8:55 AM	9	86	6	0	8	74	1	3	1	8	8	0	5	3	11	0	223	2902

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	228	1528	96	0	176	932	16	12	12	124	236	0	88	192	260	0	3900
Heavy Trucks	12	68	4		12	60	4		0	4	0		0	4	16		184
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 5/19/2017 4:01 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

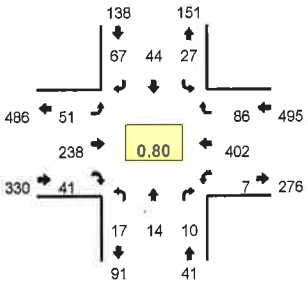
Type of peak hour being reported: Intersection Peak

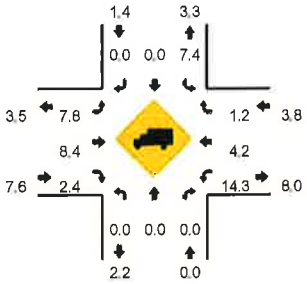
Method for determining peak hour: Total Entering Volume

LOCATION: SW Woodhaven Dr -- SW Sunset Blvd
CITY/STATE: Sherwood, OR

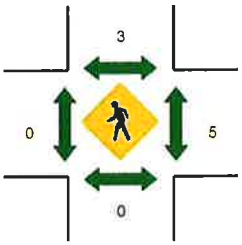
QC JOB #: 14538801
DATE: Thu, Oct 12 2017

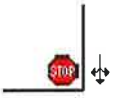
Peak-Hour: 7:10 AM -- 8:10 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

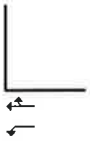


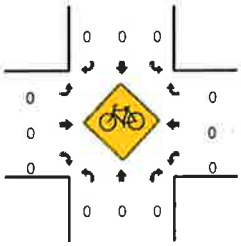


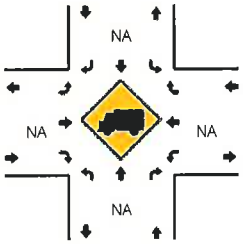
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

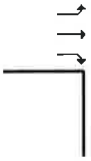


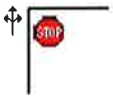


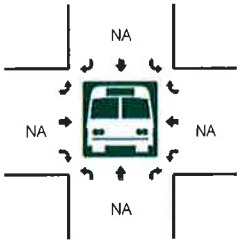












5-Min Count Period	SW Woodhaven Dr (Northbound)				SW Woodhaven Dr (Southbound)				SW Sunset Blvd (Eastbound)				SW Sunset Blvd (Westbound)				Total	Hourly Totals
Beginning At	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	0	1	0	0	1	4	0	4	7	1	0	0	32	3	0	53	
7:05 AM	6	1	1	0	0	0	3	0	2	17	0	0	0	27	2	0	59	
7:10 AM	1	0	0	0	4	0	7	0	1	13	1	0	0	32	0	1	60	
7:15 AM	0	0	0	0	1	0	6	0	0	19	2	0	0	31	2	0	61	
7:20 AM	0	0	0	0	0	0	3	0	3	15	3	0	0	36	5	0	65	
7:25 AM	2	1	0	0	2	4	9	0	1	20	0	0	1	29	7	0	76	
7:30 AM	1	1	1	0	2	6	5	0	3	14	3	0	0	38	9	0	83	
7:35 AM	4	0	1	0	3	6	5	0	2	25	10	0	0	32	11	0	99	
7:40 AM	1	1	0	0	2	11	5	0	2	27	10	0	2	31	5	0	97	
7:45 AM	2	2	0	0	1	13	10	0	5	26	7	0	1	39	9	0	115	
7:50 AM	1	3	2	0	7	2	3	0	7	21	1	0	1	31	12	0	91	
7:55 AM	3	3	4	0	1	0	7	0	11	26	3	0	1	36	13	0	108	967
8:00 AM	2	3	2	0	2	0	3	0	10	18	0	0	0	42	7	0	89	1003
8:05 AM	0	0	0	0	2	2	4	0	6	14	1	0	0	25	6	0	60	1004
8:10 AM	3	0	0	0	2	0	4	0	3	13	1	0	1	21	0	0	48	992
8:15 AM	1	1	0	0	1	0	2	0	3	16	1	0	0	17	1	0	43	974
8:20 AM	0	0	0	0	1	0	5	0	2	15	0	0	1	17	1	0	42	951
8:25 AM	1	0	0	0	0	1	2	0	7	10	0	0	0	24	1	0	46	921
8:30 AM	2	0	0	0	1	0	4	0	4	17	0	0	0	18	3	0	49	887
8:35 AM	1	1	0	0	0	0	3	0	7	11	0	0	0	21	3	0	47	835
8:40 AM	0	1	0	0	0	0	2	0	9	15	0	0	1	18	4	0	50	788
8:45 AM	2	0	1	0	0	1	5	0	2	7	0	0	0	27	6	0	51	724
8:50 AM	0	2	0	0	1	0	7	0	7	9	1	1	1	21	2	0	52	685
8:55 AM	1	0	0	0	3	0	4	0	11	9	0	0	0	13	3	0	44	621

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	24	32	24	0	36	60	80	0	92	292	44	0	12	424	136	0	1256
Heavy Trucks	0	0	0		4	0	0		4	28	0		0	24	4		64
Pedestrians		0				4				0				4			8
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 10/31/2017 8:48 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

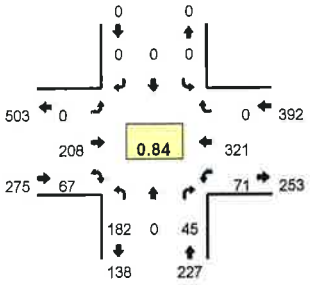
Type of peak hour being reported: Intersection Peak

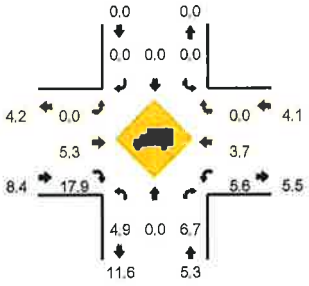
Method for determining peak hour: Total Entering Volume

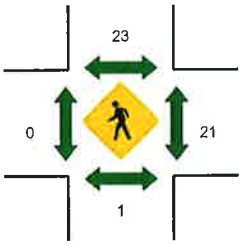
LOCATION: SW Timbrel Ln -- SW Sunset Blvd
CITY/STATE: Sherwood, OR

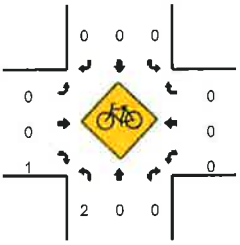
QC JOB #: 14538803
DATE: Thu, Oct 12 2017

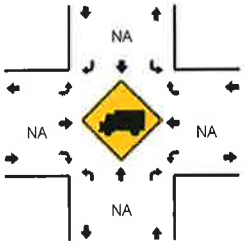
Peak-Hour: 7:10 AM -- 8:10 AM
Peak 15-Min: 7:40 AM -- 7:55 AM

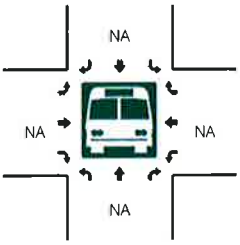












5-Min Count Period	SW Timbrel Ln (Northbound)				SW Timbrel Ln (Southbound)				SW Sunset Blvd (Eastbound)				SW Sunset Blvd (Westbound)				Total	Hourly Totals
Beginning At	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	9	0	1	0	0	0	0	0	0	9	0	0	0	25	0	0	44	
7:05 AM	8	0	3	0	0	0	0	0	0	16	2	0	1	20	0	0	50	
7:10 AM	11	0	2	0	0	0	0	0	0	12	4	0	3	25	0	0	57	
7:15 AM	8	0	1	0	0	0	0	0	0	20	2	0	2	23	0	0	56	
7:20 AM	11	0	4	0	0	0	0	0	0	13	1	0	5	31	0	0	65	
7:25 AM	15	0	3	0	0	0	0	0	0	15	8	0	7	22	0	0	70	
7:30 AM	24	0	4	0	0	0	0	0	0	15	2	0	8	25	0	0	78	
7:35 AM	14	0	4	0	0	0	0	0	0	21	7	0	13	24	0	0	83	
7:40 AM	18	0	5	0	0	0	0	0	0	21	8	0	13	32	0	0	97	
7:45 AM	19	0	3	0	0	0	0	0	0	17	7	0	11	27	0	0	84	
7:50 AM	25	0	4	0	0	0	0	0	0	19	10	0	7	19	0	0	84	
7:55 AM	20	0	12	0	0	0	0	0	0	22	9	0	1	29	0	0	93	861
8:00 AM	8	0	3	0	0	0	0	0	0	18	5	0	1	40	0	0	75	892
8:05 AM	9	0	0	0	0	0	0	0	0	15	4	0	0	24	0	0	52	894
8:10 AM	7	0	3	0	0	0	0	0	0	11	3	0	2	11	0	0	37	874
8:15 AM	5	0	0	0	0	0	0	0	0	16	0	0	1	14	0	0	36	854
8:20 AM	4	0	0	0	0	0	0	0	0	13	2	0	1	14	0	0	34	823
8:25 AM	8	0	3	0	0	0	0	0	0	11	2	0	1	17	0	0	42	795
8:30 AM	6	0	1	0	0	0	0	0	0	17	1	0	1	16	0	0	42	759
8:35 AM	6	0	0	0	0	0	0	0	0	9	1	0	3	18	0	0	37	713
8:40 AM	4	0	2	0	0	0	0	0	0	13	0	0	3	20	0	0	42	658
8:45 AM	4	0	2	0	0	0	0	0	0	9	1	0	2	25	0	0	43	617
8:50 AM	8	0	0	0	0	0	0	0	0	7	3	0	1	17	0	0	36	569
8:55 AM	5	0	3	0	0	0	0	0	0	7	5	0	0	10	0	0	30	506

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	248	0	48	0	0	0	0	0	0	228	100	0	124	312	0	0	1060
Heavy Trucks	16	0	8		0	0	0		0	8	20		8	16	0		76
Pedestrians		0				64				0				64			128
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 10/31/2017 8:48 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

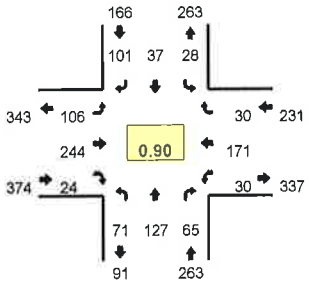
Type of peak hour being reported: Intersection Peak

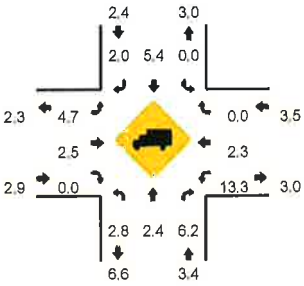
Method for determining peak hour: Total Entering Volume

LOCATION: SW Main St/SW Ladd Hill Rd -- SW Sunset Blvd
CITY/STATE: Sherwood, OR

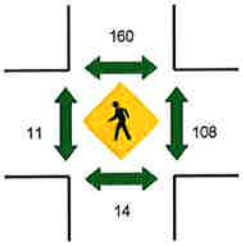
QC JOB #: 14487601
DATE: Tue, Sep 12 2017

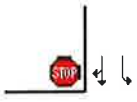
Peak-Hour: 7:05 AM -- 8:05 AM
Peak 15-Min: 7:30 AM -- 7:45 AM

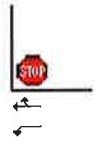


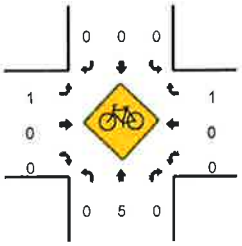


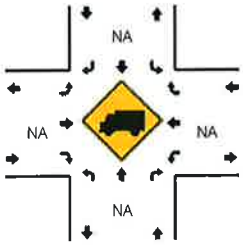
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

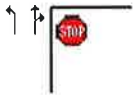


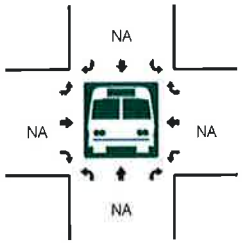












5-Min Count Period Beginning At	SW Main St/SW Ladd Hill Rd (Northbound)				SW Main St/SW Ladd Hill Rd (Southbound)				SW Sunset Blvd (Eastbound)				SW Sunset Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	3	8	2	0	0	2	2	0	7	16	1	0	1	8	2	0	52	
7:05 AM	4	6	7	0	0	2	2	0	4	19	1	0	1	12	2	0	60	
7:10 AM	4	11	3	0	1	3	5	0	5	19	1	0	1	14	4	0	71	
7:15 AM	1	12	6	0	1	3	8	0	6	21	1	0	1	11	3	0	74	
7:20 AM	8	12	6	0	0	1	10	0	9	17	4	0	2	24	2	0	95	
7:25 AM	9	11	6	0	0	2	7	0	9	23	1	0	2	17	4	0	91	
7:30 AM	5	13	8	0	4	1	11	0	11	22	2	0	5	14	2	0	98	
7:35 AM	8	10	4	0	4	2	13	0	13	21	0	0	1	13	4	0	93	
7:40 AM	17	11	1	0	3	2	14	0	12	14	1	0	6	14	2	0	97	
7:45 AM	8	12	2	0	5	5	9	0	15	15	1	0	2	15	0	0	89	
7:50 AM	3	14	8	0	2	2	8	0	14	23	4	0	1	12	4	0	95	
7:55 AM	1	8	8	0	3	9	7	0	3	23	3	0	4	11	0	0	80	995
8:00 AM	3	7	6	0	5	5	7	0	5	27	5	0	4	14	3	0	91	1034
8:05 AM	4	2	7	0	0	4	4	0	5	14	2	0	3	12	1	0	58	1032
8:10 AM	3	3	3	0	1	3	3	0	4	13	2	0	0	6	1	0	42	1003
8:15 AM	2	4	3	0	1	3	4	0	5	14	1	0	1	10	2	0	50	979
8:20 AM	2	6	1	0	1	2	3	0	5	14	5	0	2	9	1	0	51	935
8:25 AM	2	6	5	0	0	0	3	0	2	16	0	0	2	9	0	0	45	889
8:30 AM	2	1	4	0	0	2	2	0	1	8	0	0	2	6	1	0	29	820
8:35 AM	5	0	6	0	0	2	1	0	2	9	2	0	1	11	2	0	41	768
8:40 AM	3	4	5	0	0	1	3	0	2	11	0	0	3	8	2	0	42	713
8:45 AM	4	6	2	0	0	3	4	0	3	10	1	0	1	8	0	0	42	666
8:50 AM	5	5	2	0	1	3	3	0	4	10	3	0	3	12	3	0	54	625
8:55 AM	1	9	5	0	1	3	0	0	9	20	1	0	0	0	0	0	49	594

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	120	136	52	0	44	20	152	0	144	228	12	0	48	164	32	0	1152
Heavy Trucks	8	8	4		0	0	4		12	8	0		4	8	0		56
Pedestrians		24				360				4				236			624
Bicycles	0	0	0		0	0	0		1	0	0		0	0	0		1
Railroad Stopped Buses																	

Comments:

Report generated on 9/20/2017 8:46 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

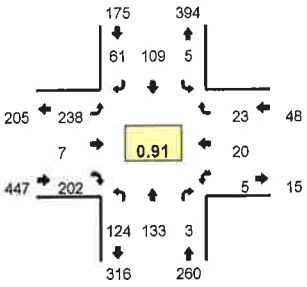
Type of peak hour being reported: Intersection Peak

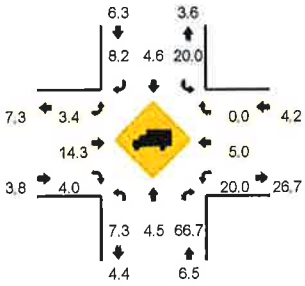
Method for determining peak hour: Total Entering Volume

LOCATION: SW Murdock Rd/SW Baker Rd -- SW Sunset Blvd/McKinley Dr
CITY/STATE: Sherwood, OR

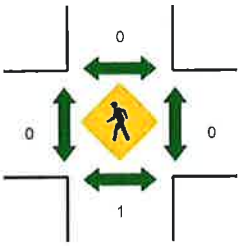
QC JOB #: 14548501
DATE: Wed, Oct 25 2017

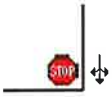
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:35 AM -- 7:50 AM

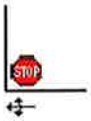


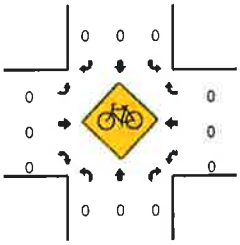


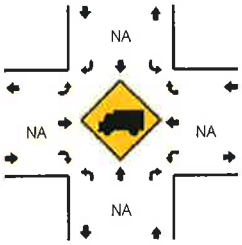
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

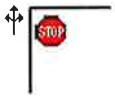


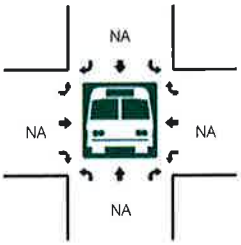












5-Min Count Period	SW Murdock Rd/SW Baker Rd (Northbound)				SW Murdock Rd/SW Baker Rd (Southbound)				SW Sunset Blvd/McKinley Dr (Eastbound)				SW Sunset Blvd/McKinley Dr (Westbound)				Total	Hourly Totals
Beginning At	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	14	5	0	0	0	8	6	0	22	0	8	0	0	0	1	0	64	
7:05 AM	10	9	0	0	0	5	3	0	18	0	9	0	0	0	4	0	58	
7:10 AM	11	6	0	0	1	6	3	0	17	0	11	0	0	0	2	0	57	
7:15 AM	12	8	0	0	0	6	5	0	15	1	16	0	0	1	3	0	67	
7:20 AM	20	10	1	0	0	6	6	0	22	0	20	0	0	2	1	0	88	
7:25 AM	8	12	2	0	0	5	5	0	17	0	18	0	1	4	4	0	76	
7:30 AM	12	7	0	0	1	9	2	0	23	1	16	0	2	0	1	0	74	
7:35 AM	11	14	0	0	0	11	7	0	24	1	22	0	0	6	2	0	98	
7:40 AM	13	8	0	0	0	12	1	0	20	0	17	0	1	2	1	0	75	
7:45 AM	13	14	0	0	0	13	7	0	17	0	13	0	0	3	3	0	83	
7:50 AM	10	19	0	0	0	10	8	0	19	1	10	0	1	0	5	0	83	
7:55 AM	5	12	0	0	2	7	7	0	17	0	18	0	0	0	2	0	70	893
8:00 AM	2	6	0	0	1	11	4	0	25	1	20	0	0	1	0	0	71	900
8:05 AM	11	11	0	0	0	7	7	0	24	1	20	0	0	1	0	0	82	924
8:10 AM	7	12	0	0	1	12	2	0	15	1	12	0	0	0	1	0	63	930
8:15 AM	8	11	0	0	0	8	3	0	11	2	14	0	0	1	3	0	61	924
8:20 AM	9	9	0	0	0	7	6	0	9	0	16	0	0	1	2	0	59	895
8:25 AM	5	7	0	0	0	5	9	0	13	1	7	0	0	1	1	0	49	868
8:30 AM	3	10	0	0	2	5	3	0	17	0	13	0	0	0	0	0	53	847
8:35 AM	1	5	0	0	1	4	4	0	12	0	9	0	0	0	1	0	37	786
8:40 AM	4	7	0	0	0	6	6	0	21	0	13	0	0	1	2	0	60	771
8:45 AM	8	8	0	0	1	10	3	0	13	0	8	0	0	2	2	0	55	743
8:50 AM	6	12	0	0	1	7	6	0	17	0	15	0	0	0	0	0	64	724
8:55 AM	6	6	0	0	0	5	3	0	12	1	8	0	0	1	0	0	42	696

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	148	144	0	0	0	144	60	0	244	4	208	0	4	44	24	0	1024
Heavy Trucks	4	4	0		0	4	4		4	0	0		0	0	0		20
Pedestrians		4				0				0				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 10/31/2017 3:00 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

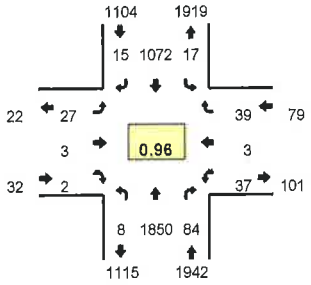
Type of peak hour being reported: Intersection Peak

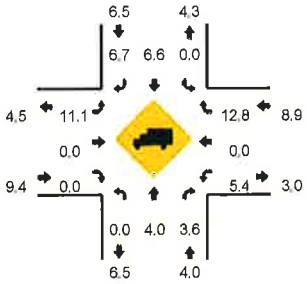
Method for determining peak hour: Total Entering Volume

LOCATION: SW Pacific Hwy -- SW Chapman Rd
CITY/STATE: Sherwood, OR

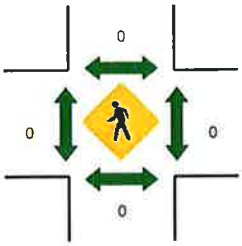
QC JOB #: 14401706
DATE: Thu, May 11 2017

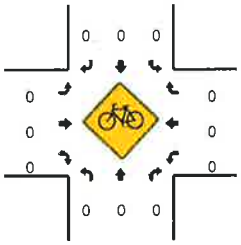
Peak-Hour: 7:05 AM -- 8:05 AM
Peak 15-Min: 7:30 AM -- 7:45 AM

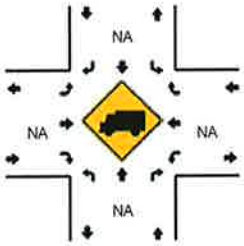


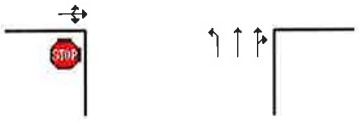


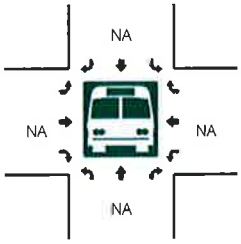
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES











5-Min Count Period	SW Pacific Hwy (Northbound)				SW Pacific Hwy (Southbound)				SW Chapman Rd (Eastbound)				SW Chapman Rd (Westbound)				Total	Hourly Totals
Beginning At	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	133	2	0	0	74	0	0	1	0	0	0	4	0	3	0	217	
7:05 AM	0	169	5	1	0	81	4	0	0	0	0	0	2	0	0	0	262	
7:10 AM	0	159	6	0	0	99	1	1	1	0	0	0	1	0	1	0	269	
7:15 AM	1	165	11	0	1	75	0	0	0	1	0	0	2	0	2	0	258	
7:20 AM	0	174	7	0	0	100	0	1	1	1	0	0	3	0	1	0	288	
7:25 AM	0	141	8	1	1	78	1	0	3	0	0	0	4	0	2	0	239	
7:30 AM	0	177	8	0	1	84	0	0	4	0	1	0	0	1	4	0	280	
7:35 AM	0	177	8	0	0	85	1	0	0	0	0	0	4	0	3	0	278	
7:40 AM	1	147	14	1	1	85	1	0	4	0	0	0	3	1	5	0	263	
7:45 AM	1	142	9	0	4	99	2	0	3	0	0	0	2	0	4	0	266	
7:50 AM	0	147	6	0	1	125	1	1	2	0	0	0	4	1	3	0	291	
7:55 AM	1	133	1	0	3	82	2	0	1	1	1	0	8	0	6	0	239	3150
8:00 AM	0	119	1	1	2	79	2	0	8	0	0	0	4	0	8	0	224	3157
8:05 AM	0	98	4	0	2	85	4	0	5	0	0	0	2	1	1	0	202	3097
8:10 AM	0	127	2	0	1	82	1	0	0	1	0	0	3	0	1	0	218	3046
8:15 AM	0	130	3	0	2	72	2	0	3	0	1	0	2	0	2	0	217	3005
8:20 AM	1	135	6	0	1	89	1	1	0	1	0	0	3	0	2	0	240	2957
8:25 AM	0	115	5	0	3	63	0	0	0	0	0	0	0	0	1	0	187	2905
8:30 AM	0	127	3	0	1	71	0	0	1	0	0	0	3	1	3	0	210	2835
8:35 AM	0	118	3	0	1	83	2	0	2	0	0	0	0	1	1	0	211	2768
8:40 AM	1	143	0	1	1	68	2	1	1	0	0	0	3	0	0	0	221	2726
8:45 AM	0	108	1	0	1	87	4	1	0	1	0	0	3	0	2	0	208	2668
8:50 AM	1	127	3	0	0	88	1	0	0	1	1	0	1	0	1	0	224	2601
8:55 AM	0	93	4	0	1	89	3	0	2	1	1	0	3	1	1	0	199	2561

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	4	2004	120	4	8	1016	8	0	32	0	4	0	28	8	48	0	3284
Heavy Trucks	0	64	4		0	100	0		0	0	0		4	0	4		176
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 5/19/2017 4:01 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

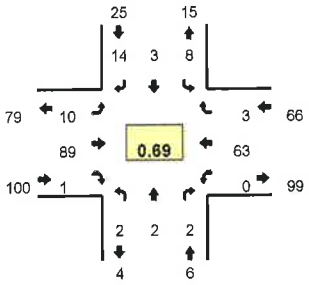
Type of peak hour being reported: Intersection Peak

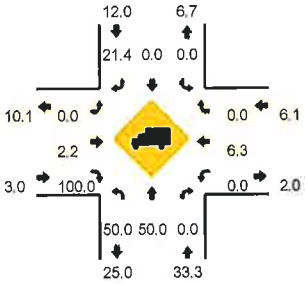
Method for determining peak hour: Total Entering Volume

LOCATION: SW Old Hwy 99W -- SW Brookman Rd
CITY/STATE: Sherwood, OR

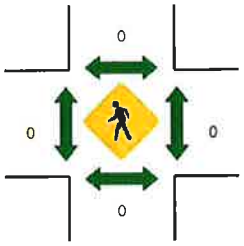
QC JOB #: 14401709
DATE: Thu, May 11 2017

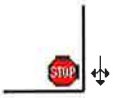
Peak-Hour: 7:10 AM -- 8:10 AM
Peak 15-Min: 7:40 AM -- 7:55 AM

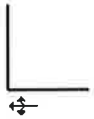


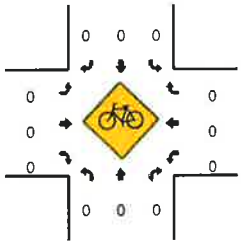


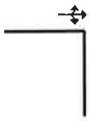
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

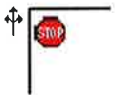


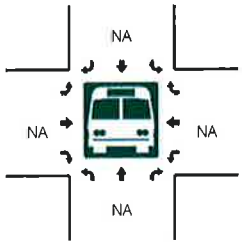












5-Min Count Period Beginning At	SW Old Hwy 99W (Northbound)				SW Old Hwy 99W (Southbound)				SW Brookman Rd (Eastbound)				SW Brookman Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	1	0	0	0	0	0	0	0	1	1	0	0	4	0	0	7	
7:05 AM	0	0	0	0	0	0	1	0	0	2	0	0	0	1	0	0	4	
7:10 AM	0	0	0	0	0	0	0	0	1	6	0	0	0	1	0	0	8	
7:15 AM	1	1	0	0	0	0	1	0	2	11	0	0	0	2	0	0	18	
7:20 AM	0	0	1	0	0	0	0	0	1	5	0	0	0	6	0	0	13	
7:25 AM	0	0	0	0	0	0	0	0	0	11	0	0	0	5	0	0	16	
7:30 AM	0	0	0	0	0	0	0	0	0	9	0	0	0	3	0	0	12	
7:35 AM	0	0	0	0	1	0	1	0	1	7	0	0	0	8	0	0	18	
7:40 AM	0	0	0	0	2	1	2	0	1	11	1	0	0	4	2	0	24	
7:45 AM	1	0	0	0	2	0	3	0	2	11	0	0	0	3	0	0	22	
7:50 AM	0	0	1	0	2	0	5	0	0	7	0	0	0	10	0	0	25	
7:55 AM	0	0	0	0	0	1	0	0	2	4	0	0	0	10	1	0	18	185
8:00 AM	0	1	0	0	0	0	1	0	0	1	0	0	0	8	0	0	11	189
8:05 AM	0	0	0	0	1	1	1	0	0	6	0	0	0	3	0	0	12	197
8:10 AM	0	0	0	0	0	0	1	0	0	5	0	0	0	2	0	0	8	197
8:15 AM	0	0	0	0	0	0	2	0	0	4	0	0	0	2	0	0	8	187
8:20 AM	0	0	0	0	0	0	0	0	0	7	0	0	0	5	0	0	12	186
8:25 AM	0	2	0	0	0	0	0	0	0	6	0	0	0	0	0	0	8	178
8:30 AM	0	0	0	0	0	0	1	0	1	3	0	0	0	4	0	0	9	175
8:35 AM	0	0	0	0	0	0	0	0	1	3	0	0	0	2	0	0	6	163
8:40 AM	0	2	0	0	0	1	0	0	0	0	0	0	0	3	0	0	6	145
8:45 AM	0	0	0	0	0	0	0	0	0	3	0	0	0	5	0	0	8	131
8:50 AM	0	0	0	0	0	1	1	0	0	2	0	0	0	4	0	0	8	114
8:55 AM	0	0	0	0	0	0	1	0	0	6	0	0	0	2	0	0	9	105

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	4	0	4	0	24	4	40	0	12	116	4	0	0	68	8	0	284
Heavy Trucks	4	0	0		0	0	12		0	0	4		0	4	0		24
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 5/19/2017 4:01 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

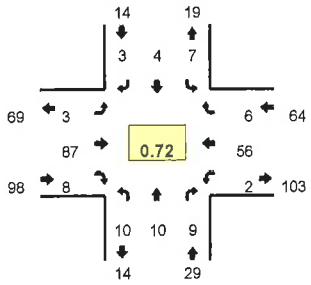
Type of peak hour being reported: Intersection Peak

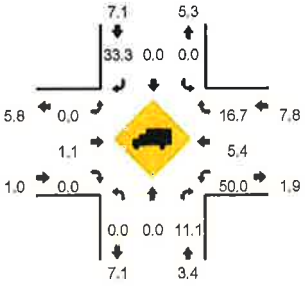
Method for determining peak hour: Total Entering Volume

LOCATION: SW Middleton Rd -- SW Brookman Rd
CITY/STATE: Sherwood, OR

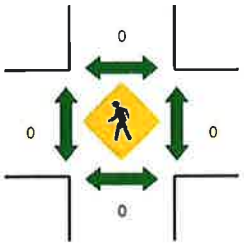
QC JOB #: 14401711
DATE: Thu, May 11 2017

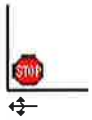
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:40 AM -- 7:55 AM

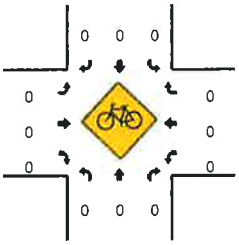


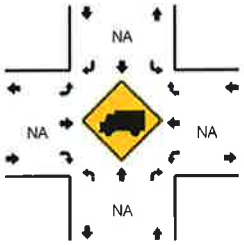


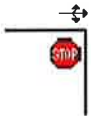
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

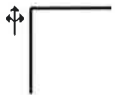


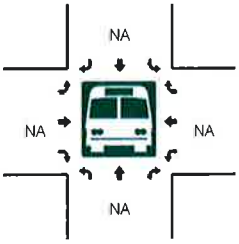












5-Min Count Period Beginning At	SW Middleton Rd (Northbound)				SW Middleton Rd (Southbound)				SW Brookman Rd (Eastbound)				SW Brookman Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3	
7:05 AM	0	0	0	0	1	0	0	0	0	2	1	0	0	1	0	0	5	
7:10 AM	0	1	0	0	0	0	0	0	0	5	0	0	0	1	0	0	7	
7:15 AM	0	0	0	0	1	0	0	0	1	10	0	0	0	4	0	0	16	
7:20 AM	1	2	1	0	0	0	0	0	0	8	0	0	1	3	0	0	16	
7:25 AM	1	0	0	0	0	0	0	0	0	9	1	0	0	5	0	0	16	
7:30 AM	1	2	1	0	2	1	0	0	0	9	0	0	0	4	0	0	20	
7:35 AM	0	0	1	0	0	0	0	0	1	8	0	0	0	8	0	0	18	
7:40 AM	1	5	1	0	2	0	1	0	0	10	0	0	0	4	2	0	26	
7:45 AM	0	0	2	0	1	1	0	0	1	12	2	0	1	5	1	0	26	
7:50 AM	2	0	0	0	1	0	0	0	0	10	1	0	0	5	0	0	19	
7:55 AM	0	0	1	0	0	2	1	0	0	3	1	0	0	8	1	0	17	189
8:00 AM	3	1	1	0	0	0	1	0	0	0	2	0	0	5	1	0	14	200
8:05 AM	1	0	0	0	0	0	0	0	0	5	1	0	0	2	0	0	9	204
8:10 AM	0	0	1	0	0	0	0	0	0	3	0	0	0	3	1	0	8	205
8:15 AM	1	0	0	0	0	0	0	0	0	5	1	0	0	1	0	0	8	197
8:20 AM	3	0	0	0	0	0	0	0	0	4	0	0	1	1	0	0	9	190
8:25 AM	0	0	1	0	0	0	0	0	2	6	1	0	0	0	0	0	10	184
8:30 AM	1	0	0	0	0	0	0	0	0	2	1	0	0	3	0	0	7	171
8:35 AM	0	0	0	0	1	0	0	0	0	3	0	0	0	2	0	0	6	159
8:40 AM	2	1	0	0	1	0	0	0	0	0	0	0	0	4	0	0	8	141
8:45 AM	1	0	0	0	0	0	0	0	0	2	0	0	1	2	1	0	7	122
8:50 AM	0	0	0	0	0	0	0	0	0	2	1	0	0	3	0	0	6	109
8:55 AM	0	0	0	0	0	0	1	0	0	6	0	0	0	1	0	0	8	100

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	20	12	0	16	4	4	0	4	128	12	0	4	56	12	0	284
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	4	4		8
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 5/19/2017 4:01 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

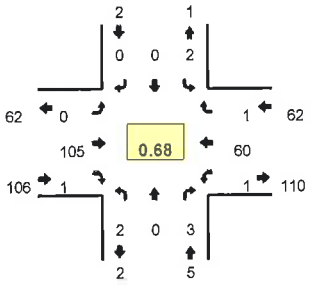
Type of peak hour being reported: Intersection Peak

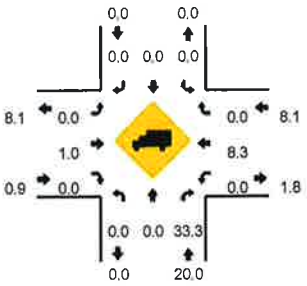
Method for determining peak hour: Total Entering Volume

LOCATION: SW Oberst Rd -- SW Brookman Rd
CITY/STATE: Sherwood, OR

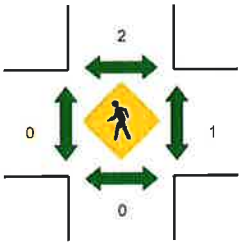
QC JOB #: 14401713
DATE: Thu, May 11 2017

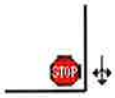
Peak-Hour: 7:10 AM -- 8:10 AM
Peak 15-Min: 7:40 AM -- 7:55 AM

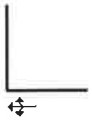


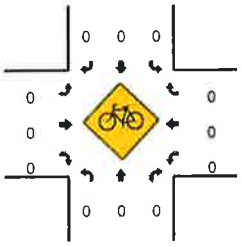


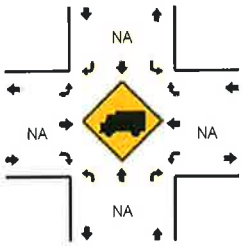
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

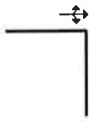


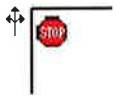


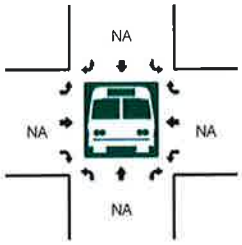












5-Min Count Period	SW Oberst Rd (Northbound)				SW Oberst Rd (Southbound)				SW Brookman Rd (Eastbound)				SW Brookman Rd (Westbound)				Total	Hourly Totals
Beginning At:	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	
7:05 AM	0	0	1	0	0	0	0	0	0	3	0	0	0	1	0	0	5	
7:10 AM	0	0	0	0	0	0	0	0	0	6	0	0	0	1	1	0	8	
7:15 AM	0	0	0	0	1	0	0	0	0	9	0	0	0	5	0	0	15	
7:20 AM	0	0	0	0	0	0	0	0	0	9	0	0	0	3	0	0	12	
7:25 AM	0	0	1	0	0	0	0	0	0	11	1	0	0	5	0	0	18	
7:30 AM	0	0	1	0	0	0	0	0	0	10	0	0	1	5	0	0	17	
7:35 AM	1	0	1	0	0	0	0	0	0	8	0	0	0	5	0	0	15	
7:40 AM	0	0	0	0	0	0	0	0	0	16	0	0	0	7	0	0	23	
7:45 AM	0	0	0	0	0	0	0	0	0	16	0	0	0	7	0	0	23	
7:50 AM	1	0	0	0	0	0	0	0	0	10	0	0	0	7	0	0	18	
7:55 AM	0	0	0	0	0	0	0	0	0	4	0	0	0	6	0	0	10	166
8:00 AM	0	0	0	0	0	0	0	0	0	2	0	0	0	6	0	0	8	172
8:05 AM	0	0	0	0	1	0	0	0	0	4	0	0	0	3	0	0	8	175
8:10 AM	1	0	0	0	0	0	0	0	0	4	0	0	0	2	0	0	7	174
8:15 AM	0	0	0	0	0	0	0	0	0	5	0	0	0	1	0	0	6	165
8:20 AM	0	0	1	0	0	0	0	0	0	2	0	0	0	2	0	0	5	158
8:25 AM	0	0	0	0	0	0	0	0	0	7	0	0	0	1	0	0	8	148
8:30 AM	0	0	0	0	0	0	0	0	0	4	0	0	0	2	0	0	6	137
8:35 AM	0	0	0	0	0	0	0	0	0	5	0	0	0	1	0	0	6	128
8:40 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	5	0	0	6	111
8:45 AM	0	0	0	0	0	0	0	0	0	1	0	0	1	3	0	0	5	93
8:50 AM	0	0	0	0	1	0	0	0	0	3	0	0	0	2	0	0	6	81
8:55 AM	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	5	76

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	4	0	0	0	0	0	0	0	0	168	0	0	0	84	0	0	256
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	8	0		8
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 5/23/2017 9:22 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

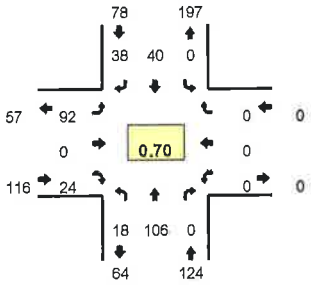
Type of peak hour being reported: Intersection Peak

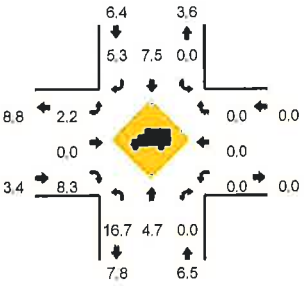
Method for determining peak hour: Total Entering Volume

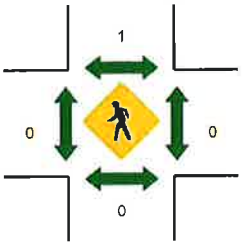
LOCATION: SW Ladd Hill Rd -- SW Brookman Rd
CITY/STATE: Sherwood, OR

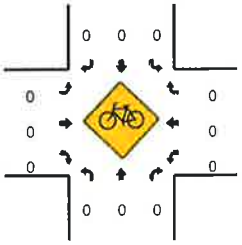
QC JOB #: 14401715
DATE: Thu, May 11 2017

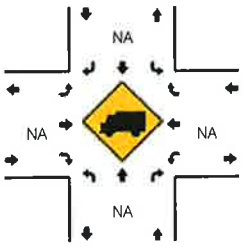
Peak-Hour: 7:10 AM -- 8:10 AM
Peak 15-Min: 7:40 AM -- 7:55 AM

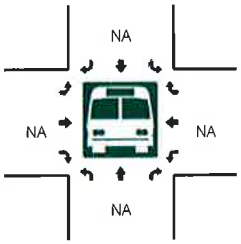












5-Min Count Period Beginning At	SW Ladd Hill Rd (Northbound)				SW Ladd Hill Rd (Southbound)				SW Brookman Rd (Eastbound)				SW Brookman Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	2	0	0	0	0	0	0	2	0	1	0	0	0	0	0	5	
7:05 AM	0	5	0	0	0	0	0	0	1	0	0	0	0	0	0	0	6	
7:10 AM	1	7	0	0	0	3	2	0	7	0	2	0	0	0	0	0	22	
7:15 AM	0	5	0	0	0	3	3	0	5	0	3	0	0	0	0	0	19	
7:20 AM	2	8	0	0	0	1	1	0	4	0	3	0	0	0	0	0	19	
7:25 AM	1	4	0	0	0	2	4	0	4	0	1	0	0	0	0	0	16	
7:30 AM	3	12	0	0	0	5	2	0	13	0	3	0	0	0	0	0	38	
7:35 AM	3	8	0	0	0	0	2	0	10	0	2	0	0	0	0	0	25	
7:40 AM	0	17	0	0	0	5	5	0	10	0	3	1	0	0	0	0	41	
7:45 AM	2	12	0	0	0	2	5	0	13	0	2	0	0	0	0	0	36	
7:50 AM	5	9	0	0	0	4	4	0	13	0	1	0	0	0	0	0	36	
7:55 AM	1	11	0	0	0	6	3	0	5	0	4	0	0	0	0	0	30	293
8:00 AM	0	5	0	0	0	6	2	0	2	0	0	0	0	0	0	0	15	303
8:05 AM	0	8	0	0	0	3	5	0	5	0	0	0	0	0	0	0	21	318
8:10 AM	0	7	0	0	0	5	0	0	4	0	1	0	0	0	0	0	17	313
8:15 AM	0	7	0	0	0	1	1	0	3	0	1	0	0	0	0	0	13	307
8:20 AM	1	3	0	0	0	3	0	0	2	0	2	0	0	0	0	0	11	299
8:25 AM	0	5	0	0	0	3	3	0	6	0	1	0	0	0	0	0	18	301
8:30 AM	0	2	0	0	0	4	0	0	4	0	0	0	0	0	0	0	10	273
8:35 AM	0	5	0	0	0	6	3	0	1	0	0	0	0	0	0	0	15	263
8:40 AM	2	3	0	0	0	5	2	0	3	0	2	0	0	0	0	0	17	239
8:45 AM	0	4	0	0	0	5	3	0	0	0	1	0	0	0	0	0	13	216
8:50 AM	1	4	0	0	0	4	1	0	1	0	1	0	0	0	0	0	12	192
8:55 AM	1	7	0	0	0	6	0	0	5	0	0	0	0	0	0	0	19	181

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	28	152	0	0	0	44	56	0	144	0	24	4	0	0	0	0	452
Heavy Trucks	0	0	0		0	0	8		0	0	4		0	0	0		12
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 5/19/2017 4:01 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

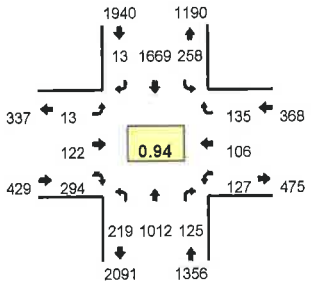
Type of peak hour being reported: Intersection Peak

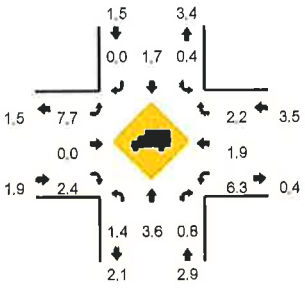
Method for determining peak hour: Total Entering Volume

LOCATION: SW Pacific Hwy -- SW Elwert Rd/SW Sunset Blvd
CITY/STATE: Sherwood, OR

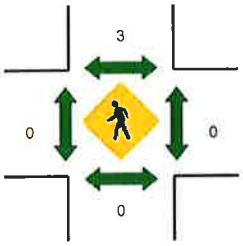
QC JOB #: 14401718
DATE: Thu, May 11 2017

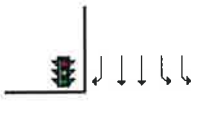
Peak-Hour: 4:40 PM -- 5:40 PM
Peak 15-Min: 5:10 PM -- 5:25 PM

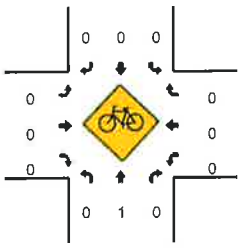


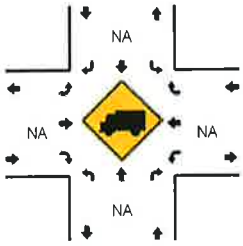


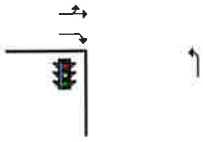
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

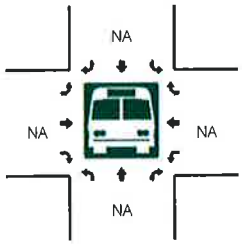












5-Min Count Period Beginning At	SW Pacific Hwy (Northbound)				SW Pacific Hwy (Southbound)				SW Elwert Rd/SW Sunset Blvd (Eastbound)				SW Elwert Rd/SW Sunset Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	15	71	6	1	11	141	3	4	3	11	27	0	10	6	6	0	315	
4:05 PM	4	62	14	0	14	154	0	1	0	12	26	0	7	5	11	0	310	
4:10 PM	12	76	3	0	11	132	0	2	0	10	27	0	9	8	10	0	300	
4:15 PM	13	96	13	1	10	111	3	3	1	7	25	0	11	8	15	0	317	
4:20 PM	16	91	13	1	13	149	0	5	0	12	18	0	13	7	11	0	349	
4:25 PM	13	82	5	0	12	140	2	3	1	9	21	0	12	10	16	0	326	
4:30 PM	22	73	10	0	12	110	3	2	0	11	28	0	6	7	11	0	295	
4:35 PM	16	82	8	0	19	121	2	6	0	11	26	0	10	8	11	0	320	
4:40 PM	24	100	17	1	13	129	1	2	0	7	29	0	12	8	9	0	352	
4:45 PM	23	79	9	0	19	136	0	3	1	7	22	0	11	19	15	0	344	
4:50 PM	22	87	11	0	22	124	1	3	2	12	27	0	11	10	12	0	344	
4:55 PM	14	78	16	0	25	136	1	1	2	6	28	0	12	8	18	0	345	3917
5:00 PM	19	77	8	0	10	117	0	5	2	11	29	0	9	11	10	0	308	3910
5:05 PM	13	63	8	0	16	153	2	2	0	12	22	0	17	6	16	0	330	3930
5:10 PM	16	80	9	0	22	158	0	0	1	13	23	0	13	4	10	0	349	3979
5:15 PM	15	95	17	0	14	157	2	2	5	7	22	0	11	10	8	0	365	4027
5:20 PM	14	108	4	0	25	154	1	4	0	12	22	0	12	9	12	0	377	4055
5:25 PM	22	75	7	0	16	142	1	5	0	13	24	0	6	8	7	0	326	4055
5:30 PM	21	93	11	0	25	110	2	1	0	9	27	0	7	6	11	0	323	4083
5:35 PM	15	77	8	0	21	153	2	2	0	13	19	0	6	7	7	0	330	4093
5:40 PM	17	89	9	0	21	131	0	7	0	10	25	0	4	8	8	0	329	4070
5:45 PM	17	88	13	0	8	136	3	1	1	5	26	0	7	8	11	0	324	4050
5:50 PM	19	87	15	0	22	134	0	3	1	11	25	0	10	5	11	0	343	4049
5:55 PM	17	64	8	0	31	134	4	2	0	12	15	0	11	6	11	0	315	4019

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	180	1132	120	0	244	1876	12	24	24	128	268	0	144	92	120	0	4364
Heavy Trucks	8	40	4		0	20	0		4	0	8		8	0	0		92
Pedestrians		0				8				0				0			8
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 5/19/2017 4:01 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

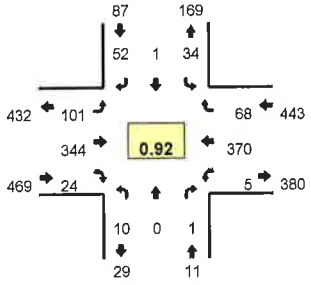
Type of peak hour being reported: Intersection Peak

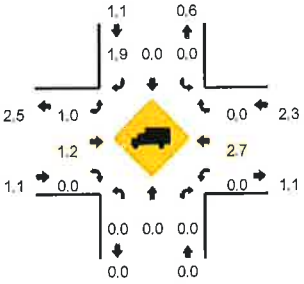
Method for determining peak hour: Total Entering Volume

LOCATION: SW Woodhaven Dr -- SW Sunset Blvd
CITY/STATE: Sherwood, OR

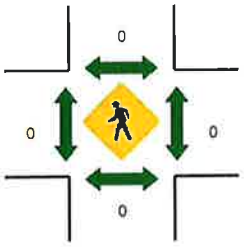
QC JOB #: 14538802
DATE: Thu, Oct 12 2017

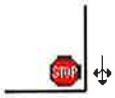
Peak-Hour: 4:45 PM -- 5:45 PM
Peak 15-Min: 5:15 PM -- 5:30 PM

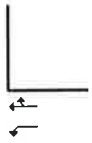


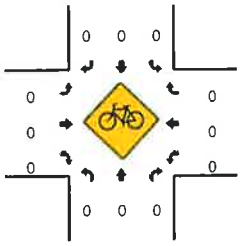


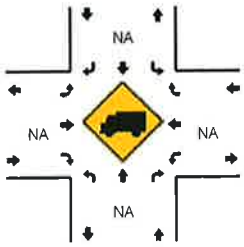
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

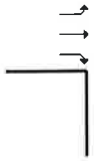


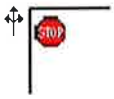


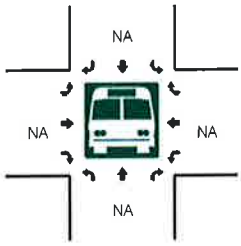












5-Min Count Period Beginning At	SW Woodhaven Dr (Northbound)				SW Woodhaven Dr (Southbound)				SW Sunset Blvd (Eastbound)				SW Sunset Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	0	0	2	0	3	0	8	20	1	0	0	20	2	0	56	
4:05 PM	0	2	1	0	4	0	3	0	7	19	1	0	0	21	3	0	61	
4:10 PM	0	0	0	0	1	0	6	0	3	19	1	0	0	19	3	0	52	
4:15 PM	0	0	0	0	3	0	2	0	6	20	1	0	2	33	5	0	72	
4:20 PM	0	0	0	0	2	0	2	0	3	18	1	0	0	25	3	0	54	
4:25 PM	1	0	0	0	4	0	3	0	7	15	0	0	0	22	6	0	58	
4:30 PM	0	0	0	0	3	0	3	0	6	20	2	0	0	26	0	0	60	
4:35 PM	0	0	1	0	2	0	2	0	9	30	0	0	1	22	1	0	68	
4:40 PM	1	0	0	0	4	0	5	0	5	24	2	1	1	27	3	0	73	
4:45 PM	1	0	0	0	5	0	2	0	8	24	3	0	1	31	5	0	80	
4:50 PM	3	0	0	0	3	0	6	0	10	21	1	0	0	28	4	1	77	
4:55 PM	1	0	1	0	1	0	1	0	5	28	1	0	1	28	10	0	77	788
5:00 PM	1	0	0	0	1	0	6	0	11	35	2	0	1	26	4	0	87	819
5:05 PM	0	0	0	0	2	0	5	0	10	34	3	0	1	30	5	0	90	848
5:10 PM	0	0	0	0	4	0	5	0	3	21	1	0	0	29	7	0	70	866
5:15 PM	1	0	0	0	2	0	4	0	8	26	4	0	0	42	3	0	90	884
5:20 PM	0	0	0	0	2	0	2	0	9	40	1	0	0	35	9	0	98	928
5:25 PM	1	0	0	0	7	1	9	0	8	25	3	0	0	27	4	0	85	955
5:30 PM	2	0	0	0	1	0	2	0	10	31	2	0	0	30	6	0	84	979
5:35 PM	0	0	0	0	4	0	4	0	8	28	2	0	0	35	3	0	84	995
5:40 PM	0	0	0	0	2	0	6	0	11	31	1	0	0	29	8	0	88	1010
5:45 PM	0	0	0	0	3	0	6	0	9	17	2	0	0	21	9	0	67	997
5:50 PM	2	0	0	0	0	0	7	0	9	17	2	0	0	28	6	0	71	991
5:55 PM	0	0	0	0	3	0	4	0	9	32	2	0	0	16	3	0	69	983

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	8	0	0	0	44	4	60	0	100	364	32	0	0	416	64	0	1092
Heavy Trucks	0	0	0		0	0	4		0	0	0		0	20	0		24
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 10/31/2017 8:48 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

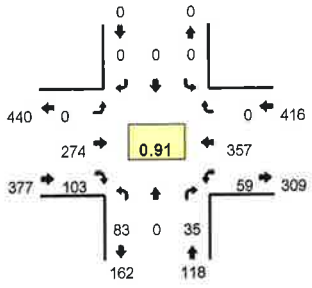
Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

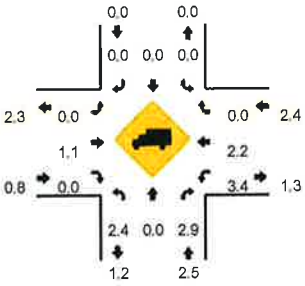
LOCATION: SW Timbrel Ln -- SW Sunset Blvd
CITY/STATE: Sherwood, OR

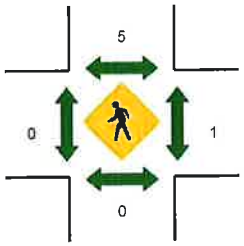
QC JOB #: 14538804
DATE: Thu, Oct 12 2017

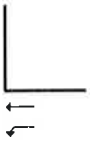
Peak-Hour: 4:45 PM -- 5:45 PM
Peak 15-Min: 5:15 PM -- 5:30 PM

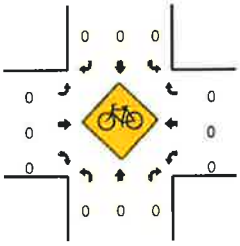


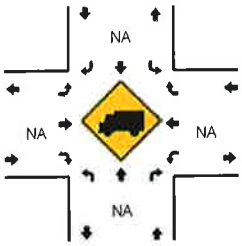
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

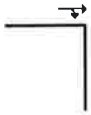


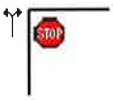


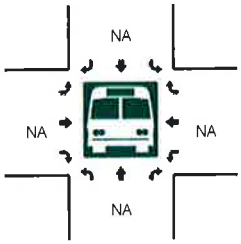












5-Min Count Period Beginning At	SW Timbrel Ln (Northbound)				SW Timbrel Ln (Southbound)				SW Sunset Blvd (Eastbound)				SW Sunset Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	5	0	2	0	0	0	0	0	0	15	5	0	1	17	0	0	45	
4:05 PM	6	0	0	0	0	0	0	0	0	21	5	0	0	16	0	0	48	
4:10 PM	1	0	1	0	0	0	0	0	0	13	9	0	5	24	0	0	53	
4:15 PM	10	0	1	0	0	0	0	0	0	21	3	0	4	26	0	0	65	
4:20 PM	12	0	7	0	0	0	0	0	0	18	3	0	2	18	0	0	60	
4:25 PM	9	0	4	0	0	0	0	0	0	15	5	0	4	21	0	0	58	
4:30 PM	5	0	4	0	0	0	0	0	0	16	6	0	4	21	0	0	56	
4:35 PM	4	0	2	0	0	0	0	0	0	25	8	0	4	22	0	0	65	
4:40 PM	3	0	4	0	0	0	0	0	0	20	10	0	3	29	0	0	69	
4:45 PM	14	0	1	0	0	0	0	0	0	17	12	0	4	21	0	0	69	
4:50 PM	7	0	2	0	0	0	0	0	0	17	8	0	5	25	0	0	64	
4:55 PM	10	0	2	0	0	0	0	0	0	27	2	0	4	34	0	0	79	731
5:00 PM	3	0	5	0	0	0	0	0	0	24	12	0	6	25	0	0	75	761
5:05 PM	4	0	2	0	0	0	0	0	0	33	3	0	8	32	0	0	82	795
5:10 PM	8	0	1	0	0	0	0	0	0	15	11	0	4	29	0	0	68	810
5:15 PM	6	0	3	0	0	0	0	0	0	18	10	0	8	37	0	0	82	827
5:20 PM	8	0	6	0	0	0	0	0	0	31	7	0	4	38	0	0	94	861
5:25 PM	4	0	5	0	0	0	0	0	0	22	13	0	3	26	0	0	73	876
5:30 PM	7	0	2	0	0	0	0	0	0	25	7	0	7	27	0	0	75	895
5:35 PM	7	0	4	0	0	0	0	0	0	24	5	0	3	32	0	0	75	905
5:40 PM	5	0	2	0	0	0	0	0	0	21	13	0	3	31	0	0	75	911
5:45 PM	6	0	1	0	0	0	0	0	0	14	4	0	4	23	0	0	52	894
5:50 PM	9	0	1	0	0	0	0	0	0	13	7	0	6	26	0	0	62	892
5:55 PM	3	0	1	0	0	0	0	0	0	22	7	0	3	15	0	0	51	864

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	72	0	56	0	0	0	0	0	0	284	120	0	60	404	0	0	996
Heavy Trucks	4	0	4		0	0	0		0	0	0		0	16	0		24
Pedestrians		0				4				0				4			8
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 10/31/2017 8:48 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

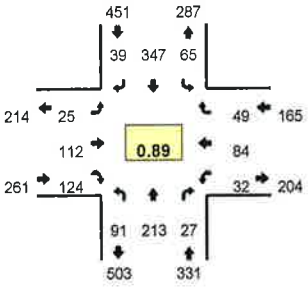
Type of peak hour being reported: User-Defined

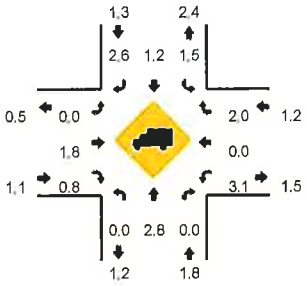
Method for determining peak hour: Total Entering Volume

LOCATION: SW Main St/SW Ladd Hill Rd -- SW Sunset Blvd
CITY/STATE: Sherwood, OR

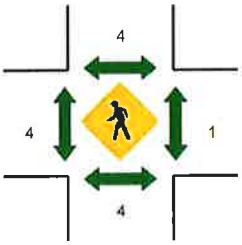
QC JOB #: 14487602
DATE: Tue, Sep 12 2017

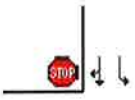
Peak-Hour: 4:40 PM -- 5:40 PM
Peak 15-Min: 5:15 PM -- 5:30 PM

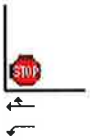


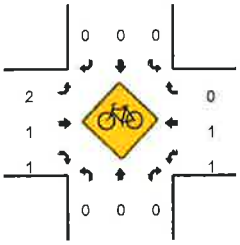


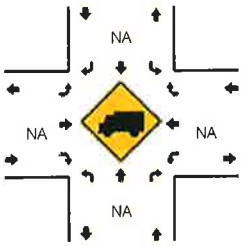
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

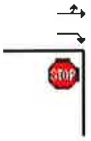


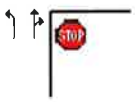


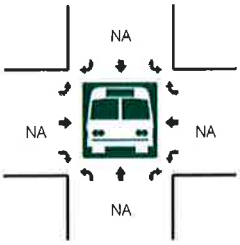












5-Min Count Period Beginning At	SW Main St/SW Ladd Hill Rd (Northbound)				SW Main St/SW Ladd Hill Rd (Southbound)				SW Sunset Blvd (Eastbound)				SW Sunset Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	2	12	3	0	5	22	2	0	1	5	8	0	3	3	2	0	68	
4:05 PM	5	10	2	0	7	18	1	0	3	5	14	0	4	4	3	0	76	
4:10 PM	6	10	2	0	1	25	2	0	3	7	9	0	3	5	3	0	76	
4:15 PM	1	8	3	0	6	19	2	0	3	6	8	0	2	3	1	0	62	
4:20 PM	7	14	3	0	6	21	2	0	1	3	8	0	2	3	2	1	73	
4:25 PM	6	13	1	0	5	20	3	0	4	4	7	0	3	5	4	0	75	
4:30 PM	10	14	2	0	9	31	4	0	0	5	5	0	2	4	3	0	89	
4:35 PM	2	15	3	0	5	24	3	0	1	7	12	0	2	3	4	0	81	
4:40 PM	3	14	1	0	3	35	6	0	2	10	8	0	4	5	3	0	94	
4:45 PM	2	26	2	0	6	27	4	0	4	10	9	0	2	8	4	0	104	
4:50 PM	10	15	3	0	3	36	2	0	1	6	13	0	1	4	6	0	100	
4:55 PM	3	17	2	0	5	34	4	0	0	10	8	0	3	7	3	0	96	994
5:00 PM	6	17	4	0	6	26	3	0	2	7	10	0	3	12	3	0	99	1025
5:05 PM	6	13	2	0	5	28	7	0	2	10	14	0	2	5	9	0	103	1052
5:10 PM	5	22	2	0	6	23	0	0	1	11	12	0	2	3	4	0	91	1067
5:15 PM	13	18	4	0	5	26	3	0	1	9	10	0	5	9	2	0	105	1110
5:20 PM	13	27	0	0	9	34	2	0	4	12	12	0	3	8	1	0	125	1162
5:25 PM	17	14	1	0	8	29	1	0	5	8	13	0	1	11	1	0	109	1196
5:30 PM	7	17	5	0	2	27	2	0	2	8	11	0	1	6	6	0	94	1201
5:35 PM	6	13	1	0	7	22	5	0	1	11	4	0	5	6	7	0	88	1208
5:40 PM	12	20	2	0	3	19	2	0	1	10	7	0	1	3	2	0	82	1196
5:45 PM	6	22	1	0	2	20	4	0	3	5	9	0	5	5	5	0	87	1179
5:50 PM	6	11	1	0	2	30	2	0	2	10	10	0	4	7	1	0	86	1165
5:55 PM	9	22	0	0	4	23	4	0	2	10	13	0	5	4	3	0	99	1168

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	172	236	20	0	88	356	24	0	40	116	140	0	36	112	16	0	1356
Heavy Trucks	0	12	0		0	0	0		0	4	0		4	0	0		20
Pedestrians		0				12				0				0			12
Bicycles	0	0	0		0	0	0		0	0	0		0	1	0		1
Railroad Stopped Buses																	

Comments:

Report generated on 2/23/2018 2:12 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

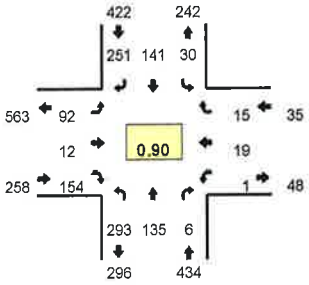
Type of peak hour being reported: Intersection Peak

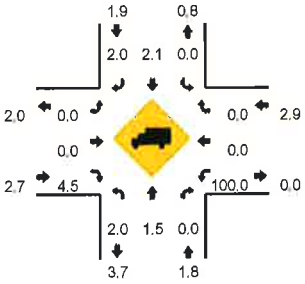
Method for determining peak hour: Total Entering Volume

LOCATION: SW Murdock Rd/SW Baker Rd -- SW Sunset Blvd/McKinley Dr
CITY/STATE: Sherwood, OR

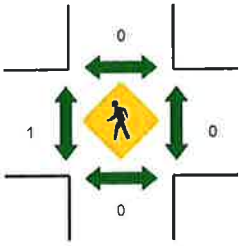
QC JOB #: 14548502
DATE: Wed, Oct 25 2017

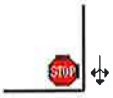
Peak-Hour: 4:45 PM -- 5:45 PM
Peak 15-Min: 5:05 PM -- 5:20 PM

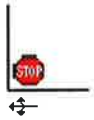


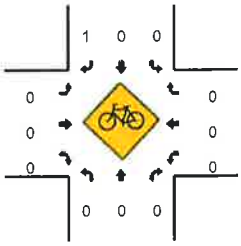


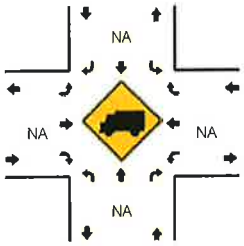
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

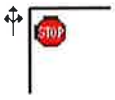


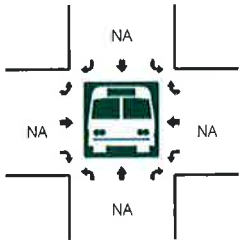












5-Min Count Period Beginning At	SW Murdock Rd/SW Baker Rd (Northbound)				SW Murdock Rd/SW Baker Rd (Southbound)				SW Sunset Blvd/McKinley Dr (Eastbound)				SW Sunset Blvd/McKinley Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	16	9	0	0	1	8	14	0	10	0	10	0	0	2	1	0	71	
4:05 PM	13	11	0	0	2	10	17	0	8	2	12	0	0	0	0	0	75	
4:10 PM	16	11	0	0	4	11	18	0	4	3	9	0	0	0	0	0	76	
4:15 PM	21	6	0	0	3	8	16	0	9	0	7	0	0	1	0	0	71	
4:20 PM	14	7	1	0	1	15	23	0	8	0	9	0	0	0	1	0	79	
4:25 PM	24	6	1	0	1	5	12	0	7	1	2	0	0	0	0	0	59	
4:30 PM	19	12	0	0	1	13	10	0	6	0	16	0	0	1	0	0	78	
4:35 PM	14	8	0	0	1	14	18	0	7	0	13	0	0	0	0	0	75	
4:40 PM	24	11	1	0	1	11	16	0	2	0	10	0	0	0	0	0	76	
4:45 PM	25	13	0	0	0	17	28	0	12	0	9	0	0	2	1	0	107	
4:50 PM	26	12	0	0	2	11	27	0	6	1	17	0	0	2	3	0	107	
4:55 PM	25	14	1	0	3	8	26	0	11	1	10	0	0	1	2	0	102	976
5:00 PM	14	9	1	0	1	12	14	0	5	0	11	0	0	1	3	0	71	976
5:05 PM	25	13	0	0	5	11	19	0	9	1	17	0	0	2	0	0	102	1003
5:10 PM	34	14	1	0	5	14	15	0	6	2	16	0	1	4	0	0	112	1039
5:15 PM	19	14	0	0	5	14	22	0	8	0	16	0	0	2	3	0	104	1072
5:20 PM	29	4	1	0	0	6	20	0	4	3	10	0	0	1	1	0	79	1072
5:25 PM	27	6	0	0	5	14	17	0	10	2	14	0	0	0	0	0	95	1108
5:30 PM	20	12	1	0	2	12	21	0	9	0	16	0	0	1	2	0	96	1126
5:35 PM	23	10	1	0	1	9	20	0	5	1	7	0	0	1	0	0	78	1129
5:40 PM	26	14	0	0	1	13	22	0	6	1	11	0	0	2	0	0	96	1149
5:45 PM	21	11	0	0	0	15	16	0	6	0	10	0	0	0	2	0	81	1123
5:50 PM	20	7	0	0	3	8	16	0	9	2	10	0	0	0	0	0	75	1091
5:55 PM	15	9	0	0	2	9	20	0	6	1	8	0	0	0	2	0	72	1061

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	164	4	0	60	156	224	0	96	12	196	0	4	32	12	0	1272
Heavy Trucks	8	0	0		0	8	0		0	0	8		4	0	0		28
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	1		0	0	0		0	0	0		1
Railroad Stopped Buses																	

Comments:

Report generated on 10/31/2017 3:00 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

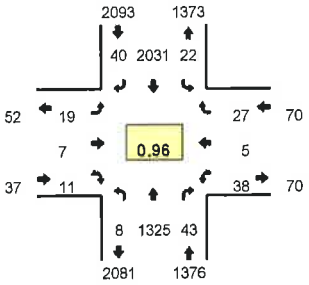
Type of peak hour being reported: Intersection Peak

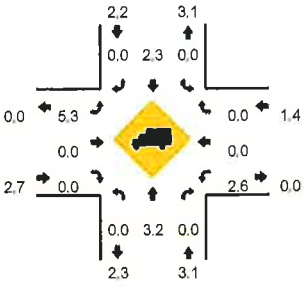
Method for determining peak hour: Total Entering Volume

LOCATION: SW Pacific Hwy -- SW Chapman Rd
CITY/STATE: Sherwood, OR

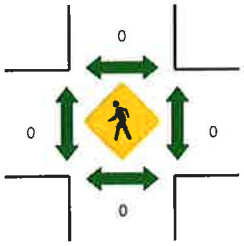
QC JOB #: 14401707
DATE: Thu, May 11 2017

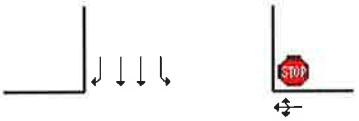
Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 5:10 PM -- 5:25 PM

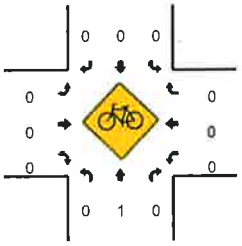


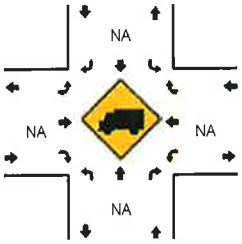


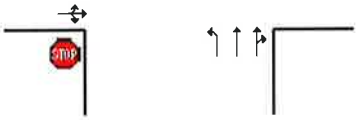
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

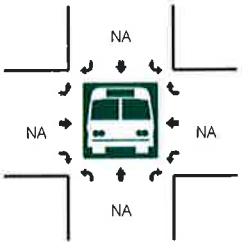












5-Min Count Period	SW Pacific Hwy (Northbound)				SW Pacific Hwy (Southbound)				SW Chapman Rd (Eastbound)				SW Chapman Rd (Westbound)				Total	Hourly Totals
Beginning At	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	89	1	0	1	184	2	0	1	1	0	0	2	0	0	0	281	
4:05 PM	0	72	6	1	0	166	3	0	0	0	1	0	5	0	0	0	254	
4:10 PM	1	103	2	1	1	160	1	0	1	0	1	0	3	0	1	0	275	
4:15 PM	0	126	4	0	1	163	4	0	4	0	0	0	4	0	2	0	308	
4:20 PM	0	124	1	0	1	153	1	0	1	0	0	0	4	0	0	0	285	
4:25 PM	1	92	5	0	1	172	4	0	1	0	0	0	4	0	2	0	282	
4:30 PM	1	102	2	0	3	149	0	0	0	0	0	0	4	0	2	0	263	
4:35 PM	2	114	0	0	1	153	3	0	2	2	0	0	1	0	4	0	282	
4:40 PM	0	117	2	0	3	149	4	0	5	1	3	0	6	0	4	0	294	
4:45 PM	0	108	2	0	0	176	3	0	3	1	1	0	3	0	5	0	302	
4:50 PM	0	117	5	0	2	177	4	0	0	1	1	0	4	1	1	0	313	
4:55 PM	2	121	3	0	1	173	5	0	0	0	1	0	1	0	3	0	310	3449
5:00 PM	0	102	6	0	4	159	1	1	0	0	2	0	3	0	1	0	279	3447
5:05 PM	0	91	2	0	2	183	3	0	1	0	1	0	0	1	0	0	284	3477
5:10 PM	0	110	6	0	4	187	2	1	4	0	0	0	5	0	1	0	320	3522
5:15 PM	2	119	3	0	1	189	5	0	0	1	1	0	2	1	1	0	325	3539
5:20 PM	1	107	1	1	0	161	3	0	2	0	0	0	6	0	5	0	287	3541
5:25 PM	0	114	6	0	2	177	5	0	1	0	1	0	4	0	0	0	310	3569
5:30 PM	0	105	7	0	0	147	2	0	1	1	0	0	3	2	2	0	270	3576
5:35 PM	0	100	0	0	1	164	2	1	1	0	1	0	4	1	2	0	277	3571
5:40 PM	0	132	4	0	0	156	2	0	1	0	1	0	0	0	1	0	297	3574
5:45 PM	0	114	4	0	0	149	1	0	4	0	0	0	5	0	2	0	279	3551
5:50 PM	0	93	3	0	3	158	1	0	0	4	0	0	5	1	1	0	269	3507
5:55 PM	0	82	3	0	2	151	0	0	1	2	0	0	5	0	1	0	247	3444

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	1344	40	4	20	2148	40	4	24	4	4	0	52	4	28	0	3728
Heavy Trucks	0	44	0		0	40	0		0	0	0		0	0	0		84
Pedestrians		0				0				0				0			0
Bicycles	0	1	0		0	0	0		0	0	0		0	0	0		1
Railroad Stopped Buses																	

Comments:

Report generated on 5/19/2017 4:01 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

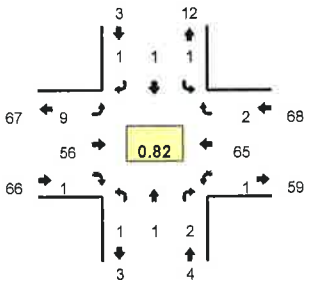
Type of peak hour being reported: Intersection Peak

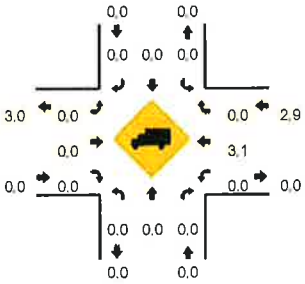
Method for determining peak hour: Total Entering Volume

LOCATION: SW Old Hwy 99W -- SW Brookman Rd
CITY/STATE: Sherwood, OR

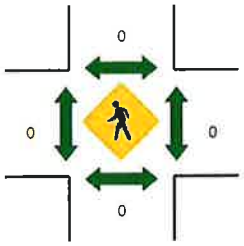
QC JOB #: 14401710
DATE: Thu, May 11 2017

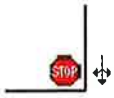
Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 5:05 PM -- 5:20 PM

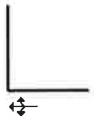


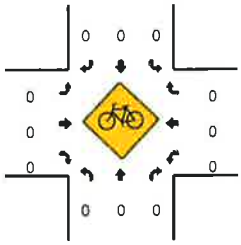


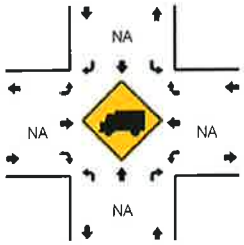
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

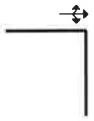


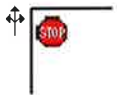


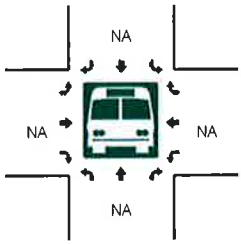












5-Min Count Period	SW Old Hwy 99W (Northbound)				SW Old Hwy 99W (Southbound)				SW Brookman Rd (Eastbound)				SW Brookman Rd (Westbound)				Total	Hourly Totals
Beginning At	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	0	0	0	0	0	0	2	1	0	0	0	1	0	0	4	
4:05 PM	0	0	1	0	0	0	0	0	0	6	0	0	1	5	0	0	13	
4:10 PM	0	0	0	0	1	0	0	0	0	3	0	0	0	4	0	0	8	
4:15 PM	0	0	0	0	1	0	2	0	2	4	0	0	0	3	0	0	12	
4:20 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	4	0	0	5	
4:25 PM	0	0	0	0	0	0	0	0	1	2	0	0	0	5	0	0	8	
4:30 PM	0	0	0	0	0	0	1	0	1	4	0	0	0	3	0	0	9	
4:35 PM	0	0	0	0	0	0	0	0	0	1	0	0	1	3	1	0	6	
4:40 PM	0	0	0	0	0	0	1	0	1	3	0	0	0	9	0	0	14	
4:45 PM	0	0	0	0	0	0	0	0	0	4	0	0	0	5	0	0	9	
4:50 PM	0	0	0	0	1	0	0	0	1	5	0	0	0	5	0	0	12	
4:55 PM	0	0	0	0	0	0	0	0	0	5	0	0	0	6	0	0	11	111
5:00 PM	0	0	0	0	0	1	0	0	4	4	1	0	0	5	0	0	15	122
5:05 PM	0	0	2	0	0	0	0	0	0	6	0	0	0	2	0	0	10	119
5:10 PM	0	1	0	0	0	0	0	0	0	8	0	0	0	4	1	0	14	125
5:15 PM	0	0	0	0	0	0	0	0	2	5	0	0	0	12	0	0	19	132
5:20 PM	0	0	0	0	0	0	0	0	1	1	0	0	0	6	0	0	8	135
5:25 PM	1	0	0	0	0	0	0	0	0	7	0	0	0	2	0	0	10	137
5:30 PM	0	0	0	0	0	0	0	0	0	7	0	0	0	6	0	0	13	141
5:35 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	4	0	0	5	140
5:40 PM	0	0	0	0	0	0	0	0	0	4	0	0	1	1	0	0	6	132
5:45 PM	0	0	0	0	0	0	0	0	1	4	0	0	0	7	0	0	12	135
5:50 PM	0	0	0	0	0	0	0	0	1	7	0	0	0	6	0	0	14	137
5:55 PM	0	0	0	0	0	0	0	0	1	5	0	0	0	5	0	0	11	137

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	4	8	0	0	0	0	0	8	76	0	0	0	72	4	0	172
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	0	0		0
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 5/19/2017 4:01 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

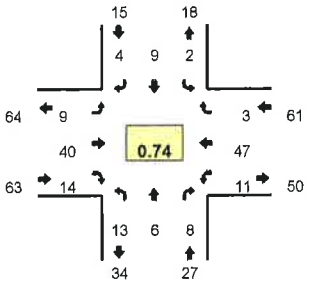
Type of peak hour being reported: Intersection Peak

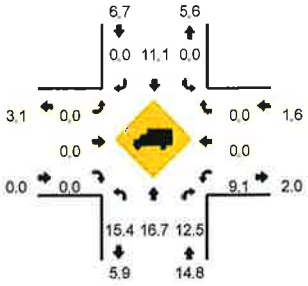
Method for determining peak hour: Total Entering Volume

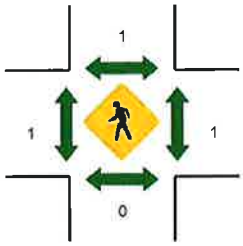
LOCATION: SW Middleton Rd -- SW Brookman Rd
CITY/STATE: Sherwood, OR

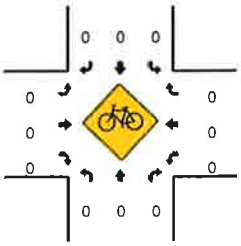
QC JOB #: 14401712
DATE: Thu, May 11 2017

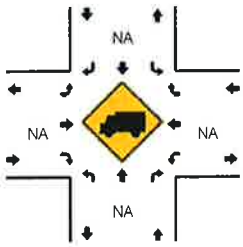
Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:05 PM -- 5:20 PM

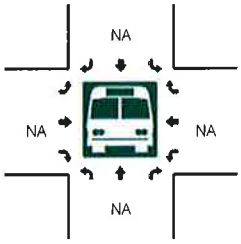












5-Min Count Period	SW Middleton Rd (Northbound)				SW Middleton Rd (Southbound)				SW Brookman Rd (Eastbound)				SW Brookman Rd (Westbound)				Total	Hourly Totals
Beginning At	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	0	0	1	0	0	0	0	1	0	0	0	2	0	0	4	
4:05 PM	0	0	0	0	0	2	1	0	0	7	0	0	0	4	0	0	14	
4:10 PM	1	0	1	0	0	0	0	0	1	3	0	0	0	3	0	0	9	
4:15 PM	3	0	0	0	0	0	0	0	1	3	1	0	0	1	0	0	9	
4:20 PM	0	0	1	0	0	0	0	0	0	1	0	0	0	4	0	0	6	
4:25 PM	0	0	0	0	0	0	0	0	0	2	0	0	1	5	0	0	8	
4:30 PM	0	0	0	0	0	0	0	0	0	1	2	0	0	2	0	0	5	
4:35 PM	0	0	1	0	1	0	0	0	0	2	0	0	0	4	1	0	9	
4:40 PM	3	0	0	0	0	0	0	0	0	2	0	0	0	7	0	0	12	
4:45 PM	1	0	0	0	2	0	2	0	1	2	1	0	1	4	0	0	14	
4:50 PM	2	0	0	0	0	1	1	0	0	6	1	0	1	2	1	0	15	
4:55 PM	0	0	0	0	0	0	0	0	0	5	0	0	1	3	0	0	9	114
5:00 PM	2	0	1	0	0	0	1	0	0	4	0	0	0	2	0	0	10	120
5:05 PM	0	0	1	0	0	1	0	0	0	7	1	0	1	3	0	0	14	120
5:10 PM	1	1	1	0	1	3	0	0	0	4	1	0	0	5	0	0	17	128
5:15 PM	2	2	0	0	0	1	0	0	1	4	3	0	2	10	0	0	25	144
5:20 PM	2	0	1	0	0	0	0	0	0	0	0	0	3	3	1	0	10	148
5:25 PM	0	0	1	0	0	0	0	0	2	5	1	0	0	3	0	0	12	152
5:30 PM	1	1	0	0	0	0	1	0	3	3	1	0	0	5	0	0	15	162
5:35 PM	1	0	1	0	0	1	0	0	0	1	1	0	1	2	0	0	8	161
5:40 PM	2	1	1	0	0	2	0	0	1	1	0	0	2	1	1	0	12	161
5:45 PM	1	1	1	0	0	0	2	0	2	3	1	0	1	3	1	0	16	163
5:50 PM	0	0	0	0	1	0	0	0	0	4	3	0	1	7	0	0	16	164
5:55 PM	1	0	0	0	0	1	0	0	0	4	2	0	0	3	0	0	11	166

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	12	8	0	4	20	0	0	4	60	20	0	12	72	0	0	224
Heavy Trucks	0	0	4		0	0	0		0	0	0		0	0	0		4
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 5/19/2017 4:01 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

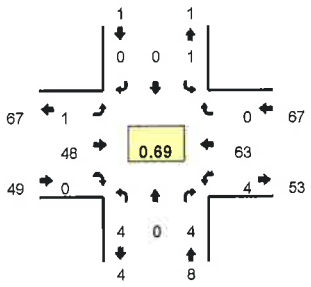
Type of peak hour being reported: Intersection Peak

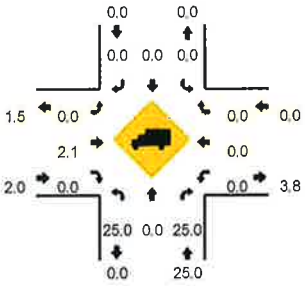
Method for determining peak hour: Total Entering Volume

LOCATION: SW Oberst Rd -- SW Brookman Rd
CITY/STATE: Sherwood, OR

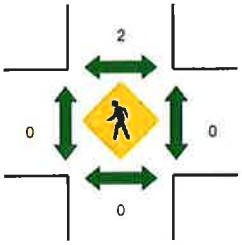
QC JOB #: 14401714
DATE: Thu, May 11 2017

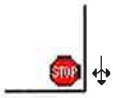
Peak-Hour: 4:55 PM -- 5:55 PM
Peak 15-Min: 5:05 PM -- 5:20 PM

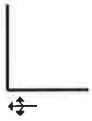


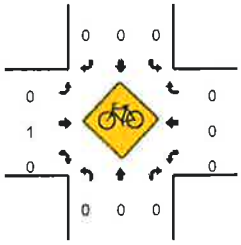


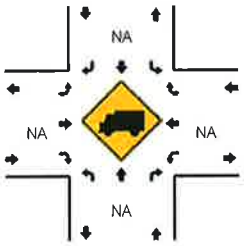
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

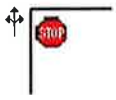


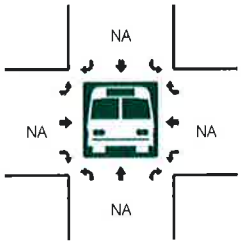












5-Min Count Period	SW Oberst Rd (Northbound)				SW Oberst Rd (Southbound)				SW Brookman Rd (Eastbound)				SW Brookman Rd (Westbound)				Total	Hourly Totals
Beginning At:	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	0	0	0	0	0	0	0	3	0	0	0	1	0	0	4	
4:05 PM	0	0	0	0	0	0	0	0	0	6	0	0	0	6	0	0	12	
4:10 PM	0	0	0	0	0	0	0	0	0	3	1	0	0	2	0	0	6	
4:15 PM	0	0	0	0	0	0	0	0	0	3	0	0	0	1	0	0	4	
4:20 PM	0	0	0	0	0	0	0	0	0	3	0	0	0	5	0	0	8	
4:25 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	5	1	0	8	
4:30 PM	0	0	0	0	0	0	1	0	0	0	1	0	0	4	0	0	6	
4:35 PM	0	0	0	0	0	0	0	0	0	3	0	0	0	5	0	0	8	
4:40 PM	0	0	0	0	0	0	0	0	0	2	1	0	0	6	0	0	9	
4:45 PM	1	0	0	0	0	0	0	0	0	1	1	0	0	6	0	0	9	
4:50 PM	0	0	0	0	0	0	0	0	0	7	1	0	1	2	0	0	11	
4:55 PM	0	0	0	0	0	0	0	0	0	4	0	0	0	5	0	0	9	94
5:00 PM	1	0	1	0	0	0	0	0	0	3	0	0	0	3	0	0	8	98
5:05 PM	0	0	0	0	0	0	0	0	1	7	0	0	0	4	0	0	12	98
5:10 PM	0	0	0	0	0	0	0	0	0	7	0	0	3	4	0	0	14	106
5:15 PM	0	0	0	0	0	0	0	0	0	5	0	0	1	13	0	0	19	121
5:20 PM	2	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	6	119
5:25 PM	0	0	1	0	0	0	0	0	0	5	0	0	0	3	0	0	9	120
5:30 PM	0	0	0	0	1	0	0	0	0	3	0	0	0	5	0	0	9	123
5:35 PM	0	0	0	0	0	0	0	0	0	3	0	0	0	5	0	0	8	123
5:40 PM	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0	0	6	120
5:45 PM	0	0	1	0	0	0	0	0	0	3	0	0	0	5	0	0	9	120
5:50 PM	1	0	1	0	0	0	0	0	0	5	0	0	0	9	0	0	16	125
5:55 PM	0	0	0	0	0	0	0	0	0	4	0	0	1	2	0	0	7	123

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	0	0	0	0	4	76	0	0	16	84	0	0	180
Heavy Trucks	0	0	0		0	0	0		0	4	0		0	0	0		4
Pedestrians		0				4				0				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 5/23/2017 9:22 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

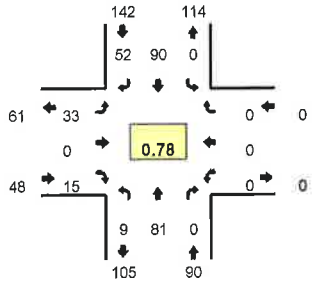
Type of peak hour being reported: Intersection Peak

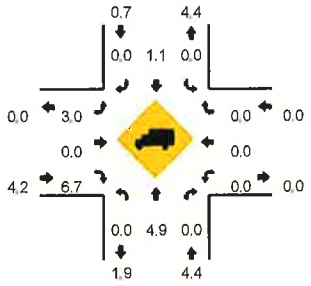
Method for determining peak hour: Total Entering Volume

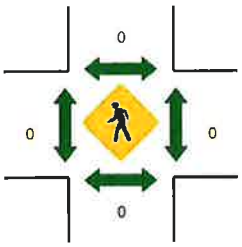
LOCATION: SW Ladd Hill Rd -- SW Brookman Rd
CITY/STATE: Sherwood, OR

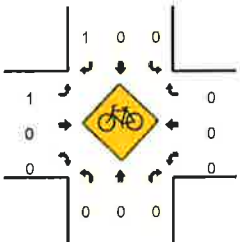
QC JOB #: 14401716
DATE: Thu, May 11 2017

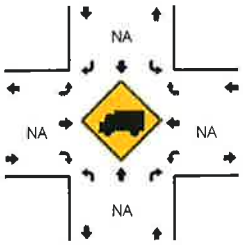
Peak-Hour: 4:45 PM -- 5:45 PM
Peak 15-Min: 5:05 PM -- 5:20 PM

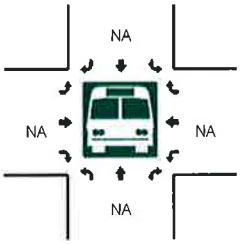












5-Min Count Period Beginning At	SW Ladd Hill Rd (Northbound)				SW Ladd Hill Rd (Southbound)				SW Brookman Rd (Eastbound)				SW Brookman Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	7	0	0	0	6	3	0	1	0	1	0	0	0	0	0	18	
4:05 PM	2	4	0	0	0	3	4	0	2	0	2	0	0	0	0	0	17	
4:10 PM	1	6	0	0	0	4	0	0	4	0	1	0	0	0	0	0	16	
4:15 PM	1	5	0	0	0	10	0	0	2	0	1	0	0	0	0	0	19	
4:20 PM	2	7	0	0	0	3	5	0	2	0	1	0	0	0	0	0	20	
4:25 PM	1	10	0	0	0	4	6	0	0	0	0	0	0	0	0	0	21	
4:30 PM	2	4	0	0	0	5	1	0	1	0	1	0	0	0	0	0	14	
4:35 PM	1	7	0	0	0	5	2	0	2	0	0	0	0	0	0	0	17	
4:40 PM	2	4	0	0	0	5	4	0	2	0	0	0	0	0	0	0	17	
4:45 PM	2	9	0	0	0	8	3	0	1	0	2	0	0	0	0	0	25	
4:50 PM	1	1	0	0	0	7	4	0	2	0	1	0	0	0	0	0	16	
4:55 PM	0	8	0	0	0	6	5	0	4	0	1	0	0	0	0	0	24	224
5:00 PM	0	7	0	0	0	2	1	0	5	0	0	0	0	0	0	0	15	221
5:05 PM	1	10	0	0	0	11	7	0	2	0	1	0	0	0	0	0	32	236
5:10 PM	2	5	0	0	0	8	7	0	6	0	2	0	0	0	0	0	30	250
5:15 PM	2	9	0	0	0	5	6	0	3	0	3	0	0	0	0	0	28	259
5:20 PM	0	7	0	0	0	10	5	0	0	0	0	0	0	0	0	0	22	261
5:25 PM	1	5	0	0	0	14	4	0	3	0	1	0	0	0	0	0	28	268
5:30 PM	0	6	0	0	0	5	2	0	3	0	2	0	0	0	0	0	18	272
5:35 PM	0	5	0	0	0	5	4	0	2	0	1	0	0	0	0	0	17	272
5:40 PM	0	9	0	0	0	9	4	0	2	0	1	0	0	0	0	0	25	280
5:45 PM	1	3	0	0	0	5	9	0	3	0	1	0	0	0	0	0	22	277
5:50 PM	1	4	0	0	0	2	5	0	4	0	0	0	0	0	0	0	16	277
5:55 PM	0	4	0	0	0	9	2	0	5	0	2	0	0	0	0	0	22	275

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	96	0	0	0	96	80	0	44	0	24	0	0	0	0	0	360
Heavy Trucks	0	4	0		0	4	0		4	0	4		0	0	0		16
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	1		0	0	0		0	0	0		1
Railroad Stopped Buses																	

Comments:

Report generated on 5/19/2017 4:01 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Appendix C Existing Conditions Level of Service Worksheets

HCM Signalized Intersection Capacity Analysis
101: SW Pacific Hwy & SW Elwert Rd/SW Sunset Blvd

01/30/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	106	223	102	179	225	245	1580	106	128	766	13
Future Volume (vph)	18	106	223	102	179	225	245	1580	106	128	766	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			-1%			2%	
Total Lost time (s)		6.0	6.0		6.0	6.0	5.0	6.0	6.0	5.0	6.0	6.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00		0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1809	1583		1818	1553	1761	3489	1561	3180	3279	1361
Flt Permitted		0.91	1.00		0.79	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1667	1583		1471	1553	1761	3489	1561	3180	3279	1361
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	19	112	235	107	188	237	258	1663	112	135	806	14
RTOR Reduction (vph)	0	0	171	0	0	109	0	0	27	0	0	8
Lane Group Flow (vph)	0	131	64	0	295	128	258	1663	85	135	806	6
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	5%	2%	2%	3%	4%	3%	4%	4%	9%	9%	15%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			6
Actuated Green, G (s)		35.0	35.0		35.0	35.0	23.8	65.1	65.1	11.2	52.5	52.5
Effective Green, g (s)		35.0	35.0		35.0	35.0	23.8	65.1	65.1	11.2	52.5	52.5
Actuated g/C Ratio		0.27	0.27		0.27	0.27	0.19	0.51	0.51	0.09	0.41	0.41
Clearance Time (s)		6.0	6.0		6.0	6.0	5.0	6.0	6.0	5.0	6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	5.4	5.4	3.5	5.4	5.4
Lane Grp Cap (vph)		454	431		401	423	326	1770	792	277	1341	556
v/s Ratio Prot							c0.15	c0.48		0.04	0.25	
v/s Ratio Perm		0.08	0.04		c0.20	0.08			0.05			0.00
v/c Ratio		0.29	0.15		0.74	0.30	0.79	0.94	0.11	0.49	0.60	0.01
Uniform Delay, d1		36.8	35.4		42.4	37.0	49.9	29.7	16.5	55.8	29.7	22.5
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.4	0.2		6.9	0.4	12.3	10.7	0.1	1.6	1.2	0.0
Delay (s)		37.2	35.5		49.3	37.4	62.2	40.4	16.6	57.4	30.9	22.5
Level of Service		D	D		D	D	E	D	B	E	C	C
Approach Delay (s)		36.1			44.0			41.9			34.5	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM 2000 Control Delay	39.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	128.3	Sum of lost time (s)	17.0
Intersection Capacity Utilization	83.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	51	238	41	7	410	86	17	14	10	27	44	67
Future Volume (Veh/h)	51	238	41	7	410	86	17	14	10	27	44	67
Sign Control		Free			Free			Stop			Stop	
Grade		-1%			1%			-2%			0%	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	64	298	51	9	513	108	21	18	13	34	55	84
Pedestrians					5						3	
Lane Width (ft)					12.0						12.0	
Walking Speed (ft/s)					3.5						3.5	
Percent Blockage					0						0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		648										
pX, platoon unblocked												
vC, conflicting volume	624			349			1068	1068	303	1041	1065	570
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	624			349			1068	1068	303	1041	1065	570
tC, single (s)	4.2			4.2			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.3			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	93			99			83	91	98	80	73	84
cM capacity (veh/h)	926			1146			127	206	738	174	207	523

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	SB 1
Volume Total	64	298	51	9	621	52	173
Volume Left	64	0	0	9	0	21	34
Volume Right	0	0	51	0	108	13	84
cSH	926	1700	1700	1146	1700	192	278
Volume to Capacity	0.07	0.18	0.03	0.01	0.37	0.27	0.62
Queue Length 95th (ft)	6	0	0	1	0	26	96
Control Delay (s)	9.2	0.0	0.0	8.2	0.0	30.6	37.1
Lane LOS	A			A		D	E
Approach Delay (s)	1.4			0.1		30.6	37.1
Approach LOS						D	E

Intersection Summary				
Average Delay	6.8			
Intersection Capacity Utilization	48.8%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	208	67	71	321	182	45
Future Volume (Veh/h)	208	67	71	321	182	45
Sign Control	Free			Free	Stop	
Grade	-1%			1%	0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	248	80	85	382	217	54
Pedestrians				21	1	
Lane Width (ft)				12.0	12.0	
Walking Speed (ft/s)				3.5	3.5	
Percent Blockage				2	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	1264					
pX, platoon unblocked						
vC, conflicting volume			329		841	310
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			329		841	310
tC, single (s)			4.2		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.4
p0 queue free %			93		29	92
cM capacity (veh/h)			1207		307	704

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	328	85	382	271
Volume Left	0	85	0	217
Volume Right	80	0	0	54
cSH	1700	1207	1700	346
Volume to Capacity	0.19	0.07	0.22	0.78
Queue Length 95th (ft)	0	6	0	161
Control Delay (s)	0.0	8.2	0.0	44.3
Lane LOS		A		E
Approach Delay (s)	0.0	1.5		44.3
Approach LOS				E

Intersection Summary			
Average Delay	11.9		
Intersection Capacity Utilization	42.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	106	244	24	30	171	30	71	127	65	28	37	101
Future Volume (vph)	106	244	24	30	171	30	71	127	65	28	37	101
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	118	271	27	33	190	33	79	141	72	31	41	112

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	118	298	33	223	79	213	31	153
Volume Left (vph)	118	0	33	0	79	0	31	0
Volume Right (vph)	0	27	0	33	0	72	0	112
Hadj (s)	0.58	-0.03	0.72	-0.07	0.55	-0.18	0.50	-0.46
Departure Headway (s)	6.9	6.3	7.3	6.5	7.2	6.5	7.4	6.4
Degree Utilization, x	0.23	0.52	0.07	0.40	0.16	0.39	0.06	0.27
Capacity (veh/h)	495	550	465	527	469	522	451	520
Control Delay (s)	10.7	14.8	9.6	12.6	10.4	12.3	9.7	10.6
Approach Delay (s)	13.6		12.2		11.8		10.5	
Approach LOS	B		B		B		B	

Intersection Summary				
Delay	12.3			
Level of Service	B			
Intersection Capacity Utilization	49.2%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	238	7	202	5	20	23	124	133	3	5	109	61
Future Volume (vph)	238	7	202	5	20	23	124	133	3	5	109	61
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	262	8	222	5	22	25	136	146	3	5	120	67

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	262	230	52	285	192
Volume Left (vph)	262	0	5	136	5
Volume Right (vph)	0	222	25	3	67
Hadj (s)	0.55	-0.60	-0.20	0.20	-0.09
Departure Headway (s)	6.5	5.4	6.0	5.8	5.7
Degree Utilization, x	0.48	0.34	0.09	0.46	0.31
Capacity (veh/h)	528	642	520	580	585
Control Delay (s)	14.2	10.0	9.6	13.7	11.2
Approach Delay (s)	12.2		9.6	13.7	11.2
Approach LOS	B		A	B	B

Intersection Summary			
Delay	12.3		
Level of Service	B		
Intersection Capacity Utilization	53.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (veh/h)	27	3	2	37	3	39	4	8	1850	84	3	17
Future Volume (Veh/h)	27	3	2	37	3	39	4	8	1850	84	3	17
Sign Control		Stop			Stop				Free			
Grade		0%			0%				0%			
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	28	3	2	39	3	41	0	8	1927	88	0	18
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type									Raised			
Median storage veh)									2			
Upstream signal (ft)												
pX, platoon unblocked							0.00				0.00	
vC, conflicting volume	2175	3184	558	2585	3156	1008	0	1133			0	2015
vC1, stage 1 conf vol	1153	1153		1987	1987							
vC2, stage 2 conf vol	1022	2031		598	1169							
vCu, unblocked vol	2175	3184	558	2585	3156	1008	0	1133			0	2015
tC, single (s)	7.7	6.5	6.9	7.6	6.5	7.2	0.0	4.1			0.0	4.1
tC, 2 stage (s)	6.7	5.5		6.6	5.5							
tF (s)	3.6	4.0	3.3	3.5	4.0	3.4	0.0	2.2			0.0	2.2
p0 queue free %	76	96	100	32	97	81	0	99			0	94
cM capacity (veh/h)	119	76	478	58	93	220	0	624			0	287

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	33	83	8	1285	730	18	558	558	16
Volume Left	28	39	8	0	0	18	0	0	0
Volume Right	2	41	0	0	88	0	0	0	16
cSH	118	93	624	1700	1700	287	1700	1700	1700
Volume to Capacity	0.28	0.89	0.01	0.76	0.43	0.06	0.33	0.33	0.01
Queue Length 95th (ft)	26	125	1	0	0	5	0	0	0
Control Delay (s)	46.7	147.1	10.8	0.0	0.0	18.4	0.0	0.0	0.0
Lane LOS	E	F	B			C			
Approach Delay (s)	46.7	147.1	0.0			0.3			
Approach LOS	E	F							

Intersection Summary				
Average Delay	4.3			
Intersection Capacity Utilization	64.9%	ICU Level of Service	C	
Analysis Period (min)	15			

Movement	SBT	SBR
Lane Configurations	↑↑	↱
Traffic Volume (veh/h)	1072	15
Future Volume (Veh/h)	1072	15
Sign Control	Free	
Grade	0%	
Peak Hour Factor	0.96	0.96
Hourly flow rate (vph)	1117	16
Pedestrians		
Lane Width (ft)		
Walking Speed (ft/s)		
Percent Blockage		
Right turn flare (veh)		
Median type	Raised	
Median storage veh)	2	
Upstream signal (ft)		
pX, platoon unblocked		
vC, conflicting volume		
vC1, stage 1 conf vol		
vC2, stage 2 conf vol		
vCu, unblocked vol		
tC, single (s)		
tC, 2 stage (s)		
tF (s)		
p0 queue free %		
cM capacity (veh/h)		
Direction, Lane #		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	89	1	0	63	3	2	2	2	8	3	14
Future Volume (Veh/h)	10	89	1	0	63	3	2	2	2	8	3	14
Sign Control		Free			Free			Stop			Stop	
Grade		0%			2%			2%			-2%	
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69
Hourly flow rate (vph)	14	129	1	0	91	4	3	3	3	12	4	20
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	95			130			272	252	130	255	251	93
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	95			130			272	252	130	255	251	93
tC, single (s)	4.1			4.1			7.6	7.0	6.2	7.1	6.5	6.4
tC, 2 stage (s)												
tF (s)	2.2			2.2			4.0	4.5	3.3	3.5	4.0	3.5
p0 queue free %	99			100			99	99	100	98	99	98
cM capacity (veh/h)	1512			1468			573	571	926	693	650	914

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	144	95	9	36
Volume Left	14	0	3	12
Volume Right	1	4	3	20
cSH	1512	1468	656	794
Volume to Capacity	0.01	0.00	0.01	0.05
Queue Length 95th (ft)	1	0	1	4
Control Delay (s)	0.8	0.0	10.6	9.8
Lane LOS	A		B	A
Approach Delay (s)	0.8	0.0	10.6	9.8
Approach LOS			B	A

Intersection Summary				
Average Delay	2.0			
Intersection Capacity Utilization	22.0%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	87	8	2	56	6	10	10	9	7	4	3
Future Volume (Veh/h)	3	87	8	2	56	6	10	10	9	7	4	3
Sign Control		Stop			Stop			Free			Free	
Grade		-1%			1%			-2%			0%	
Peak Hour Factor	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
Hourly flow rate (vph)	4	121	11	3	78	8	14	14	13	10	6	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	124	83	8	148	78	20	10			27		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	124	83	8	148	78	20	10			27		
tC, single (s)	7.1	6.5	6.2	7.6	6.6	6.4	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	4.0	4.0	3.5	2.2			2.2		
p0 queue free %	99	85	99	100	90	99	99			99		
cM capacity (veh/h)	776	797	1080	625	794	1015	1623			1600		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	136	89	41	20
Volume Left	4	3	14	10
Volume Right	11	8	13	4
cSH	814	802	1623	1600
Volume to Capacity	0.17	0.11	0.01	0.01
Queue Length 95th (ft)	15	9	1	0
Control Delay (s)	10.3	10.0	2.5	3.7
Lane LOS	B	B	A	A
Approach Delay (s)	10.3	10.0	2.5	3.7
Approach LOS	B	B		

Intersection Summary				
Average Delay	8.6			
Intersection Capacity Utilization	16.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	105	1	1	60	2	3
Future Volume (Veh/h)	105	1	1	60	2	3
Sign Control	Free			Free	Stop	
Grade	-3%			2%	1%	
Peak Hour Factor	0.68	0.68	0.68	0.68	0.68	0.68
Hourly flow rate (vph)	154	1	1	88	3	4
Pedestrians				1		
Lane Width (ft)				12.0		
Walking Speed (ft/s)				3.5		
Percent Blockage				0		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			155		244	156
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			155		244	156
tC, single (s)			4.1		6.4	6.5
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.6
p0 queue free %			100		100	100
cM capacity (veh/h)			1438		748	814

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	155	89	7
Volume Left	0	1	3
Volume Right	1	0	4
cSH	1700	1438	784
Volume to Capacity	0.09	0.00	0.01
Queue Length 95th (ft)	0	0	1
Control Delay (s)	0.0	0.1	9.6
Lane LOS		A	A
Approach Delay (s)	0.0	0.1	9.6
Approach LOS			A

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	15.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	92	24	18	106	40	38
Future Volume (Veh/h)	92	24	18	106	40	38
Sign Control	Stop			Free	Free	
Grade	2%			-1%	0%	
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70
Hourly flow rate (vph)	131	34	26	151	57	54
Pedestrians					1	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	288	84	111			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	288	84	111			
tC, single (s)	6.4	6.3	4.3			
tC, 2 stage (s)						
tF (s)	3.5	3.4	2.4			
p0 queue free %	81	96	98			
cM capacity (veh/h)	688	959	1390			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	165	177	111
Volume Left	131	26	0
Volume Right	34	0	54
cSH	731	1390	1700
Volume to Capacity	0.23	0.02	0.07
Queue Length 95th (ft)	22	1	0
Control Delay (s)	11.4	1.3	0.0
Lane LOS	B	A	
Approach Delay (s)	11.4	1.3	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	26.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
101: SW Pacific Hwy & SW Elwert Rd/SW Sunset Blvd

01/30/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	122	294	127	106	135	219	1012	125	258	1669	13
Future Volume (vph)	13	122	294	127	106	135	219	1012	125	258	1669	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			-1%			2%	
Total Lost time (s)		6.0	6.0		6.0	6.0	5.0	6.0	6.0	5.0	6.0	6.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes		1.00	1.00		1.00	0.98	1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00		0.97	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1876	1583		1775	1558	1796	3489	1587	3467	3504	1599
Flt Permitted		0.94	1.00		0.66	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1765	1583		1195	1558	1796	3489	1587	3467	3504	1599
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	14	130	313	135	113	144	233	1077	133	274	1776	14
RTOR Reduction (vph)	0	0	235	0	0	85	0	0	32	0	0	7
Lane Group Flow (vph)	0	144	78	0	248	59	233	1077	101	274	1776	7
Confl. Peds. (#/hr)	3					3						
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	8%	0%	2%	6%	2%	2%	1%	4%	1%	0%	2%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			6
Actuated Green, G (s)		35.2	35.2		35.2	35.2	24.6	86.5	86.5	18.2	80.1	80.1
Effective Green, g (s)		35.2	35.2		35.2	35.2	24.6	86.5	86.5	18.2	80.1	80.1
Actuated g/C Ratio		0.22	0.22		0.22	0.22	0.16	0.55	0.55	0.12	0.51	0.51
Clearance Time (s)		6.0	6.0		6.0	6.0	5.0	6.0	6.0	5.0	6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	5.4	5.4	3.5	5.4	5.4
Lane Grp Cap (vph)		395	355		268	349	281	1923	874	402	1788	816
v/s Ratio Prot							c0.13	0.31		0.08	c0.51	
v/s Ratio Perm		0.08	0.05		c0.21	0.04			0.06			0.00
v/c Ratio		0.36	0.22		0.93	0.17	0.83	0.56	0.12	0.68	0.99	0.01
Uniform Delay, d1		51.4	49.6		59.6	49.1	64.1	22.8	16.9	66.6	38.1	18.9
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.6	0.3		35.4	0.2	17.9	0.7	0.1	4.9	19.7	0.0
Delay (s)		52.0	50.0		94.9	49.3	82.1	23.5	17.0	71.5	57.8	18.9
Level of Service		D	D		F	D	F	C	B	E	E	B
Approach Delay (s)		50.6			78.2			32.4			59.4	
Approach LOS		D			E			C			E	

Intersection Summary			
HCM 2000 Control Delay	51.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	156.9	Sum of lost time (s)	17.0
Intersection Capacity Utilization	98.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	101	344	24	5	370	68	10	0	1	34	1	52
Future Volume (Veh/h)	101	344	24	5	370	68	10	0	1	34	1	52
Sign Control		Free			Free			Stop			Stop	
Grade		-1%			1%			-2%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	110	374	26	5	402	74	11	0	1	37	1	57
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		648										
pX, platoon unblocked				0.98			0.98	0.98	0.98	0.98	0.98	
vC, conflicting volume	476			400			1064	1080	374	1044	1069	439
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	476			380			1056	1072	354	1036	1061	439
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	90			100			93	100	100	81	99	91
cM capacity (veh/h)	1091			1168			168	196	682	191	198	618

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	SB 1
Volume Total	110	374	26	5	476	12	95
Volume Left	110	0	0	5	0	11	37
Volume Right	0	0	26	0	74	1	57
cSH	1091	1700	1700	1168	1700	179	326
Volume to Capacity	0.10	0.22	0.02	0.00	0.28	0.07	0.29
Queue Length 95th (ft)	8	0	0	0	0	5	30
Control Delay (s)	8.7	0.0	0.0	8.1	0.0	26.5	20.5
Lane LOS	A			A		D	C
Approach Delay (s)	1.9			0.1		26.5	20.5
Approach LOS						D	C

Intersection Summary				
Average Delay	3.0			
Intersection Capacity Utilization	43.9%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	276	103	59	360	83	35
Future Volume (Veh/h)	276	103	59	360	83	35
Sign Control	Free			Free	Stop	
Grade	-1%			1%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	303	113	65	396	91	38
Pedestrians				1		
Lane Width (ft)				12.0		
Walking Speed (ft/s)				3.5		
Percent Blockage				0		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	1264					
pX, platoon unblocked						
vC, conflicting volume			416		886	360
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			416		886	360
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		69	94
cM capacity (veh/h)			1138		297	681

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	416	65	396	129
Volume Left	0	65	0	91
Volume Right	113	0	0	38
cSH	1700	1138	1700	356
Volume to Capacity	0.24	0.06	0.23	0.36
Queue Length 95th (ft)	0	5	0	40
Control Delay (s)	0.0	8.4	0.0	20.7
Lane LOS		A		C
Approach Delay (s)	0.0	1.2		20.7
Approach LOS				C

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	41.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	25	112	124	32	84	49	91	213	27	65	347	39
Future Volume (vph)	25	112	124	32	84	49	91	213	27	65	347	39
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	28	126	139	36	94	55	102	239	30	73	390	44

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	28	265	36	149	102	269	73	434
Volume Left (vph)	28	0	36	0	102	0	73	0
Volume Right (vph)	0	139	0	55	0	30	0	44
Hadj (s)	0.50	-0.34	0.55	-0.25	0.50	-0.03	0.53	-0.05
Departure Headway (s)	7.9	7.0	8.2	7.4	7.5	6.9	7.3	6.7
Degree Utilization, x	0.06	0.52	0.08	0.31	0.21	0.52	0.15	0.81
Capacity (veh/h)	429	478	405	449	460	489	475	524
Control Delay (s)	10.2	16.2	10.7	12.4	11.3	16.0	10.3	30.8
Approach Delay (s)	15.6		12.1		14.7		27.9	
Approach LOS	C		B		B		D	

Intersection Summary				
Delay	19.5			
Level of Service	C			
Intersection Capacity Utilization	56.1%	ICU Level of Service	B	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	92	12	154	1	19	15	293	135	6	30	141	251
Future Volume (vph)	92	12	154	1	19	15	293	135	6	30	141	251
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	102	13	171	1	21	17	326	150	7	33	157	279

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	102	184	39	483	469
Volume Left (vph)	102	0	1	326	33
Volume Right (vph)	0	171	17	7	279
Hadj (s)	0.50	-0.57	-0.21	0.15	-0.31
Departure Headway (s)	7.7	6.6	7.3	5.9	5.5
Degree Utilization, x	0.22	0.34	0.08	0.79	0.72
Capacity (veh/h)	430	488	422	597	629
Control Delay (s)	11.6	11.7	10.9	27.4	21.1
Approach Delay (s)	11.7		10.9	27.4	21.1
Approach LOS	B		B	D	C

Intersection Summary				
Delay	21.1			
Level of Service	C			
Intersection Capacity Utilization	70.0%	ICU Level of Service	C	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (veh/h)	19	7	11	38	5	27	1	8	1325	43	2	22
Future Volume (Veh/h)	19	7	11	38	5	27	1	8	1325	43	2	22
Sign Control		Stop			Stop				Free			
Grade		0%			0%				0%			
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	20	7	11	40	5	28	0	8	1380	45	0	23
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type									Raised			
Median storage veh)									2			
Upstream signal (ft)												
pX, platoon unblocked							0.00				0.00	
vC, conflicting volume	2898	3603	1058	2537	3622	712	0	2158			0	1425
vC1, stage 1 conf vol	2162	2162		1418	1418							
vC2, stage 2 conf vol	736	1441		1118	2204							
vCu, unblocked vol	2898	3603	1058	2537	3622	712	0	2158			0	1425
tC, single (s)	7.6	6.5	6.9	7.6	6.5	6.9	0.0	4.1			0.0	4.1
tC, 2 stage (s)	6.6	5.5		6.6	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	0.0	2.2			0.0	2.2
p0 queue free %	53	90	95	61	92	93	0	97			0	95
cM capacity (veh/h)	43	71	224	103	64	379	0	252			0	484

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	38	73	8	920	505	23	1058	1058	42
Volume Left	20	40	8	0	0	23	0	0	0
Volume Right	11	28	0	0	45	0	0	0	42
cSH	62	135	252	1700	1700	484	1700	1700	1700
Volume to Capacity	0.62	0.54	0.03	0.54	0.30	0.05	0.62	0.62	0.02
Queue Length 95th (ft)	64	66	2	0	0	4	0	0	0
Control Delay (s)	130.4	59.2	19.7	0.0	0.0	12.8	0.0	0.0	0.0
Lane LOS	F	F	C			B			
Approach Delay (s)	130.4	59.2	0.1			0.1			
Approach LOS	F	F							

Intersection Summary				
Average Delay	2.6			
Intersection Capacity Utilization	67.9%	ICU Level of Service	C	
Analysis Period (min)	15			

Movement	SBT	SBR
Lane Configurations		
Traffic Volume (veh/h)	2031	40
Future Volume (Veh/h)	2031	40
Sign Control	Free	
Grade	0%	
Peak Hour Factor	0.96	0.96
Hourly flow rate (vph)	2116	42
Pedestrians		
Lane Width (ft)		
Walking Speed (ft/s)		
Percent Blockage		
Right turn flare (veh)		
Median type	Raised	
Median storage veh)	2	
Upstream signal (ft)		
pX, platoon unblocked		
vC, conflicting volume		
vC1, stage 1 conf vol		
vC2, stage 2 conf vol		
vCu, unblocked vol		
tC, single (s)		
tC, 2 stage (s)		
tF (s)		
p0 queue free %		
cM capacity (veh/h)		
Direction, Lane #		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	56	1	1	65	2	1	1	2	1	1	1
Future Volume (Veh/h)	9	56	1	1	65	2	1	1	2	1	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			2%			2%			-2%	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	11	68	1	1	79	2	1	1	2	1	1	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	81			69			174	174	68	175	173	80
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	81			69			174	174	68	175	173	80
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	100	100	100
cM capacity (veh/h)	1529			1545			787	718	1000	785	718	986

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	80	82	4	3
Volume Left	11	1	1	1
Volume Right	1	2	2	1
cSH	1529	1545	858	815
Volume to Capacity	0.01	0.00	0.00	0.00
Queue Length 95th (ft)	1	0	0	0
Control Delay (s)	1.1	0.1	9.2	9.4
Lane LOS	A	A	A	A
Approach Delay (s)	1.1	0.1	9.2	9.4
Approach LOS			A	A

Intersection Summary				
Average Delay	0.9			
Intersection Capacity Utilization	18.5%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	40	14	11	47	3	13	6	8	2	9	4
Future Volume (Veh/h)	9	40	14	11	47	3	13	6	8	2	9	4
Sign Control		Stop			Stop			Free			Free	
Grade		-1%			1%			-2%			0%	
Peak Hour Factor	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74
Hourly flow rate (vph)	12	54	19	15	64	4	18	8	11	3	12	5
Pedestrians		1			1						1	
Lane Width (ft)		12.0			12.0						12.0	
Walking Speed (ft/s)		3.5			3.5						3.5	
Percent Blockage		0			0						0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	108	78	16	117	74	16	18			20		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	108	78	16	117	74	16	18			20		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.3	2.3			2.2		
p0 queue free %	99	93	98	98	92	100	99			100		
cM capacity (veh/h)	808	804	1069	775	807	1068	1517			1608		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	85	83	37	20
Volume Left	12	15	18	3
Volume Right	19	4	11	5
cSH	852	811	1517	1608
Volume to Capacity	0.10	0.10	0.01	0.00
Queue Length 95th (ft)	8	9	1	0
Control Delay (s)	9.7	9.9	3.6	1.1
Lane LOS	A	A	A	A
Approach Delay (s)	9.7	9.9	3.6	1.1
Approach LOS	A	A		

Intersection Summary				
Average Delay	8.0			
Intersection Capacity Utilization	16.1%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	48	0	4	63	4	4
Future Volume (Veh/h)	48	0	4	63	4	4
Sign Control	Free			Free	Stop	
Grade	-3%			2%	1%	
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69
Hourly flow rate (vph)	70	0	6	91	6	6
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			70		173	70
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			70		173	70
tC, single (s)			4.1		6.7	6.5
tC, 2 stage (s)						
tF (s)			2.2		3.7	3.5
p0 queue free %			100		99	99
cM capacity (veh/h)			1544		764	932

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	70	97	12
Volume Left	0	6	6
Volume Right	0	0	6
cSH	1700	1544	840
Volume to Capacity	0.04	0.00	0.01
Queue Length 95th (ft)	0	0	1
Control Delay (s)	0.0	0.5	9.4
Lane LOS		A	A
Approach Delay (s)	0.0	0.5	9.4
Approach LOS			A

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	16.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	33	15	9	81	90	52
Future Volume (Veh/h)	33	15	9	81	90	52
Sign Control	Stop			Free	Free	
Grade	2%			-1%	0%	
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	42	19	12	104	115	67
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	276	148	182			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	276	148	182			
tC, single (s)	6.4	6.3	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.4	2.2			
p0 queue free %	94	98	99			
cM capacity (veh/h)	705	885	1405			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	61	116	182
Volume Left	42	12	0
Volume Right	19	0	67
cSH	753	1405	1700
Volume to Capacity	0.08	0.01	0.11
Queue Length 95th (ft)	7	1	0
Control Delay (s)	10.2	0.8	0.0
Lane LOS	B	A	
Approach Delay (s)	10.2	0.8	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	21.8%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix D Queueing Summary

Appendix D. 95th Percentile Queues

ID	Intersection	Existing				Year 2020 Background (RIRO at 99W/Brookman-Chapman)				Year 2020 Total Traffic (RIRO at 99W/Brookman-Chapman)			
		Movement	Storage (ft)	Weekday AM	Weekday PM	Movement	Storage (ft)	Weekday AM	Weekday PM	Movement	Storage (ft)	Weekday AM	Weekday PM
1	Highway 99W/SW Elwert Road-SW Sunset Boulevard	EBL/T	85 [3]	**150**	225	EBL	260 [1]	**300**	150	EBL	260 [3]	**300**	150
		EBR	85 [3]	75	**100**	EBT/R	500 [3]	300	350	EBT/R	500 [3]	300	375
		WBL/T	600 [1]	375	450	WBL	185 [2]	**375**	**375**	WBL	185 [2]	**375**	**375**
		WBR	140	150	100	WBT/R	600 [3]	425	**125**	WBT/R	600 [3]	425	125
		NBL	320	300	**350**	NBL	490	325	325	NBL	490	325	325
		NBR	150	**75**	75	NBR	150	75	50	**NBR**	150	75	50
		SBL	210	100	200	SBL	460	175	300	SBL	460	175	**325**
		SBR	300	<25	<25	SBR	300	75	<25	SBR	300	75	<25
2	SW Woodhaven Drive/SW Sunset Boulevard	**EBL**	90	**<25**	**<25**	EBL	90	<25	<25	**EBL**	**90**	<25	<25
		EBR	150	<25	**<25**	EBR	150	<25	**<25**	EBR	150	<25	<25
		WBL	125	<25	<25	WBL	**125**	<25	<25	WBL	125	<25	<25
		WBT/R	675 [3]	<25	<25	WBT/R	675 [3]	<25	<25	WBT/R	675 [3]	<25	<25
		NBL/T/R	190 [3]	50	<25	NBL/T/R	190 [3]	175	<25	NBL/T/R	190 [3]	**175**	<25
		SBL/T/R	460 [3]	100	50	SBL/T/R	460 [3]	**475**	100	SBL/T/R	460 [3]	**475**	100
3	SW Timbrel Lane/SW Sunset Boulevard	EBT/R	675 [3]	<25	<25	EBT/R	675 [3]	<25	<25	EBT/R	675 [3]	<25	<25
		WBL	115	<25	<25	WBL	115	<25	<25	WBL	115	<25	<25
		NBL/R	**215** [3]	175	50	NBL/R	215 [3]	**600**	125	NBL/R	215 [1]	**600**	125
4	SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard[2]	EBL	95	<25	<25	EBL	**95**	50	<25	EBL	95	50	**<25**
		EBT/R	700 [3]	100	100	EBT/R	700 [3]	250	150	EBT/R	700 [3]	250	150
		WBL	100	<25	<25	WBL	**100**	<25	<25	WBL	100	<25	<25
		WBT/R	740 [3]	75	50	WBT/R	740 [3]	175	75	WBT/R	740 [3]	175	75
		NBL	**100**	<25	<25	NBL	100	50	50	NBL	100	50	50
		NBT/R	470 [3]	50	100	NBT/R	470 [3]	125	150	NBT/R	470 [3]	125	175
		SBL	150	**<25**	<25	SBL	150	<25	<25	**SBL**	150	<25	<25
		SBT/R	170 [1]	50	**225**	SBT/R	170 [3]	50	**450**	SBT/R	170 [3]	50	**450**
5	SW Baker Road-SW Murdock Road/SW Sunset Boulevard[2]	**EBL**	95	75	<25	**EBL**	**95**	**125**	50	EBL	95	**125**	**50**
		EBT/R	880 [1]	50	50	EBT/R	880 [3]	75	75	EBT/R	880 [3]	75	75
		WBL/T/R	700 [1]	<25	<25	WBL/T/R	700 [3]	<25	<25	WBL/T/R	700 [3]	<25	<25
		NBL/T/R	390 [1]	75	200	NBL/T/R	390 [3]	100	**400**	NBL/T/R	390 [3]	100	**400**
		SBL/T/R	540 [1]	50	150	SBL/T/R	540 [3]	75	325	SBL/T/R	540 [3]	75	300
6	Highway 99W/SW Brookman Road-SW Chapman Road	EBL/T/R	1,000 [1]	50	75	EBR	1,000 [1]	<25	<25	EBR	1,000 [1]	<25	<25
		WBL/T/R	520 [1]	125	75	WBR	520 [3]	100	<25	WBR	520 [3]	125	<25
		NBL/U	260	<25	<25			<25	<25			<25	**<25**
		NBT/R	>1,000 [1]	<25	<25	NBT/R	>1,000 [1]	<25	<25	NBT/R	>1,000 [1]	<25	<25
		SBL/U	260	<25	<25			<25	<25			<25	<25
		SBR	255	<25	<25	SBR	255	<25	<25	SBR	255	<25	<25
7	Old Highway 99 W/SW Brookman Road	EBL/T/R	520 [1]	<25	<25	EBL/T/R	520 [3]	<25	<25	EBL/T/R	520 [3]	<25	<25
		WBL/T/R	220 [2]	<25	<25	WBL/T/R	220 [3]	<25	<25	WBL/T/R	220 [2]	<25	<25
		NBL/T/R	>1,000 [1]	<25	<25	NBL/T/R	>1,000 [1]	<25	<25	NBL/T/R	>1,000 [1]	<25	<25
		SBL/T/R	>1,000 [1]	<25	<25	SBL/T/R	>1,000 [1]	<25	<25	SBL/T/R	>1,000 [1]	<25	<25
8	SW Middleton Road/SW Brookman Road	EBL/T/R	>1,000 [2]	<25	<25	EBL/T/R	>1,000 [2]	<25	<25	EBL/T/R	>1,000 [2]	<25	<25
		WBL/T/R	>1,000 [1]	<25	<25	WBL/T/R	>1,000 [1]	<25	<25	WBL/T/R	>1,000 [1]	<25	<25
		NBL/T/R	400 [1]	<25	<25	NBL/T/R	400 [3]	<25	<25	NBL/T/R	400 [3]	<25	<25
		SBL/T/R	690 [2]	<25	<25	SBL/T/R	690 [2]	<25	<25	SBL/T/R	690 [2]	<25	<25
9	SW Oberst Road/SW Brookman Road	EBT/R	890 [3]	<25	<25	EBT/R	890 [3]	<25	<25	EBT/R	890 [3]	<25	<25
		WBL/T	100 [3]	<25	<25	WBL/T	100 [3]	<25	<25	WBL/T	100 [3]	<25	<25
		NBL/R	>1,000 [1]	<25	<25	NBL/R	>1,000 [1]	<25	<25	NBL/R	>1,000 [1]	<25	<25
10	SW Ladd Hill Road/SW Brookman Road	EBL/R	>1,000 [1]	<25	<25	EBL/R	>1,000 [1]	50	<25	EBL/R	>1,000 [1]	50	<25
		NBL/T	>1,000 [1]	<25	<25	NBL/T	>1,000 [1]	<25	<25	NBL/T	>1,000 [1]	<25	<25
		SBT/R	820 [3]	<25	<25	SBT/R	820 [3]	<25	<25	SBT/R	820 [3]	<25	<25
A	Middlebrook Access-Future Northern Site Access/SW Brookman Road					EBT/L	890 [3]	<25	<25	EBT/L	890 [3]	<25	<25
						WBT/R	100 [3]	<25	<25	WBT/R	100 [3]	<25	<25
						SBL/R	250 [3]	<25	<25	SBL/R	250 [3]	<25	<25
B	Future Southern Site Access/SW Brookman Road									EBT/L	>1000 [1]	<25	<25
										WBT/R	850 [3]	<25	<25
										SBL/R	250	<25	<25

[1] Distance to adjacent intersection

[2] Distance to railroad crossing

[3] Based on conceptual drawing provided by the City of Sherwood

Bold and grey shading indicates 95th percentile queue exceeds available storage

Yellow shading indicates change in lane configuration

Appendix E Background Conditions
Level of Service Worksheets

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	140	572	166	671	401	1761	127	194	804	205
v/c Ratio	0.92	0.70	1.11	0.88	0.91	1.04	0.16	0.76	0.56	0.29
Control Delay	123.7	45.3	167.7	68.3	92.6	72.6	9.3	91.2	35.9	4.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	123.7	45.3	167.7	68.3	92.6	72.6	9.3	91.2	35.9	4.4
Queue Length 50th (ft)	150	210	~203	326	219	~1076	24	105	338	0
Queue Length 95th (ft)	#294	279	#363	406	#314	#1210	64	#162	407	51
Internal Link Dist (ft)		574		568		888			476	
Turn Bay Length (ft)	260		185		490		150	460		300
Base Capacity (vph)	153	876	150	822	453	1694	801	262	1429	708
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.92	0.65	1.11	0.82	0.89	1.04	0.16	0.74	0.56	0.29

Intersection Summary

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	133	254	290	158	401	237	27	354	1673	121	13	171
Future Volume (vph)	133	254	290	158	401	237	27	354	1673	121	13	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%				-1%			
Total Lost time (s)	4.5	6.0		4.5	6.0			5.0	6.0	6.0		5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.97	0.95	1.00		0.97
Frpb, ped/bikes	1.00	1.00		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	0.94			1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	1.00			0.95	1.00	1.00		0.95
Satd. Flow (prot)	1805	3212		1770	3298			3424	3489	1561		3200
Flt Permitted	0.95	1.00		0.95	1.00			0.95	1.00	1.00		0.95
Satd. Flow (perm)	1805	3212		1770	3298			3424	3489	1561		3200
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	140	267	305	166	422	249	28	373	1761	127	14	180
RTOR Reduction (vph)	0	131	0	0	54	0	0	0	0	43	0	0
Lane Group Flow (vph)	140	441	0	166	617	0	0	401	1761	84	0	194
Confl. Bikes (#/hr)												
Heavy Vehicles (%)	0%	5%	2%	2%	3%	4%	0%	3%	4%	4%	0%	9%
Turn Type	Prot	NA		Prot	NA		Prot	Prot	NA	Perm	Prot	Prot
Protected Phases	7	4		3	8		5	5	2		1	1
Permitted Phases										2		
Actuated Green, G (s)	13.5	33.9		13.5	33.9			20.6	77.1	77.1		12.7
Effective Green, g (s)	13.5	33.9		13.5	33.9			20.6	77.1	77.1		12.7
Actuated g/C Ratio	0.09	0.21		0.09	0.21			0.13	0.49	0.49		0.08
Clearance Time (s)	4.5	6.0		4.5	6.0			5.0	6.0	6.0		5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	5.4	5.4		3.5
Lane Grp Cap (vph)	153	686		150	704			444	1695	758		256
v/s Ratio Prot	0.08	0.14		c0.09	c0.19			c0.12	c0.50			0.06
v/s Ratio Perm										0.05		
v/c Ratio	0.92	0.64		1.11	0.88			0.90	1.04	0.11		0.76
Uniform Delay, d1	72.0	56.9		72.6	60.4			68.1	40.8	22.2		71.5
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00		1.00
Incremental Delay, d2	48.1	2.1		104.9	11.8			21.3	32.7	0.2		12.4
Delay (s)	120.1	59.0		177.5	72.2			89.4	73.5	22.3		83.9
Level of Service	F	E		F	E			F	E	C		F
Approach Delay (s)		71.0			93.1				73.4			
Approach LOS		E			F				E			

Intersection Summary			
HCM 2000 Control Delay	68.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	158.7	Sum of lost time (s)	21.5
Intersection Capacity Utilization	95.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBT	SBR
Lane Configurations		
Traffic Volume (vph)	764	195
Future Volume (vph)	764	195
Ideal Flow (vphpl)	1900	1900
Grade (%)	2%	
Total Lost time (s)	6.0	6.0
Lane Util. Factor	0.95	1.00
Frpb, ped/bikes	1.00	0.98
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3279	1361
Flt Permitted	1.00	1.00
Satd. Flow (perm)	3279	1361
Peak-hour factor, PHF	0.95	0.95
Adj. Flow (vph)	804	205
RTOR Reduction (vph)	0	116
Lane Group Flow (vph)	804	89
Confl. Bikes (#/hr)		1
Heavy Vehicles (%)	9%	15%
Turn Type	NA	Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	69.2	69.2
Effective Green, g (s)	69.2	69.2
Actuated g/C Ratio	0.44	0.44
Clearance Time (s)	6.0	6.0
Vehicle Extension (s)	5.4	5.4
Lane Grp Cap (vph)	1429	593
v/s Ratio Prot	0.25	
v/s Ratio Perm		0.07
v/c Ratio	0.56	0.15
Uniform Delay, d1	33.4	27.0
Progression Factor	1.00	1.00
Incremental Delay, d2	0.9	0.3
Delay (s)	34.4	27.3
Level of Service	C	C
Approach Delay (s)	41.2	
Approach LOS	D	

Intersection Summary

Intersection	
Int Delay, s/veh	73.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	59	395	81	8	633	98	25	16	11	31	50	124
Future Vol, veh/h	59	395	81	8	633	98	25	16	11	31	50	124
Conflicting Peds, #/hr	0	0	5	5	0	0	0	0	3	3	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	90	-	0	127	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-1	-	-	1	-	-	-2	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	7	0	0	14	4	1	8	8	2
Mvmt Flow	74	494	101	10	791	123	31	20	14	39	63	155

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	914	0	0	600	0	0	1629	1581	502	1586	1621	853
Stage 1	-	-	-	-	-	-	647	647	-	873	873	-
Stage 2	-	-	-	-	-	-	982	934	-	713	748	-
Critical Hdwy	4.1	-	-	4.17	-	-	6.84	6.14	6.01	7.18	6.58	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	5.84	5.14	-	6.18	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.84	5.14	-	6.18	5.58	-
Follow-up Hdwy	2.2	-	-	2.263	-	-	3.626	4.036	3.309	3.572	4.072	3.318
Pot Cap-1 Maneuver	754	-	-	953	-	-	91	128	587	85	100	359
Stage 1	-	-	-	-	-	-	473	498	-	337	360	-
Stage 2	-	-	-	-	-	-	318	379	-	413	411	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	754	-	-	948	-	-	~ 21	114	583	66	89	359
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 21	114	-	66	89	-
Stage 1	-	-	-	-	-	-	425	447	-	304	356	-
Stage 2	-	-	-	-	-	-	147	375	-	346	369	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.1	0.1	$ 550.2	$ 403.1
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	39	754	-	-	948	-	-	149
HCM Lane V/C Ratio	1.667	0.098	-	-	0.011	-	-	1.72
HCM Control Delay (s)	$ 550.2	10.3	-	-	8.8	-	-	$ 403.1
HCM Lane LOS	F	B	-	-	A	-	-	F
HCM 95th %tile Q(veh)	6.8	0.3	-	-	0	-	-	18.6

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

Intersection	
Int Delay, s/veh	87

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	321	116	81	515	223	51
Future Vol, veh/h	321	116	81	515	223	51
Conflicting Peds, #/hr	0	21	21	0	1	23
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	115	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-1	-	-	1	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	0	7	0	0	6	0
Mvmt Flow	382	138	96	613	265	61

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	541	0	1278	495
Stage 1	-	-	-	-	472	-
Stage 2	-	-	-	-	806	-
Critical Hdwy	-	-	4.1	-	6.46	6.2
Critical Hdwy Stg 1	-	-	-	-	5.46	-
Critical Hdwy Stg 2	-	-	-	-	5.46	-
Follow-up Hdwy	-	-	2.2	-	3.554	3.3
Pot Cap-1 Maneuver	-	-	1038	-	~ 180	579
Stage 1	-	-	-	-	619	-
Stage 2	-	-	-	-	433	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1017	-	~ 160	555
Mov Cap-2 Maneuver	-	-	-	-	~ 160	-
Stage 1	-	-	-	-	607	-
Stage 2	-	-	-	-	392	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.2	$ 412.5
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	184	-	-	1017	-
HCM Lane V/C Ratio	1.773	-	-	0.095	-
HCM Control Delay (s)	$ 412.5	-	-	8.9	-
HCM Lane LOS	F	-	-	A	-
HCM 95th %tile Q(veh)	23.1	-	-	0.3	-

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

Intersection	
Intersection Delay, s/veh	29.2
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	121	330	42	40	279	34	102	155	91	32	24	136
Future Vol, veh/h	121	330	42	40	279	34	102	155	91	32	24	136
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	5	2	0	13	2	0	3	2	6	0	5	2
Mvmt Flow	134	367	47	44	310	38	113	172	101	36	27	151
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	39	31	20.6	16.1
HCM LOS	E	D	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	63%	0%	89%	0%	89%	0%	15%
Vol Right, %	0%	37%	0%	11%	0%	11%	0%	85%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	102	246	121	372	40	313	32	160
LT Vol	102	0	121	0	40	0	32	0
Through Vol	0	155	0	330	0	279	0	24
RT Vol	0	91	0	42	0	34	0	136
Lane Flow Rate	113	273	134	413	44	348	36	178
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.28	0.613	0.314	0.89	0.109	0.774	0.092	0.409
Departure Headway (Hd)	8.882	8.078	8.398	7.748	8.797	8.009	9.337	8.285
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	405	448	429	467	408	452	384	434
Service Time	6.628	5.823	6.141	5.491	6.542	5.753	7.088	6.035
HCM Lane V/C Ratio	0.279	0.609	0.312	0.884	0.108	0.77	0.094	0.41
HCM Control Delay	15.1	22.9	15	46.8	12.6	33.3	13	16.7
HCM Lane LOS	C	C	B	E	B	D	B	C
HCM 95th-tile Q	1.1	4	1.3	9.6	0.4	6.7	0.3	2

Intersection	
Intersection Delay, s/veh	15.8
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	300	10	243	6	25	26	151	152	3	6	124	110
Future Vol, veh/h	300	10	243	6	25	26	151	152	3	6	124	110
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	8	0	2	6	2	2	1	4	1	0	2	0
Mvmt Flow	319	11	259	6	27	28	161	162	3	6	132	117
Number of Lanes	1	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	2
HCM Control Delay	16.9	10.6	16.8	13.4
HCM LOS	C	B	C	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	49%	100%	0%	11%	3%
Vol Thru, %	50%	0%	4%	44%	52%
Vol Right, %	1%	0%	96%	46%	46%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	306	300	253	57	240
LT Vol	151	300	0	6	6
Through Vol	152	0	10	25	124
RT Vol	3	0	243	26	110
Lane Flow Rate	326	319	269	61	255
Geometry Grp	2	7	7	5	2
Degree of Util (X)	0.558	0.62	0.423	0.114	0.422
Departure Headway (Hd)	6.169	6.992	5.661	6.779	5.956
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	583	514	632	532	600
Service Time	4.246	4.763	3.431	4.779	4.038
HCM Lane V/C Ratio	0.559	0.621	0.426	0.115	0.425
HCM Control Delay	16.8	20.6	12.6	10.6	13.4
HCM Lane LOS	C	C	B	B	B
HCM 95th-tile Q	3.4	4.2	2.1	0.4	2.1

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	37	0	0	109	0	2030	102	0	1201	30
Future Vol, veh/h	0	0	37	0	0	109	0	2030	102	0	1201	30
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	255
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	11	0	0	5	0	13	0	4	4	0	7	7
Mvmt Flow	0	0	39	0	0	114	0	2115	106	0	1251	31

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	626	-	-	1111	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.9	-	-	7.16	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.3	-	-	3.43	-	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	432	0	0	187	0	-	-	0	-	-
Stage 1	0	0	-	0	0	-	0	-	-	0	-	-
Stage 2	0	0	-	0	0	-	0	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	432	-	-	187	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.1	50.2	0	0
HCM LOS	B	F		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	-	-	432	187	-	-
HCM Lane V/C Ratio	-	-	0.089	0.607	-	-
HCM Control Delay (s)	-	-	14.1	50.2	-	-
HCM Lane LOS	-	-	B	F	-	-
HCM 95th %tile Q(veh)	-	-	0.3	3.4	-	-

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	10	91	0	1	93	3	3	2	2	9	4	15
Future Vol, veh/h	10	91	0	1	93	3	3	2	2	9	4	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	2	-	-	2	-	-	-2	-
Peak Hour Factor	69	69	69	69	69	69	69	69	69	69	69	69
Heavy Vehicles, %	0	2	100	0	6	0	50	50	0	0	0	21
Mvmt Flow	14	132	0	1	135	4	4	3	3	13	6	22

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	139	0	0	132	0	0	313	301	132	302	299	137
Stage 1	-	-	-	-	-	-	160	160	-	139	139	-
Stage 2	-	-	-	-	-	-	153	141	-	163	160	-
Critical Hdwy	4.1	-	-	4.1	-	-	8	7.4	6.4	6.7	6.1	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	7	6.4	-	5.7	5.1	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7	6.4	-	5.7	5.1	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.95	4.45	3.3	3.5	4	3.489
Pot Cap-1 Maneuver	1457	-	-	1466	-	-	537	522	916	677	637	870
Stage 1	-	-	-	-	-	-	728	671	-	882	798	-
Stage 2	-	-	-	-	-	-	735	686	-	859	783	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1457	-	-	1466	-	-	516	516	916	666	630	870
Mov Cap-2 Maneuver	-	-	-	-	-	-	516	516	-	666	630	-
Stage 1	-	-	-	-	-	-	721	664	-	873	797	-
Stage 2	-	-	-	-	-	-	711	685	-	844	775	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0.1	11.2	10
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	590	1457	-	-	1466	-	-	755
HCM Lane V/C Ratio	0.017	0.01	-	-	0.001	-	-	0.054
HCM Control Delay (s)	11.2	7.5	0	-	7.5	0	-	10
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	9.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	4	94	4	2	80	14	17	14	10	30	14	4
Future Vol, veh/h	4	94	4	2	80	14	17	14	10	30	14	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-1	-	-	1	-	-	-2	-	-	0	-
Peak Hour Factor	72	72	72	72	72	72	72	72	72	72	72	72
Heavy Vehicles, %	0	1	0	50	5	17	0	0	11	0	0	33
Mvmt Flow	6	131	6	3	111	19	24	19	14	42	19	6

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	245	187	22	249	183	26	25	0	0	33	0	0
Stage 1	106	106	-	74	74	-	-	-	-	-	-	-
Stage 2	139	81	-	175	109	-	-	-	-	-	-	-
Critical Hdwy	6.9	6.31	6.1	7.8	6.75	6.47	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	5.9	5.31	-	6.8	5.75	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.9	5.31	-	6.8	5.75	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.009	3.3	3.95	4.045	3.453	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	723	717	1062	607	699	1007	1603	-	-	1592	-	-
Stage 1	910	814	-	825	824	-	-	-	-	-	-	-
Stage 2	876	833	-	720	795	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	599	687	1062	500	670	1007	1603	-	-	1592	-	-
Mov Cap-2 Maneuver	599	687	-	500	670	-	-	-	-	-	-	-
Stage 1	896	792	-	813	812	-	-	-	-	-	-	-
Stage 2	730	821	-	582	774	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.5	11.4	3	4.6
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1603	-	-	693	699	1592	-	-
HCM Lane V/C Ratio	0.015	-	-	0.204	0.191	0.026	-	-
HCM Control Delay (s)	7.3	0	-	11.5	11.4	7.3	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.8	0.7	0.1	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	154	2	1	53	4	3
Future Vol, veh/h	154	2	1	53	4	3
Conflicting Peds, #/hr	0	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-3	-	-	2	1	-
Peak Hour Factor	68	68	68	68	68	68
Heavy Vehicles, %	1	0	0	8	0	33
Mvmt Flow	226	3	1	78	6	4

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	229	0	308	229
Stage 1	-	-	-	-	228	-
Stage 2	-	-	-	-	80	-
Critical Hdwy	-	-	4.1	-	6.6	6.63
Critical Hdwy Stg 1	-	-	-	-	5.6	-
Critical Hdwy Stg 2	-	-	-	-	5.6	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.597
Pot Cap-1 Maneuver	-	-	1351	-	677	734
Stage 1	-	-	-	-	804	-
Stage 2	-	-	-	-	944	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1351	-	676	733
Mov Cap-2 Maneuver	-	-	-	-	676	-
Stage 1	-	-	-	-	804	-
Stage 2	-	-	-	-	943	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	10.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	699	-	-	1351	-
HCM Lane V/C Ratio	0.015	-	-	0.001	-
HCM Control Delay (s)	10.2	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection	
Int Delay, s/veh	6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	132	35	19	125	47	31
Future Vol, veh/h	132	35	19	125	47	31
Conflicting Peds, #/hr	1	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, %	2	-	-	-1	0	-
Peak Hour Factor	70	70	70	70	70	70
Heavy Vehicles, %	2	8	17	5	8	5
Mvmt Flow	189	50	27	179	67	44

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	323	89	111	0	-	0
Stage 1	89	-	-	-	-	-
Stage 2	234	-	-	-	-	-
Critical Hdwy	6.82	6.48	4.27	-	-	-
Critical Hdwy Stg 1	5.82	-	-	-	-	-
Critical Hdwy Stg 2	5.82	-	-	-	-	-
Follow-up Hdwy	3.518	3.372	2.353	-	-	-
Pot Cap-1 Maneuver	647	948	1390	-	-	-
Stage 1	925	-	-	-	-	-
Stage 2	784	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	633	948	1390	-	-	-
Mov Cap-2 Maneuver	633	-	-	-	-	-
Stage 1	905	-	-	-	-	-
Stage 2	784	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.1	1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1390	-	680	-	-
HCM Lane V/C Ratio	0.02	-	0.351	-	-
HCM Control Delay (s)	7.6	0	13.1	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	1.6	-	-

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	18	119	45	12	35	50
Future Vol, veh/h	18	119	45	12	35	50
Conflicting Peds, #/hr	2	0	0	2	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	-3	1	-	0	-
Peak Hour Factor	68	68	68	68	68	68
Heavy Vehicles, %	0	1	8	0	0	0
Mvmt Flow	26	175	66	18	51	74

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	86	0	-	0	305	77
Stage 1	-	-	-	-	77	-
Stage 2	-	-	-	-	228	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1523	-	-	-	691	990
Stage 1	-	-	-	-	951	-
Stage 2	-	-	-	-	815	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1520	-	-	-	675	988
Mov Cap-2 Maneuver	-	-	-	-	675	-
Stage 1	-	-	-	-	931	-
Stage 2	-	-	-	-	813	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	10.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1520	-	-	-	830
HCM Lane V/C Ratio	0.017	-	-	-	0.151
HCM Control Delay (s)	7.4	0	-	-	10.1
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	49	556	202	328	301	1164	152	424	1867	49
v/c Ratio	0.86	1.13dr	0.95	0.35	1.56	0.78	0.19	0.90	1.05	0.06
Control Delay	150.3	75.1	112.1	22.5	318.7	40.3	3.3	83.7	70.0	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	150.3	75.1	112.1	22.5	318.7	40.3	3.3	83.7	70.0	0.1
Queue Length 50th (ft)	47	237	192	64	~206	495	0	205	~1009	0
Queue Length 95th (ft)	#130	#348	#352	108	#305	586	35	#298	#1145	0
Internal Link Dist (ft)		1143		568		888			476	
Turn Bay Length (ft)	260		185		490		150	460		300
Base Capacity (vph)	57	602	213	959	193	1489	781	478	1781	858
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.92	0.95	0.34	1.56	0.78	0.19	0.89	1.05	0.06

Intersection Summary

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

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

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	46	177	346	190	154	154	19	264	1094	143	36	363
Future Volume (vph)	46	177	346	190	154	154	19	264	1094	143	36	363
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%				-1%			
Total Lost time (s)	4.5	6.0		4.5	6.0			5.0	6.0	6.0		5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.97	0.95	1.00		0.97
Frpb, ped/bikes	1.00	1.00		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	0.90		1.00	0.93			1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	1.00			0.95	1.00	1.00		0.95
Satd. Flow (prot)	1671	3209		1703	3274			3487	3489	1607		3460
Flt Permitted	0.95	1.00		0.95	1.00			0.95	1.00	1.00		0.95
Satd. Flow (perm)	1671	3209		1703	3274			3487	3489	1607		3460
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	49	188	368	202	164	164	20	281	1164	152	38	386
RTOR Reduction (vph)	0	71	0	0	122	0	0	0	0	87	0	0
Lane Group Flow (vph)	49	485	0	202	206	0	0	301	1164	65	0	424
Confl. Bikes (#/hr)												
Heavy Vehicles (%)	8%	0%	2%	6%	2%	2%	0%	1%	4%	1%	2%	0%
Turn Type	Prot	NA		Prot	NA		Prot	Prot	NA	Perm	Prot	Prot
Protected Phases	7	4		3	8		5	5	2		1	1
Permitted Phases										2		
Actuated Green, G (s)	5.0	23.5		18.1	36.6			8.0	61.7	61.7		19.8
Effective Green, g (s)	5.0	23.5		18.1	36.6			8.0	61.7	61.7		19.8
Actuated g/C Ratio	0.03	0.16		0.13	0.25			0.06	0.43	0.43		0.14
Clearance Time (s)	4.5	6.0		4.5	6.0			5.0	6.0	6.0		5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	5.4	5.4		3.5
Lane Grp Cap (vph)	57	521		213	828			192	1488	685		473
v/s Ratio Prot	0.03	c0.15		c0.12	0.06			c0.09	0.33			0.12
v/s Ratio Perm										0.04		
v/c Ratio	0.86	1.13dr		0.95	0.25			1.57	0.78	0.09		0.90
Uniform Delay, d1	69.5	59.7		62.8	43.0			68.3	35.7	24.8		61.4
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00		1.00
Incremental Delay, d2	69.8	23.5		46.6	0.2			279.2	3.3	0.1		19.6
Delay (s)	139.3	83.2		109.4	43.2			347.5	39.0	24.9		81.0
Level of Service	F	F		F	D			F	D	C		F
Approach Delay (s)		87.8			68.4				95.1			
Approach LOS		F			E				F			

Intersection Summary			
HCM 2000 Control Delay	80.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	144.6	Sum of lost time (s)	21.5
Intersection Capacity Utilization	101.1%	ICU Level of Service	G
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Movement	SBT	SBR
Lane Configurations		
Traffic Volume (vph)	1755	46
Future Volume (vph)	1755	46
Ideal Flow (vphpl)	1900	1900
Grade (%)	2%	
Total Lost time (s)	6.0	6.0
Lane Util. Factor	0.95	1.00
Frpb, ped/bikes	1.00	0.98
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3504	1566
Flt Permitted	1.00	1.00
Satd. Flow (perm)	3504	1566
Peak-hour factor, PHF	0.94	0.94
Adj. Flow (vph)	1867	49
RTOR Reduction (vph)	0	24
Lane Group Flow (vph)	1867	25
Confl. Bikes (#/hr)		1
Heavy Vehicles (%)	2%	0%
Turn Type	NA	Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	73.5	73.5
Effective Green, g (s)	73.5	73.5
Actuated g/C Ratio	0.51	0.51
Clearance Time (s)	6.0	6.0
Vehicle Extension (s)	5.4	5.4
Lane Grp Cap (vph)	1781	795
v/s Ratio Prot	c0.53	
v/s Ratio Perm		0.02
v/c Ratio	1.05	0.03
Uniform Delay, d1	35.5	17.8
Progression Factor	1.00	1.00
Incremental Delay, d2	35.3	0.0
Delay (s)	70.8	17.8
Level of Service	E	B
Approach Delay (s)	71.5	
Approach LOS	E	

Intersection Summary

Intersection	
Int Delay, s/veh	5.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	129	480	32	6	491	79	12	0	1	41	1	68
Future Vol, veh/h	129	480	32	6	491	79	12	0	1	41	1	68
Conflicting Peds, #/hr	0	0	5	5	0	0	0	0	3	3	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	90	-	0	127	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-1	-	-	1	-	-	-2	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	1	1	0	0	3	0	0	0	0	0	0	2
Mvmt Flow	140	522	35	7	534	86	13	0	1	45	1	74

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	620	0	0	562	0	0	1436	1441	530	1414	1433	577
Stage 1	-	-	-	-	-	-	807	807	-	591	591	-
Stage 2	-	-	-	-	-	-	629	634	-	823	842	-
Critical Hdwy	4.11	-	-	4.1	-	-	6.7	6.1	6	7.1	6.5	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	5.7	5.1	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.7	5.1	-	6.1	5.5	-
Follow-up Hdwy	2.209	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.318
Pot Cap-1 Maneuver	965	-	-	1019	-	-	132	157	569	116	135	516
Stage 1	-	-	-	-	-	-	414	435	-	497	498	-
Stage 2	-	-	-	-	-	-	508	511	-	371	383	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	965	-	-	1014	-	-	99	133	565	102	114	516
Mov Cap-2 Maneuver	-	-	-	-	-	-	99	133	-	102	114	-
Stage 1	-	-	-	-	-	-	352	370	-	425	495	-
Stage 2	-	-	-	-	-	-	431	507	-	316	326	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.9	0.1	44.1	45.4
HCM LOS			E	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	106	965	-	-	1014	-	-	203
HCM Lane V/C Ratio	0.133	0.145	-	-	0.006	-	-	0.589
HCM Control Delay (s)	44.1	9.4	-	-	8.6	-	-	45.4
HCM Lane LOS	E	A	-	-	A	-	-	E
HCM 95th %tile Q(veh)	0.4	0.5	-	-	0	-	-	3.3

Intersection	
Int Delay, s/veh	6.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	337	186	67	467	108	40
Future Vol, veh/h	337	186	67	467	108	40
Conflicting Peds, #/hr	0	21	21	0	1	23
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	115	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-1	-	-	1	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	1	0	3	2	2	3
Mvmt Flow	370	204	74	513	119	44

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	595	0	1155	516
Stage 1	-	-	-	-	493	-
Stage 2	-	-	-	-	662	-
Critical Hdwy	-	-	4.13	-	6.42	6.23
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.227	-	3.518	3.327
Pot Cap-1 Maneuver	-	-	976	-	218	557
Stage 1	-	-	-	-	614	-
Stage 2	-	-	-	-	513	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	956	-	197	534
Mov Cap-2 Maneuver	-	-	-	-	197	-
Stage 1	-	-	-	-	602	-
Stage 2	-	-	-	-	473	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.1	47.5
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	238	-	-	956	-
HCM Lane V/C Ratio	0.683	-	-	0.077	-
HCM Control Delay (s)	47.5	-	-	9.1	-
HCM Lane LOS	E	-	-	A	-
HCM 95th %tile Q(veh)	4.4	-	-	0.2	-

Intersection	
Intersection Delay, s/veh	50.3
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	29	142	146	55	110	56	118	249	42	74	380	69
Future Vol, veh/h	29	142	146	55	110	56	118	249	42	74	380	69
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	0	2	1	3	0	2	0	3	0	2	1	3
Mvmt Flow	33	160	164	62	124	63	133	280	47	83	427	78
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	29.5	17.8	26.9	94.8
HCM LOS	D	C	D	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	86%	0%	49%	0%	66%	0%	85%
Vol Right, %	0%	14%	0%	51%	0%	34%	0%	15%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	118	291	29	288	55	166	74	449
LT Vol	118	0	29	0	55	0	74	0
Through Vol	0	249	0	142	0	110	0	380
RT Vol	0	42	0	146	0	56	0	69
Lane Flow Rate	133	327	33	324	62	187	83	504
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.318	0.734	0.081	0.732	0.162	0.446	0.2	1.124
Departure Headway (Hd)	9.063	8.491	9.393	8.538	9.884	9.059	8.668	8.022
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	399	428	384	427	365	401	417	454
Service Time	6.763	6.191	7.093	6.238	7.584	6.759	6.368	5.722
HCM Lane V/C Ratio	0.333	0.764	0.086	0.759	0.17	0.466	0.199	1.11
HCM Control Delay	15.9	31.3	12.9	31.2	14.5	18.9	13.5	108.2
HCM Lane LOS	C	D	B	D	B	C	B	F
HCM 95th-tile Q	1.3	5.9	0.3	5.8	0.6	2.2	0.7	17.7

Intersection	
Intersection Delay, s/veh	47.9
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	117	15	183	1	23	17	345	154	7	34	161	302
Future Vol, veh/h	117	15	183	1	23	17	345	154	7	34	161	302
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	0	0	5	100	0	0	2	1	0	0	2	2
Mvmt Flow	130	17	203	1	26	19	383	171	8	38	179	336
Number of Lanes	1	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	2
HCM Control Delay	15.4	14.8	70.2	48.6
HCM LOS	C	B	F	E

Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	68%	100%	0%	2%	7%
Vol Thru, %	30%	0%	8%	56%	32%
Vol Right, %	1%	0%	92%	41%	61%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	506	117	198	41	497
LT Vol	345	117	0	1	34
Through Vol	154	0	15	23	161
RT Vol	7	0	183	17	302
Lane Flow Rate	562	130	220	46	552
Geometry Grp	2	7	7	5	2
Degree of Util (X)	1.023	0.299	0.442	0.127	0.94
Departure Headway (Hd)	6.553	8.491	7.233	10.33	6.13
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	551	426	497	349	591
Service Time	4.608	6.191	5.005	8.33	4.185
HCM Lane V/C Ratio	1.02	0.305	0.443	0.132	0.934
HCM Control Delay	70.2	14.8	15.7	14.8	48.6
HCM Lane LOS	F	B	C	B	E
HCM 95th-tile Q	15.3	1.2	2.2	0.4	12.3

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↱			↱		↑↑↱			↑↑	↱
Traffic Vol, veh/h	0	0	42	0	0	66	0	1451	66	0	2226	60
Future Vol, veh/h	0	0	42	0	0	66	0	1451	66	0	2226	60
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	255
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	5	0	0	3	0	0	0	3	0	0	2	0
Mvmt Flow	0	0	44	0	0	69	0	1511	69	0	2319	63

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	1160	-	-	790	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.9	-	-	6.9	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.3	-	-	3.3	-	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	192	0	0	337	0	-	-	0	-	-
Stage 1	0	0	-	0	0	-	0	-	-	0	-	-
Stage 2	0	0	-	0	0	-	0	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	192	-	-	337	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	29.2	18.4	0	0
HCM LOS	D	C		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	-	-	192	337	-	-
HCM Lane V/C Ratio	-	-	0.228	0.204	-	-
HCM Control Delay (s)	-	-	29.2	18.4	-	-
HCM Lane LOS	-	-	D	C	-	-
HCM 95th %tile Q(veh)	-	-	0.8	0.8	-	-

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	9	54	0	1	60	2	1	1	2	1	2	5
Future Vol, veh/h	9	54	0	1	60	2	1	1	2	1	2	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	2	-	-	2	-	-	-2	-
Peak Hour Factor	82	82	82	82	82	82	82	82	82	82	82	82
Heavy Vehicles, %	0	0	0	0	3	0	0	0	0	0	0	0
Mvmt Flow	11	66	0	1	73	2	1	1	2	1	2	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	75	0	0	66	0	0	168	165	66	166	164	74
Stage 1	-	-	-	-	-	-	88	88	-	76	76	-
Stage 2	-	-	-	-	-	-	80	77	-	90	88	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.9	6.4	6.7	6.1	6
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.9	-	5.7	5.1	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.9	-	5.7	5.1	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1537	-	-	1549	-	-	786	718	1000	818	746	997
Stage 1	-	-	-	-	-	-	916	818	-	946	843	-
Stage 2	-	-	-	-	-	-	925	828	-	932	834	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1537	-	-	1549	-	-	774	712	1000	810	740	997
Mov Cap-2 Maneuver	-	-	-	-	-	-	774	712	-	810	740	-
Stage 1	-	-	-	-	-	-	910	812	-	939	842	-
Stage 2	-	-	-	-	-	-	916	827	-	922	828	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.1	0.1	9.3	9.1
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	852	1537	-	-	1549	-	-	894
HCM Lane V/C Ratio	0.006	0.007	-	-	0.001	-	-	0.011
HCM Control Delay (s)	9.3	7.4	0	-	7.3	0	-	9.1
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	8.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	9	45	10	13	43	12	12	11	9	57	18	6
Future Vol, veh/h	9	45	10	13	43	12	12	11	9	57	18	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-1	-	-	1	-	-	-2	-	-	0	-
Peak Hour Factor	74	74	74	74	74	74	74	74	74	74	74	74
Heavy Vehicles, %	0	0	0	50	0	0	15	0	11	0	11	0
Mvmt Flow	12	61	14	18	58	16	16	15	12	77	24	8

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	272	241	28	273	239	21	32	0	0	27	0	0
Stage 1	182	182	-	53	53	-	-	-	-	-	-	-
Stage 2	90	59	-	220	186	-	-	-	-	-	-	-
Critical Hdwy	6.9	6.3	6.1	7.8	6.7	6.3	4.25	-	-	4.1	-	-
Critical Hdwy Stg 1	5.9	5.3	-	6.8	5.7	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.9	5.3	-	6.8	5.7	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.95	4	3.3	2.335	-	-	2.2	-	-
Pot Cap-1 Maneuver	695	673	1054	584	657	1062	1500	-	-	1600	-	-
Stage 1	833	760	-	849	852	-	-	-	-	-	-	-
Stage 2	927	852	-	677	742	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	607	633	1054	510	618	1062	1500	-	-	1600	-	-
Mov Cap-2 Maneuver	607	633	-	510	618	-	-	-	-	-	-	-
Stage 1	824	723	-	840	843	-	-	-	-	-	-	-
Stage 2	841	843	-	582	706	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.2	11.6	2.8	5.2
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1500	-	-	671	639	1600	-	-
HCM Lane V/C Ratio	0.011	-	-	0.129	0.144	0.048	-	-
HCM Control Delay (s)	7.4	0	-	11.2	11.6	7.4	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.4	0.5	0.2	-	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	76	0	5	73	5	5
Future Vol, veh/h	76	0	5	73	5	5
Conflicting Peds, #/hr	0	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-3	-	-	2	1	-
Peak Hour Factor	68	68	68	68	68	68
Heavy Vehicles, %	2	0	0	0	0	33
Mvmt Flow	112	0	7	107	7	7

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	112	0	233	113
Stage 1	-	-	-	-	112	-
Stage 2	-	-	-	-	121	-
Critical Hdwy	-	-	4.1	-	6.6	6.63
Critical Hdwy Stg 1	-	-	-	-	5.6	-
Critical Hdwy Stg 2	-	-	-	-	5.6	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.597
Pot Cap-1 Maneuver	-	-	1490	-	750	860
Stage 1	-	-	-	-	912	-
Stage 2	-	-	-	-	903	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1490	-	746	859
Mov Cap-2 Maneuver	-	-	-	-	746	-
Stage 1	-	-	-	-	912	-
Stage 2	-	-	-	-	898	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	9.6
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	799	-	-	1490	-
HCM Lane V/C Ratio	0.018	-	-	0.005	-
HCM Control Delay (s)	9.6	-	-	7.4	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	55	21	10	102	104	62
Future Vol, veh/h	55	21	10	102	104	62
Conflicting Peds, #/hr	1	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, %	2	-	-	-1	0	-
Peak Hour Factor	78	78	78	78	78	78
Heavy Vehicles, %	3	7	0	5	1	0
Mvmt Flow	71	27	13	131	133	79

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	331	173	212	0	-	0
Stage 1	173	-	-	-	-	-
Stage 2	158	-	-	-	-	-
Critical Hdwy	6.83	6.47	4.1	-	-	-
Critical Hdwy Stg 1	5.83	-	-	-	-	-
Critical Hdwy Stg 2	5.83	-	-	-	-	-
Follow-up Hdwy	3.527	3.363	2.2	-	-	-
Pot Cap-1 Maneuver	638	850	1370	-	-	-
Stage 1	839	-	-	-	-	-
Stage 2	853	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	632	850	1370	-	-	-
Mov Cap-2 Maneuver	632	-	-	-	-	-
Stage 1	831	-	-	-	-	-
Stage 2	853	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.2	0.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1370	-	680	-	-
HCM Lane V/C Ratio	0.009	-	0.143	-	-
HCM Control Delay (s)	7.7	0	11.2	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.5	-	-

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	57	53	41	36	23	32
Future Vol, veh/h	57	53	41	36	23	32
Conflicting Peds, #/hr	2	0	0	2	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	-3	1	-	0	-
Peak Hour Factor	68	68	68	68	68	68
Heavy Vehicles, %	0	2	0	0	0	0
Mvmt Flow	84	78	60	53	34	47

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	115	0	-	0	336	89
Stage 1	-	-	-	-	89	-
Stage 2	-	-	-	-	247	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1487	-	-	-	663	975
Stage 1	-	-	-	-	940	-
Stage 2	-	-	-	-	799	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1484	-	-	-	621	973
Mov Cap-2 Maneuver	-	-	-	-	621	-
Stage 1	-	-	-	-	883	-
Stage 2	-	-	-	-	797	-

Approach	EB	WB	SB
HCM Control Delay, s	3.9	0	10.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1484	-	-	-	787
HCM Lane V/C Ratio	0.056	-	-	-	0.103
HCM Control Delay (s)	7.6	0	-	-	10.1
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.3

Appendix F Total Traffic Conditions
Level of Service Worksheets

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	140	573	169	671	403	1779	127	200	804	205
v/c Ratio	0.92	0.70	1.13	0.88	0.91	1.05	0.16	0.78	0.56	0.29
Control Delay	124.0	45.3	173.5	68.3	93.0	76.1	9.3	92.8	35.9	4.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	124.0	45.3	173.5	68.3	93.0	76.1	9.3	92.8	35.9	4.4
Queue Length 50th (ft)	150	211	~209	326	220	~1097	24	109	338	0
Queue Length 95th (ft)	#294	281	#372	406	#318	#1231	64	#170	407	51
Internal Link Dist (ft)		574		568		888			476	
Turn Bay Length (ft)	260		185		490		150	460		300
Base Capacity (vph)	153	876	150	822	453	1693	801	262	1428	708
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.92	0.65	1.13	0.82	0.89	1.05	0.16	0.76	0.56	0.29

Intersection Summary

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	133	255	290	161	401	237	28	355	1690	121	13	177
Future Volume (vph)	133	255	290	161	401	237	28	355	1690	121	13	177
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%				-1%			
Total Lost time (s)	4.5	6.0		4.5	6.0			5.0	6.0	6.0		5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.97	0.95	1.00		0.97
Frpb, ped/bikes	1.00	1.00		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	0.94			1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	1.00			0.95	1.00	1.00		0.95
Satd. Flow (prot)	1805	3212		1770	3298			3424	3489	1561		3199
Flt Permitted	0.95	1.00		0.95	1.00			0.95	1.00	1.00		0.95
Satd. Flow (perm)	1805	3212		1770	3298			3424	3489	1561		3199
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	140	268	305	169	422	249	29	374	1779	127	14	186
RTOR Reduction (vph)	0	130	0	0	54	0	0	0	0	43	0	0
Lane Group Flow (vph)	140	443	0	169	617	0	0	403	1779	84	0	200
Confl. Bikes (#/hr)												
Heavy Vehicles (%)	0%	5%	2%	2%	3%	4%	0%	3%	4%	4%	0%	9%
Turn Type	Prot	NA		Prot	NA		Prot	Prot	NA	Perm	Prot	Prot
Protected Phases	7	4		3	8		5	5	2		1	1
Permitted Phases										2		
Actuated Green, G (s)	13.5	34.0		13.5	34.0			20.6	77.1	77.1		12.7
Effective Green, g (s)	13.5	34.0		13.5	34.0			20.6	77.1	77.1		12.7
Actuated g/C Ratio	0.09	0.21		0.09	0.21			0.13	0.49	0.49		0.08
Clearance Time (s)	4.5	6.0		4.5	6.0			5.0	6.0	6.0		5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	5.4	5.4		3.5
Lane Grp Cap (vph)	153	687		150	706			444	1693	757		255
v/s Ratio Prot	0.08	0.14		c0.10	c0.19			c0.12	c0.51			0.06
v/s Ratio Perm										0.05		
v/c Ratio	0.92	0.64		1.13	0.87			0.91	1.05	0.11		0.78
Uniform Delay, d1	72.1	56.9		72.7	60.3			68.2	40.9	22.2		71.7
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00		1.00
Incremental Delay, d2	48.1	2.1		111.5	11.6			21.9	36.6	0.2		14.9
Delay (s)	120.1	59.0		184.2	71.9			90.1	77.4	22.4		86.7
Level of Service	F	E		F	E			F	E	C		F
Approach Delay (s)		71.0			94.5				76.6			
Approach LOS		E			F				E			

Intersection Summary			
HCM 2000 Control Delay	70.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	158.8	Sum of lost time (s)	21.5
Intersection Capacity Utilization	96.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBT	SBR
Lane Configurations	↑↑	↱
Traffic Volume (vph)	764	195
Future Volume (vph)	764	195
Ideal Flow (vphpl)	1900	1900
Grade (%)	2%	
Total Lost time (s)	6.0	6.0
Lane Util. Factor	0.95	1.00
Frpb, ped/bikes	1.00	0.98
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3279	1361
Flt Permitted	1.00	1.00
Satd. Flow (perm)	3279	1361
Peak-hour factor, PHF	0.95	0.95
Adj. Flow (vph)	804	205
RTOR Reduction (vph)	0	116
Lane Group Flow (vph)	804	89
Confl. Bikes (#/hr)		1
Heavy Vehicles (%)	9%	15%
Turn Type	NA	Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	69.2	69.2
Effective Green, g (s)	69.2	69.2
Actuated g/C Ratio	0.44	0.44
Clearance Time (s)	6.0	6.0
Vehicle Extension (s)	5.4	5.4
Lane Grp Cap (vph)	1428	593
v/s Ratio Prot	0.25	
v/s Ratio Perm		0.07
v/c Ratio	0.56	0.15
Uniform Delay, d1	33.5	27.1
Progression Factor	1.00	1.00
Incremental Delay, d2	0.9	0.3
Delay (s)	34.4	27.3
Level of Service	C	C
Approach Delay (s)	41.9	
Approach LOS	D	

Intersection Summary

Intersection	
Int Delay, s/veh	76.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	59	402	81	8	636	98	25	16	11	31	50	124
Future Vol, veh/h	59	402	81	8	636	98	25	16	11	31	50	124
Conflicting Peds, #/hr	0	0	5	5	0	0	0	0	3	3	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	90	-	0	127	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-1	-	-	1	-	-	-2	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	7	0	0	14	4	1	8	8	2
Mvmt Flow	74	503	101	10	795	123	31	20	14	39	63	155

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	918	0	0	609	0	0	1642	1594	511	1599	1634	857
Stage 1	-	-	-	-	-	-	656	656	-	877	877	-
Stage 2	-	-	-	-	-	-	986	938	-	722	757	-
Critical Hdwy	4.1	-	-	4.17	-	-	6.84	6.14	6.01	7.18	6.58	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	5.84	5.14	-	6.18	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.84	5.14	-	6.18	5.58	-
Follow-up Hdwy	2.2	-	-	2.263	-	-	3.626	4.036	3.309	3.572	4.072	3.318
Pot Cap-1 Maneuver	752	-	-	946	-	-	90	126	581	83	98	357
Stage 1	-	-	-	-	-	-	468	494	-	335	358	-
Stage 2	-	-	-	-	-	-	316	378	-	409	407	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	752	-	-	941	-	-	~ 20	112	577	64	87	357
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 20	112	-	64	87	-
Stage 1	-	-	-	-	-	-	420	443	-	302	354	-
Stage 2	-	-	-	-	-	-	146	374	-	343	365	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.1	0.1	$ 598	$ 419.4
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	37	752	-	-	941	-	-	146
HCM Lane V/C Ratio	1.757	0.098	-	-	0.011	-	-	1.755
HCM Control Delay (s)	$ 598	10.3	-	-	8.9	-	-	$ 419.4
HCM Lane LOS	F	B	-	-	A	-	-	F
HCM 95th %tile Q(veh)	7	0.3	-	-	0	-	-	18.9

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

Intersection	
Int Delay, s/veh	90

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	321	123	81	515	226	51
Future Vol, veh/h	321	123	81	515	226	51
Conflicting Peds, #/hr	0	21	21	0	1	23
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	115	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-1	-	-	1	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	0	7	0	0	6	0
Mvmt Flow	382	146	96	613	269	61

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	549	0	1282	499
Stage 1	-	-	-	-	476	-
Stage 2	-	-	-	-	806	-
Critical Hdwy	-	-	4.1	-	6.46	6.2
Critical Hdwy Stg 1	-	-	-	-	5.46	-
Critical Hdwy Stg 2	-	-	-	-	5.46	-
Follow-up Hdwy	-	-	2.2	-	3.554	3.3
Pot Cap-1 Maneuver	-	-	1031	-	~ 179	576
Stage 1	-	-	-	-	617	-
Stage 2	-	-	-	-	433	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1010	-	~ 159	552
Mov Cap-2 Maneuver	-	-	-	-	~ 159	-
Stage 1	-	-	-	-	605	-
Stage 2	-	-	-	-	391	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.2	$ 425.4
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	183	-	-	1010	-
HCM Lane V/C Ratio	1.802	-	-	0.095	-
HCM Control Delay (s)	$ 425.4	-	-	8.9	-
HCM Lane LOS	F	-	-	A	-
HCM 95th %tile Q(veh)	23.6	-	-	0.3	-

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

Intersection	
Intersection Delay, s/veh	30
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	121	330	42	43	279	34	102	159	97	32	25	136
Future Vol, veh/h	121	330	42	43	279	34	102	159	97	32	25	136
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	5	2	0	13	2	0	3	2	6	0	5	2
Mvmt Flow	134	367	47	48	310	38	113	177	108	36	28	151
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	40.3	31.5	21.7	16.3
HCM LOS	E	D	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	62%	0%	89%	0%	89%	0%	16%
Vol Right, %	0%	38%	0%	11%	0%	11%	0%	84%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	102	256	121	372	43	313	32	161
LT Vol	102	0	121	0	43	0	32	0
Through Vol	0	159	0	330	0	279	0	25
RT Vol	0	97	0	42	0	34	0	136
Lane Flow Rate	113	284	134	413	48	348	36	179
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.281	0.641	0.316	0.898	0.118	0.78	0.093	0.415
Departure Headway (Hd)	8.92	8.109	8.471	7.82	8.867	8.078	9.404	8.355
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	403	447	425	463	405	449	381	431
Service Time	6.665	5.854	6.216	5.566	6.614	5.824	7.157	6.107
HCM Lane V/C Ratio	0.28	0.635	0.315	0.892	0.119	0.775	0.094	0.415
HCM Control Delay	15.1	24.3	15.1	48.5	12.8	34.1	13.1	16.9
HCM Lane LOS	C	C	C	E	B	D	B	C
HCM 95th-tile Q	1.1	4.4	1.3	9.8	0.4	6.8	0.3	2

Intersection	
Intersection Delay, s/veh	16
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	303	10	246	6	25	26	152	152	3	6	124	112
Future Vol, veh/h	303	10	246	6	25	26	152	152	3	6	124	112
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	8	0	2	6	2	2	1	4	1	0	2	0
Mvmt Flow	322	11	262	6	27	28	162	162	3	6	132	119
Number of Lanes	1	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	2
HCM Control Delay	17.1	10.7	17	13.5
HCM LOS	C	B	C	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	50%	100%	0%	11%	2%
Vol Thru, %	50%	0%	4%	44%	51%
Vol Right, %	1%	0%	96%	46%	46%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	307	303	256	57	242
LT Vol	152	303	0	6	6
Through Vol	152	0	10	25	124
RT Vol	3	0	246	26	112
Lane Flow Rate	327	322	272	61	257
Geometry Grp	2	7	7	5	2
Degree of Util (X)	0.562	0.627	0.429	0.115	0.427
Departure Headway (Hd)	6.191	7.007	5.676	6.809	5.972
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	578	513	629	529	597
Service Time	4.268	4.78	3.448	4.809	4.056
HCM Lane V/C Ratio	0.566	0.628	0.432	0.115	0.43
HCM Control Delay	17	20.9	12.7	10.7	13.5
HCM Lane LOS	C	C	B	B	B
HCM 95th-tile Q	3.5	4.3	2.2	0.4	2.1

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↱			↱		↑↑↱			↑↑	↱
Traffic Vol, veh/h	0	0	37	0	0	128	0	2030	103	0	1205	30
Future Vol, veh/h	0	0	37	0	0	128	0	2030	103	0	1205	30
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	255
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	11	0	0	5	0	13	0	4	4	0	7	7
Mvmt Flow	0	0	39	0	0	133	0	2115	107	0	1255	31

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	628	-	-	1111	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.9	-	-	7.16	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.3	-	-	3.43	-	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	431	0	0	187	0	-	-	0	-	-
Stage 1	0	0	-	0	0	-	0	-	-	0	-	-
Stage 2	0	0	-	0	0	-	0	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	431	-	-	187	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.2	61.4	0	0
HCM LOS	B	F		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	-	-	431	187	-	-
HCM Lane V/C Ratio	-	-	0.089	0.713	-	-
HCM Control Delay (s)	-	-	14.2	61.4	-	-
HCM Lane LOS	-	-	B	F	-	-
HCM 95th %tile Q(veh)	-	-	0.3	4.5	-	-

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	10	92	0	1	112	3	3	2	2	9	4	15
Future Vol, veh/h	10	92	0	1	112	3	3	2	2	9	4	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	2	-	-	2	-	-	-2	-
Peak Hour Factor	69	69	69	69	69	69	69	69	69	69	69	69
Heavy Vehicles, %	0	2	100	0	6	0	50	50	0	0	0	21
Mvmt Flow	14	133	0	1	162	4	4	3	3	13	6	22

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	166	0	0	133	0	0	341	329	133	330	327	164
Stage 1	-	-	-	-	-	-	161	161	-	166	166	-
Stage 2	-	-	-	-	-	-	180	168	-	164	161	-
Critical Hdwy	4.1	-	-	4.1	-	-	8	7.4	6.4	6.7	6.1	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	7	6.4	-	5.7	5.1	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7	6.4	-	5.7	5.1	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.95	4.45	3.3	3.5	4	3.489
Pot Cap-1 Maneuver	1424	-	-	1464	-	-	512	501	915	651	617	841
Stage 1	-	-	-	-	-	-	727	670	-	856	779	-
Stage 2	-	-	-	-	-	-	708	665	-	858	782	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1424	-	-	1464	-	-	490	495	915	640	610	841
Mov Cap-2 Maneuver	-	-	-	-	-	-	490	495	-	640	610	-
Stage 1	-	-	-	-	-	-	719	663	-	847	778	-
Stage 2	-	-	-	-	-	-	684	664	-	842	773	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0.1	11.5	10.2
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	567	1424	-	-	1464	-	-	728
HCM Lane V/C Ratio	0.018	0.01	-	-	0.001	-	-	0.056
HCM Control Delay (s)	11.5	7.6	0	-	7.5	0	-	10.2
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	9.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	4	95	4	2	99	17	17	14	10	37	14	4
Future Vol, veh/h	4	95	4	2	99	17	17	14	10	37	14	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-1	-	-	1	-	-	-2	-	-	0	-
Peak Hour Factor	72	72	72	72	72	72	72	72	72	72	72	72
Heavy Vehicles, %	0	1	0	50	5	17	0	0	11	0	0	33
Mvmt Flow	6	132	6	3	138	24	24	19	14	51	19	6

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	279	205	22	267	201	26	25	0	0	33	0	0
Stage 1	124	124	-	74	74	-	-	-	-	-	-	-
Stage 2	155	81	-	193	127	-	-	-	-	-	-	-
Critical Hdwy	6.9	6.31	6.1	7.8	6.75	6.47	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	5.9	5.31	-	6.8	5.75	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.9	5.31	-	6.8	5.75	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.009	3.3	3.95	4.045	3.453	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	688	701	1062	590	682	1007	1603	-	-	1592	-	-
Stage 1	891	801	-	825	824	-	-	-	-	-	-	-
Stage 2	859	833	-	702	780	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	543	667	1062	480	649	1007	1603	-	-	1592	-	-
Mov Cap-2 Maneuver	543	667	-	480	649	-	-	-	-	-	-	-
Stage 1	878	775	-	813	812	-	-	-	-	-	-	-
Stage 2	686	821	-	560	754	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.8	12	3	4.9
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1603	-	-	671	680	1592	-	-
HCM Lane V/C Ratio	0.015	-	-	0.213	0.241	0.032	-	-
HCM Control Delay (s)	7.3	0	-	11.8	12	7.3	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.8	0.9	0.1	-	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	167	2	1	61	4	3
Future Vol, veh/h	167	2	1	61	4	3
Conflicting Peds, #/hr	0	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-3	-	-	2	1	-
Peak Hour Factor	68	68	68	68	68	68
Heavy Vehicles, %	1	0	0	8	0	33
Mvmt Flow	246	3	1	90	6	4

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	249	0	340	249
Stage 1	-	-	-	-	248	-
Stage 2	-	-	-	-	92	-
Critical Hdwy	-	-	4.1	-	6.6	6.63
Critical Hdwy Stg 1	-	-	-	-	5.6	-
Critical Hdwy Stg 2	-	-	-	-	5.6	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.597
Pot Cap-1 Maneuver	-	-	1328	-	648	715
Stage 1	-	-	-	-	787	-
Stage 2	-	-	-	-	932	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1328	-	647	714
Mov Cap-2 Maneuver	-	-	-	-	647	-
Stage 1	-	-	-	-	787	-
Stage 2	-	-	-	-	931	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	10.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	674	-	-	1328	-
HCM Lane V/C Ratio	0.015	-	-	0.001	-
HCM Control Delay (s)	10.4	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection	
Int Delay, s/veh	6.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	142	38	20	125	47	35
Future Vol, veh/h	142	38	20	125	47	35
Conflicting Peds, #/hr	1	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, %	2	-	-	-1	0	-
Peak Hour Factor	70	70	70	70	70	70
Heavy Vehicles, %	2	8	17	5	8	5
Mvmt Flow	203	54	29	179	67	50

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	330	92	117	0	-	0
Stage 1	92	-	-	-	-	-
Stage 2	238	-	-	-	-	-
Critical Hdwy	6.82	6.48	4.27	-	-	-
Critical Hdwy Stg 1	5.82	-	-	-	-	-
Critical Hdwy Stg 2	5.82	-	-	-	-	-
Follow-up Hdwy	3.518	3.372	2.353	-	-	-
Pot Cap-1 Maneuver	641	944	1383	-	-	-
Stage 1	922	-	-	-	-	-
Stage 2	781	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	626	944	1383	-	-	-
Mov Cap-2 Maneuver	626	-	-	-	-	-
Stage 1	901	-	-	-	-	-
Stage 2	781	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.6	1.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1383	-	674	-	-
HCM Lane V/C Ratio	0.021	-	0.382	-	-
HCM Control Delay (s)	7.7	0	13.6	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	1.8	-	-

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	24	121	49	16	46	68
Future Vol, veh/h	24	121	49	16	46	68
Conflicting Peds, #/hr	2	0	0	2	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	-3	1	-	0	-
Peak Hour Factor	68	68	68	68	68	68
Heavy Vehicles, %	0	1	8	0	0	0
Mvmt Flow	35	178	72	24	68	100

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	98	0	-	0	335	86
Stage 1	-	-	-	-	86	-
Stage 2	-	-	-	-	249	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1508	-	-	-	664	978
Stage 1	-	-	-	-	942	-
Stage 2	-	-	-	-	797	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1505	-	-	-	644	976
Mov Cap-2 Maneuver	-	-	-	-	644	-
Stage 1	-	-	-	-	916	-
Stage 2	-	-	-	-	795	-

Approach	EB	WB	SB
HCM Control Delay, s	1.2	0	10.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1505	-	-	-	808
HCM Lane V/C Ratio	0.023	-	-	-	0.207
HCM Control Delay (s)	7.4	0	-	-	10.6
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.8

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	2	171	54	1	5	5
Future Vol, veh/h	2	171	54	1	5	5
Conflicting Peds, #/hr	2	0	0	2	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	68	68	68	68	68	68
Heavy Vehicles, %	0	2	8	0	0	0
Mvmt Flow	3	251	79	1	7	7

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	82	0	-	0	339	82
Stage 1	-	-	-	-	82	-
Stage 2	-	-	-	-	257	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1528	-	-	-	661	983
Stage 1	-	-	-	-	946	-
Stage 2	-	-	-	-	791	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1525	-	-	-	657	981
Mov Cap-2 Maneuver	-	-	-	-	657	-
Stage 1	-	-	-	-	942	-
Stage 2	-	-	-	-	789	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	9.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1525	-	-	-	787
HCM Lane V/C Ratio	0.002	-	-	-	0.019
HCM Control Delay (s)	7.4	0	-	-	9.7
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	49	557	203	328	303	1173	152	441	1867	49
v/c Ratio	0.86	1.13dr	0.95	0.34	1.57	0.79	0.20	0.92	1.05	0.06
Control Delay	150.3	75.5	113.1	22.5	322.9	40.9	3.3	86.9	70.1	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	150.3	75.5	113.1	22.5	322.9	40.9	3.3	86.9	70.1	0.1
Queue Length 50th (ft)	47	238	193	64	~208	500	0	215	~1009	0
Queue Length 95th (ft)	#130	#351	#356	108	#307	593	35	#316	#1145	0
Internal Link Dist (ft)		1143		568		888			476	
Turn Bay Length (ft)	260		185		490		150	460		300
Base Capacity (vph)	57	600	213	959	193	1483	779	478	1781	858
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.93	0.95	0.34	1.57	0.79	0.20	0.92	1.05	0.06

Intersection Summary

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

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

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	46	178	346	191	154	154	20	265	1103	143	36	379
Future Volume (vph)	46	178	346	191	154	154	20	265	1103	143	36	379
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%				-1%			
Total Lost time (s)	4.5	6.0		4.5	6.0			5.0	6.0	6.0		5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.97	0.95	1.00		0.97
Frpb, ped/bikes	1.00	1.00		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	0.90		1.00	0.93			1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	1.00			0.95	1.00	1.00		0.95
Satd. Flow (prot)	1671	3210		1703	3274			3487	3489	1607		3461
Flt Permitted	0.95	1.00		0.95	1.00			0.95	1.00	1.00		0.95
Satd. Flow (perm)	1671	3210		1703	3274			3487	3489	1607		3461
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	49	189	368	203	164	164	21	282	1173	152	38	403
RTOR Reduction (vph)	0	70	0	0	122	0	0	0	0	87	0	0
Lane Group Flow (vph)	49	487	0	203	206	0	0	303	1173	65	0	441
Confl. Bikes (#/hr)												
Heavy Vehicles (%)	8%	0%	2%	6%	2%	2%	0%	1%	4%	1%	2%	0%
Turn Type	Prot	NA		Prot	NA		Prot	Prot	NA	Perm	Prot	Prot
Protected Phases	7	4		3	8		5	5	2		1	1
Permitted Phases										2		
Actuated Green, G (s)	5.0	23.5		18.1	36.6			8.0	61.5	61.5		20.0
Effective Green, g (s)	5.0	23.5		18.1	36.6			8.0	61.5	61.5		20.0
Actuated g/C Ratio	0.03	0.16		0.13	0.25			0.06	0.43	0.43		0.14
Clearance Time (s)	4.5	6.0		4.5	6.0			5.0	6.0	6.0		5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	5.4	5.4		3.5
Lane Grp Cap (vph)	57	521		213	828			192	1483	683		478
v/s Ratio Prot	0.03	c0.15		c0.12	0.06			c0.09	0.34			0.13
v/s Ratio Perm										0.04		
v/c Ratio	0.86	1.13dr		0.95	0.25			1.58	0.79	0.09		0.92
Uniform Delay, d1	69.5	59.8		62.8	43.0			68.3	36.0	24.9		61.5
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00		1.00
Incremental Delay, d2	69.8	24.0		48.1	0.2			283.6	3.5	0.1		23.7
Delay (s)	139.3	83.8		111.0	43.2			351.9	39.5	25.0		85.2
Level of Service	F	F		F	D			F	D	C		F
Approach Delay (s)		88.3			69.1				96.3			
Approach LOS		F			E				F			

Intersection Summary			
HCM 2000 Control Delay	81.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	144.6	Sum of lost time (s)	21.5
Intersection Capacity Utilization	101.2%	ICU Level of Service	G
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Movement	SBT	SBR
Lane Configurations		
Traffic Volume (vph)	1755	46
Future Volume (vph)	1755	46
Ideal Flow (vphpl)	1900	1900
Grade (%)	2%	
Total Lost time (s)	6.0	6.0
Lane Util. Factor	0.95	1.00
Frpb, ped/bikes	1.00	0.98
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3504	1566
Flt Permitted	1.00	1.00
Satd. Flow (perm)	3504	1566
Peak-hour factor, PHF	0.94	0.94
Adj. Flow (vph)	1867	49
RTOR Reduction (vph)	0	24
Lane Group Flow (vph)	1867	25
Confl. Bikes (#/hr)		1
Heavy Vehicles (%)	2%	0%
Turn Type	NA	Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	73.5	73.5
Effective Green, g (s)	73.5	73.5
Actuated g/C Ratio	0.51	0.51
Clearance Time (s)	6.0	6.0
Vehicle Extension (s)	5.4	5.4
Lane Grp Cap (vph)	1781	795
v/s Ratio Prot	c0.53	
v/s Ratio Perm		0.02
v/c Ratio	1.05	0.03
Uniform Delay, d1	35.5	17.8
Progression Factor	1.00	1.00
Incremental Delay, d2	35.3	0.0
Delay (s)	70.8	17.8
Level of Service	E	B
Approach Delay (s)	72.4	
Approach LOS	E	

Intersection Summary

Intersection	
Int Delay, s/veh	5.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	129	497	32	6	492	79	12	0	1	42	1	68
Future Vol, veh/h	129	497	32	6	492	79	12	0	1	42	1	68
Conflicting Peds, #/hr	0	0	5	5	0	0	0	0	3	3	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	90	-	0	127	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-1	-	-	1	-	-	-2	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	1	1	0	0	3	0	0	0	0	0	0	2
Mvmt Flow	140	540	35	7	535	86	13	0	1	46	1	74

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	621	0	0	580	0	0	1455	1460	548	1433	1452	578
Stage 1	-	-	-	-	-	-	825	825	-	592	592	-
Stage 2	-	-	-	-	-	-	630	635	-	841	860	-
Critical Hdwy	4.11	-	-	4.1	-	-	6.7	6.1	6	7.1	6.5	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	5.7	5.1	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.7	5.1	-	6.1	5.5	-
Follow-up Hdwy	2.209	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.318
Pot Cap-1 Maneuver	965	-	-	1004	-	-	128	153	557	113	132	516
Stage 1	-	-	-	-	-	-	405	427	-	496	497	-
Stage 2	-	-	-	-	-	-	507	510	-	362	376	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	965	-	-	999	-	-	96	129	553	99	112	516
Mov Cap-2 Maneuver	-	-	-	-	-	-	96	129	-	99	112	-
Stage 1	-	-	-	-	-	-	345	363	-	424	494	-
Stage 2	-	-	-	-	-	-	430	506	-	308	320	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.8	0.1	45.4	49
HCM LOS			E	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	103	965	-	-	999	-	-	196
HCM Lane V/C Ratio	0.137	0.145	-	-	0.007	-	-	0.616
HCM Control Delay (s)	45.4	9.4	-	-	8.6	-	-	49
HCM Lane LOS	E	A	-	-	A	-	-	E
HCM 95th %tile Q(veh)	0.5	0.5	-	-	0	-	-	3.5

Intersection	
Int Delay, s/veh	6.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	337	204	67	467	109	40
Future Vol, veh/h	337	204	67	467	109	40
Conflicting Peds, #/hr	0	21	21	0	1	23
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	115	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-1	-	-	1	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	1	0	3	2	2	3
Mvmt Flow	370	224	74	513	120	44

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	615	0	1165	526
Stage 1	-	-	-	-	503	-
Stage 2	-	-	-	-	662	-
Critical Hdwy	-	-	4.13	-	6.42	6.23
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.227	-	3.518	3.327
Pot Cap-1 Maneuver	-	-	960	-	215	550
Stage 1	-	-	-	-	607	-
Stage 2	-	-	-	-	513	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	941	-	194	527
Mov Cap-2 Maneuver	-	-	-	-	194	-
Stage 1	-	-	-	-	595	-
Stage 2	-	-	-	-	472	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.1	49.8
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	234	-	-	941	-
HCM Lane V/C Ratio	0.7	-	-	0.078	-
HCM Control Delay (s)	49.8	-	-	9.2	-
HCM Lane LOS	E	-	-	A	-
HCM 95th %tile Q(veh)	4.6	-	-	0.3	-

Intersection	
Intersection Delay, s/veh	51.9
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	29	142	146	61	110	56	118	252	47	74	384	69
Future Vol, veh/h	29	142	146	61	110	56	118	252	47	74	384	69
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	0	2	1	3	0	2	0	3	0	2	1	3
Mvmt Flow	33	160	164	69	124	63	133	283	53	83	431	78
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	30.1	17.9	28.6	98.1
HCM LOS	D	C	D	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	84%	0%	49%	0%	66%	0%	85%
Vol Right, %	0%	16%	0%	51%	0%	34%	0%	15%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	118	299	29	288	61	166	74	453
LT Vol	118	0	29	0	61	0	74	0
Through Vol	0	252	0	142	0	110	0	384
RT Vol	0	47	0	146	0	56	0	69
Lane Flow Rate	133	336	33	324	69	187	83	509
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.321	0.76	0.081	0.736	0.179	0.448	0.2	1.134
Departure Headway (Hd)	9.112	8.53	9.465	8.608	9.944	9.119	8.663	8.018
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	396	427	381	424	363	397	413	453
Service Time	6.812	6.23	7.165	6.308	7.644	6.819	6.433	5.787
HCM Lane V/C Ratio	0.336	0.787	0.087	0.764	0.19	0.471	0.201	1.124
HCM Control Delay	16.1	33.6	13	31.8	14.8	19	13.6	111.9
HCM Lane LOS	C	D	B	D	B	C	B	F
HCM 95th-tile Q	1.4	6.3	0.3	5.9	0.6	2.2	0.7	18

Intersection	
Intersection Delay, s/veh	48.3
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	120	15	185	1	23	17	348	154	7	34	161	306
Future Vol, veh/h	120	15	185	1	23	17	348	154	7	34	161	306
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	0	0	5	100	0	0	2	1	0	0	2	2
Mvmt Flow	133	17	206	1	26	19	387	171	8	38	179	340
Number of Lanes	1	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	1
Conflicting Approach Righ	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	2
HCM Control Delay	15.3	14.8	73.7	46.4
HCM LOS	C	B	F	E

Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	68%	100%	0%	2%	7%
Vol Thru, %	30%	0%	7%	56%	32%
Vol Right, %	1%	0%	93%	41%	61%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	509	120	200	41	501
LT Vol	348	120	0	1	34
Through Vol	154	0	15	23	161
RT Vol	7	0	185	17	306
Lane Flow Rate	566	133	222	46	557
Geometry Grp	2	7	7	5	2
Degree of Util (X)	1.036	0.306	0.438	0.126	0.928
Departure Headway (Hd)	6.594	8.491	7.304	10.335	6.199
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	554	425	496	349	590
Service Time	4.594	6.191	5.004	8.335	4.199
HCM Lane V/C Ratio	1.022	0.313	0.448	0.132	0.944
HCM Control Delay	73.7	14.9	15.6	14.8	46.4
HCM Lane LOS	F	B	C	B	E
HCM 95th-tile Q	15.8	1.3	2.2	0.4	11.8

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	42	0	0	77	0	1451	70	0	2228	60
Future Vol, veh/h	0	0	42	0	0	77	0	1451	70	0	2228	60
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	255
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	5	0	0	3	0	0	0	3	0	0	2	0
Mvmt Flow	0	0	44	0	0	80	0	1511	73	0	2321	63

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	1161	-	-	792	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.9	-	-	6.9	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.3	-	-	3.3	-	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	191	0	0	336	0	-	-	0	-	-
Stage 1	0	0	-	0	0	-	0	-	-	0	-	-
Stage 2	0	0	-	0	0	-	0	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	191	-	-	336	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	29.4	19	0	0
HCM LOS	D	C		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	-	-	191	336	-	-
HCM Lane V/C Ratio	-	-	0.229	0.239	-	-
HCM Control Delay (s)	-	-	29.4	19	-	-
HCM Lane LOS	-	-	D	C	-	-
HCM 95th %tile Q(veh)	-	-	0.9	0.9	-	-

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	9	58	0	1	71	2	1	1	2	1	2	5
Future Vol, veh/h	9	58	0	1	71	2	1	1	2	1	2	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	2	-	-	2	-	-	-2	-
Peak Hour Factor	82	82	82	82	82	82	82	82	82	82	82	82
Heavy Vehicles, %	0	0	0	0	3	0	0	0	0	0	0	0
Mvmt Flow	11	71	0	1	87	2	1	1	2	1	2	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	89	0	0	71	0	0	187	184	71	185	183	88
Stage 1	-	-	-	-	-	-	93	93	-	90	90	-
Stage 2	-	-	-	-	-	-	94	91	-	95	93	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.9	6.4	6.7	6.1	6
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.9	-	5.7	5.1	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.9	-	5.7	5.1	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1519	-	-	1542	-	-	762	699	993	796	729	981
Stage 1	-	-	-	-	-	-	909	813	-	932	833	-
Stage 2	-	-	-	-	-	-	908	815	-	926	830	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1519	-	-	1542	-	-	750	693	993	787	722	981
Mov Cap-2 Maneuver	-	-	-	-	-	-	750	693	-	787	722	-
Stage 1	-	-	-	-	-	-	902	806	-	925	832	-
Stage 2	-	-	-	-	-	-	899	814	-	915	823	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1	0.1	9.3	9.2
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	835	1519	-	-	1542	-	-	876
HCM Lane V/C Ratio	0.006	0.007	-	-	0.001	-	-	0.011
HCM Control Delay (s)	9.3	7.4	0	-	7.3	0	-	9.2
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	8.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	9	48	10	13	53	13	12	11	9	75	18	6
Future Vol, veh/h	9	48	10	13	53	13	12	11	9	75	18	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-1	-	-	1	-	-	-2	-	-	0	-
Peak Hour Factor	74	74	74	74	74	74	74	74	74	74	74	74
Heavy Vehicles, %	0	0	0	50	0	0	15	0	11	0	11	0
Mvmt Flow	12	65	14	18	72	18	16	15	12	101	24	8

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	328	289	28	323	287	21	32	0	0	27	0	0
Stage 1	230	230	-	53	53	-	-	-	-	-	-	-
Stage 2	98	59	-	270	234	-	-	-	-	-	-	-
Critical Hdwy	6.9	6.3	6.1	7.8	6.7	6.3	4.25	-	-	4.1	-	-
Critical Hdwy Stg 1	5.9	5.3	-	6.8	5.7	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.9	5.3	-	6.8	5.7	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.95	4	3.3	2.335	-	-	2.2	-	-
Pot Cap-1 Maneuver	641	635	1054	538	616	1062	1500	-	-	1600	-	-
Stage 1	787	727	-	849	852	-	-	-	-	-	-	-
Stage 2	918	852	-	632	706	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	538	588	1054	459	570	1062	1500	-	-	1600	-	-
Mov Cap-2 Maneuver	538	588	-	459	570	-	-	-	-	-	-	-
Stage 1	778	680	-	840	843	-	-	-	-	-	-	-
Stage 2	817	843	-	528	661	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.8	12.4	2.8	5.6
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1500	-	-	621	592	1600	-	-
HCM Lane V/C Ratio	0.011	-	-	0.146	0.18	0.063	-	-
HCM Control Delay (s)	7.4	0	-	11.8	12.4	7.4	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.5	0.7	0.2	-	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	88	0	5	85	5	5
Future Vol, veh/h	88	0	5	85	5	5
Conflicting Peds, #/hr	0	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-3	-	-	2	1	-
Peak Hour Factor	68	68	68	68	68	68
Heavy Vehicles, %	1	0	0	8	0	33
Mvmt Flow	129	0	7	125	7	7

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	129	0	268	130
Stage 1	-	-	-	-	129	-
Stage 2	-	-	-	-	139	-
Critical Hdwy	-	-	4.1	-	6.6	6.63
Critical Hdwy Stg 1	-	-	-	-	5.6	-
Critical Hdwy Stg 2	-	-	-	-	5.6	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.597
Pot Cap-1 Maneuver	-	-	1469	-	715	840
Stage 1	-	-	-	-	895	-
Stage 2	-	-	-	-	886	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1469	-	711	839
Mov Cap-2 Maneuver	-	-	-	-	711	-
Stage 1	-	-	-	-	895	-
Stage 2	-	-	-	-	882	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	9.8
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	770	-	-	1469	-
HCM Lane V/C Ratio	0.019	-	-	0.005	-
HCM Control Delay (s)	9.8	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	63	24	14	102	104	73
Future Vol, veh/h	63	24	14	102	104	73
Conflicting Peds, #/hr	1	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, %	2	-	-	-1	0	-
Peak Hour Factor	78	78	78	78	78	78
Heavy Vehicles, %	3	7	0	5	1	0
Mvmt Flow	81	31	18	131	133	94

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	348	180	227	0	-	0
Stage 1	180	-	-	-	-	-
Stage 2	168	-	-	-	-	-
Critical Hdwy	6.83	6.47	4.1	-	-	-
Critical Hdwy Stg 1	5.83	-	-	-	-	-
Critical Hdwy Stg 2	5.83	-	-	-	-	-
Follow-up Hdwy	3.527	3.363	2.2	-	-	-
Pot Cap-1 Maneuver	622	842	1353	-	-	-
Stage 1	832	-	-	-	-	-
Stage 2	843	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	613	842	1353	-	-	-
Mov Cap-2 Maneuver	613	-	-	-	-	-
Stage 1	820	-	-	-	-	-
Stage 2	843	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.5	0.9	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1353	-	663	-	-
HCM Lane V/C Ratio	0.013	-	0.168	-	-
HCM Control Delay (s)	7.7	0	11.5	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.6	-	-

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	75	59	43	47	30	42
Future Vol, veh/h	75	59	43	47	30	42
Conflicting Peds, #/hr	2	0	0	2	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	-3	1	-	0	-
Peak Hour Factor	68	68	68	68	68	68
Heavy Vehicles, %	0	1	8	0	0	0
Mvmt Flow	110	87	63	69	44	62

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	134	0	-	0	408	100
Stage 1	-	-	-	-	100	-
Stage 2	-	-	-	-	308	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1463	-	-	-	603	961
Stage 1	-	-	-	-	929	-
Stage 2	-	-	-	-	750	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1460	-	-	-	553	959
Mov Cap-2 Maneuver	-	-	-	-	553	-
Stage 1	-	-	-	-	854	-
Stage 2	-	-	-	-	749	-

Approach	EB	WB	SB
HCM Control Delay, s	4.3	0	10.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1460	-	-	-	734
HCM Lane V/C Ratio	0.076	-	-	-	0.144
HCM Control Delay (s)	7.7	0	-	-	10.7
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.5

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	85	85	5	4	2
Future Vol, veh/h	5	85	85	5	4	2
Conflicting Peds, #/hr	2	0	0	2	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	69	69	69	69	69	69
Heavy Vehicles, %	0	2	0	0	0	0
Mvmt Flow	7	123	123	7	6	3

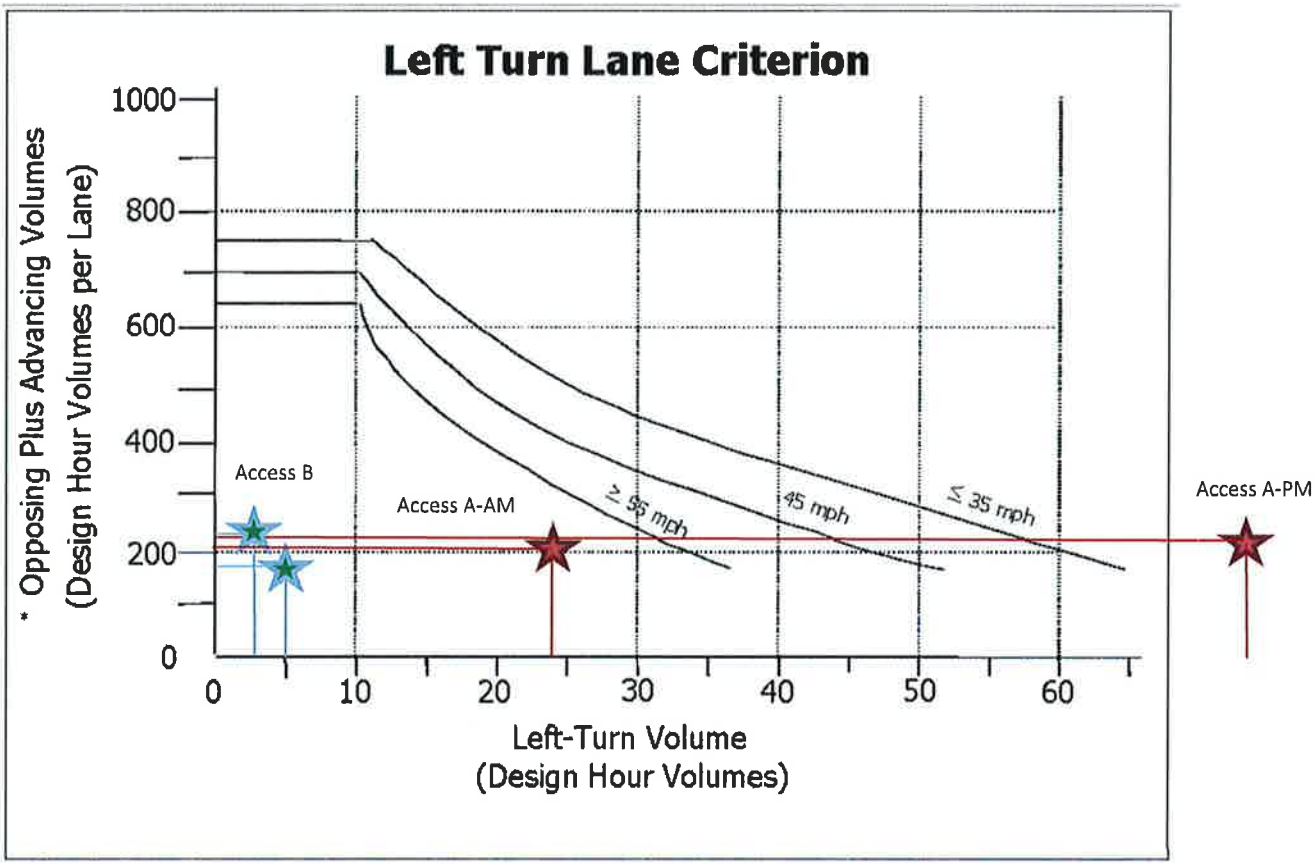
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	132	0	-	0	266	129
Stage 1	-	-	-	-	129	-
Stage 2	-	-	-	-	137	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1466	-	-	-	727	926
Stage 1	-	-	-	-	902	-
Stage 2	-	-	-	-	895	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1463	-	-	-	720	924
Mov Cap-2 Maneuver	-	-	-	-	720	-
Stage 1	-	-	-	-	896	-
Stage 2	-	-	-	-	893	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	9.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1463	-	-	-	777
HCM Lane V/C Ratio	0.005	-	-	-	0.011
HCM Control Delay (s)	7.5	0	-	-	9.7
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Appendix G Turn Lane Assessment

Appendix G: Turn Lane Assessment



*(Advancing Volume/Number of Advancing Through Lanes) + (Opposing Volume/Number of Opposing Through Lanes)
Opposing left turns are not counted as opposing volumes

Access	Scenario	Eastbound Left-Turn Volume	Opposing Plus Advancing Volumes	Meets Criteria?
A	Year 2024 Total Traffic, Weekday AM Peak Hour	24	211	No
	Year 2024 Total Traffic, Weekday PM Peak Hour	75	224	Yes
B	Year 2024 Total Traffic, Weekday AM Peak Hour	3	234	No
	Year 2024 Total Traffic, Weekday PM Peak Hour	5	180	No

PIONEER DESIGN GROUP, INC.
CIVIL • PLANNING • SURVEY • LANDSCAPE
P 503.643.8286 www.pd-grp.com
9020 SW Washington Square Rd Suite 170
Portland, Oregon 97223

October 7, 2019

Mr. Stacy Shetler, P.E.
County Engineer
Washington County
Department of Land Use and Transportation
1400 SW Walnut St., Ste 212, MS 17A
Hillsboro, Oregon 97123

RE: **The Reserve at Cedar Creek**
Design Exception Request for local street access to a County arterial road.

WASHINGTON COUNTY ROAD DESIGN AND CONSTRUCTION STANDARDS
REQUEST FOR EXCEPTION

The following is a request for exception as per Section 501.8.5.B.4 of the Washington County Community Development Code Standards.

Reason: The proposed development of tax lots 100 & 101 of tax map 3S1 06 is for a 59-lot subdivision (see attached site plan). The existing site is divided into a north section and a south section by Cedar Creek & associated 100-year flood plain, a large existing vegetated corridor and sensitive area (see attached CWS Amended SPL & site plans). The north portion of the site will have access from future streets stubbed to the west property line from an approved development to the adjacent property to the west. With the existing VC and other topographical constraints, the southern portion of the site can't gain access from these streets. The only way to develop this portion of the site is to access off of SW Brookman Road. As adding a collector or arterial street is impracticable for this dead-end public street, a local street is being proposed.

Comparison: The existing standard states that "*Direct access to arterial roads shall be from collector or other arterial streets. Exceptions for local streets and private accesses may be allowed through a Type II process when collector access is found to be unavailable and impracticable by the Director.*" We are proposing to access SW Brookman Road, a County Arterial road, with a new local street. As the land development is in the City of Sherwood while SW Brookman Road is under County jurisdiction, this design exception is being submitted to the County as part of the land use process to allow this local street connection.

Documentation: On the attached "Amended SPL" you will see that the southern portion of the site is precluded from access from anywhere except for SW Brookman Road. The SPL also identifies that the proposed site plan minimizes the incursion into the existing VC and that no other practicable alternative development patterns exist to avoid further disturbance. Also, a Traffic Impact Analysis was completed by Kittelson and Associates analyzing the intersection, which is noted as intersection "B". The T.I.A. clearly states that it is impracticable to cross Cedar Creek in this location from the north, and that there are no proposed north/south arterials or collectors proposed in this location along Brookman Road. The T.I.A. also states that the access location meets the Washington County Access Spacing standards (see attached TIA for documentation).

Public Safety: The proposed access location meets the Washington County Access spacing standards along an arterial street. The proposed intersection will meet the standards of the Washington County Road Design and Construction Standards. The design exception will not decrease the public safety of the intersection.

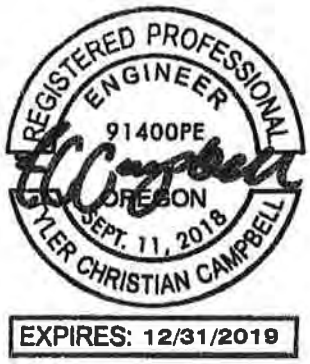
Performance: The design exception would have minimal to no effect on the operation and functionality of SW Brookman Road and the intersection with the new public street. The trip counts from the proposed 15 lots in the southern portion are shown in the T.I.A., and were found to have minimal effect on SW Brookman Road. No reduction in pavement widths or R.O.W. widths are requested, and intersection sight distance will be met per the County standards. The performance of the intersection will meet County standards.

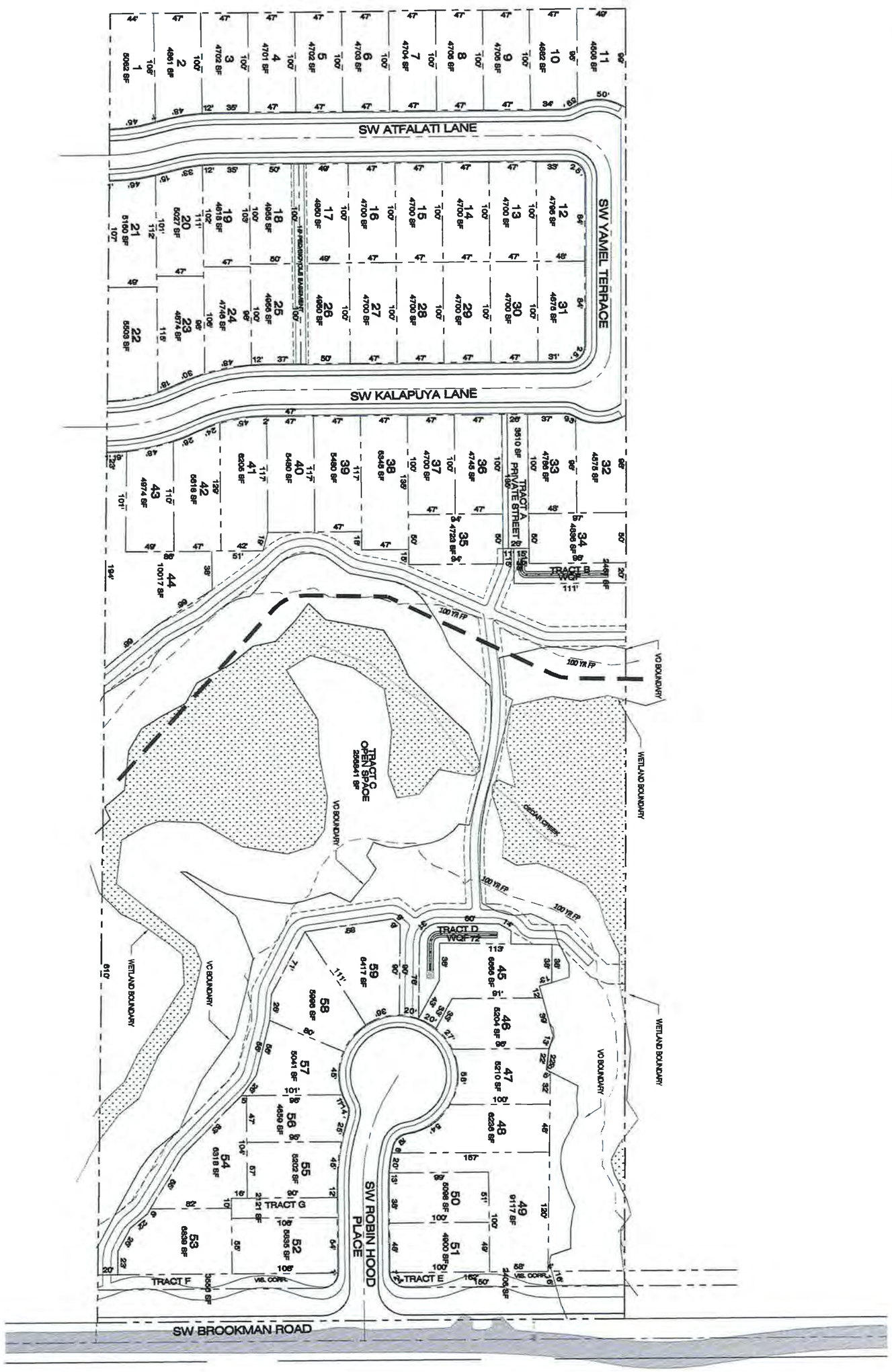
Exhibits: See attached Site Plan, Amended SPL, Traffic Impact Analysis.

Sincerely,
Pioneer Design Group, Inc.

Tyler Christian Campbell

T.C. Campbell, P.E.
Project Manager





Project No.	THE RESERVE AT CEDAR CREEK 359-003	Designed by	JLS Date 09/19
Type	PLANNING	Drawn by	JLS Date 09/19
Sheet	P3.0	Reviewed by	MLS Date 09/19
		Project No.	359-003 REF.
		Horiz. Scale:	1" = 50'
		Vert. Scale:	N/A

No.	Date	Revision	By

PRELIMINARY PLAT

THE RESERVE AT CEDAR CREEK
CITY OF SHERWOOD, OREGON

PIONEER DESIGN GROUP
CIVIL ENGINEERING • LAND USE PLANNING • LAND SURVEYING • LANDSCAPE ARCHITECTURE
9020 SW WASHINGTON SQUARE RD., SUITE 170 PORTLAND, OREGON 97223
p 503.643.8286 www.pd-pg.com

Clean Water Services
Our commitment is clear.

CWS File Number: 19-001036

AMENDED Service Provider Letter

This form and the attached conditions will serve as your Service Provider Letter in accordance with Clean Water Services Design and Construction Standards (R&O 19-5).

Jurisdiction:	City of Sherwood	**Review Type:**	Tier 2 Analysis
		SPL Original Date:	April 16, 2019
Site Address / Location:	17045 & 17117 SW Brookman RD Sherwood, OR 97140	**SPL Amendment Date:**	September 17, 2019
		SPL Expiration Date:	September 16, 2021

Applicant Information:		**Owner Information:**	
Name	MIKE IRWIN	Name	JACK DALTON
Company	WEEKLEY HOMES, LLC	Company	ENVIRONMENTAL SCIENCE & ASSESS
Address	1930 THOREAU DR SUITE 160 SCHEUMBURG IL 60173	Address	107 SE WASHINGTON ST SUITE 249 PORTLAND OR 97214
Phone/Fax		Phone/Fax	(503) 478-0424
E-mail:	mirwin@dwmoes.com	E-mail:	jack@esapdx.com

Tax lot ID	**Development Activity**
3S1060000100, 101	DW Homes – Brookman Subdivision

Pre-Development Site Conditions:		**Post Development Site Conditions:**	
Sensitive Area Present:	[X] On-Site [X] Off-Site	Sensitive Area Present:	[X] On-Site [X] Off-Site
Vegetated Corridor Width:	Variable	Vegetated Corridor Width:	Variable
Vegetated Corridor Condition:	Good/Marginal/Degraded		

Enhancement of Remaining Vegetated Corridor Required: [X]

Square Footage to be enhanced: 122,690

Encroachments into Pre-Development Vegetated Corridor:

Type and location of Encroachment:	Square Footage:
Lots, Road (Permanent Encroachment; Mitigation Required)	7,041

Mitigation Requirements:

Type/Location	Sq. Ft./Ratio/Cost
On-site VC Replacement	4,157/2.4:1
Per R&O 13-12, VC Encroachment Requirements Associated with Wetland Mitigation Bank Credits are Waived	5,327

[X] Conditions Attached [X] Development Figures Attached (2) [ ] Planting Plan Attached [ ] Geotech Report Required

This Service Provider Letter does NOT eliminate the need to evaluate and protect water quality sensitive areas if they are subsequently discovered on your property.

ALTERNATIVES ANALYSIS

1. **The proposed encroachment area is mitigated in accordance with Section 3.08.**
   The proposed site plan will impact Vegetated Corridors due to roadway and lot development. The VC impacts totaling 1,714 square feet in the south portion of the site will be mitigated on site within the large open space tract. The on-site mitigation totals 4,157 square feet, which includes enhancement of several degraded areas north of the creek and two areas of good condition habitat where invasive species removal will occur. Mitigation for impacts to the isolated Wetland A (4,208 sf) and 25-foot VC totaling 5,327 square feet will be mitigated through the purchase of wetland mitigation bank credits.

2. **The replacement mitigation protects the functions and values of the Vegetated Corridor and Sensitive Area.**
   VC functions impacted by trail encroachment and road encroachment will be offset with VC mitigation areas along the Cedar Creek corridor totaling greater acreage than the impact acreage. VC functions lost with the elimination of Wetland A in north end will be provided by the purchase of wetland mitigation bank credits. The mitigation bank credits will offset the lost wetland functions, which are minimal for this wetland. Elimination of the Wetland A and associated VC will not greatly impact the existing function of the local watershed, since the wetland is currently isolated from any surrounding wetland or waters by the existing subdivision to the north.

3. **Enhancement of the replacement area, if not already in Good Corridor Condition, and either the remaining Vegetated Corridor on the site or the first 50 feet of width closest to the resource.**
   A total of 54,172 square feet of existing VC (Degraded and Marginal Condition) will be enhanced along the sensitive areas in the north and south end along the Cedar Creek corridor to district standards. Good condition corridor totaling 68,518 square feet will have invasive species removal only. The Marginal VC outside of the first 50 feet (731 sf) is also included in the enhancement area to maximize the ecological benefit to the sensitive areas in south end where the highest invasive cover is currently present.

4. **A District Stormwater Connection Permit is likely to be issued based on proposed plans.**
   The project engineer has submitted a preliminary storm drainage report with the land use application to the City of Sherwood. Upon acceptance of the Tier 2, construction plans with the proposed storm water treatment plan will be submitted with the goal to achieve a Stormwater Connection Permit.

5. **Location of development and site planning minimizes incursion into the Vegetated Corridor.**
   The preferred site plan minimizes VC encroachment by clustering the lot development to the north and south end of the site and reducing the lot sizes. The preferred site plan maximizes the open space area in the middle of the site and maintains a direct connection to off-site habitat east and west of the site. The only wetland impacts are of the small isolated Wetland A in north end that is already cut off from the surrounding watershed. The VC functions associated with Wetland A lost by removal will not be significant to the watershed since the wetland is already cut off from the downstream watershed.

6. **No practicable alternative to location of the development exists that will not disturb the Sensitive Area or Vegetated Corridor.**
   The preferred alternative clusters development and avoids all impacts to the Cedar Creek wetlands and floodplain in the middle of site. This plan results in unavoidable impacts to Wetland A in north end of the site with the development of Lots 1 and 2, with direct wetland impacts (4,208 sf) and CWS VC totaling 5,327 square feet (4,674 sf on-site/ 653 sf off-site). The site plan alternatives that attempted to avoid direct impact to Wetland A were found to be unfeasible since they either resulted in greater wetland impacts in another part of site or result in indirect impacts to the wetland by cutting off source hydrology to the wetland. Unavoidable loss of Wetland A hydrology will result in any alternative, even if not impacted directly, since the adjacent subdivision to the west and the required on-site storm system will eliminate source hydrology to the wetland regardless. This plan also minimizes trail and frontage

improvements as much as possible. The trail in southeast end of the site is terminated at the edge of Good condition VC avoiding 369 square feet of previously proposed impact. The Brookman frontage improvements minimize impacts by using a 3-lane half street design standard instead of a 5-lane standard.

7. **The proposed encroachment provides public benefits.**
The site plan provides a 4,157 square foot mitigation area within an approximately 2.5-acre open space in the central and southeast portions of the site. The mitigation for trail and road improvement impacts provides a 2.4:1 mitigation area to impact area and will preserve the hydrologic functions of the Cedar Creek wetland and floodplain in the large open space area beyond the base VC setback in the middle of the site. Marginal VC outside of the first 50 feet (731 sf) is also included in the enhancement area to maximize the ecological benefit to sensitive areas where invasive cover is highest. The large contiguous open space area in the middle and southeast end of site will provide water quality public benefit to serve the surrounding Cedar Creek and downstream Tualatin River watershed. Wetland and VC functions lost with the elimination of Wetland A in north end will be replaced by the purchase of wetland mitigation bank credits and CWS PTP. The mitigation bank credits will offset the lost wetland functions, which are minimal for this wetland, by providing off-site benefits within a wetland mitigation bank.

In order to comply with Clean Water Services water quality protection requirements the project must comply with the following conditions:

1. No structures, development, construction activities, gardens, lawns, application of chemicals, uncontained areas of hazardous materials as defined by Oregon Department of Environmental Quality, pet wastes, dumping of materials of any kind, or other activities shall be permitted within the sensitive area or Vegetated Corridor which may negatively impact water quality, except those allowed in R&O 17-5, Chapter 3.
2. Prior to any site clearing, grading or construction the Vegetated Corridor and water quality sensitive areas shall be surveyed, staked, and temporarily fenced per approved plan. During construction the Vegetated Corridor shall remain fenced and undisturbed except as allowed by R&O 17-5, Section 3.06.1 and per approved plans.
3. **Prior to any activity within the sensitive area, the applicant shall gain authorization for the project from the Oregon Department of State Lands (DSL) and US Army Corps of Engineers (USACE). The applicant shall provide Clean Water Services or its designee (appropriate city) with copies of all DSL and USACE project authorization permits.**
4. An approved Oregon Department of Forestry Notification is required for one or more trees harvested for sale, trade, or barter, on any non-federal lands within the State of Oregon.
5. Prior to ground disturbing activities, an erosion control permit is required. Appropriate Best Management Practices (BMP's) for Erosion Control, in accordance with Clean Water Services' Erosion Prevention and Sediment Control Planning and Design Manual, shall be used prior to, during, and following earth disturbing activities.
6. Prior to construction, a Stormwater Connection Permit from Clean Water Services or its designee is required pursuant to Ordinance 27, Section 4.B.
7. Activities located within the 100-year floodplain shall comply with R&O 17-5, Section 5.10.
8. Removal of native, woody vegetation shall be limited to the greatest extent practicable.
9. The water quality swale and detention pond shall be planted with Clean Water Services approved native species, and designed to blend into the natural surroundings.
10. **Should final development plans differ significantly from those submitted for review by Clean Water Services, the applicant shall provide updated drawings, and if necessary, obtain a revised Service Provider Letter.**

11. The Vegetated Corridor width for sensitive areas within the project site shall be a minimum of 50 feet wide, as measured horizontally from the delineated boundary of the sensitive area.
12. For Vegetated Corridors that extend 35 feet from the break in slope, the width of Vegetated Corridors may be reduced to 15 feet wide if a stamped geotechnical report confirms that slope stability can be maintained with the reduced setback from the break in slope.
13. **For Vegetated Corridors greater than 50 feet in width, the applicant shall enhance the first 50 feet closest to the sensitive area to meet or exceed good corridor condition as defined in R&O 17-5, Section 3.14.2, Table 3-3.**
14. **For Vegetated Corridors up to 50 feet wide, the applicant shall enhance the entire Vegetated Corridor to meet or exceed good corridor condition as defined in R&O 17-5, Section 3.14.2, Table 3-3.**
15. Removal of invasive non-native species by hand is required in all Vegetated Corridors rated ""good."" Replanting is required in any cleared areas larger than 25 square feet using low impact methods. The applicant shall calculate all cleared areas larger than 25 square feet prior to the preparation of the required Vegetated Corridor enhancement/restoration plan.
16. Prior to any site clearing, grading or construction, the applicant shall provide Clean Water Services with a Vegetated Corridor enhancement/restoration plan. Enhancement/restoration of the Vegetated Corridor shall be provided in accordance with R&O 17-5, Appendix A, and shall include planting specifications for all Vegetated Corridor, including any cleared areas larger than 25 square feet in Vegetated Corridor rated ""good.""
17. Prior to installation of plant materials, all invasive vegetation within the Vegetated Corridor shall be removed per methods described in Clean Water Services' Integrated Vegetation and Animal Management Guidance, 2003. During removal of invasive vegetation care shall be taken to minimize impacts to existing native tree and shrub species.
18. Clean Water Services shall be notified 72 hours prior to the start and completion of enhancement/restoration activities. Enhancement/restoration activities shall comply with the guidelines provided in Planting Requirements (R&0 17-5, Appendix A).
19. **Maintenance and monitoring requirements shall comply with R&O 17-5, Section 2.12.2. If at any time during the warranty period the landscaping falls below the 80% survival level, the owner shall reinstall all deficient planting at the next appropriate planting opportunity and the two year maintenance period shall begin again from the date of replanting.**
20. **Performance assurances for the Vegetated Corridor shall comply with R&O 17-5, Section 2.07.2, Table 2-1 and Section 2.11, Table 2-2.**
21. **For any developments which create multiple parcels or lots intended for separate ownership, Clean Water Services shall require that the sensitive area and Vegetated Corridor be contained in a separate tract and subject to a ""STORM SEWER, SURFACE WATER, DRAINAGE AND DETENTION EASEMENT OVER ITS ENTIRETY"" to be granted to the City or Clean Water Services.**
22. **Final construction plans shall include landscape plans**. In the details section of the plans, a description of the methods for removal and control of exotic species, location, distribution, condition and size of plantings, existing plants and trees to be preserved, and installation methods for plant materials is required. Plantings shall be tagged for dormant season identification and shall remain on plant material after planting for monitoring purposes.
23. **A Maintenance Plan shall be included on final plans** including methods, responsible party contact information, and dates (minimum two times per year, by June 1 and September 30).
24. **Final construction plans shall clearly depict the location and dimensions of the sensitive area and the Vegetated Corridor** (indicating good, marginal, or degraded condition). Sensitive area boundaries shall be marked in the field.
25. Protection of the Vegetated Corridors and associated sensitive areas shall be provided by the installation of permanent fencing and signage between the development and the outer limits of

the Vegetated Corridors. **Fencing and signage details to be included on final construction plans.**

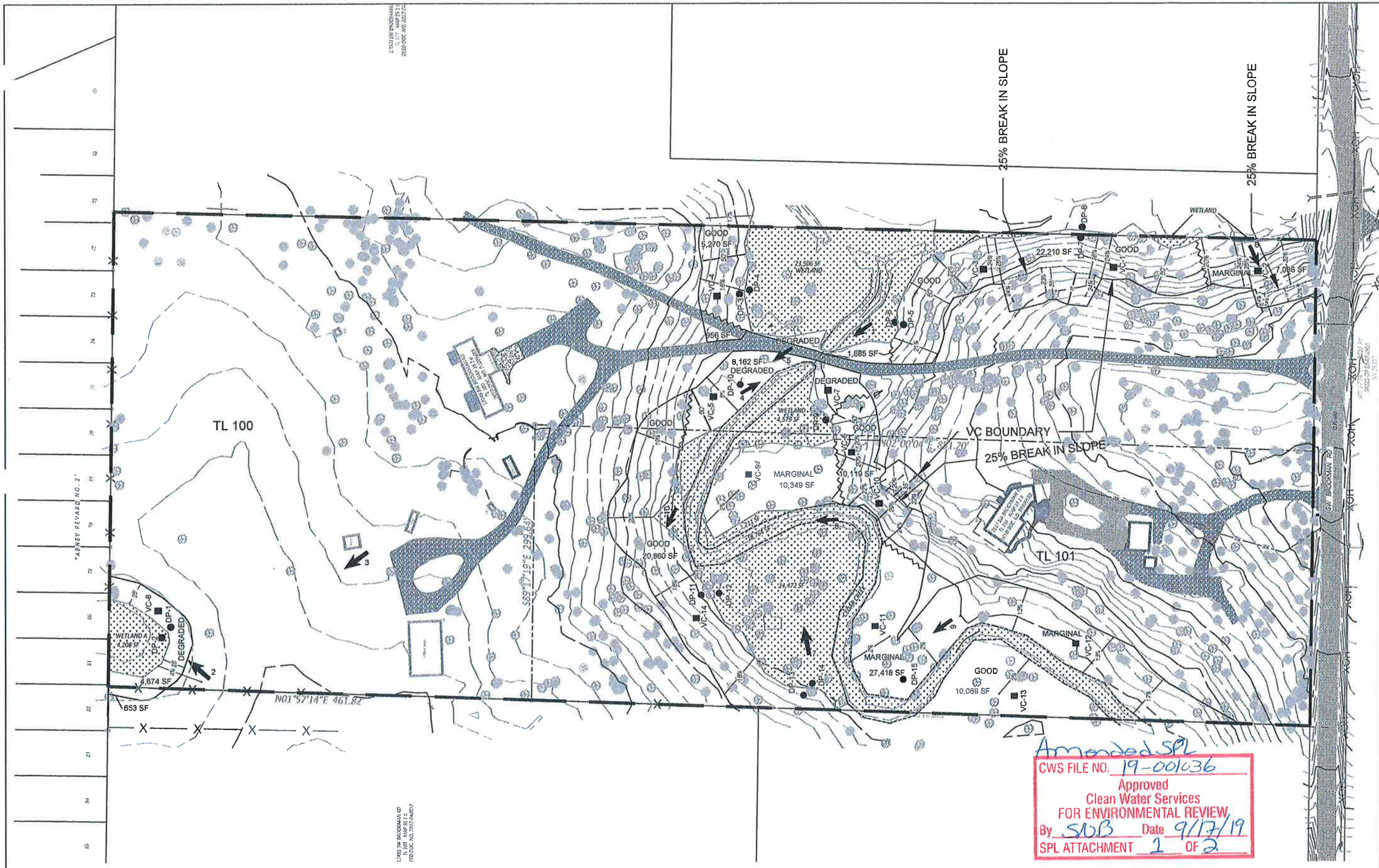
This Service Provider Letter is not valid unless CWS-approved site plan is attached.

Please call (503) 681-3667 with any questions.

Stacy Benjamin

Stacy Benjamin
Environmental Plan Review

Attachments (2)



Vegetated Corridor: 129, 731 SF

Degraded: 16,330 SF
Marginal: 44,853 SF
Good: 68,548 SF

● Wetland Data Plot
■ VC Data Plot
1 ➔ Photo Point
Sensitive Areas: 76,749 SF

N

1" = 100'
0 50 100

Amended SPL
CWS FILE NO. 19-001036
Approved
Clean Water Services
FOR ENVIRONMENTAL REVIEW
By SUB Date 9/17/19
SPL ATTACHMENT 1 OF 2

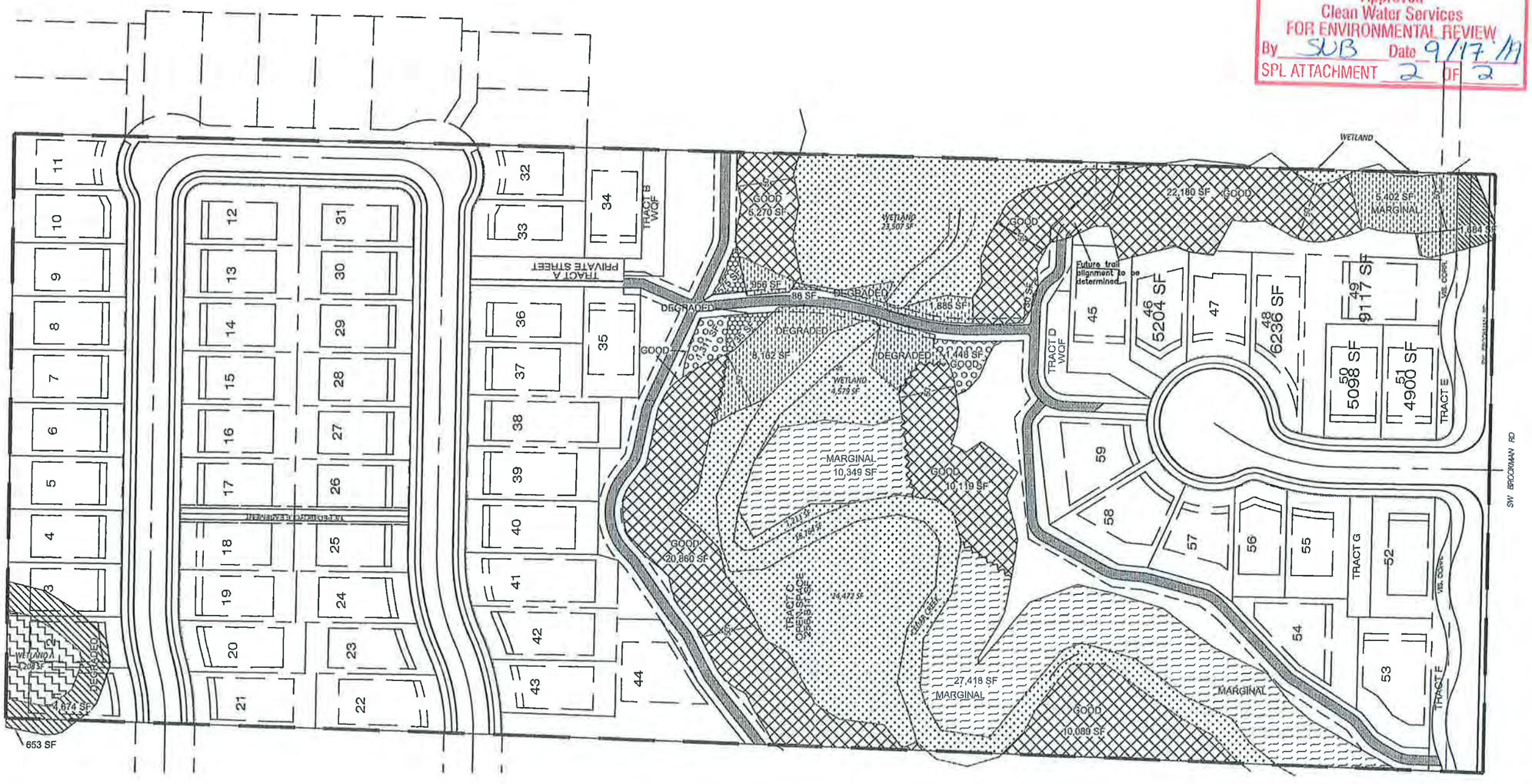
Environmental Science & Assessment, LLC
107 SE Washington St., Suite 249
Portland, OR 97214
Phone: 503.478.0424
www.esapdx.com

Existing Conditions Map
DW Homes - Brookman
Sherwood, Oregon

Base Map Source:	Pioneer Design Group
Modified By:	KR
Date:	3/2019
Job:	18032
Rev:	8/2019

Figure 3

Amended SPL
CWS FILE NO. 19-001036
Approved
Clean Water Services
FOR ENVIRONMENTAL REVIEW
By SUB Date 9/17/19
SPL ATTACHMENT 2 OF 2



Wetland A Impacts: 4,208 SF	
VC Permanent Impacts: 7,041 SF (5,327 SF & 1,714 SF)	
Total VC Mitigation: 9,484 SF	
Onsite Mitigation 4,157 SF; (2.4:1 Ratio)	
PTP Mitigation: 5,327 SF	

Vegetated Corridor: 126,847 SF

VC Mitigation: 4,157 SF (onsite)

- Good: 2,759 SF — No plantings, Invasive Removal
- Degraded: 1,398 SF — Trees 14 & Shrubs 70

VC Enhancement: 122,690 SF

- Degraded/Marginal 16,405 SF — Trees 164 & Shrubs 820
- Marginal 37,767 SF — Trees 227 & Shrubs 1,888
- Good Condition: 68,518 SF — No plantings, Invasive Removal

Environmental Science & Assessment, LLC
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Portland, OR 97214
Phone: 503.478.0424
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Site Plan
DW Homes - Brookman
Sherwood, Oregon

Base Map Source:	Pioneer Design Group
Modified By:	KR
Date:	3/2019
Job:	18032
Rev:	8/2019

Figure 4

KITTELSON & ASSOCIATES
851 SW 6th AVENUE, SUITE 600
PORTLAND, OR 97204
P 503.228.5230 F 503.273.8169

September 19, 2019 Project #: 24316

Bob Galati, PE
City of Sherwood
22560 SW Pine Street
Sherwood, OR 97140

RE: The Reserve at Cedar Creek Transportation Impact Analysis – Sherwood, Oregon

Dear Bob:

This letter presents the transportation impact analysis prepared for The Reserve at Cedar Creek project. This study concludes that the proposed residential subdivision can be developed in accordance with traffic operations requirements of the City of Sherwood Municipal Code as well as applicable Washington County and Oregon Department of Transportation (ODOT) mobility targets assuming provision of recommended transportation mitigation measures.

Four off-site study intersections were identified that require mitigation to comply with applicable agency requirements in the future. These mitigation measures are not triggered by the proposed development but rather by growth in regional traffic. As discussed herein, the proposed homes have an incremental additional traffic impact at each of the four intersections. The recommended mitigation associated with The Reserve development is:

- With site development and subject to City review, pay a proportionate share contribution (estimated to be $106,947 in total) towards future improvements at the following intersections:
  - SW Sunset Boulevard/SW Woodhaven Drive (study intersection #2): $19,849 toward the construction of a planned future traffic signal;
  - SW Sunset Boulevard/SW Timbrel Lane (study intersection #3): $14,858 toward the construction of a planned future mini-roundabout;
  - SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard (study intersection #4): $17,025 toward the construction of a planned future traffic signal; and
  - SW Baker Road-SW Murdock Road/SW Sunset Boulevard (study intersection #5): $55,215 toward the construction of planned future north and southbound turn lanes.

In addition to the proportional share mitigation payments listed above, trips from the proposed homes were found to trigger the need for providing an eastbound left-turn lane on SW Brookman Road at the west site access (shared access to the previously approved Middlebrook Residential Subdivision, Reference 1). SW Brookman Road is planned to have a center left-turn lane at its ultimate configuration; however, widening and tapers needed to provide the eastbound left-turn lane in conjunction with site development require off-site property acquisition that may not be possible. Accordingly, it is

recommended the Applicant coordinate with City of Sherwood and Washington County staff to assess the potential for constructing an eastbound left-turn lane at the west access with site development and/or to pay a fee-in-lieu of the turn lane construction (with the fee intended to be used to construct the turn lane in conjunction with a future public road project).

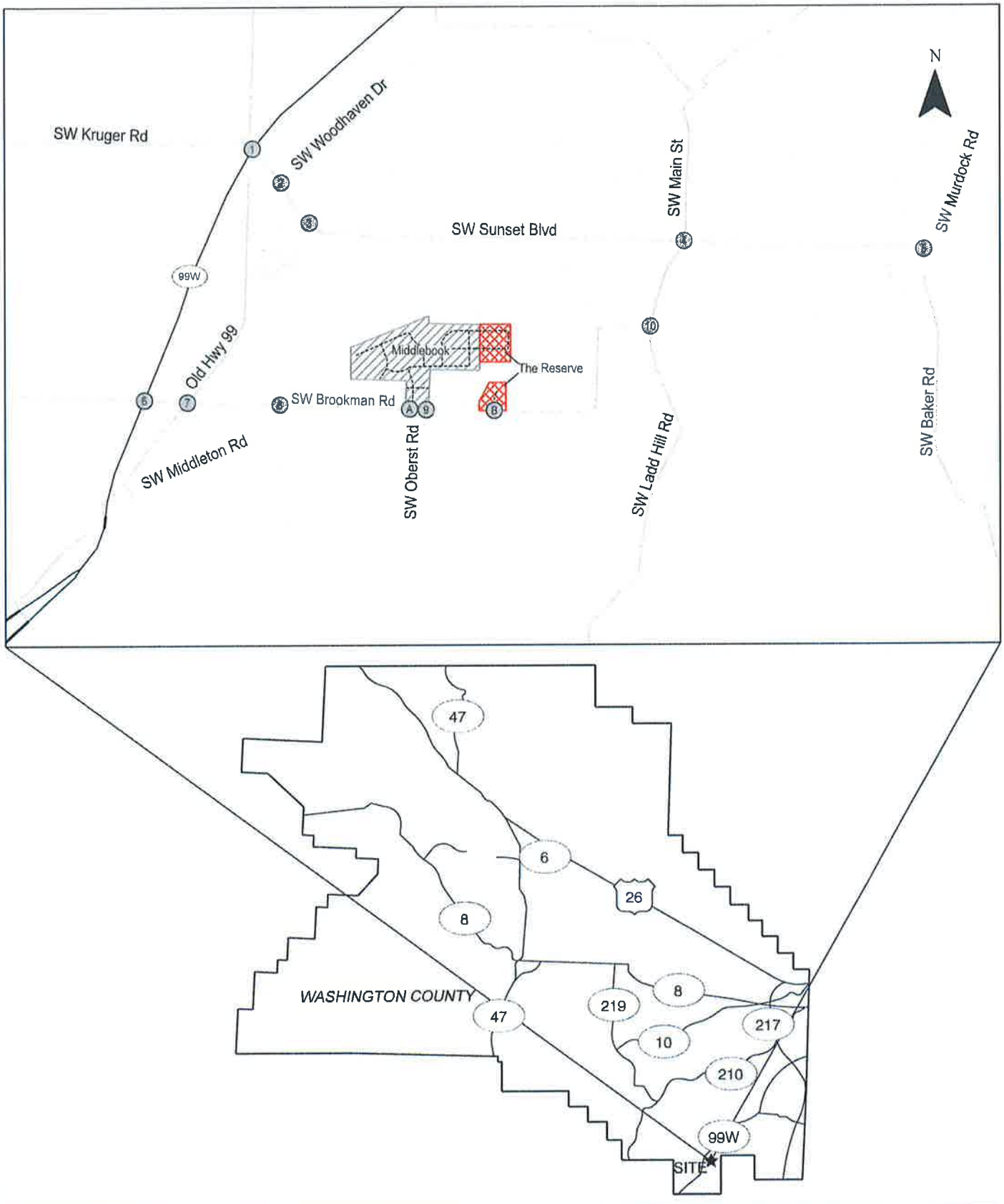
Additional details of the study methodology, findings, and recommendations are provided herein.

INTRODUCTION

The Applicant, David Weekley Homes, is proposing to develop up to 59 detached single-family homes within a residential subdivision on land located along the north side of SW Brookman Road that is within the City limits. The site vicinity is shown in Figure 1 and a conceptual site plan is provided in Figure 2.

The site is separated by Cedar Creek with 44 homes located north of the creek and 15 homes to the south. Access to the 44 homes on the northern portion of the site would be provided via new public roadway connections to the recently approved Middlebrook Residential Subdivision located to the west of the proposed homes. These connections will provide the proposed development with access to a planned new public roadway connection to SW Brookman Road through Middlebrook (see Intersection A in Figure 1). Access to the southern 15 homes is proposed at a new public street connection to SW Brookman Road (Intersection B in Figure 1). This new connection will have a cul-de-sac on the north end of the street due to the inability to feasibly cross Cedar Creek at this location.

Construction is expected to begin in 2021 (after completion of the approved Middlebrook Residential Subdivision) with buildout and occupancy anticipated by 2024.



Site Vicinity Map
Sherwood, Oregon

Figure
1

●## - Study Intersections

KITTELSON & ASSOCIATES

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Site Plan provided by PDG, dated August 15, 2019.

Proposed Site Plan
Sherwood, Oregon

Figure
2

STUDY METHODOLOGY

The Traffic Impact Analysis (TIA) addresses the requirements of City of Sherwood Municipal Code Section 16.106.080 as well as applicable Washington County and ODOT review requirements. The study methodology, assumptions and scope were determined based on a review of existing travel patterns, the City of Sherwood's Development Code and direction provided by DKS Associates (the City's traffic engineer). The study intersections and requirements are the same as was required for the recently approved Middlebrook Residential Subdivision.

Analysis Scenarios

Weekday AM and PM peak hour traffic conditions were assessed for the following analysis scenarios:

- Existing conditions
- Year 2024 background conditions (without the proposed homes)
- Year 2024 total conditions (with buildout of the proposed homes)

Study Intersections

City of Sherwood Municipal Code Section 16.106.080 requires analysis of all intersections where fifty (50) or more peak hour vehicle trips can be expected to result from the development. The intersections included in this study are identical to the Middlebrook Subdivision study for consistency; however, only the proposed shared site driveway on SW Brookman Road is projected to experience 50 or more peak hour vehicle trips.

The study intersections are listed below, including a numerical ID corresponding with report figures:

1. Highway 99W/SW Elwert Road-SW Sunset Boulevard
2. SW Woodhaven Drive/SW Sunset Boulevard
3. SW Timbrel Lane/SW Sunset Boulevard
4. SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard
5. SW Baker Road-SW Murdock Road/SW Sunset Boulevard
6. Highway 99W/SW Brookman Road-SW Chapman Road
7. Old Highway 99 W/SW Brookman Road
8. SW Middleton Road/SW Brookman Road
9. SW Oberst Road/SW Brookman Road
10. SW Ladd Hill Road/SW Brookman Road

A. Middlebrook Subdivision Access-Future Shared Northern Site Access/SW Brookman Road

B. Future Southern Site Access/SW Brookman Road

All level-of-service analyses described in this report were performed in accordance with the procedures stated in the *Highway Capacity Manual* (HCM). The 6th Edition of the HCM (Reference 2) was used to assess unsignalized[1] study intersection operations while the 2000 Edition of the HCM (Reference 3) was used to assess signalized intersection performance. The operational analysis presented in this report was competed using Synchro software.

Performance Measures & Operating Standards

The volume-to-capacity (V/C) ratio is the principle performance measure documented in this report. V/C operating standards adopted by Washington County, ODOT and the City are summarized below.

Washington County Operating Standards

Washington County has jurisdiction over SW Brookman Road. The County has defined operating standards for signalized and stop controlled intersections assuming a peak hour (60-minute analysis) period as follows:

- **Signalized intersections:** the maximum peak hour intersection V/C ratio shall be no greater than 0.99.
- **Unsignalized intersections:** no movement shall experience a V/C ratio greater than 0.99.

ODOT Mobility Targets

ODOT operates and maintains Highway 99W (Pacific Highway West). ODOT's operating mobility target for signalized intersections along Highway 99W in the study area is an intersection V/C ratio no greater than 0.99 during the peak 15-minutes per Table 7 of the *Oregon Highway Plan* (Reference 4). For unsignalized intersections, the target for the state highway approaches is a V/C ratio no greater than 0.99 during the peak 15-minutes. Non-state highway approaches are expected to operate at a V/C ratio no greater than identified in Table 6 of the *Oregon Highway Plan* for district/local interest roads. The target for the Brookman Road and Chapman Road approaches to Highway 99W is a V/C ratio no greater than 0.95.

Sherwood Operating Standards

The City defers to ODOT and Washington County standards for facilities under their jurisdiction. For intersections in the City but on the Metro-designated Arterial and Throughway Network, the applicable standard is a V/C ratio less than or equal to 0.99 in both the highest hour and the second hour during the PM peak period. Roadways on the Arterial and Throughway Network include SW Sunset Boulevard, SW Murdock Road, SW Elwert Road, SW Main Street, and SW Ladd Hill Road (*City of Sherwood Transportation System Plan,* Reference 5). Table 1 summarizes the minimum operating thresholds by study intersection.

[1] HCM 2000 procedures were used to assess intersection operations under existing conditions. The existing conditions analysis for this study are reported directly from the Middlebrook Subdivision traffic study (Reference 1).

Table 1: Study Intersection Performance Standard

	Intersection	Traffic Control	Responsible Agency	Performance Standard
1	Highway 99W/ SW Elwert Road-SW Sunset Boulevard	Signal	ODOT	Intersection V/C ≤ 0.99
2	SW Woodhaven Drive/ SW Sunset Boulevard	TWSC	City	Movement V/C ≤ 0.99[1]
3	SW Timbrel Lane/SW Sunset Boulevard	TWSC	City	Movement V/C ≤ 0.99[1]
4	SW Ladd Hill Road-SW Main Street/ SW Sunset Boulevard	AWSC	City	Movement V/C ≤ 0.99[1]
5	SW Baker Road-SW Murdock Road/ SW Sunset Boulevard	AWSC	City	Movement V/C ≤ 0.99[1]
6	Highway 99W/SW Brookman Road-SW Chapman Road	TWSC	ODOT	Movement V/C ≤ 0.99 for Highway 99W approaches, movement V/C ≤ 0.95 for SW Brookman Road and SW Chapman Road
7	Old Highway 99 W/SW Brookman Road	TWSC	County	Movement V/C ≤ 0.99
8	SW Middleton Road/SW Brookman Road	TWSC	County	Movement V/C ≤ 0.99
9	SW Oberst Rd/SW Brookman Road	TWSC	County	Movement V/C ≤ 0.99
10	SW Ladd Hill Road/SW Brookman Road	TWSC	County	Movement V/C ≤ 0.99[1]
A	Middlebrook Access-Future Northern Site Shared Access/SW Brookman Road	TWSC (Proposed)	County	Movement V/C ≤ 0.99
B	Future Southern Site Access/ SW Brookman Road	TWSC (Proposed)	County	Movement V/C ≤ 0.99

[1]These roadways are located on the Arterial and Throughway Network (Metro Designation,)
TWSC = Two-way stop-control, AWSC = All-way stop-control

Turn Lane Warrants

Left-turn lane needs along SW Brookman Road were assessed using turn lane warrants contained in the *ODOT Analysis Procedures Manual* (*APM*, Reference 6). Washington County policy's is to require a right-turn deceleration lane on roadways with a daily traffic volume greater than 10,000 and with a posted speed of 35 miles per hour (mph) or more in situations where the inbound right-turn movement exceeds 40 vehicles during the AM or PM peak hour.

REPORT FORMAT

This report addresses the following transportation issues:

- Existing land use and transportation system conditions within the site vicinity;
- Planned developments and transportation improvements in the study area;
- Forecast year 2024 background peak hour traffic conditions (prior to site development);
- Site trip generation and trip distribution estimates;
- Forecast year 2024 total traffic peak hour conditions (with site development);
- Turn lane and vehicle queuing needs at key study area intersections;
- Site access compliance with Washington County access management requirements; and
- Conclusions and recommendations.

EXISTING CONDITIONS

The existing conditions analysis identifies site conditions and the current operational and geometric characteristics of roadways within the study area. The purpose of this section is to set the stage for a basis of comparison to future conditions.

Site Conditions and Adjacent Land Uses

Today, the parcels comprising the site include a combination of properties occupied by two single-family homes with private driveway access to SW Brookman Road.

The site is bordered primarily by undeveloped lands and single family subdivisions. Cedar Creek bisects the property today.

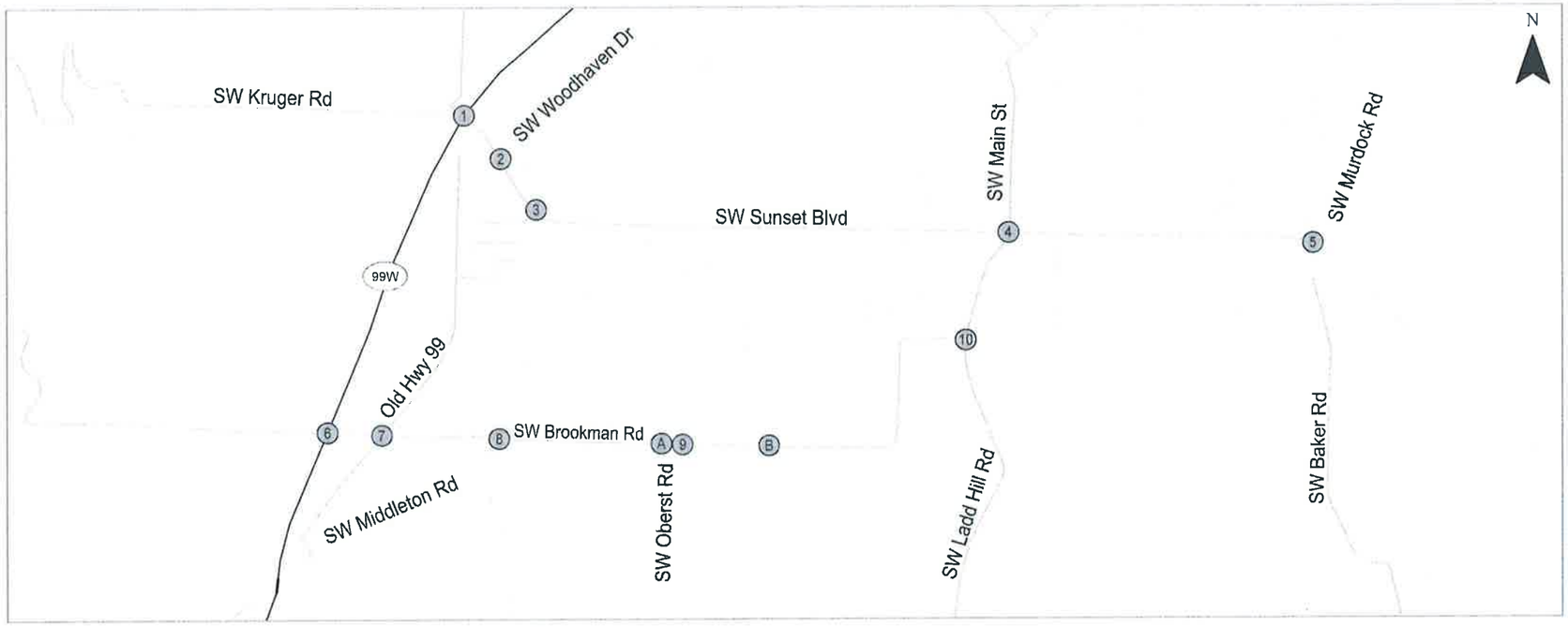
Transportation Facilities

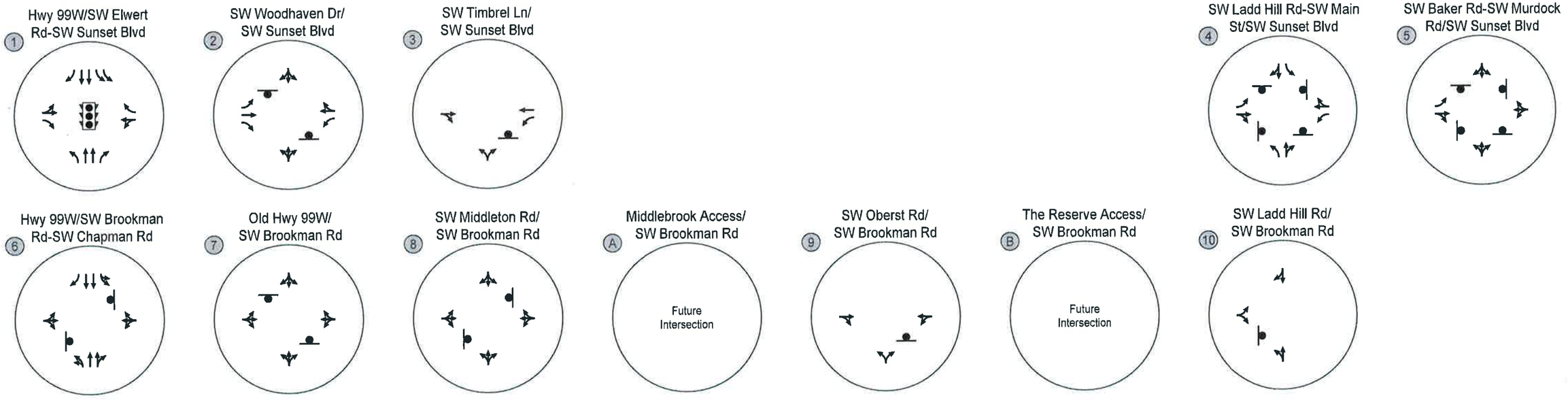
Table 2 provides a summary of transportation facilities (including pedestrian and bicycle facilities) in the site vicinity while Figure 3 illustrates the existing lane configurations and traffic control devices at the study intersections.

Table 2: Existing Transportation Facilities

Roadway	Classification[1]	Jurisdiction	Vehicle Lanes	Posted Speed	Sidewalks Present?	Bike Lanes Present?	On-Street Parking Allowed?
SW Pacific Highway 99W	Principal Arterial	ODOT	4 lanes	45-55 mph[2]	No	Yes	No
SW Sunset Boulevard	Arterial	City	2 lanes	35 mph	Yes	Yes	No
SW Woodhaven Drive	Neighborhood[3]	City	2 lanes	25 mph	Partial[4]	No	Yes
SW Timbrel Lane	Collector	City	2 lanes	Unposted	Yes	No	No
SW Main Street	Arterial	City	2 lanes	20 mph	Yes	No	No
SW Ladd Hill Road	Arterial	City	2 lanes	25 mph	Yes	Partial[5]	No
SW Murdock Road	Arterial	City	2 lanes	35 mph	Partial[6]	No	No
SW Baker Road	Arterial	City	2 lanes	35 mph	Partial[7]	No	No
SW Brookman Road	Arterial	County	2 lanes	35 mph	No	No	No
Old Highway 99W	Collector	City	2 lanes	35 mph	No	No	No
SW Middleton Road	Neighborhood[8]	City	2 lanes	Unposted	No	No	No
SW Oberst Road	Local	City	2 lanes	Unposted	No	No	No

[1]Source: *City of Sherwood Transportation System Plan.*
[2]The speed limit on SW Pacific Highway 99W changes between SW Sunset Boulevard and SW Brookman Road. The posted speed is 45 miles per hour at the intersection of SW Sunset Boulevard and 55 miles per hour at the intersection of SW Brookman Road.
[3]SW Woodhaven Drive is classified as a neighborhood roadway north of SW Sunset Boulevard. It is designated a local street to the south.
[4]There is a gap in sidewalk on the north side of SW Woodhaven Drive between SW Sunset Boulevard and SW Fitch Drive.
[5]There are bike lanes on SW Ladd Hill Road between SW Willow Drive and SW Sunset Boulevard.
[6]There are sidewalks on the west side of SW Murdock Road.
[7]There are sidewalks on the west side of SW Baker Road.
[8]SW Middleton Road is classified as a neighborhood roadway north of SW Brookman Road. It is designated a local street to the south.





- STOP SIGN
- TRAFFIC SIGNAL

Existing Lane Configurations and Traffic Control Devices
Sherwood, Oregon

Figure 3

KITTELSON & ASSOCIATES

Pedestrian and Bicycle Facilities

Table 2 highlights pedestrian and bicycle facilities available in the larger area surrounding the site. There are no sidewalks or bicycle lanes provided along SW Brookman Road serving the site today, though the proposed development and the previously approved Middlebrook Residential Subdivision will provide frontage improvements.

Transit Facilities

Transit service in Sherwood is currently provided by TriMet; however, there is no scheduled fixed route service in walking or cycling distance of the site nor along SW Brookman Road or Highway 99W.. The closest fixed route transit service is currently available at the Sherwood Park and Ride located in the downtown area north of SW Sunset Boulevard (Reference 7).

TRAFFIC SAFETY

Crash history was reviewed for the study intersections in an effort to identify potential intersection safety issues. Crash data for the study intersections were obtained from ODOT for the five-year period from January 1, 2013 through December 31, 2017. Table 3 illustrates the crashes reported at the study intersections. *Appendix A* contains the ODOT crash data.

Table 3: Intersection Crash History (January 1, 2013 through December 31, 2017)

Location		Collision Type						Severity		Total
		Rear-end	Turning	Angle	Backing	Bicyclist	Fixed Object	PDO[1]	Injury	
1	Highway 99W/SW Elwert Road-SW Sunset Boulevard	22	6	1	0	0	0	15	14	29
2	SW Woodhaven Drive/SW Sunset Boulevard	1	1	0	0	0	0	2	0	2
3	SW Timbrel Lane/SW Sunset Boulevard	0	0	0	0	0	0	0	0	0
4	SW Ladd Hill Rd.-SW Main St./SW Sunset Boulevard	2	2	1	0	0	1	3	3	6
5	SW Baker Road-SW Murdock Road/SW Sunset Boulevard	2	0	0	0	0	0	1	1	2
6	Highway 99W/SW Brookman Road-SW Chapman Road	1	7	9	0	0	0	12	5	17
7	Old Highway 99 W/SW Brookman Road	0	0	0	0	0	0	0	0	0
8	SW Middleton Road/SW Brookman Road	0	0	0	0	1	0	0	1	1
9	SW Oberst Road/SW Brookman Road	0	0	0	0	0	0	0	0	0
10	SW Ladd Hill Road/SW Brookman Road	0	0	0	0	0	0	0	0	0
A	Middlebrook Access-Future Northern Site Access/SW Brookman Road	Future Intersection								
B	Future Southern Site Access/ SW Brookman Road	Future Intersection								

[1]PDO – Property damage only

Critical crash rates were calculated for each of the study intersections following the analysis methodology presented in ODOT's *SPR 667 Assessment of Statewide Intersection Safety Performance* (Reference 8). SPR 667 provided average crash rates at a variety of intersection configurations in Oregon based on number of approaches and traffic control types. The average crash rate represents the approximate number of crashes that are "expected" at a study intersection. Additionally, this average crash rate was used to calculate the critical crash rate for each study intersection, based on the *Highway Safety Manual* methodology (Reference 9). The critical crash rate is calculated for each intersection based on the average crash rate for each facility and serves as a threshold for further analysis.

Table 4 summarizes the critical crash rate for each intersection and compares those values to the observed crash rate. Per ODOT, if the observed crash rate at the study location exceeds the critical rate, it is a possible indication that the location is exceeding average crash rates.

Table 4: Intersection Crash Rate Assessment (January 1, 2013 through December 31, 2017)

	Location	Total Crashes	Observed Crash Rate	Critical Crash Rate by Intersection Type	Observed Crash Rate > Critical Crash Rate by Intersection	Critical Crash Rate by Volume	Observed Crash Rate > Critical Crash Rate by Volume	90th Percentile Rate by Intersection Type	Observed Crash Rate > 90th Percentile Rate
1	Highway 99W/SW Elwert Road-SW Sunset Boulevard	29	0.39	0.62	No	0.53	No	0.86	No
2	SW Woodhaven Drive/ SW Sunset Boulevard	2	0.11	0.40	No	0.40	No	0.41	No
3	SW Timbrel Lane/ SW Sunset Boulevard	0	0.00	0.41	No	0.42	No	0.41	No
4	SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard	6	0.27	0.38	No	0.38	No	0.41	No
5	SW Baker Road-SW Murdock Road/SW Sunset Boulevard	2	0.10	0.38	No	0.39	No	0.41	No
6	Highway 99W/SW Brookman Road-SW Chapman Road	17	0.26	0.63	No	0.54	No	0.86	No
7	Old Highway 99 W/ SW Brookman Road	0	0.00	0.85	No	0.72	No	0.41	No
8	SW Middleton Road/ SW Brookman Road	1	0.33	0.78	No	0.66	No	0.41	No
9	SW Oberst Road/ SW Brookman Road	0	0.00	0.74	No	0.77	No	0.29	No
10	SW Ladd Hill Road/ SW Brookman Road	0	0.00	0.49	No	0.51	No	0.29	No

Crash rate – Crashes per million entering vehicles

As shown in Table 4, the observed crash rate is below the critical crash rate by the intersection type at all of the study intersections.

ODOT SPIS List

ODOT provides an annual list of safety priority index system (SPIS) locations which are based on reported crash data. The intent of the SPIS list is to identify roadway segments exhibiting an unusually high occurrence of crashes and is used to select locations for investigation. The segment on Highway 99W in the vicinity of SW Elwert Road-SW Sunset Boulevard is listed in the top 5% SPIS sites and the

Highway 99W/SW Brookman Road-SW Chapman Road intersection is listed as a top 10% SPIS location (both listings appear in the year 2017 SPIS list, the version available at the time this report was prepared).

Washington County SPIS List

Washington County also maintains a SPIS list to identify existing hazardous intersections for potential safety improvements. Intersections are included in the County SPIS list if they have three or more crashes or if they have one or more severe injury or fatal crashes within three consecutive years. The intersection of Highway 99W/SW Brookman Road-SW Chapman Road appears on the most recent Washington County SPIS list (2013-2015).

SW Elwert Road-SW Sunset Boulevard Intersection Configuration Changes

Washington County is reconstructing the SW Elwert Road-SW Sunset Boulevard intersection in conjunction with a Major Streets Transportation Improvement Program (MSTIP) project. The intersection reconstruction includes new turn lanes, traffic signal changes, as well as reconstruction of the west approach.

Highway 99W/SW Brookman Road-SW Chapman Road Intersection Configuration Changes

The City of Sherwood TSP includes an unfunded project to realign SW Brookman Road to intersect with Highway 99W approximately ¼ mile north of its current location and signalize the intersection. A corridor study was underway at the time this report was being prepared to further evaluate future intersection and roadway alignment options. In the interim, the approved Middlebrook Residential Subdivision development is required to restrict turn movements at the intersection to right-turns only as a safety mitigation measure.

No new safety-based mitigation needs were identified at the study intersections based on the crash data review. The City may want to consider modifying the existing north-south stop control at the SW Middleton Road/SW Brookman Road intersection to east-west stop control or all-way stop control as traffic volumes on SW Brookman Road continue to grow and recognizing the existing east-west sight distance limitations at the intersection.

TRAFFIC VOLUMES AND PEAK HOUR OPERATIONS

Traffic counts were obtained at the study intersections on a typical mid-week day in 2017[2] for the Middlebrook Residential Subdivision and were re-used in this study with approval by City staff. These counts were conducted during the morning (7:00 – 9:00 AM) and evening (4:00 – 6:00 PM) hours. *Appendix B* contains the traffic count sheets used in this study.

An assessment of 95th percentile queues under all scenarios is provided in *Appendix D*. Queues were reported from Synchro. As indicated in the summary, all but the following 95th percentile queues can be accommodated within available storage:

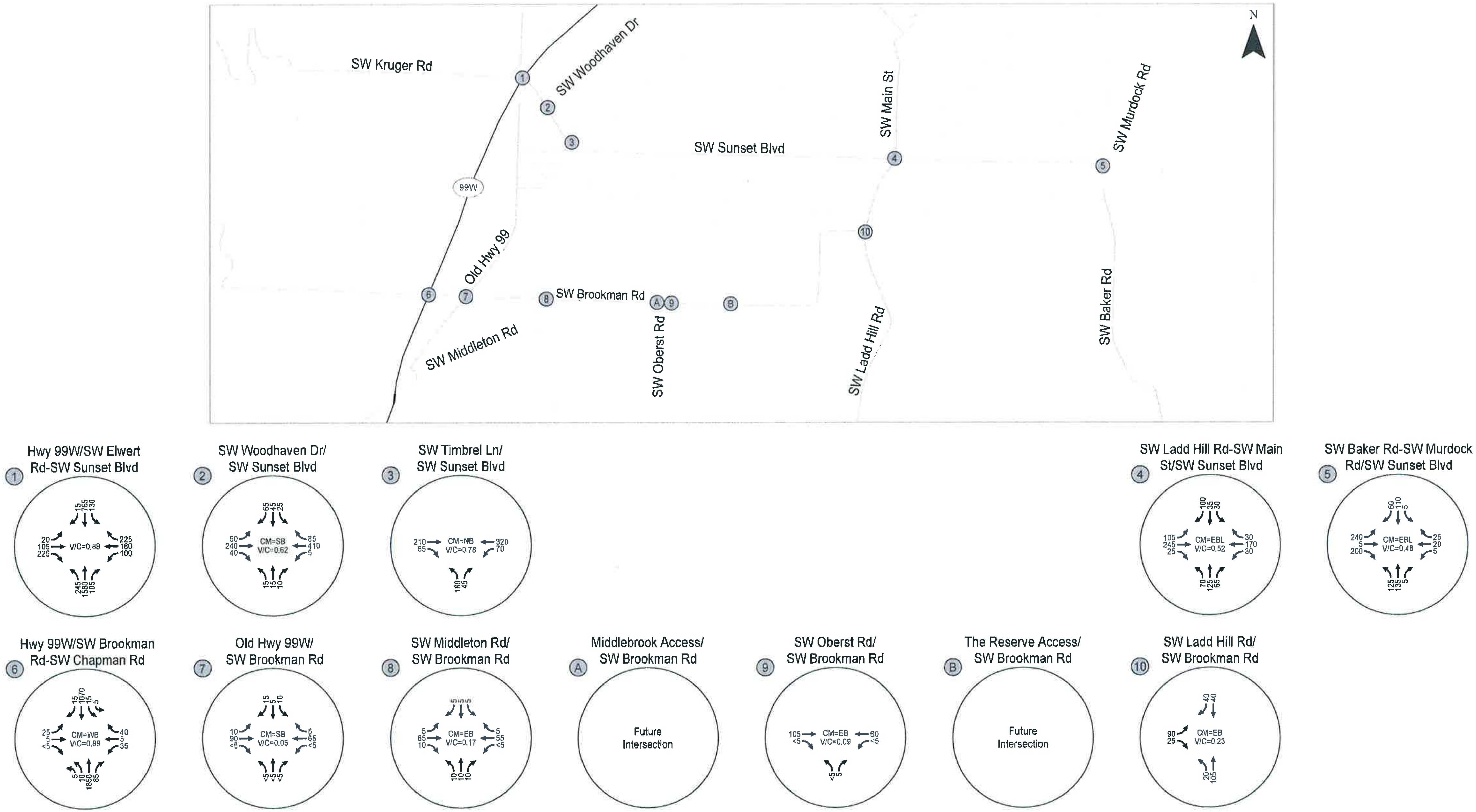
- The eastbound left-turn/through movement and eastbound right-turn movement at the intersection of Highway 99W/SW Elwert Road-SW Sunset Boulevard (study intersection #1) extend beyond the adjacent intersection at SW Kruger Road/SW Elwert Road during the weekday AM and weekday PM peak hour.
- The northbound left-turn movement at the intersection of Highway 99W/SW Elwert Road-SW Sunset Boulevard (study intersection #1) exceeds the available striped storage by one to two vehicles during the weekday PM peak hour.
- The 95th percentile queue for the southbound through/right-turn movement at the intersection of SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard (study intersection #4) extends beyond the adjacent intersection at SW Cornerstone Lane during the weekday PM peak hour.

[2] Refer to the traffic count summaries in *Appendix B* for specific count dates which occurred in May, September, October and November of 2017.

Figure 4 and Figure 5 present the existing traffic conditions for the weekday AM and PM peak hours, respectively. Each of the study intersections operate in compliance with the respective mobility standards today, though the Highway 99W/SW Elwert Road-SW Sunset Boulevard intersection is approaching capacity during the weekday PM peak hour. *Appendix C* includes the existing conditions level-of-service worksheets.

An assessment of 95th percentile queues under all scenarios is provided in *Appendix D.* Queues were reported from Synchro. As indicated in the summary, all but the following 95th percentile queues can be accommodated within available storage:

- The eastbound left-turn/through movement and eastbound right-turn movement at the intersection of Highway 99W/SW Elwert Road-SW Sunset Boulevard (study intersection #1) extend beyond the adjacent intersection at SW Kruger Road/SW Elwert Road during the weekday AM and weekday PM peak hour.
- The northbound left-turn movement at the intersection of Highway 99W/SW Elwert Road-SW Sunset Boulevard (study intersection #1) exceeds the available striped storage by one to two vehicles during the weekday PM peak hour.
- The 95th percentile queue for the southbound through/right-turn movement at the intersection of SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard (study intersection #4) extends beyond the adjacent intersection at SW Cornerstone Lane during the weekday PM peak hour.



CM = CRITICAL MOVEMENT (TWSC)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED/AWSC) / CRITICAL MOVEMENT LEVEL OF SERVICE (TWSC)
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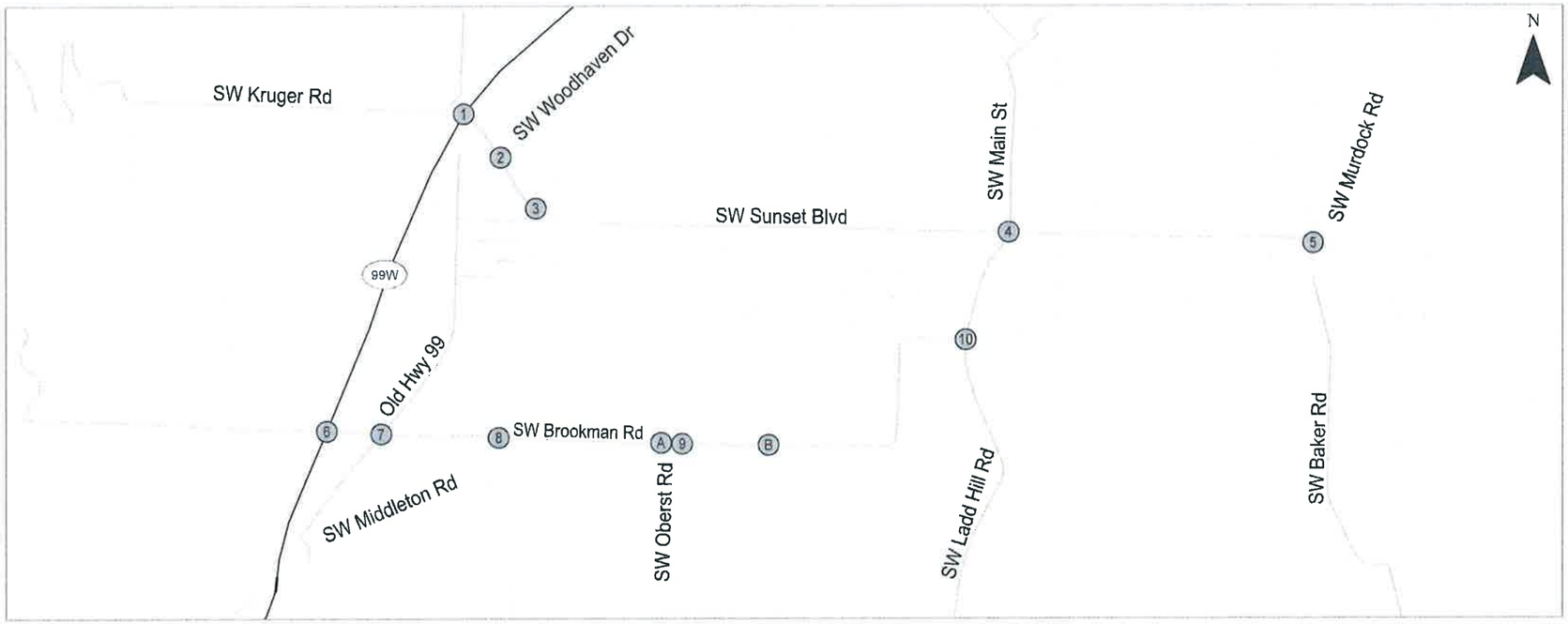
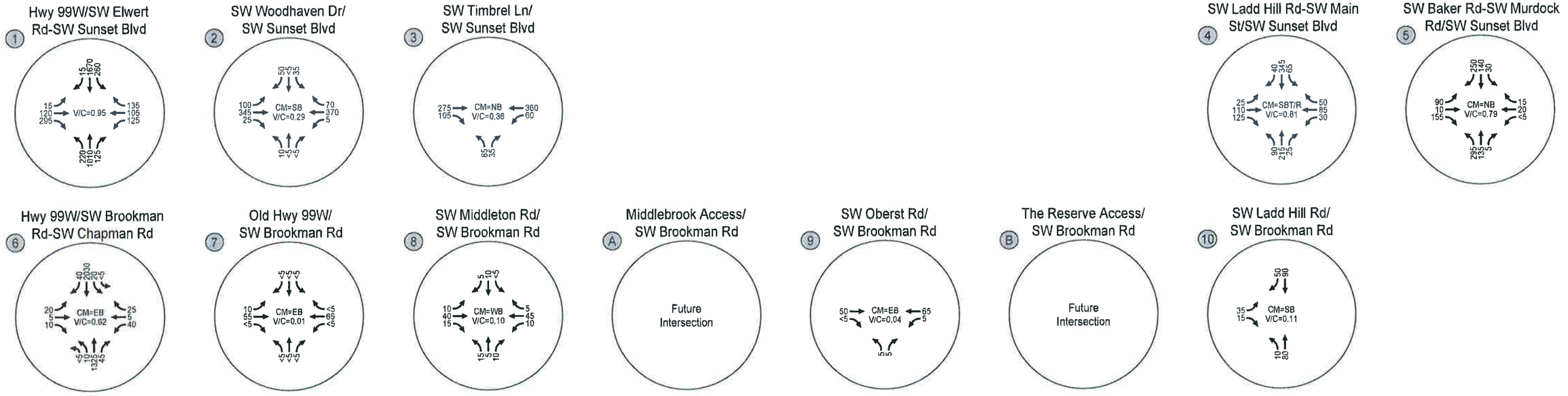
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO
TWSC = TWO-WAY STOP CONTROL
AWSC= ALL-WAY STOP CONTROL

Existing Intersection Operations Weekday AM Peak Hour Sherwood, Oregon

Figure 4

KITTELSON & ASSOCIATES





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Existing Intersection Operations
Weekday PM Peak Hour
Sherwood, Oregon

Figure 5

YEAR 2024 BACKGROUND TRAFFIC CONDITIONS

The background traffic analysis identifies how the study area's transportation system will operate in 2024, the year the proposed homes are expected to be built out. This analysis includes traffic growth due to development within the study area but does not include traffic from the proposed development.

Approved In-Process Developments

Three in-process developments were identified by City staff including:

- The Sherwood Hotel located on SW Meinecke Road at Highway 99W;
- The Sherwood High School relocation to a site northeast of the intersection of SW Elwert Road and SW Kruger Road, east of Highway 99W; and
- The Middlebrook Residential Subdivision development directly west of the proposed development.

All three developments were included as in-process as part of this study under 2024 background traffic.

Planned Transportation Improvements

The following improvements at the Highway 99W/SW Elwert Road-SW Sunset Boulevard intersection (study intersection #1) were included in the year 2024 background and total traffic conditions scenarios per City staff direction:

- Addition of a second northbound left turn lane (required as part of the *Sherwood High School Transportation Planning Rule Analysis*, as documented in the Sherwood High School Transportation Impact Study, Reference 10);
- Widening the west leg of the intersection to provide a left-turn, through lane, and through/right-turn lane (per preliminary drawings provided by County staff); and
- Widening the east leg of the intersection to provide a left-turn, through lane, and through/right-turn lane (per preliminary drawings provided by County staff).

In addition, the Highway 99W/SW Brookman Road-SW Chapman Road intersection (study intersection #6) will be restricted to right-turns only (Right-in, Right-out only – RIRO) as required of the Middlebrook Subdivision development.

Figure 6 shows the assumed 2024 background lane configurations and traffic control devices.

Background Traffic Volumes and Conditions

Year 2024 background traffic volumes were developed by rerouting left-turn movements from the Highway 99W/SW Brookman Road-SW Chapman Road intersection reflective of the planned RIRO improvements (study intersection #6) and then increasing the traffic volumes by 1% annually along Highway 99W and 2% annually on all other approaches as per City direction. Traffic volumes from the

in-process hotel development, the high school relocation, and the Middlebrook development were then added, assuming rerouting where appropriate due to the RIRO turn restrictions at Highway 99W.

Figure 7 and Figure 8 report the 2024 background traffic volumes and operating conditions at the study intersections during the weekday AM and PM peak hours, respectively. As seen in the figures, the following intersections are projected to exceed operational standards:

- The signalized Highway 99W/SW Elwert Road-SW Sunset Boulevard intersection (study intersection #1) will exceed ODOT's standard of a V/C ratio less than or equal to 0.99 during both the weekday AM (V/C = 1.01) and PM (V/C = 1.04) peak hours.
- The southbound approach to the stop-controlled SW Woodhaven Drive/SW Sunset Boulevard intersection (study intersection #2) is projected to operate with a V/C ratio of over 1.0 during the weekday AM peak hour, exceeding the City's 0.99 V/C ratio standard for the first hour.
- The northbound approach to the stop-controlled SW Timbrel Lane/SW Sunset Boulevard intersection (study intersection #3) is projected to operate with a V/C ratio over 1.0 during the weekday AM peak hour, exceeding the City's 0.99 V/C standard.
- The southbound through/right lane at the all-way stop controlled SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard intersection (study intersection #4) is projected to operate with a V/C ratio of 1.11, exceeding the City's 0.99 V/C standard.
- The northbound approach to the all-way stop controlled SW Baker Road-SW Murdock Road/SW Sunset Boulevard intersection (study intersection #5) is projected to operate with a V/C ratio of 1.02 during the weekday PM peak hour, exceeding the City's 0.99 V/C ratio standard.

Potential future mitigations are further discussed under total traffic conditions. *Appendix E* includes the year 2024 background conditions level-of-service worksheets.

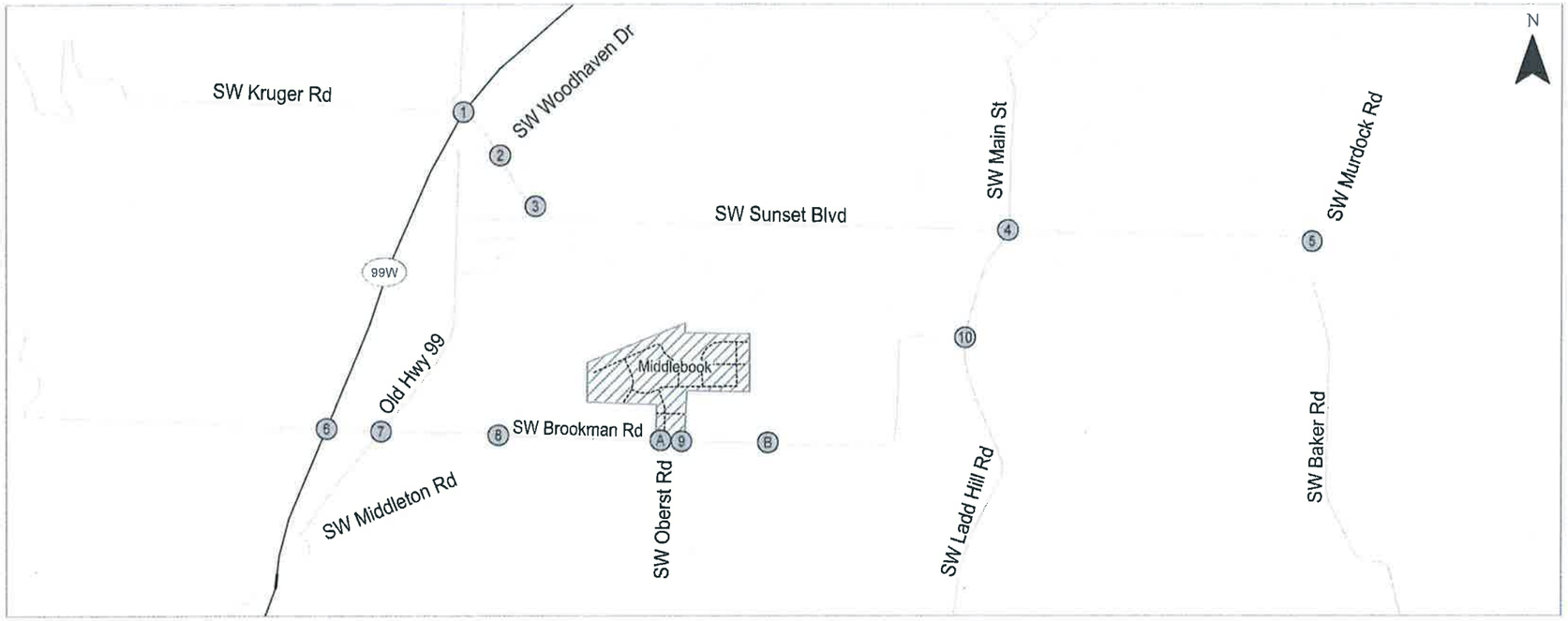
An assessment of 95th percentile queues under all scenarios is provided in *Appendix D*. Queues were reported from Synchro. As indicated in the summary, beyond the locations discussed under existing conditions, 95th percentile queues can be accommodated within available storage except for the following:

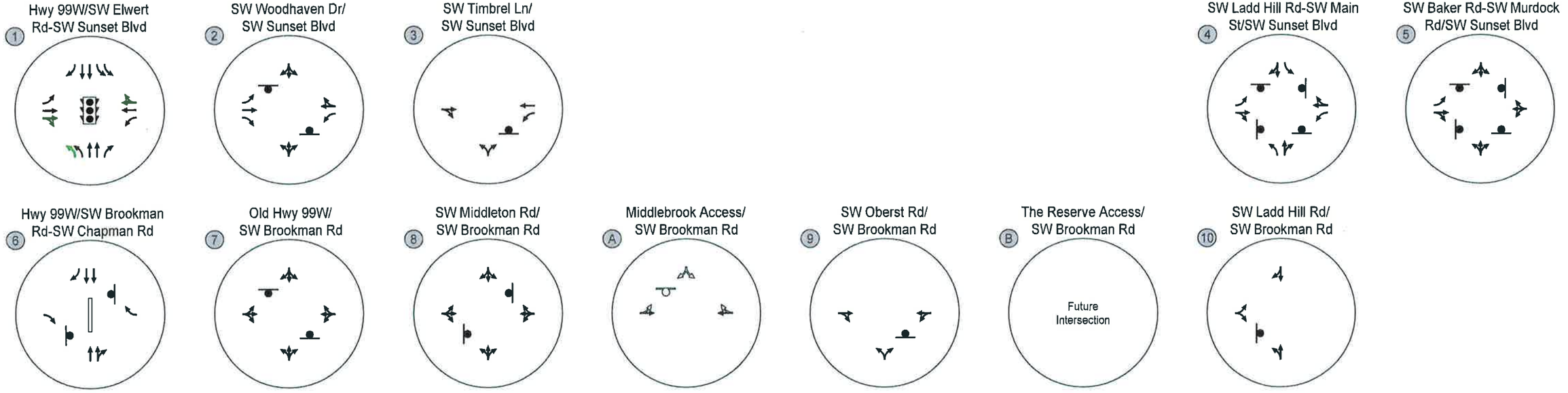
- The westbound left-turn movement at the intersection of Highway 99W/SW Elwert Road-SW Sunset Boulevard (study intersection #1) extends beyond the 185 foot storage during the weekday AM and PM peak hour.
- The 95th percentile queue for the southbound approach at the intersection of SW Woodhaven Drive/SW Sunset Boulevard (study intersection #2) extends beyond adjacent intersection at SW Fitch Drive during the weekday AM peak hour.
- The 95th percentile queue for the northbound left-turn/through movement at the intersection of SW Timbrel Lane/SW Sunset Boulevard (study intersection #3) extends beyond the adjacent intersection at SW Middleton Road during the weekday AM peak hour.

- The 95th percentile queue for the eastbound left turn at the intersection of SW Baker Road-SW Murdock Road/SW Sunset Boulevard (study intersection #5) extends beyond the available striped turn lane storage by one to two vehicles during the weekday AM peak hour.

- The 95th percentile queue for the eastbound left turn at the intersection of SW Baker Road-SW Murdock Road/SW Sunset Boulevard (study intersection #5) extends beyond the adjacent intersection at SW Cornerstone Lane by one vehicle during the weekday PM peak hour.

Compared to existing conditions, the queue for the northbound left-turn movement at the intersection of Highway 99W/SW Elwert Road-SW Sunset Boulevard (#1) is no longer projected to exceed storage with the planned second turn-lane in place (i.e., the Washington County MSTIP project mitigates the existing northbound left-turn lane storage issue).

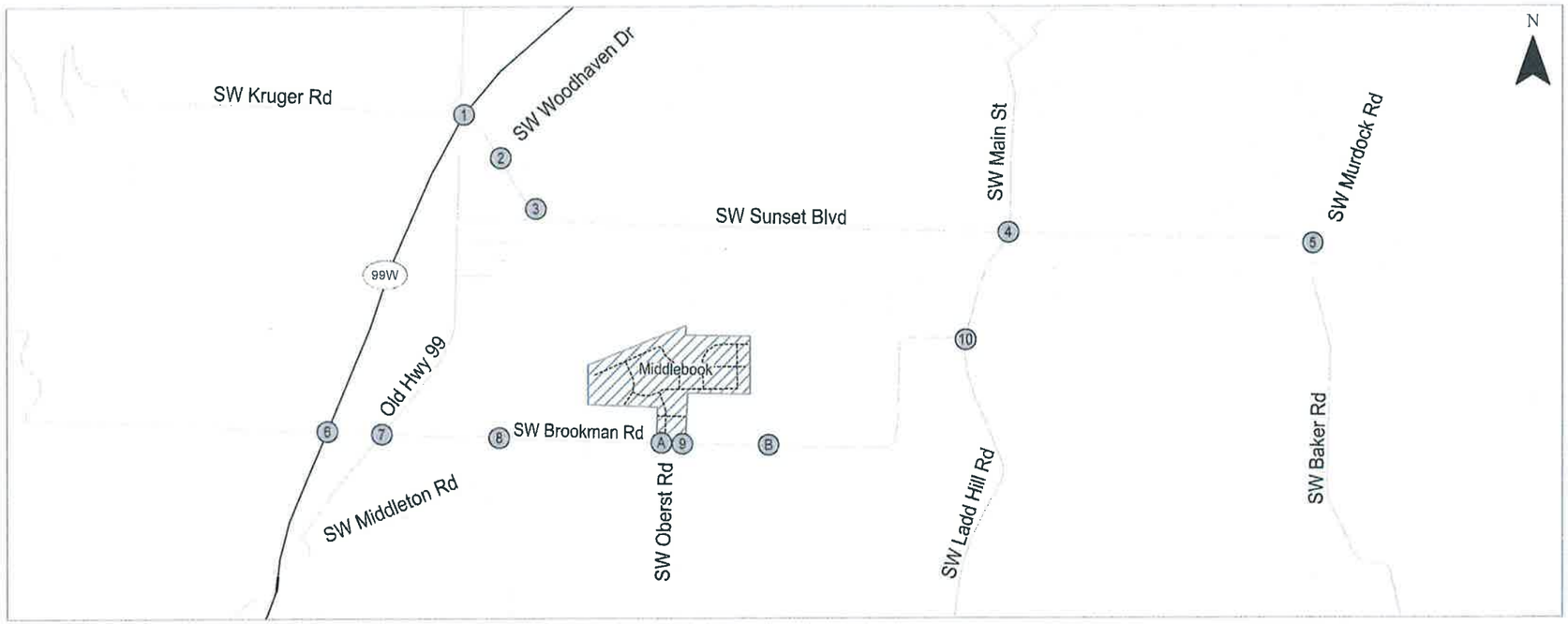


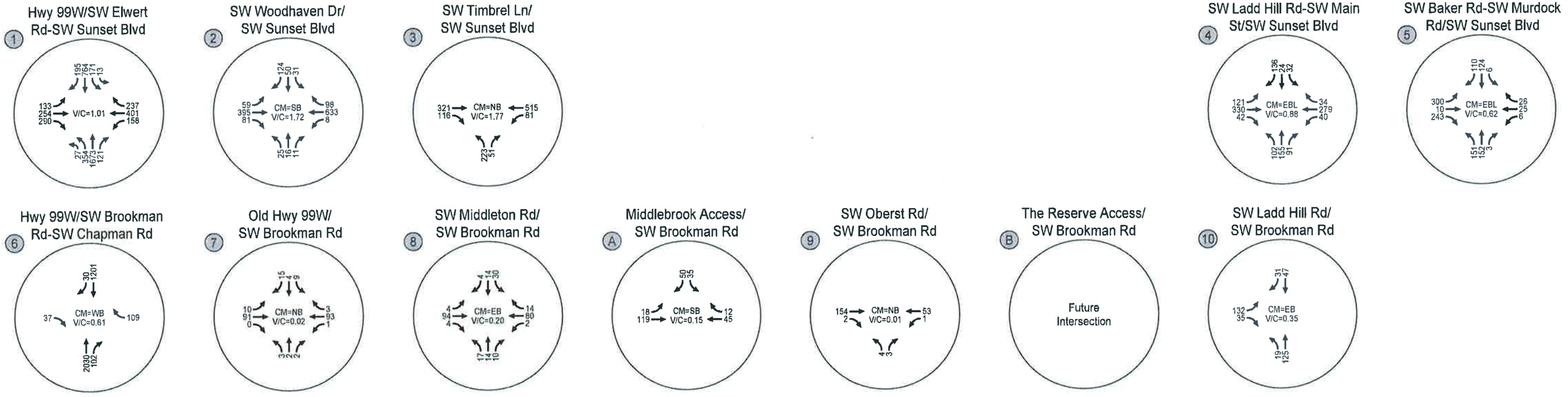


- STOP SIGN
- TRAFFIC SIGNAL
- RAISED MEDIAN
- EXISTING
- PLANNED IMPROVEMENT
- MOVEMENT/IMPROVEMENT ADDED WITH MIDDLEBROOK DEVELOPMENT

Year 2024 Background Assumed Lane Configurations and Traffic Control Devices Sherwood, Oregon

Figure 6





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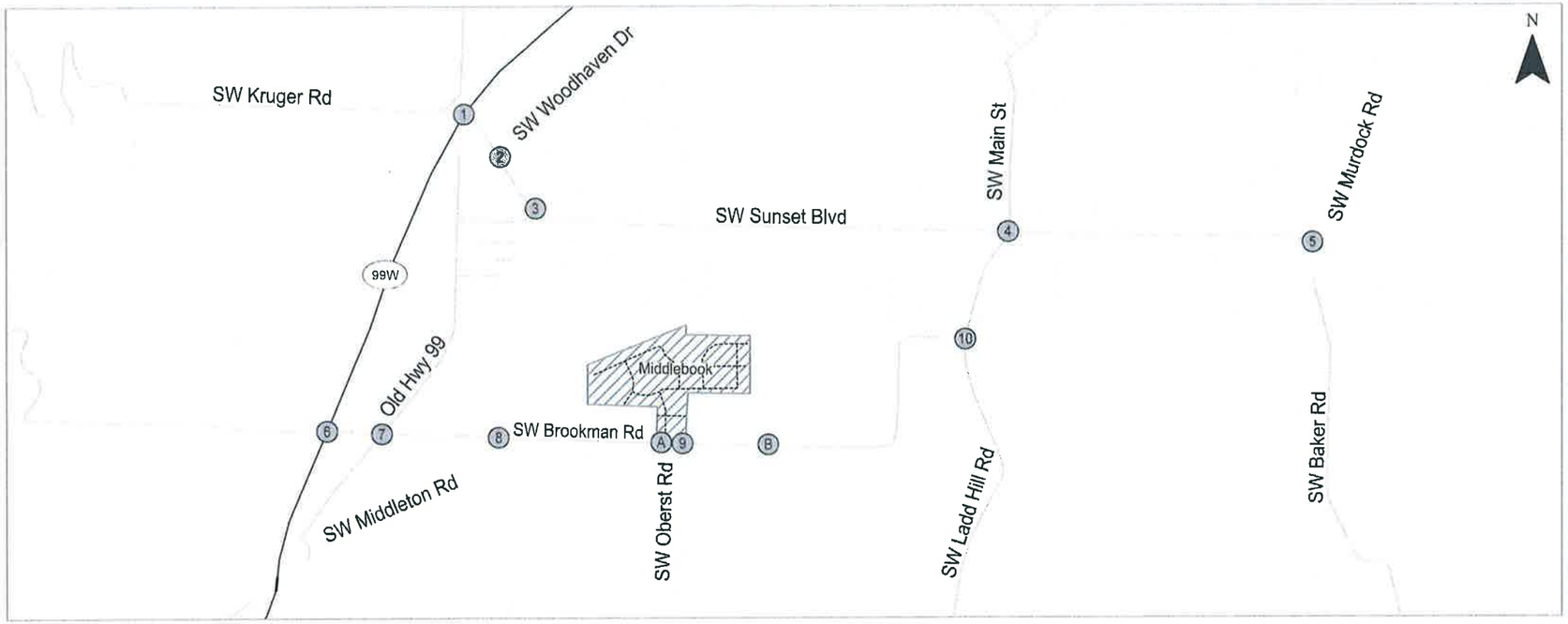
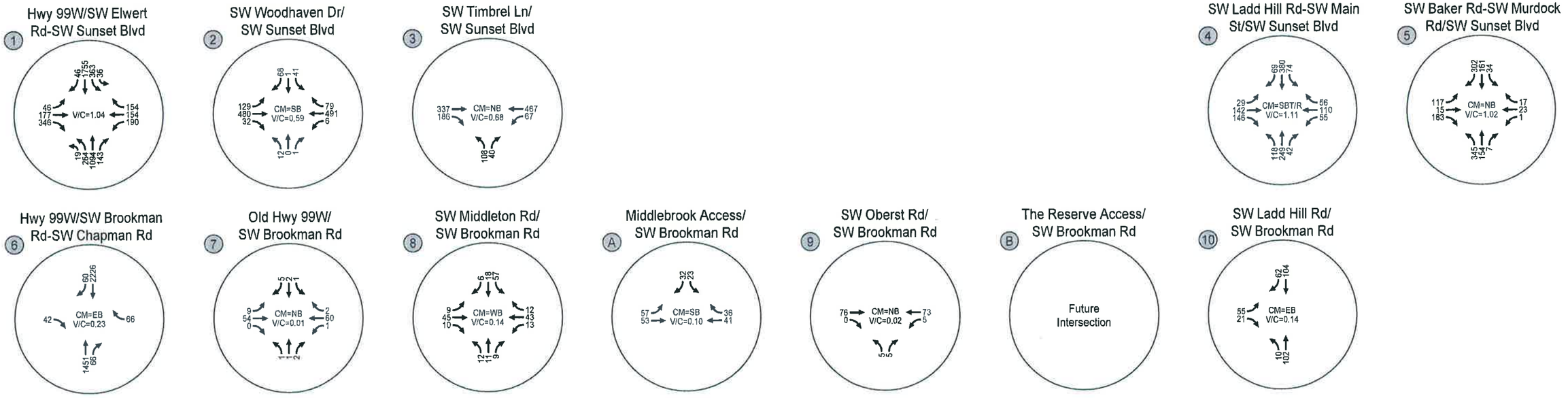
Year 2024 Background Intersection Operations
Weekday AM Peak Hour
Sherwood, Oregon

Figure 7





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Year 2024 Background Intersection Operations
Weekday PM Peak Hour
Sherwood, Oregon

Figure 8

PROPOSED DEVELOPMENT PLAN

The proposed subdivision consists of 59 detached single-family homes. Access to 44 of the homes on the north portion of the site is proposed via a public street connection on SW Brookman Road to be shared with the previously approved Middlebrook Residential Subdivision (Study Intersection A in Figure 9). A second public street connection to SW Brookman Road is proposed to provide access to 15 homes located on the southern side of Cedar Creek and will replace two existing site driveways (Study Intersection B). The lane configurations and traffic control devices assumed for the year 2024 total traffic conditions are shown in Figure 9. The two existing single-family homes on site will be removed and the existing accesses to SW Brookman Road vacated.

Trip Generation Estimate

Trip generation estimates for the proposed subdivision were prepared based on information presented in the *Trip Generation Manual* (Reference 10) and are shown in Table 5. Note that the estimates in Table 5 are presented assuming a trip credit for the two existing homes on site today.

Table 5: Trip Generation Estimate

Land Use	ITE Code	Size	Daily Trips	Weekday AM Peak Hour			Weekday PM Peak Hour		
				Total	In	Out	Total	In	Out
Single-Family Detached (lots 1 to 44)	210	43 units[1]	406	38	10	28	45	28	17
Single-Family Detached (lots 45 to 59)	210	14 units[2]	132	12	3	9	15	9	6
TOTAL		**57 units**	**538**	**50**	**13**	**37**	**60**	**37**	**23**

Note: Per direction from ODOT and the City, the average rate was used for the daily trip generation and the fitted curve equation for the weekday AM and PM peak hour trip generation.
[1]There is one single-family detached home on-site currently, so the trip generation is based on 43 units (44 proposed units minus 1 existing unit).
[2]There is one single-family detached home on-site currently, so the trip generation is based on 14 units (15 proposed units minus 1 existing unit).

As shown in Table 5, the proposed development is estimated to generate an additional 538 daily trips, including 50 trips during the weekday AM peak hour and 60 trips during the weekday PM peak after accounting for the two existing homes on site.

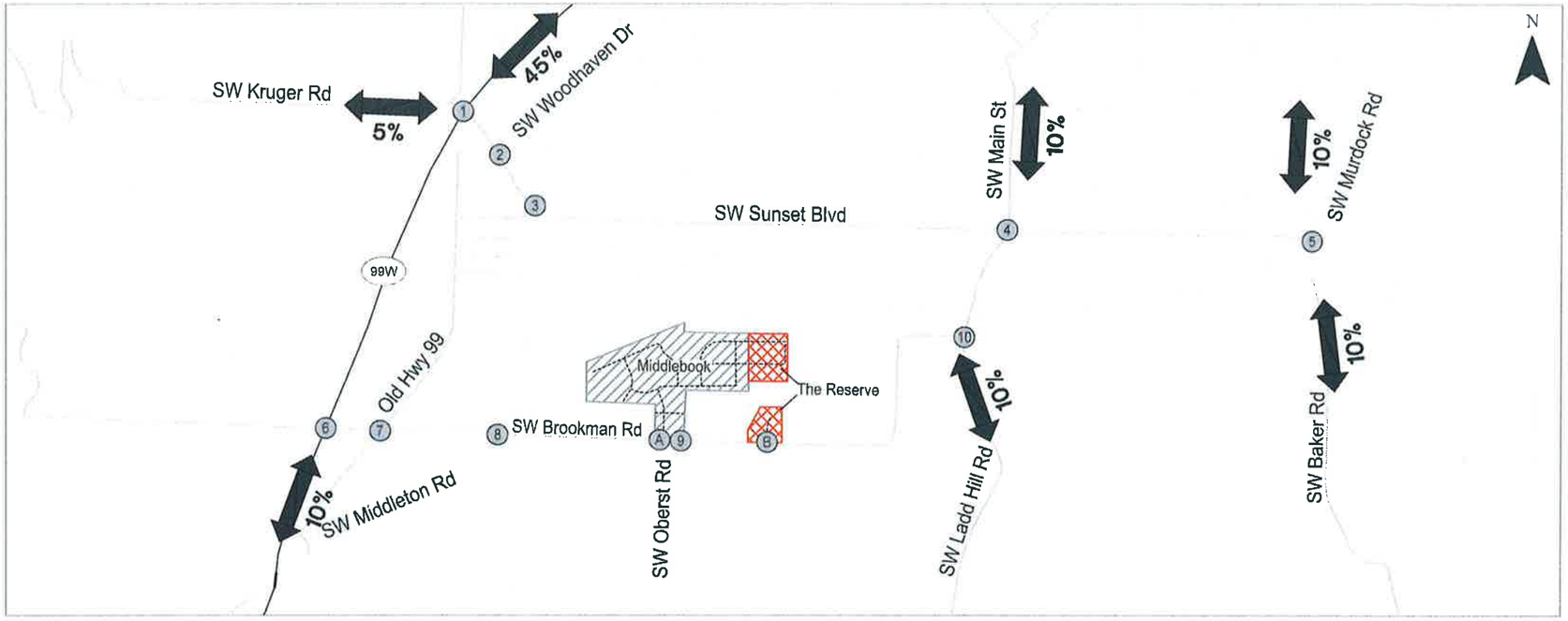
Trip Distribution & Assignment

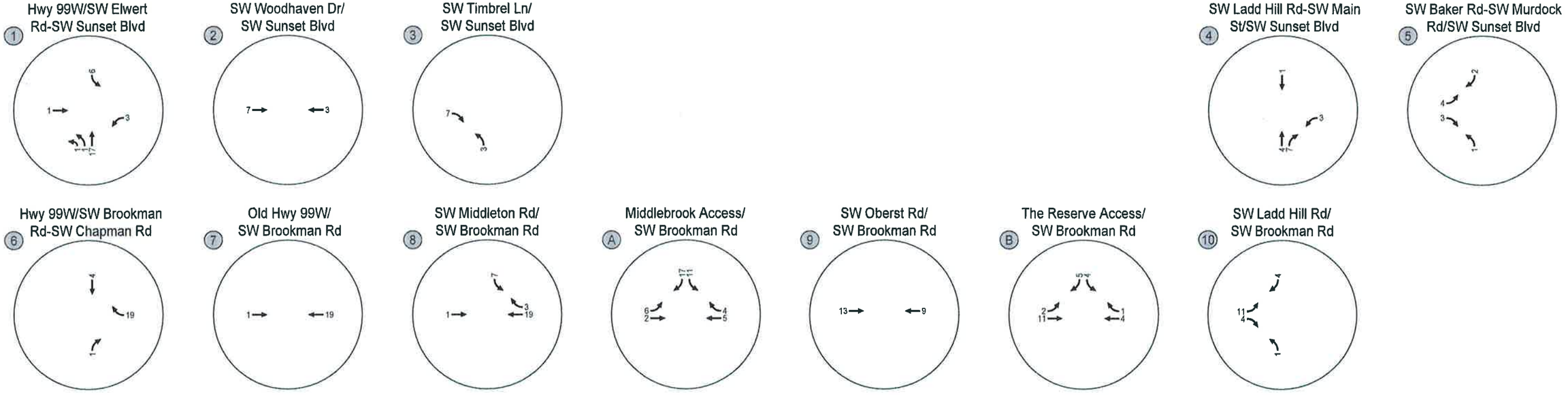
The assumed site trip distribution pattern is identical to the pattern previously assumed for the Middlebrook Residential Subdivision Study, which was developed considering existing traffic patterns and roadway connectivity (including the planned RIRO at Highway 99W/SW Brookman Road/SW Chapman Road intersection). The trip distribution pattern was used to assign the weekday AM and PM peak hour site trips to the study intersections as shown in Figure 10 and Figure 11.

- STOP SIGN
- TRAFFIC SIGNAL
- RAISED MEDIAN
- EXISTING
- PLANNED IMPROVEMENT
- MOVEMENT ADDED WITH THE RESERVE DEVELOPMENT

Year 2024 Background Assumed Lane Configurations and Traffic Control Devices
Sherwood, Oregon

Figure
9

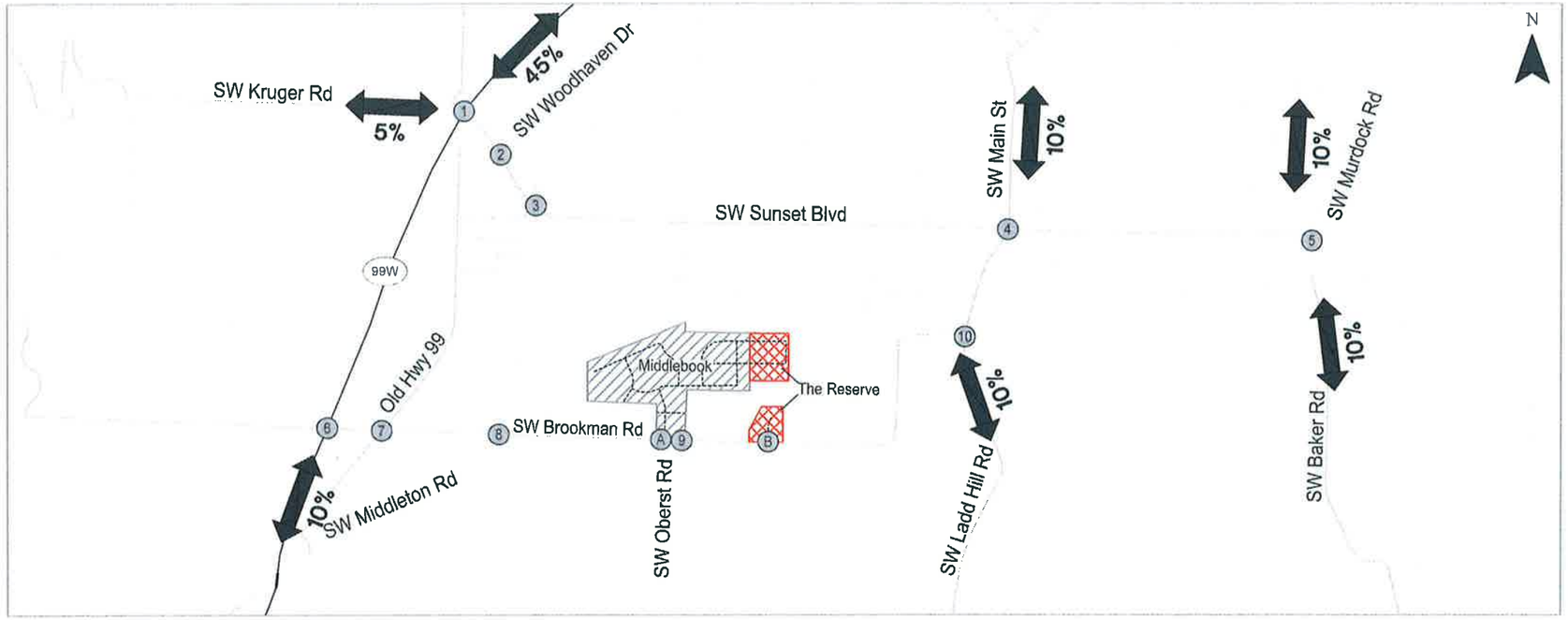


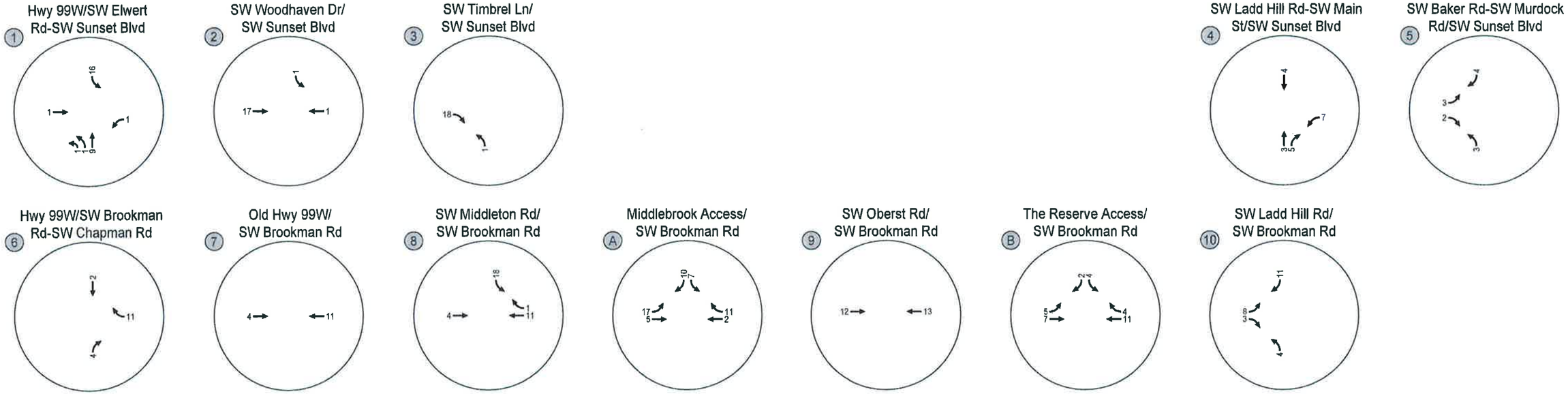


Assumed Trip Distribution and Assignment with RIRO at Highway 99W/SW Brookman Road-SW Chapman Road
Weekday AM Peak Hour
Sherwood, Oregon

Figure 10

KITTELSON & ASSOCIATES





Assumed Trip Distribution and Assignment with RIRO at Highway 99W/SW Brookman Road-SW Chapman Road
Weekday PM Peak Hour
Sherwood, Oregon

Figure 11

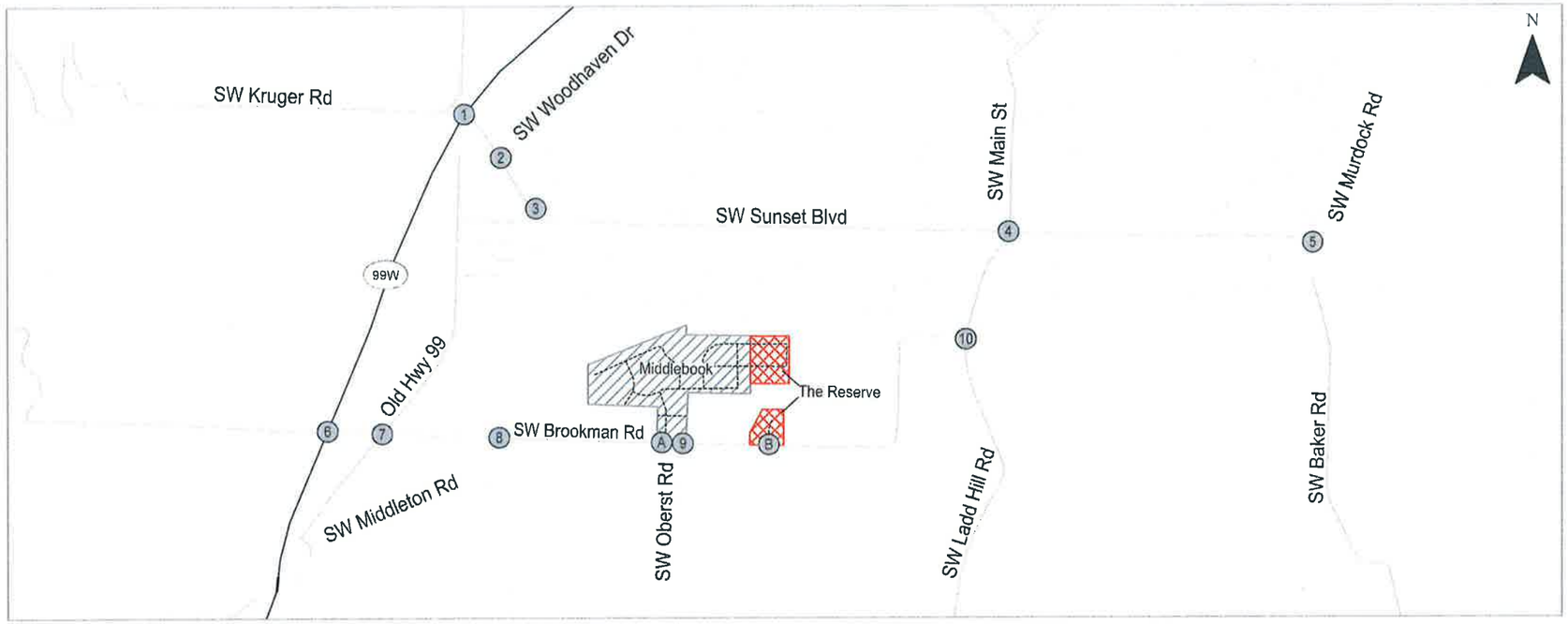
YEAR 2024 TOTAL TRAFFIC CONDITIONS

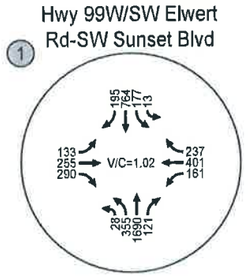
The 2024 total traffic conditions analysis forecasts how the study area's transportation system will operate with the inclusion of traffic from the proposed development and identifies traffic mitigation measures required to support the site. Future traffic conditions were estimated by adding site-generated traffic to the 2024 background traffic volumes for the weekday AM and PM peak hours to arrive at the 2024 total traffic volumes.

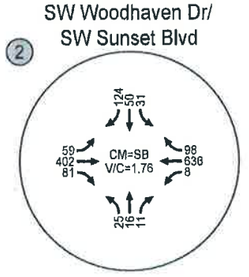
Figure 12 and Figure 13 report the 2024 total traffic volumes and operating conditions for the weekday AM and PM peak hours with site development. As seen in the figures, consistent with background conditions, the following intersections are projected to continue to exceed operational standards:

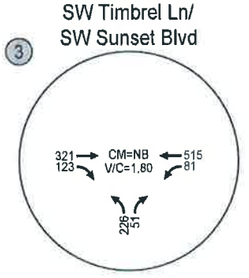
- The signalized Highway 99W/SW Elwert Road-SW Sunset Boulevard intersection (study intersection #1) will continue to exceed capacity during both weekday AM and PM peak hours (AM peak hour V/C ratio change from 1.01 under background traffic to 1.02 under total traffic and PM peak hour V/C ratio change from 1.04 under background traffic to 1.05 under total traffic).
- The southbound approach to the stop-controlled SW Woodhaven Drive/SW Sunset Boulevard intersection (study intersection #2) is projected to operate with a V/C ratio of 1.76 during the weekday AM peak hour. The proposed development adds no trips to the southbound approach.
- The northbound approach to the stop-controlled SW Timbrel Lane/SW Sunset Boulevard intersection (study intersection #3) is projected to operate with a V/C ratio of 1.80 during the weekday AM peak hour. The proposed development adds three trips to the northbound approach.
- The southbound through/right lane at the all-way stop controlled SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard intersection (study intersection #4) is projected to operate with a V/C ratio of 1.13 during the weekday PM peak hour.
- The northbound approach to the all-way stop controlled SW Baker Road-SW Murdock Road/SW Sunset Boulevard intersection (study intersection #5) is projected to operate with a V/C ratio of 1.04 during the weekday PM peak hour.

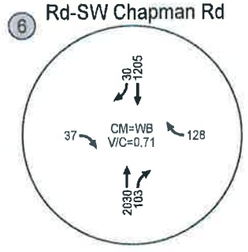
Operations and mitigation opportunities at these five intersections are discussed further below. *Appendix F* includes the year 2024 total traffic conditions level-of-service worksheets.

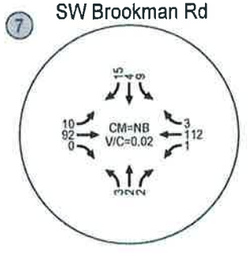


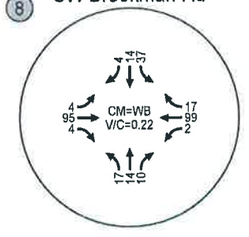


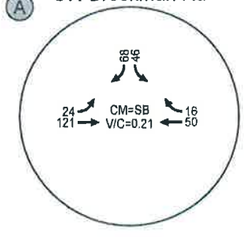


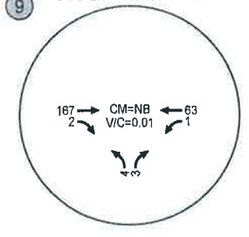


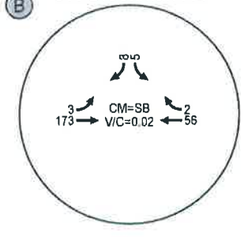


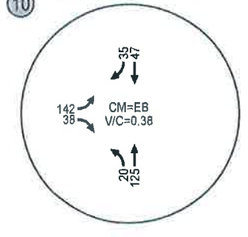


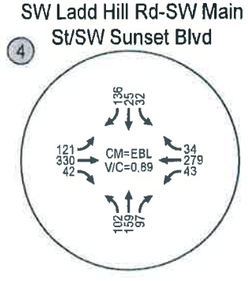


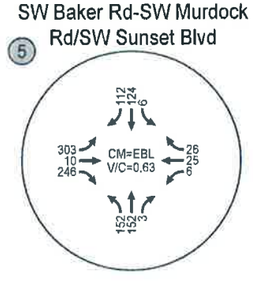












* Note: Trips were added to intersections A and B to account for rerouted trips associated with the existing two homes on site.

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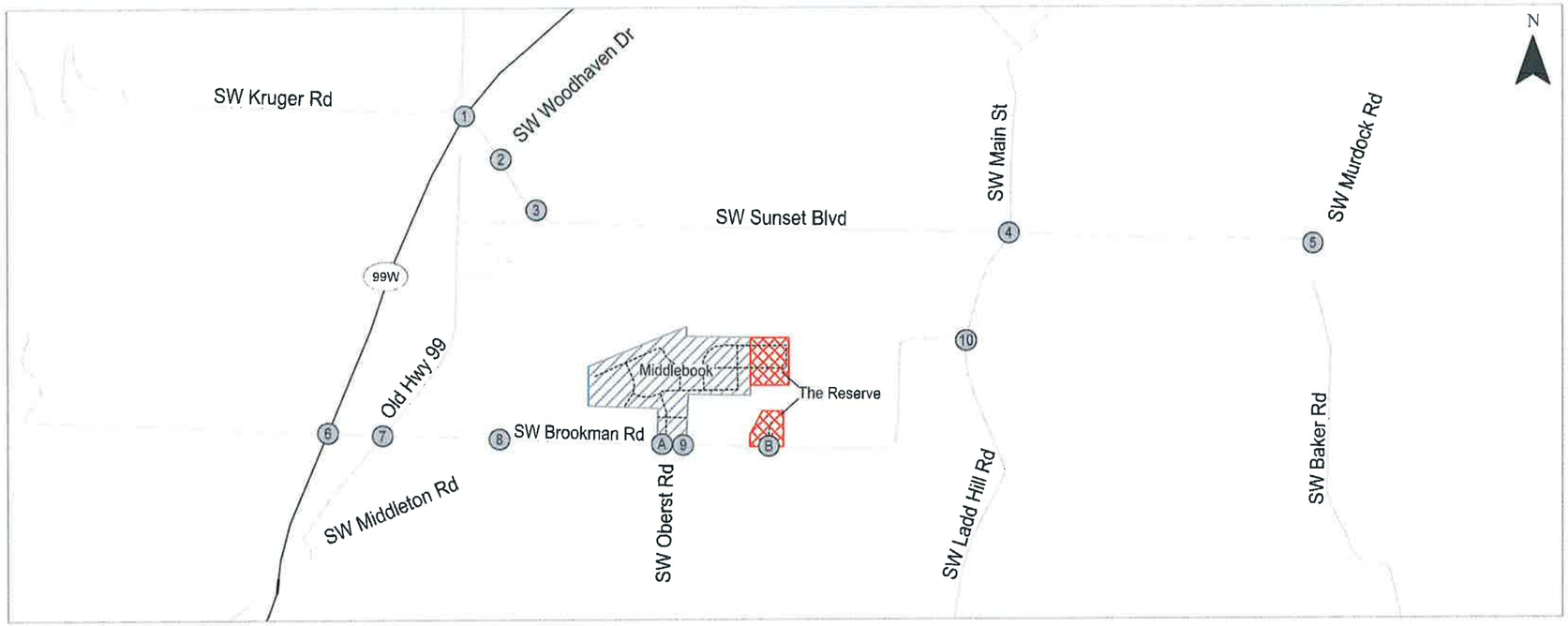
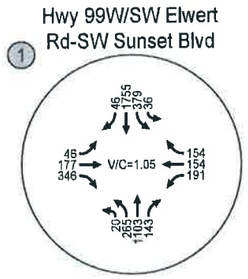
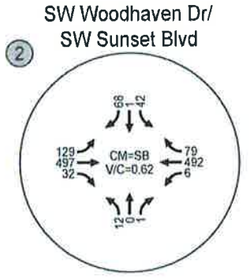
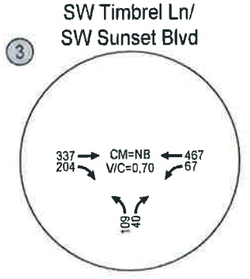
Year 2024 Total Intersection Operations
Weekday AM Peak Hour
Sherwood, Oregon

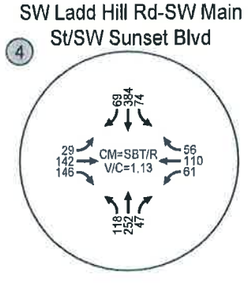
Figure 12

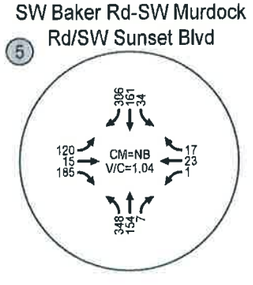


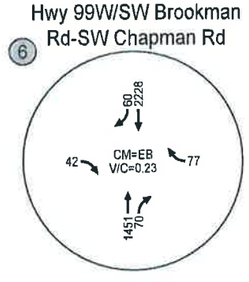


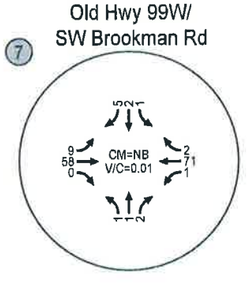


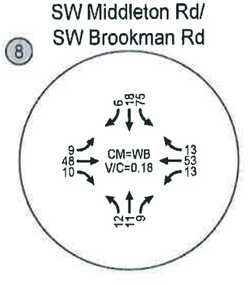


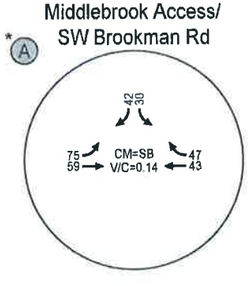


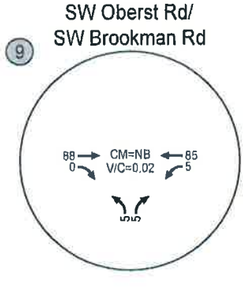


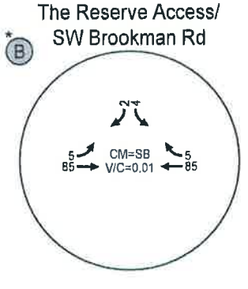


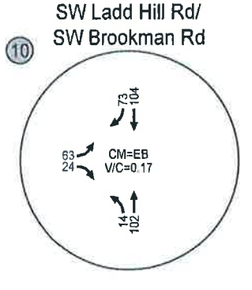












* Note: Trips were added to intersections A and B to account for rerouted trips associated with the existing two homes on site.

CM = CRITICAL MOVEMENT (TWSC)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED/AWSC) / CRITICAL MOVEMENT LEVEL OF SERVICE (TWSC)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED/AWSC) / CRITICAL MOVEMENT CONTROL DELAY (TWSC)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO
TWSC = TWO-WAY STOP CONTROL
AWSC= ALL-WAY STOP CONTROL

Year 2024 Total Intersection Operations
Weekday PM Peak Hour
Sherwood, Oregon

Figure 13

Highway 99W/SW Elwert Road-SW Sunset Boulevard intersection (Study Intersection #1)

This intersection is projected to continue to exceed ODOT's 0.99 V/C mobility standard under weekday AM and PM peak hour conditions under total traffic assuming completion of Washington County's MSTIP project. The proposed development results in the following projected southbound V/C ratio changes relative to the background conditions: weekday AM peak hour 1.01 to 1.02, weekday PM peak hour 1.04 to 1.05. Given that the already over-capacity V/C ratio change is less than 0.03[3] assuming no signal timing change, the City of Sherwood could make a finding that site development impacts do not require mitigation per ODOT Policy Statement findings relative to the change in V/C ratio.

SW Woodhaven Drive/SW Sunset Boulevard (Study Intersection #2)

The southbound approach to this stop-controlled intersection is projected to operate at a V/C ratio of 1.72 under background traffic and a V/C ratio of 1.76 under total traffic conditions during the weekday AM peak hour. This intersection is identified for signalization in the City TSP.

Given that the intersection does not meet City operating standards under background conditions, no site trips are added to the critical stop-controlled approach and the planned future signalization cost is not proportionate to site trip impacts, site-impact mitigation is recommended through payment of a proportionate share contribution to the planned future signalization. The proposed proportionate share mitigation is discussed later in this report.

SW Timbrel Lane/SW Sunset Boulevard (Study Intersection #3)

The weekday AM peak hour V/C ratio of the northbound approach to this stop-controlled intersection is projected to change from 1.77 prior to site development to 1.80 with site development. The City plans construction of a roundabout at this intersection in the future.

Given that the intersection does not meet City operating standards under background conditions, the site adds three trips to the critical movement during the weekday AM peak hour and the planned future signalization cost is not proportionate to site trip impacts, site-impact mitigation is recommended through payment of a proportionate share contribution to the planned future roundabout. The proposed proportionate share mitigation is discussed later in this report.

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[3] A May 25, 2011 Oregon Highway Plan Policy intent statement issued by ODOT indicates that "In applying OHP mobility standards to analyze mitigation, ODOT recognizes that there are many variables and levels of uncertainty in calculating volume-to-capacity ratios, particularly over the planning horizon. In applying the standards after negotiating reasonable levels of mitigation for actions required under OAR 660-012-0060, ODOT considers calculated values for volume-to-capacity ratios that are within 0.03 of the adopted standard in the OHP to be considered in compliance with the standard."

SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard (Study Intersection #4)

The weekday PM peak hour V/C ratio on the southbound approach to this all-way stop-controlled intersection is projected to change from 1.11 under background traffic to 1.13 with site traffic. This intersection is identified for signalization in the City TSP.

Given that the intersection does not meet City operating standards under background conditions and the planned future signalization cost is not proportionate to site trip impacts, site-impact mitigation is recommended through payment of a proportionate share contribution to the planned future signalization. The proposed proportionate share mitigation is discussed later in this report.

SW Baker Road-SW Murdock Road/SW Sunset Boulevard (Study Intersection #5)

The weekday AM peak hour V/C ratio on the northbound approach to this all-way stop-controlled intersection is projected to change from 1.02 before site development to 1.04 with site development. Construction of a northbound left turn lane and a southbound right turn lane is planned in the Sherwood TSP.

Given that the intersection does not meet City operating standards under background conditions and the planned turn lane cost is not proportionate to site trip impacts, site-impact mitigation is recommended through payment of a proportionate share contribution to the planned future turn lane project. The proposed proportionate share mitigation is discussed later in this report.

Proportionate Share Mitigation Assessment

Proportional share mitigation calculations for both the SW Woodhaven Drive/SW Sunset Boulevard and SW Timbrel Lane/SW Sunset Boulevard intersections were prepared following the methodology used by the City of Sherwood to assess impacts of the previously approved Middlebrook Residential Subdivision. The same methodology was prepared for the other two intersections for City consideration. Table 6 presents the assumed mitigation measures and costs as well as the trip components and assessment methodology for the four study intersections.

Table 6: Proportional Share Methodology

	SW Sunset Blvd/ SW Woodhaven Dr (#2)	SW Sunset Blvd/ SW Timbrel Ln (#3)	SW Ladd Hill Rd.-SW Main St./SW Sunset Boulevard (#4)	SW Baker Rd.-SW Murdock Rd./ SW Sunset Boulevard (#5)
Mitigation Project Summary	Construct Traffic Signal	Construct Mini Roundabout	Construct Traffic Signal	Construct Northbound Left Turn lane & Southbound Right Turn lane
City TSP Project ID	Not applicable	D28	D26	D33
Peak Hour	Weekday AM	Weekday AM	Weekday PM	Weekday PM
Scenario when mitigation is triggered	No Build (2024)	No Build (2024)	No Build (2024)	No Build (2024)
Existing Total Entering Volume, TEV (X)	1,012	894	1,208	1,208
2024 No Build (Background with RIRO, Y)	1,531	1,308	1,468	1,359
2024 Project Trips (PT)	10	10	19	12
Background Growth (Z = Y – X)	519	414	260	151
Proportional Share (%)*	1.89%	2.36%	6.81%	7.36%
Mitigation Cost Estimate ($)	$1,050,000	$630,000	$250,000	$750,000
Cost Estimate Reference	DKS (Ref 10)	DKS (Ref 10)	TSP (Ref 5)	TSP (Ref 5)
Proportional Share Cost ($)**	$19,849	$14,858	$17,025	$55,215

*if 2024 mitigation is triggered in: Existing — Proportional Share % = PT / X
No Build/Build — Proportional Share % = PT / (PT+ Z)

** If intersection fails in AM and PM, use average of AM and PM proportional share (%) to estimate share cost ($)

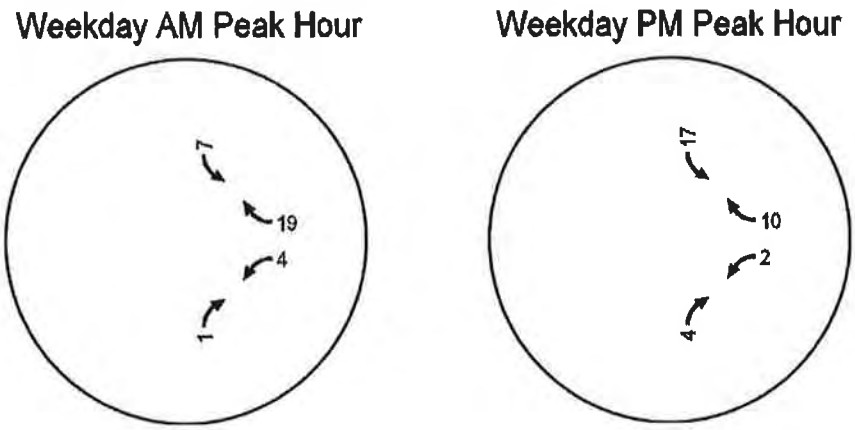
Source: *Sherwood High School Transportation Impact Study* (Reference 10)

In reviewing the proportional share estimates in Table 6, the City could consider:

- The extent to which the proportional share contributions will be Transportation Development Tax creditable (both the SW Woodhaven Drive/SW Sunset Boulevard and SW Timbrel Lane/SW Sunset Boulevard intersections were determined to be fully creditable for the previously approved Middlebrook Residential Subdivision).
- While the Reserve at Cedar Creek trip impacts at the two Sunset Boulevard study intersections can be mitigated through payment of a proportional share, the site-generated trips are expected to shift back to the Highway 99W/SW Brookman Road-SW Chapman Road intersection once the ultimate mitigation is implemented on Highway 99W and full turn movements are again provided at the Highway connection. Site mitigation would then no longer be required on Sunset Boulevard.

Exhibit 1 illustrates the projected number of site-generated peak hour trips that are expected to travel through the Highway 99W/SW Brookman Road-SW Chapman Road intersection once the ultimate mitigation is implemented at that location. This trip assignment is provided for informational purposes in case the City determines that proportional share payments are required at the Highway 99W/SW Brookman Road-SW Chapman Road.

Exhibit 1: Site Trips though Highway 99W/SW Brookman Road upon Ultimate Mitigation



SW Brookman Road Intersection Turn Lane Considerations at Site Access Points

In the future, SW Brookman Road is planned to be widened to a three- or five-lane arterial with a center left-turn lane. Each development fronting SW Brookman Road is currently expected to provide half-street right-of-way dedication to Washington County consistent with a future five-lane arterial.

Left-Turn Lane Needs Assessment

The location and configuration of the public street providing access to SW Brookman Road for both the Middlebrook Residential Subdivision and the 44 homes in the northern portion of the new residential subdivision (Study Intersection A) along with the Middlebrook Residential Subdivision frontage widening was previously approved with the Middlebrook Residential Subdivision. Although SW Brookman Road is being widened to provide half of the ultimate five-lane section along the Middlebrook Residential Subdivision frontage, the new frontage section SW Brookman Road is planned to be striped as a two-lane roadway (one lane in each direction) initially due to the relatively short frontage length and an inability to transition to a three-lane section within the frontage paving area.

While the two-lane roadway section was sufficient to support the Middlebrook Residential Subdivision, the need for an eastbound left-turn lane on SW Brookman Road into the shared access was re-assessed assuming the proposed new homes. The turn lane assessment was prepared using ODOT APM volume-based criterion for left-turn lanes. The projected weekday PM peak hour volumes with site development of the Reserve at Cedar Creek indicate that it would be appropriate to construct an eastbound left-turn lane with site development at the shared site access (Study Intersection A).

While provision of a left-turn lane is desirable from a traffic volume perspective, widening and tapers needed to provide the eastbound left-turn lane in conjunction with site development require off-site property acquisition that may not be possible. Accordingly, it is recommended the Applicant coordinate with City of Sherwood and Washington County staff to assess the potential for constructing an eastbound left-turn lane at the west access with site development and/or to pay a fee-in-lieu of the turn lane construction (with the fee intended to be used to construct the turn lane in conjunction with a future public road project).

The potential need for an eastbound left-turn lane on SW Brookman Road at the east site access (Study Intersection B) was also evaluated and determined that the projected traffic volumes do not suggest the need for a turn lane using ODOT APM volume-based criterion.

Right-turn Lane Needs Assessment

The projected westbound right-turn traffic volumes (well below 40 vehicles per hour) do not justify right-turn deceleration lanes at either of the site accesses on SW Brookman Road per Washington County criteria.

The turn lane warrant analysis worksheets are provided in *Appendix G*.

SW BROOKMAN ROAD ACCESS MANAGEMENT

Washington County *Community Development Code* (Reference 12) Section 501 provides standards for access spacing along arterial roads. Per the code, when allowed, accesses to arterial facilities such as SW Brookman Road should be spaced at least 600 feet apart. Figure 14 is an influence area map that shows existing site driveways, the proposed site access as well as other existing accesses in the vicinity within 600 feet of the site frontage. The existing site driveways serving the two single family homes on the project site will each be closed as noted.

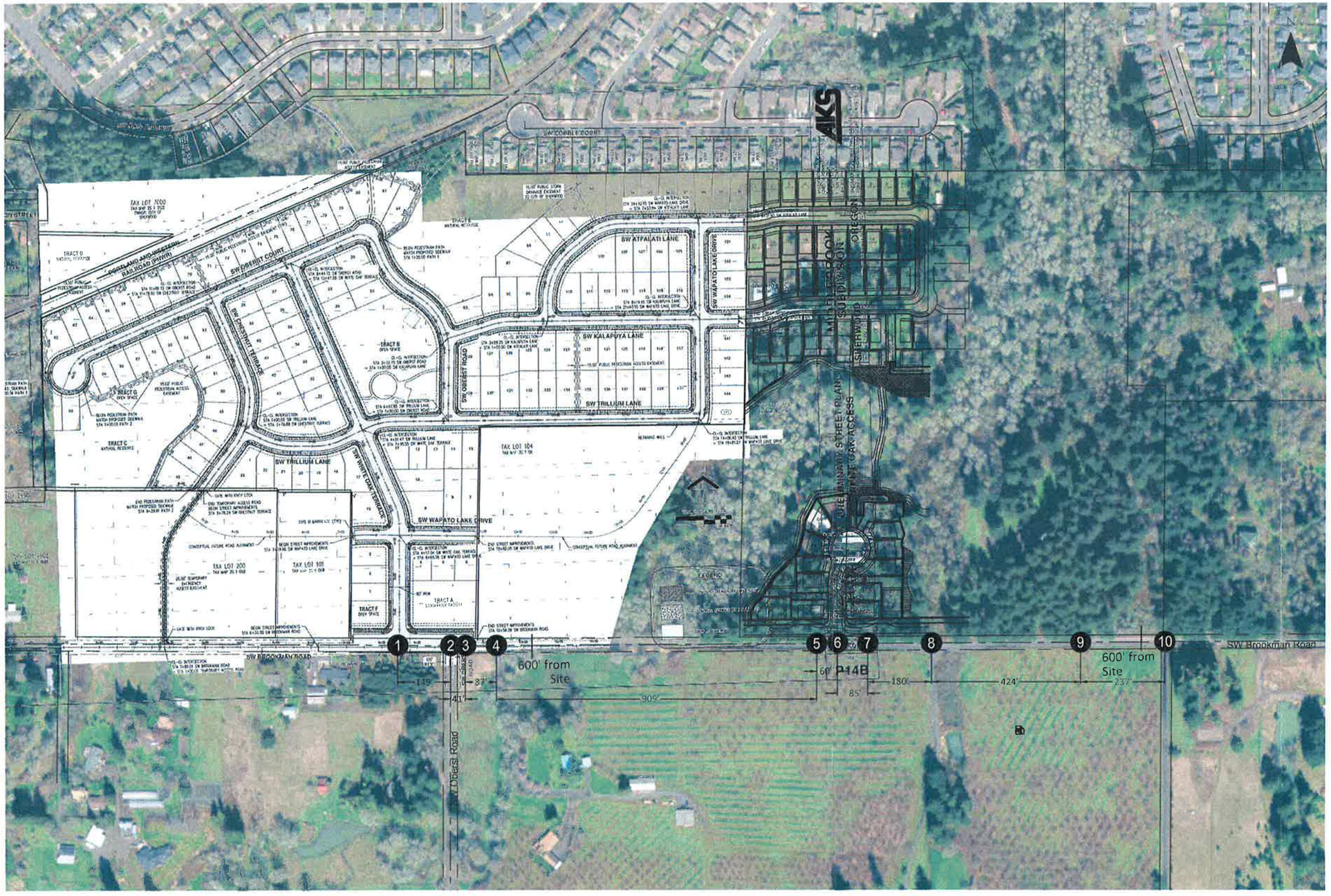
Middlebrook Shared Site Access (Study Intersection A)

The location of the proposed new connection to SW Brookman Road is situated west of the SW Oberst Road and was previously approved by both the City of Sherwood and Washington County. No additional analysis is required to support this access location.

The Reserve at Cedar Creek East Access (Study Intersection B)

The proposed eastern site access satisfies Washington County's minimum 600-foot spacing standard west of the site frontage along SW Brookman Road (the nearest driveway to the west is located over 900 feet away from Study Intersection B). The nearest driveway to the east of the access is located approximately 265 feet to the east, serving a single family home to the south (Driveway 8 on Figure 14)[4]. The next closest driveway is located over 600 feet to the east. Based on this review, the eastern proposed site access can satisfy the *Community Development Code* spacing requirements.

[4] Note that the existing site driveways identified as #5 and #7 in Figure 14 will be closed with the proposed development.



Influence Area Map
Sherwood, Oregon

Figure
14

Local Street Exception

Washington County previously approved the Middlebrook Shared Site Access (Study Intersection A). We expect the County will need to process an exception to allow the proposed eastern site access (Study Intersection B) local street connection to SW Brookman Road per CDC Section 501-8.5 which requires that direct access to arterials be from collector and other streets. Per the CDC 501-8.5, exceptions for local streets may be allowed through a Type II process when collector access is found to be unavailable and impracticable by the Director.

Support for granting the proposed local street connection is provided by multiple adopted documents guiding local area transportation needs. First, the City of Sherwood's adopted *Brookman Addition Concept Plan* (Reference 13) identifies only local street connections to SW Brookman Road in the area of the site. Further, the City's *Transportation System Plan* as well as the recently adopted minor amendments to the Transportation System Plan (Ordinance 2018-03) each show local street connections to SW Brookman Road along the site frontage as well as to the east and west. No planned north-south collector or arterial through the proposed site area is identified in any of the City's guiding documents. Considering the adopted planning documents and the creek crossing that would be required to connect the northern and southern portions of the site, the Washington County Director should make a determination that collector access is both unavailable and impracticable and that local access can be allowed as proposed in accordance with CDC 501-8.5. As noted above, the proposed local access (Study Intersection B) can satisfy County access spacing standards for SW Brookman Road.

QUEUING ASSESSMENT

A table summarizing the queueing assessment under all traffic scenarios is provided in Appendix D. Each location where the 95th percentile queue is projected to exceed storage under total traffic conditions is discussed below.

Highway 99W/SW Elwert Road-SW Sunset Boulevard (Study Intersection #1)

The 95th percentile queue for the eastbound left-turn and westbound left-turn at the signalized intersection of Highway 99W/SW Elwert Road-SW Sunset Boulevard are projected to exceed storage during the weekday AM and/or weekday PM peak hour.

Consistent with background conditions, the eastbound left-turn movement is projected to have a 95th percentile queue of 300 feet during the weekday AM peak hour, in excess of the 260 feet of storage planned for the intersection[5]. The proposed Reserve at Cedar Creek subdivision is not projected to add any trips to the eastbound left-turn.

[5] The analysis assumes the planned improvements at the intersection of Highway 99W/SW Elwert Road-SW Sunset Boulevard with the Sherwood High School project, including a second northbound left-turn lane, extended storage for the northbound and southbound left-turns, and exclusive eastbound and westbound left-turn lanes. In addition, the project relocated the intersection of SW Kruger Road and SW Elwert Road to provide additional storage on the eastbound approach to 99W.

The 95th percentile queue for the westbound left-turn is expected to exceed the proposed 185 feet of queue storage during both the weekday AM and PM peak hour under background and total traffic conditions. The increase in queue during the weekday AM peak hour is in part due to the interim RIRO restriction at Highway 99W and SW Brookman Road-SW Chapman Road, which is expected to add vehicles to the westbound left-turn movement. The site is projected to add 3 westbound left-turns (of a total projected westbound left-turn volume of 161) during the weekday AM peak hour and 1 during the weekday PM peak hour. Once the interim RIRO restriction is removed, the proposed residential development would not contribute any westbound left-turns to the intersection.

No mitigation is recommended at the Highway 99W/SW Elwert Road-SW Sunset Boulevard in conjunction with the proposed site development.

SW Woodhaven Drive/SW Sunset Boulevard (Study Intersection #2)

The 95th percentile queue for the southbound movement at the two-way stop-controlled intersection of SW Woodhaven Drive/SW Sunset Boulevard is projected to extend beyond the adjacent intersection of SW Fitch Drive during the weekday AM peak hour under background and total traffic conditions. No change in the queue is projected with site development. As illustrated in Exhibit 2, there is approximately 460 feet between the intersections.

Exhibit 2: SW Woodhaven Drive/SW Sunset Boulevard

The site is not projected to contribute any new trips of the projected 205 southbound approach traffic volumes during the weekday AM peak hour. The projected site-generated trips are expected to travel west and east along SW Sunset Boulevard to travel south on Highway 99W and to the site, given the RIRO restriction at Highway 99W and SW Brookman Road-SW Chapman Road. Once the interim RIRO restriction is removed, the proposed residential development would not contribute any trips to the intersection.

As previously documented in Table 6, it is recommended that the proposed development pay a proportional share contribution towards capacity mitigation of the SW Woodhaven Drive/SW Sunset Boulevard intersection. No additional mitigation beyond the proportional share payment is recommended.

SW Timbrel Lane/SW Sunset Boulevard (Study Intersection #3)

The 95th percentile queue for the northbound through/left-turn movement at the two-way stop-controlled intersection of SW Timbrel Lane/SW Sunset Boulevard is projected to extend beyond the adjacent intersection of SW Middleton Road during the weekday AM peak hour under both background and total traffic conditions. No change in queue length is projected with site development. As illustrated in Exhibit 3, there is approximately 215 feet between the intersections.

Exhibit 3: SW Timbrel Lane/SW Sunset Boulevard

The site is projected to contribute 3 of the projected 226 northbound left-turns during the weekday AM peak hour. The projected site-generated trips are expected to travel north on SW Middleton Road and west of SW Sunset Boulevard to travel south on Highway 99W, given the RIRO restriction at Highway 99W and SW Brookman Road-SW Chapman Road. Once the interim RIRO restriction is removed, the proposed residential development would not contribute any northbound left-turns to the intersection.

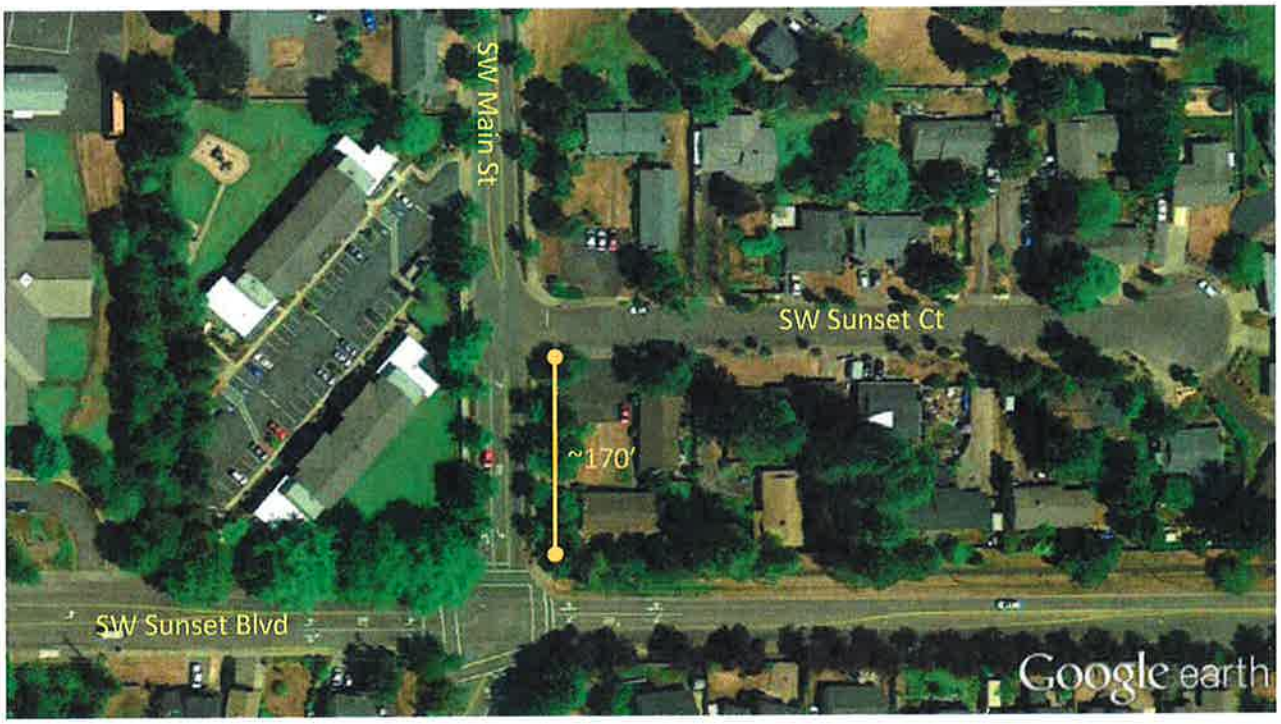
As previously documented in Table 6, it is recommended that the proposed development pay a proportional share contribution towards capacity mitigation of the SW Timbrel Lane/SW Sunset Boulevard intersection. No additional mitigation beyond the proportional share payment is recommended.

SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard (Study Intersection #4)

The 95th percentile queue for the southbound through/right-turn movement at the all-way stop-controlled intersection of SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard is projected to

extend beyond the adjacent intersection of SW Sunset Court (north of SW Sunset Boulevard) during the weekday PM peak hour under all scenarios studied. As illustrated in Exhibit 4, there is approximately 170 feet between the two intersections. The 95th percentile queue for the southbound through/right-turn during the weekday PM peak hour is projected to be 450 feet under both background and total traffic conditions. The site is anticipated to add 4 southbound vehicles to the intersection (of a total 453 southbound through and right-turns on the approach) over the course of the PM peak hour, having minimal impact to the queue. During the weekday PM peak hour, vehicles turning left from SW Sunset Court onto SW Main Street may experience incrementally longer delays waiting for a gap in traffic on SW Main Street as a result.

Exhibit 4: SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard



As previously documented in Table 6, it is recommended that the proposed development pay a proportional share contribution towards capacity mitigation of the SW Main Street/SW Sunset Boulevard intersection. No additional mitigation beyond the proportional share payment is recommended.

SW Baker Road-SW Murdock Road/SW Sunset Boulevard (Study Intersection #5)

The 95th percentile queue for the northbound movement at the all-way stop-controlled intersection of SW Baker Road-SW Murdock Road/SW Sunset Boulevard is projected to extend to adjacent intersection of SW Cornerstone Lane during the weekday PM peak hour under background and total traffic conditions. As illustrated in Exhibit 5, there is approximately 390 feet between the two intersections. The 95th percentile queue for the northbound approach during the weekday PM peak hour is projected to be 400 feet under both background and total traffic conditions. The site is anticipated to add 3

northbound left vehicles to the intersection (of a total 509 northbound vehicles on the approach) over the course of the weekday PM peak hour.

Exhibit 5: SW Baker Road-SW Murdock Road/SW Sunset Boulevard

As previously documented in Table 6, it is recommended that the proposed development pay a proportional share contribution towards capacity mitigation of the SW Baker Road-SW Murdock Road/SW Sunset Boulevard intersection. No additional mitigation beyond the proportional share payment is recommended.

Site Accesses/SW Brookman Road

Vehicle queuing conditions were assessed on the stop controlled approaches to both proposed site access connections to SW Brookwood Road as shown in Table 7. The queuing results indicate there will be adequate southbound queue storage at both proposed site access connections upon site development.

Table 7: Projected 95th Percentile Vehicle Queues for 2020 Total Traffic Conditions

	Intersection	Movement	Assumed Storage Length	Weekday AM Peak Queue	Weekday PM Peak Queue	Storage Adequate? (Yes/No)
A	Future Site Access/ SW Brookman Road	Southbound	250[1] feet	25 feet	<25 feet	Yes
B	Future Site Access/ SW Brookman Road	Southbound	50[2] feet	<25 feet	<25 feet	Yes

Queues rounded up to the nearest 25 feet
[1]Approximate distance to first internal intersection
[2]Anticipated distance to first on-site residential driveway

COMPLIANCE WITH REQUIREMENTS IN THE SHERWOOD MUNICIPAL CODE

Section 16.106.080 of the Sherwood Municipal Code outlines the purpose, applicability, requirements, and approval criteria for a traffic impact analysis. The approval criteria provided in 16.106.080F are listed below with specific application to the proposed development.

1. The analysis complies with the requirements of 16.106.080.C

   Per 16.106.080.C:

   - *A pre-application conference was held involving the City, Washington County and ODOT (on July 21, 2018)*
   - *This TIA has been prepared by an Oregon Registered Professional Engineer*
   - *The latest edition of the Trip Generation Manual (10th Edition) was used. Per direction from ODOT and the City, the average rate was used for the daily trip generation and the fitted curve equation for the weekday AM and PM peak hour trip generation.*
   - *Intersection-level analysis was conducted at 12 study intersections identified in coordination with City staff and based on historic traffic impact studies in the area. These study intersections were analyzed even though only the western shared site access (Study Intersection A) was impacted by 50 or more peak hour trips.*
   - *The Transportation Planning Rule is not applicable to a land division application, per OAR 660-012-0060.*

2. The analysis demonstrates that adequate transportation facilities exist to serve the proposed development or identifies mitigation measures that resolve identified traffic safety problems in a manner that is satisfactory to the City Engineer and, when County or State highway facilities are affected, to Washington County and ODOT.

   This study addresses the adequacy of the transportation facilities and recommends mitigation at the impacted intersections through payment of proportionate share contributions.

3. For affected non-highway facilities, the TIA demonstrates that mobility and other applicable performance standards established in the adopted City TSP have been met.

The City's mobility performance standards have been applied, as documented in this study.

4. Proposed public improvements are designed and will be constructed to the street standards specified in Section 16.106.010 and the Engineering Design Manual, and to the access standards in Section 16.106.040.

   The appropriate street and access standards will be applied to the development. The development plans will be subject to review and approval by the City.

5. Proposed public improvements and mitigation measures will provide safe connections across adjacent right-of-way (e.g., protected crossings) when pedestrian or bicycle facilities are present or planned on the far side of the right-of-way.

   The project will provide a sidewalk and pavement widening for a future bike lane along the site frontage on Brookman Road. Off-site bicycle and pedestrian facilities are expected to be constructed in conjunction with future off-site development by others consistent with County and City frontage improvement requirements.

FINDINGS AND RECOMMENDATIONS

Based on the results of the transportation impact analysis, the proposed subdivision can be developed while maintaining acceptable operations at the study intersections. The analysis developed the following findings and recommendations.

Findings

- All study intersection operations currently satisfy City, County, and ODOT standards.
- All future scenarios evaluated in this study assume implementation of right-turn only restrictions at the Highway 99W/SW Brookman Road-SW Chapman Road intersection in conjunction with the previously approved Middlebrook Residential Subdivision.
- The proposed residential development is estimated to generate approximately 538 daily trips, including 50 trips during the weekday AM peak hour and 60 weekday PM peak trips after accounting for the two existing detached single-family homes on the site.
- Under background and total traffic conditions, five of the study intersections were found to not operate in accordance with the applicable standards:
    - The signalized Highway 99W/SW Elwert Road-SW Sunset Boulevard intersection (study intersection #1) will continue to exceed ODOT's 0.99 V/C threshold during both the weekday AM and PM peak hours.
        - The site development impacts do not require mitigation per ODOT Policy Statement findings relative to the change in V/C ratio.

- The southbound approach V/C ratio at the stop-controlled SW Woodhaven Drive/SW Sunset Boulevard intersection (study intersection #2) is projected to exceed City V/C ratio standards during the weekday AM peak hour.
- The northbound approach V/C ratio at the stop-controlled SW Timbrel Lane/SW Sunset Boulevard intersection (study intersection #3) is projected to exceed City V/C ratio standards during the weekday AM peak hour.
- The southbound through/right lane V/C ratio at the all-way stop controlled SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard intersection (study intersection #4) is projected to exceed City V/C ratio standards during the weekday PM peak hour.
- The northbound approach V/C ratio at the all-way stop controlled SW Baker Road-SW Murdock Road/SW Sunset Boulevard intersection (study intersection #5) is projected to exceed City V/C ratio standards during the weekday PM peak hour.

- The proposed new east site access on SW Brookman Road can comply with the Washington County *Community Development Code* minimum access spacing requirements.
- The volume based criteria for providing an eastbound left-turn are satisfied under weekday PM total traffic conditions at Site Access A (shared Middlebrook Residential Subdivision Access).

Recommendations

Recommended transportation improvements to be implemented with site development include:

- With site development and subject to City review, pay a proportionate share contribution (estimated to be $106,947 in total) towards planned future improvements at the following study intersections:
  - Sunset Boulevard/Woodhaven Drive (study intersection #2): $19,849 toward the construction of a planned future traffic signal.
  - Sunset Boulevard/Timbrel Lane (study intersection #3): $14,858 toward the construction of a planned future mini-roundabout.
  - SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard (study intersection #4): $17,025 toward the construction of a planned future traffic signal.
  - SW Baker Road-SW Murdock Road/SW Sunset Boulevard (study intersection #5): $55,215 toward the construction of planned future north and southbound turn lanes.

- Coordinate with City of Sherwood and Washington County staff to assess the potential for constructing an eastbound left-turn lane at the west access (shared with Middlebrook Residential Subdivision) with site development and/or to pay a fee-in-lieu of the turn lane construction (with the fee intended to be used to construct the turn lane in conjunction with a future public road project).

We trust that this letter adequately documents the transportation impacts associated with the proposed development. Please contact us if you have any questions or comments regarding the contents of this letter or the analyses performed.

Sincerely,
KITTELSON & ASSOCIATES, INC.

Chris Brehmer, PE
Senior Principal Engineer

Julia Kuhn, PE
Senior Principal Engineer

Expires: 12-31-2019

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4-2-19

WASHINGTON COUNTY
LAND USE AND TRANSPORTATION
SURVEYOR'S OFFICE

SUBDIVISION PLAT NAMING

I request that the Washington County Surveyor's Office reserve the following subdivision name:

PROPOSED NAME OF SUBDIVISION:	~~Dale~~ RESERVE AT CEDAR CREEK
MAP AND TAX LOT NUMBER:	2S 1W 06 TL 100
CITY JURISDICTION (Which City?) or COUNTY JURISDICTION:	WASHINGTON COUNTY
SURVEYOR'S NAME: **PLS NUMBER:** **COMPANY NAME:**	DWAYNE KUFCHAK 75644 PIONEER DESIGN GROUP
OWNER'S NAME:	DAVID WEEKLEY HOMES

I understand that if the name is not used within five years, it will be automatically canceled.

Name of person reserving name: DWAYNE KUFCHAK
Company name: PIONEER DESIGN GROUP
Address: 9020 SW WASHINGTON SQUARE DR #170
Telephone number: 503 641 8286 (DIR) 971 708 6264
E-Mail: DKUFCHAK@PD-GRP.COM

Jean Dyer 4-2-19 Name added to SID ✓
Name approved *Date*
Washington County Surveyor's Office

155 North First Avenue, Suite 350, MS 15, Hillsboro, OR 97124 ***Phone: 503-846-8723***

Chicago Title
Company of Oregon

PRELIMINARY REPORT

In response to the application for a policy of title insurance referenced herein Chicago Title Company of Oregon hereby reports that it is prepared to issue, or cause to be issued, as of the specified date, a policy or policies of title insurance describing the land and the estate or interest hereinafter set forth, insuring against loss which may be sustained by reason of any defect, lien or encumbrance not shown or referred to as an exception herein or not excluded from coverage pursuant to the printed Schedules, Conditions and Stipulations or Conditions of said policy forms.

The printed Exceptions and Exclusions from the coverage of said policy or policies are set forth in Exhibit One. Copies of the policy forms should be read. They are available from the office which issued this report.

This report (and any supplements or amendments hereto) is issued solely for the purpose of facilitating the issuance of a policy of title insurance and no liability is assumed hereby.

The policy(s) of title insurance to be issued hereunder will be policy(s) of Chicago Title Insurance Company, a/an Florida corporation.

Please read the exceptions shown or referred to herein and the Exceptions and Exclusions set forth in Exhibit One of this report carefully. The Exceptions and Exclusions are meant to provide you with notice of matters which are not covered under the terms of the title insurance policy and should be carefully considered.

It is important to note that this preliminary report is not a written representation as to the condition of title and may not list all liens, defects and encumbrances affecting title to the land.

This preliminary report is for the exclusive use of the parties to the contemplated transaction, and the Company does not have any liability to any third parties nor any liability until the full premium is paid and a policy is issued. Until all necessary documents are placed of record, the Company reserves the right to amend or supplement this preliminary report.

Countersigned

Maggie Mercaf

Chicago Title
Company of Oregon
1500 NW Bethany Blvd., Ste 155, Beaverton, OR 97006
(503)973-7470 FAX (503)645-3457

PRELIMINARY REPORT

ESCROW OFFICER: Molly Kearney
Molly.Kearney@CTT.com
503-973-7521

ORDER NO.: 472518001475
Supplement 3

TITLE OFFICER: Deborah Noble

TO: Chicago Title Company of Oregon
1500 NW Bethany Blvd., Ste 155
Beaverton, OR 97006

ESCROW LICENSE NO.: 201004072
OWNER/SELLER: Gerald Ouellette and Liz Ouellette
BUYER/BORROWER: Weekley Homes, LLC
PROPERTY ADDRESS: 17045 S.W. Brookman Road, Sherwood, OR 97140

EFFECTIVE DATE: April 10, 2019, 08:00 AM

1. THE POLICY AND ENDORSEMENTS TO BE ISSUED AND THE RELATED CHARGES ARE:

	AMOUNT	PREMIUM
ALTA Standard Owner's Policy 2006	$ 4,500,000.00	$ 12,128.00
Owner's Extended		
OTIRO 209.1-06 - Covenants, Conditions and Restrictions - Unimproved Land (ALTA 9.1-06)		$ 1,000.00
OTIRO 217-06 - Access and Entry (ALTA 17-06)		$ 125.00
OTIRO 218-06 - Single Tax Parcel (ALTA 18-06)		$ 50.00
OTIRO 85 - Modification of Arbitration Provision		$ 50.00

2. THE ESTATE OR INTEREST IN THE LAND HEREINAFTER DESCRIBED OR REFERRED TO COVERED BY THIS REPORT IS:

   A Fee

3. TITLE TO SAID ESTATE OR INTEREST AT THE DATE HEREOF IS VESTED IN:

   Gerald J. Ouellette and Liz A. Ouellette, as tenants by the entirety

4. THE LAND REFERRED TO IN THIS REPORT IS SITUATED IN THE COUNTY OF WASHINGTON, STATE OF OREGON, AND IS DESCRIBED AS FOLLOWS:

   SEE EXHIBIT "A" ATTACHED HERETO AND MADE A PART HEREOF

EXHIBIT "A"
Legal Description

That portion of the North half of the Northeast one-quarter of Section 6, Township 3 South, Range 1 West of the Willamette Meridian, in the County of Washington and State of Oregon, described as follows:

Beginning at the Southwest corner of the North one-half of the Northeast one-quarter of said Section 6; thence East along the South line thereof, 1100 feet to the true place of beginning; thence East along said South line 228 feet; thence North parallel to the East line of said Section 6, a distance of 1320 feet; thence West along the North line of said Section 6, a distance of 528 feet; thence South parallel to the East line of said Section 6, a distance of 448.8 feet; thence East along a line parallel with the North line of said Section 6, a distance of 300 feet; thence South parallel to the East line of said Section 6, a distance of 871.2 feet to the true point of beginning.

AS OF THE DATE OF THIS REPORT, ITEMS TO BE CONSIDERED AND EXCEPTIONS TO COVERAGE IN ADDITION TO THE PRINTED EXCEPTIONS AND EXCLUSIONS IN THE POLICY FORM WOULD BE AS FOLLOWS:

GENERAL EXCEPTIONS:

1. Taxes or assessments which are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the Public Records; proceedings by a public agency which may result in taxes or assessments, or notices of such proceedings, whether or not shown by the records of such agency or by the Public Records.

2. Any facts, rights, interests or claims, which are not shown by the Public Records but which could be ascertained by an inspection of the Land or by making inquiry of persons in possession thereof.

3. Easements, or claims of easement, which are not shown by the Public Records; reservations or exceptions in patents or in Acts authorizing the issuance thereof; water rights, claims or title to water.

4. Any encroachment (of existing improvements located on the Land onto adjoining land or of existing improvements located on adjoining land onto the subject Land), encumbrance, violation, variation or adverse circumstance affecting the Title that would be disclosed by an accurate and complete land survey of the subject Land.

5. Any lien or right to a lien for services, labor, material, equipment rental or workers compensation heretofore or hereafter furnished, imposed by law and not shown by the Public Records.

SPECIFIC ITEMS AND EXCEPTIONS:

6. [Intentionally Deleted]

7. The Land has been classified as Forestland, as disclosed by the tax roll. If the Land becomes disqualified, said Land may be subject to additional taxes and/or penalties.

8. Rights of the public to any portion of the Land lying within S.W. Brookman Road.

9. Rights of the public and of governmental bodies in and to that portion of the premises herein described lying below the high water mark of Cedar Creek.

10. Waiver of Remonstrance and Consent to Local Improvement District:
Purpose: Customarily Commonly) accepted farm or forestry practices
Recording Date: March 28, 1990
Recording No.: 90-014838

11. Waiver of Remonstrance and Consent to Local Improvement District:
Purpose: Customarily Commonly) accepted farm or forestry practices
Recording Date: February 1, 1991
Recording No.: 91-005564

12. A Short Form Line of Credit Trust Deed to secure an indebtedness in the amount shown below,
Amount: $233,000.00
Dated: June 24, 2010
Grantor: Gerald Ouellette and Liz Ouellette, husband and wife
Trustee: U.S. Bank Trust Company, National Association
Beneficiary: U.S. Bank National Association ND
Recording Date: July 23, 2010
Recording No.: 2010-055882

The Deed of Trust set forth above is purported to be a "Credit Line" Deed of Trust. It is a requirement that the Grantor of said Deed of Trust provide written authorization to close said credit line account to the Lender when the Deed of Trust is being paid off through the Company or other Settlement/Escrow Agent or provide a satisfactory subordination of this Deed of Trust to the proposed Deed of Trust to be recorded at closing.

13. Facts, rights, interests or claims which are not shown by the public records but which could be ascertained by an inspection of the Land or by making inquiry of persons in possession thereof.

To remove this item, the Company will require an affidavit and indemnity on a form supplied by the Company.

14. Any lien or right to a lien for services, labor, material, equipment rental or workers compensation heretofore or hereafter furnished, imposed by law and not shown by the public records.

To remove this item, the Company will require an affidavit and indemnity on a form supplied by the Company.

15. Any encroachment (of existing improvements located on the subject Land onto adjoining land or of existing improvements located on adjoining land onto the subject Land), encumbrance, violation, variation or adverse circumstance affecting the title that would be disclosed by an accurate and complete land survey of the subject Land.

The Company will require an inspection of the premises, and this exception may be eliminated or limited as a result thereof.

16. [Intentionally Deleted]

ADDITIONAL REQUIREMENTS/NOTES:

A. Note: Property Taxes are paid in full

Fiscal Year: 2018-2019
Amount: $7,153.09
Levy Code: 088.14
Account No.: R586100
Map No.: 3S16-00100

Prior to close of escrow, please contact the Tax Collector's Office to confirm all amounts owing, including current fiscal year taxes, supplemental taxes, escaped assessments and any delinquencies.

B. Washington County imposes a transfer tax of $1.00 per $1,000 (or fraction thereof) of the selling price in a real estate transfer, unless the county approves an exemption application. Exemption criteria and applications are available at the county's website, see: http://www.co.washington.or.us/AssessmentTaxation/Recording/TransferTaxExemption/index.cfm.

C. NOTE: There are no matters against the party shown below which would appear as exceptions to coverage in a title insurance product:
Party: Weekley Homes, LLC, a Delaware limited liability company

D. NOTE: The Company will require the following documents for review prior to the issuance of any title insurance predicated upon a conveyance or encumbrance from the entity named below.
Limited Liability Company: Weekley Homes, LLC
a. A copy of its operating agreement, if any, and any and all amendments, supplements and/or modifications thereto, certified by the appropriate manager or member.
b. If a domestic Limited Liability Company, a copy of its Articles of Organization and all amendment thereto with the appropriate filing stamps.
c. If the Limited Liability Company is member-managed a full and complete current list of members certified by the appropriate manager or member.
d. A current dated certificate of good standing from the proper governmental authority of the state in which the entity was created
e. If less than all members, or managers, as appropriate, will be executing the closing documents, furnish evidence of the authority of those signing

The Company reserves the right to add additional items or make further requirements after review of the requested documentation.

E. In addition to the standard policy exceptions, the exceptions enumerated above shall appear on the final 2006 ALTA Policy unless removed prior to issuance.

F. NOTE: No utility search has been made or will be made for water, sewer or storm drainage charges unless the City/Service District claims them as liens (i.e. foreclosable) and reflects them on its lien docket as of the date of closing. Buyers should check with the appropriate city bureau or water service district and obtain a billing cutoff. Such charges must be adjusted outside of escrow.

G. NOTE: There are NO conveyances affecting said Land recorded within 24 months of the date of this report.

H. NOTE: Effective January 1, 2008, Oregon law (ORS 314.258) mandates withholding of Oregon income taxes from sellers who do not continue to be Oregon residents or qualify for an exemption. Please contact your Escrow Closer for further information.

I. THE FOLLOWING NOTICE IS REQUIRED BY STATE LAW: YOU WILL BE REVIEWING, APPROVING AND SIGNING IMPORTANT DOCUMENTS AT CLOSING. LEGAL CONSEQUENCES FOLLOW FROM THE SELECTION AND USE OF THESE DOCUMENTS. YOU MAY CONSULT AN ATTORNEY ABOUT THESE DOCUMENTS IF YOU HAVE QUESTIONS OR CONCERNS ABOUT THE TRANSACTION OR ABOUT THE DOCUMENTS. IF YOU WISH TO REVIEW TRANSACTION DOCUMENTS THAT YOU HAVE NOT SEEN, PLEASE CONTACT THE ESCROW AGENT.

J. NOTE: This map/plat is being furnished as an aid in locating the herein described Land in relation to adjoining streets, natural boundaries and other land. Except to the extent a policy of title insurance is expressly modified by endorsement, if any, the Company does not insure dimensions, distances or acreage shown thereon.

K. Recording Charge (Per Document) is the following:

County	First Page	Each Additional Page
Washington	$41.00	$5.00

NOTE: When possible the company will record electronically. An additional charge of $5.00 applies to each document that is recorded electronically.

L. NOTICE: Please be aware that due to the conflict between federal and state laws concerning the cultivation, distribution, manufacture or sale of marijuana, the Company is not able to close or insure any transaction involving Land that is associated with these activities.

EXHIBIT ONE

2006 AMERICAN LAND TITLE ASSOCIATION LOAN POLICY (06-17-06)
EXCLUSIONS FROM COVERAGE

The following matters are expressly excluded from the coverage of this policy and the Company will not pay loss or damage, costs, attorneys' fees or expenses that arise by reason of:

1. (a) Any law, ordinance or governmental regulation (including but not limited to building and zoning) restricting, regulating, prohibiting or relating to
   (i) the occupancy, use, or enjoyment of the Land;
   (ii) the character, dimensions or location of any improvement erected on the land;
   (iii) the subdivision of land; or
   (iv) environmental protection;
   or the effect of any violation of these laws, ordinances or governmental regulations. This Exclusion 1(a) does not modify or limit the coverage provided under Covered Risk 5.
   (b) Any governmental police power. This Exclusion 1(b) does not modify or limit the coverage provided under Covered Risk 6.
2. Rights of eminent domain. This Exclusion does not modify or limit the coverage provided under Covered Risk 7 or 8.
3. Defects, liens, encumbrances, adverse claims, or other matters
   (a) created, suffered, assumed or agreed to by the Insured Claimant;
   (b) not known to the Company, not recorded in the Public Records at Date of Policy, but known to the Insured Claimant and not disclosed in writing to the Company by the Insured Claimant prior to the date the Insured Claimant became an Insured under this policy;
   (c) resulting in no loss or damage to the Insured Claimant;
   (d) attaching or created subsequent to Date of Policy (however, this does not modify or limit the coverage provided under Covered Risk 11, 13, or 14); or
   (e) resulting in loss or damage that would not have been sustained if the Insured Claimant had paid value for the Insured Mortgage.
4. Unenforceability of the lien of the Insured Mortgage because of the inability or failure of an Insured to comply with the applicable doing-business laws of the state where the Land is situated.
5. Invalidity or unenforceability in whole or in part of the lien of the Insured Mortgage that arises out of the transaction evidenced by the Insured Mortgage and is based upon usury or any consumer credit protection or truth-in-lending law.
6. Any claim, by reason of the operation of federal bankruptcy, state insolvency or similar creditors' rights laws, that the transaction creating the lien of the Insured Mortgage, is
   (a) a fraudulent conveyance or fraudulent transfer, or
   (b) a preferential transfer for any reason not stated in the Covered Risk 13(b) of this policy.
7. Any lien on the Title for real estate taxes or assessments imposed by governmental authority and created or attaching between Date of Policy and the date of recording of the Insured Mortgage in the Public Records. This Exclusion does not modify or limit the coverage provided under Covered Risk 11(b).

The above policy form may be issued to afford either Standard Coverage or Extended Coverage. In addition to the above Exclusions from Coverage, the Exceptions from Coverage in a Standard Coverage policy will also include the following Exceptions from Coverage.

SCHEDULE B - GENERAL EXCEPTIONS FROM COVERAGE

This policy does not insure against loss or damage (and the Company will not pay costs, attorneys' fees or expenses) which arise by reason of:

1. Taxes or assessments which are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the Public Records; proceedings by a public agency which may result in taxes or assessments, or notices of such proceedings, whether or not shown by the records of such agency or by the Public Records.
2. Facts, rights, interests or claims which are not shown by the Public Records but which could be ascertained by an inspection of the Land or by making inquiry of persons in possession thereof.
3. Easements, or claims of easement, not shown by the Public Records; reservations or exceptions in patents or in Acts authorizing the issuance thereof, water rights, claims or title to water.
4. Any encroachment, encumbrance, violation, variation, or adverse circumstance affecting the Title that would be disclosed by an accurate and complete land survey of the Land. The term "encroachment" includes encroachments of existing improvements located on the Land onto adjoining land, and encroachments onto the Land of existing improvements located on adjoining land.
5. Any lien for services, labor or material heretofore or hereafter furnished, or for contributions due to the State of Oregon for unemployment compensation or worker's compensation, imposed by law and not shown by the Public Records.

2006 AMERICAN LAND TITLE ASSOCIATION OWNER'S POLICY (06-17-06)
EXCLUSIONS FROM COVERAGE

The following matters are expressly excluded from the coverage of this policy and the Company will not pay loss or damage, costs, attorneys' fees or expenses that arise by reason of:

1. (a) Any law, ordinance or governmental regulation (including but not limited to building and zoning) restricting, regulating, prohibiting or relating to
   (i) the occupancy, use, or enjoyment of the Land;
   (ii) the character, dimensions or location of any improvement erected on the land;
   (iii) the subdivision of land; or
   (iv) environmental protection;
   or the effect of any violation of these laws, ordinances or governmental regulations. This Exclusion 1(a) does not modify or limit the coverage provided under Covered Risk 5.
   (b) Any governmental police power. This Exclusion 1(b) does not modify or limit the coverage provided under Covered Risk 6.
2. Rights of eminent domain. This Exclusion does not modify or limit the coverage provided under Covered Risk 7 or 8.
3. Defects, liens, encumbrances, adverse claims, or other matters
   (a) created, suffered, assumed or agreed to by the Insured Claimant;
   (b) not known to the Company, not recorded in the Public Records at Date of Policy, but known to the Insured Claimant and not disclosed in writing to the Company by the Insured Claimant prior to the date the Insured Claimant became an Insured under this policy;
   (c) resulting in no loss or damage to the Insured Claimant;
   (d) attaching or created subsequent to Date of Policy (however, this does not modify or limit the coverage provided under Covered Risk 9 and 10); or
   (e) resulting in loss or damage that would not have been sustained if the Insured Claimant had paid value for the Title.
4. Any claim, by reason of the operation of federal bankruptcy, state insolvency or similar creditors' rights laws, that the transaction creating the lien of the Insured Mortgage, is
   (a) a fraudulent conveyance or fraudulent transfer, or
   (b) a preferential transfer for any reason not stated in the Covered Risk 9 of this policy.
7. Any lien on the Title for real estate taxes or assessments imposed by governmental authority and created or attaching between Date of Policy and the date of recording of the deed or other instrument of transfer in the Public Records that vests Title as shown in Schedule A.

The above policy form may be issued to afford either Standard Coverage or Extended Coverage. In addition to the above Exclusions from Coverage, the Exceptions from Coverage in a Standard Coverage policy will also include the following Exceptions from Coverage.

SCHEDULE B - GENERAL EXCEPTIONS FROM COVERAGE

This policy does not insure against loss or damage (and the Company will not pay costs, attorneys' fees or expenses) which arise by reason of:

1. Taxes or assessments which are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the Public Records; proceedings by a public agency which may result in taxes or assessments, or notices of such proceedings, whether or not shown by the records of such agency or by the Public Records.
2. Facts, rights, interests or claims which are not shown by the Public Records but which could be ascertained by an inspection of the Land or by making inquiry of persons in possession thereof.
3. Easements, or claims of easement, not shown by the Public Records; reservations or exceptions in patents or in Acts authorizing the issuance thereof, water rights, claims or title to water.
4. Any encroachment, encumbrance, violation, variation, or adverse circumstance affecting the Title that would be disclosed by an accurate and complete land survey of the Land. The term "encroachment" includes encroachments of existing improvements located on the Land onto adjoining land, and encroachments onto the Land of existing improvements located on adjoining land.
5. Any lien for services, labor or material heretofore or hereafter furnished, or for contributions due to the State of Oregon for unemployment compensation or worker's compensation, imposed by law and not shown by the Public Records.

WIRE SAFE™ | Inquire before you wire!

WIRE FRAUD ALERT

This Notice is not intended to provide legal or professional advice.
If you have any questions, please consult with a lawyer.

All parties to a real estate transaction are targets for wire fraud and many have lost hundreds of thousands of dollars because they simply relied on the wire instructions received via email, without further verification. **If funds are to be wired in conjunction with this real estate transaction, we strongly recommend verbal verification of wire instructions through a known, trusted phone number prior to sending funds.**

In addition, the following non-exclusive self-protection strategies are recommended to minimize exposure to possible wire fraud.

- **NEVER RELY** on emails purporting to change wire instructions. Parties to a transaction rarely change wire instructions in the course of a transaction.
- **ALWAYS VERIFY** wire instructions, specifically the ABA routing number and account number, by calling the party who sent the instructions to you. DO NOT use the phone number provided in the email containing the instructions, use phone numbers you have called before or can otherwise verify. **Obtain the number of relevant parties to the transaction as soon as an escrow account is opened.** DO NOT send an email to verify as the email address may be incorrect or the email may be intercepted by the fraudster.
- **USE COMPLEX EMAIL PASSWORDS** that employ a combination of mixed case, numbers, and symbols. Make your passwords greater than eight (8) characters. Also, change your password often and do NOT reuse the same password for other online accounts.
- **USE MULTI-FACTOR AUTHENTICATION** for email accounts. Your email provider or IT staff may have specific instructions on how to implement this feature.

For more information on wire-fraud scams or to report an incident, please refer to the following links:

Federal Bureau of Investigation:
http://www.fbi.gov

Internet Crime Complaint Center:
http://www.ic3.gov

FIDELITY NATIONAL FINANCIAL
PRIVACY NOTICE
Revised May 1, 2018

Fidelity National Financial, Inc. and its majority-owned subsidiary companies (collectively, "FNF", "our," or "we") respect and are committed to protecting your privacy. This Privacy Notice explains how we collect, use, and protect personal information, when and to whom we disclose such information, and the choices you have about the use and disclosure of that information.

Types of Information Collected
We may collect two types of information from you: Personal Information and Browsing Information.

Personal Information. FNF may collect the following categories of Personal Information:
- contact information (e.g., name, address, phone number, email address);
- demographic information (e.g., date of birth, gender, marital status);
- identity information (e.g. Social Security Number, driver's license, passport, or other government ID number);
- financial account information (e.g. loan or bank account information); and
- other personal information necessary to provide products or services to you.

Browsing Information. FNF may automatically collect the following types of Browsing Information when you access an FNF website, online service, or application (each an "FNF Website") from your Internet browser, computer, and/or mobile device:
- Internet Protocol (IP) address and operating system;
- browser version, language, and type;
- domain name system requests; and
- browsing history on the FNF Website, such as date and time of your visit to the FNF Website and visits to the pages within the FNF Website.

How Personal Information is Collected
We may collect Personal Information about you from:
- information we receive from you on applications or other forms;
- information about your transactions with FNF, our affiliates, or others; and
- information we receive from consumer reporting agencies and/or governmental entities, either directly from these entities or through others.

How Browsing Information is Collected
If you visit or use an FNF Website, Browsing Information may be collected during your visit. Like most websites, our servers automatically log each visitor to the FNF Website and may collect the Browsing Information described above. We use Browsing Information for system administration, troubleshooting, fraud investigation, and to improve our websites. Browsing Information generally does not reveal anything personal about you, though if you have created a user account for an FNF Website and are logged into that account, the FNF Website may be able to link certain browsing activity to your user account.

Other Online Specifics
Cookies. When you visit an FNF Website, a "cookie" may be sent to your computer. A cookie is a small piece of data that is sent to your Internet browser from a web server and stored on your computer's hard drive. Information gathered using cookies helps us improve your user experience. For example, a cookie can help the website load properly or can customize the display page based on your browser type and user preferences. You can choose whether or not to accept cookies by changing your Internet browser settings. Be aware that doing so may impair or limit some functionality of the FNF Website.

Web Beacons. We use web beacons to determine when and how many times a page has been viewed. This information is used to improve our websites.

Do Not Track. Currently our FNF Websites do not respond to "Do Not Track" features enabled through your browser.

Links to Other Sites. FNF Websites may contain links to other websites. FNF is not responsible for the privacy practices or the content of any of those other websites. We advise you to read the privacy policy of every website you visit.

Use of Personal Information

FNF uses Personal Information for three main purposes:

- To provide products and services to you or in connection with a transaction involving you.
- To improve our products and services.
- To communicate with you about our, our affiliates', and third parties' products and services, jointly or independently.

When Information Is Disclosed

We may make disclosures of your Personal Information and Browsing Information in the following circumstances:

- to enable us to detect or prevent criminal activity, fraud, material misrepresentation, or nondisclosure;
- to nonaffiliated service providers who provide or perform services or functions on our behalf and who agree to use the information only to provide such services or functions;
- to nonaffiliated third party service providers with whom we perform joint marketing, pursuant to an agreement with them to jointly market financial products or services to you;
- to law enforcement or authorities in connection with an investigation, or in response to a subpoena or court order; or
- in the good-faith belief that such disclosure is necessary to comply with legal process or applicable laws, or to protect the rights, property, or safety of FNF, its customers, or the public.

The law does not require your prior authorization and does not allow you to restrict the disclosures described above. Additionally, we may disclose your information to third parties for whom you have given us authorization or consent to make such disclosure. We do not otherwise share your Personal Information or Browsing Information with nonaffiliated third parties, except as required or permitted by law.

We reserve the right to transfer your Personal Information, Browsing Information, and any other information, in connection with the sale or other disposition of all or part of the FNF business and/or assets, or in the event of bankruptcy, reorganization, insolvency, receivership, or an assignment for the benefit of creditors. By submitting Personal Information and/or Browsing Information to FNF, you expressly agree and consent to the use and/or transfer of the foregoing information in connection with any of the above described proceedings.

Please see **"Choices With Your Information"** to learn the disclosures you can restrict.

Security of Your Information

We maintain physical, electronic, and procedural safeguards to guard your Personal Information. We limit access to nonpublic personal information about you to employees who need to know that information to do their job. When we provide Personal Information to others as discussed in this Privacy Notice, we expect that they process such information in compliance with our Privacy Notice and in compliance with applicable privacy laws.

Choices With Your Information

If you do not want FNF to share your information with our affiliates to directly market to you, you may send an "opt out" request by email, phone, or physical mail as directed at the end of this Privacy Notice. We do not share your Personal Information with nonaffiliates for their use to direct market to you.

Whether you submit Personal Information or Browsing Information to FNF is entirely up to you. If you decide not to submit Personal Information or Browsing Information, FNF may not be able to provide certain services or products to you.

For California Residents: We will not share your Personal Information or Browsing Information with nonaffiliated third parties, except as permitted by California law.

For Nevada Residents: You may be placed on our internal Do Not Call List by calling (888) 934-3354 or by contacting us via the information set forth at the end of this Privacy Notice. Nevada law requires that we also provide you with the following contact information: Bureau of Consumer Protection, Office of the Nevada Attorney General, 555 E. Washington St., Suite 3900, Las Vegas, NV 89101; Phone number: (702) 486-3132; email: BCPINFO@ag.state.nv.us.

For Oregon Residents: We will not share your Personal Information or Browsing Information with nonaffiliated third parties for marketing purposes, except after you have been informed by us of such sharing and had an opportunity to indicate that you do not want a disclosure made for marketing purposes.

For Vermont Residents: We will not disclose information about you creditworthiness to our affiliates and will not disclose your personal information, financial information, credit report, or health information to nonaffiliated third parties to market to you, other than as permitted by Vermont law, unless you authorize us to make those disclosures.

Information From Children

The FNF Websites are meant for adults and are not intended or designed to attract persons under the age of eighteen (18). We do not collect Personal Information from any person that we know to be under the age of thirteen (13) without permission from a parent or guardian.

International Users

FNF's headquarters is located within the United States. If you reside outside the United States and choose to provide Personal Information or Browsing Information to us, please note that we may transfer that information outside of your country of residence for any of the purposes described in this Privacy Notice. By providing FNF with your Personal Information and/or Browsing Information, you consent to our collection, transfer, and use of such information in accordance with this Privacy Notice.

FNF Website Services for Mortgage Loans

Certain FNF companies provide services to mortgage loan servicers, including hosting websites that collect customer information on behalf of mortgage loan servicers (the "Service Websites"). The Service Websites may contain links to both this Privacy Notice and the mortgage loan servicer or lender's privacy notice. The sections of this Privacy Notice titled When Information is Disclosed, Choices with Your Information, and Accessing and Correcting Information do not apply to the Service Websites. The mortgage loan servicer or lender's privacy notice governs use, disclosure, and access to your Personal Information. FNF does not share Personal Information collected through the Service Websites, except (1) as required or authorized by contract with the mortgage loan servicer or lender, or (2) as required by law or in the good-faith belief that such disclosure is necessary to comply with a legal process or applicable law, to enforce this Privacy Notice, or to protect the rights, property, or safety of FNF or the public.

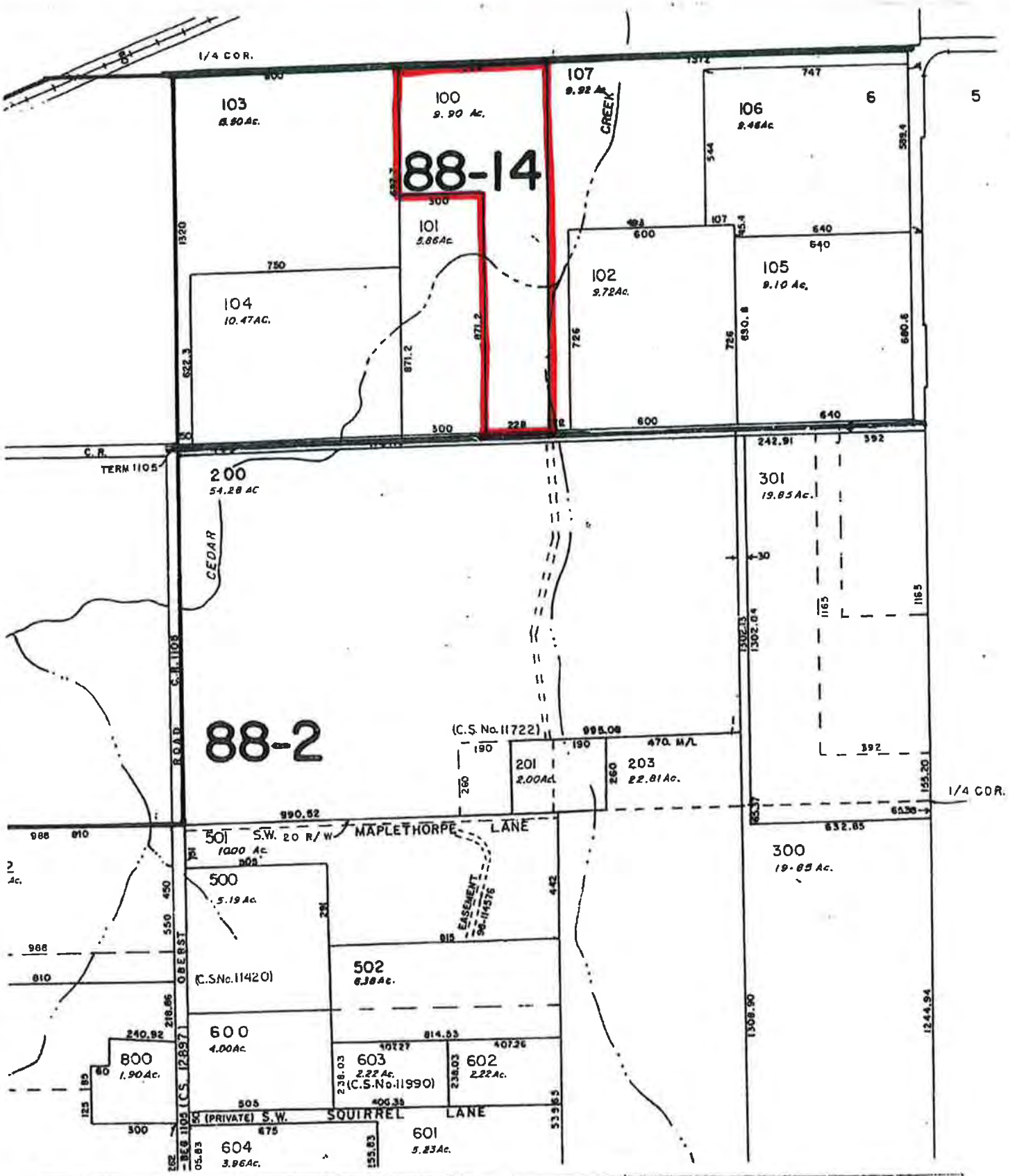
Your Consent To This Privacy Notice; Notice Changes

By submitting Personal Information and/or Browsing Information to FNF, you consent to the collection and use of the information in accordance with this Privacy Notice. We may change this Privacy Notice at any time. The revised Privacy Notice, showing the new revision date, will be posted on the FNF Website. Each time you provide information to us following any amendment of this Privacy Notice, your provision of information to us will signify your assent to and acceptance of the terms of the revised Privacy Notice for all previously collected information and information collected from you in the future. We may use comments, information or feedback that you submit to us in any manner that we may choose without notice or compensation to you.

Accessing and Correcting Information; Contact Us

If you have questions, would like to access or correct your Personal Information, or want to opt-out of information sharing for affiliate marketing, send your requests via email to privacy@fnf.com, by phone to (888) 934-3354, or by mail to:

Fidelity National Financial, Inc.
601 Riverside Avenue,
Jacksonville, Florida 32204
Attn: Chief Privacy Officer



This map has been copied from the public records and is provided solely for the purpose of assisting in locating the premises. No liabilities are assumed for inaccuracies contained herein or for variations, if any, in dimensions, area or location of the premises or the location of improvements ascertained by actual survey.

SOBIEV7

OREGON TITLE Insurance Company

After Recording, Return to:
Gerald and Liz Ouellette
17045 SW Brookman Road
Sherwood, OR 97140

Until a change is requested, tax statements shall be sent to the following address:

SAME AS ABOVE

STATE OF OREGON } SS
County of Washington

I, Jerry R. Hanson, Director of Assessment and Taxation and Ex-Officio County Clerk for said county, do hereby certify that the within instrument of writing was received and recorded in book of records of said county.

Jerry R. Hanson, Director of Assessment and Taxation, Ex-Officio County Clerk

Doc : 98103799
Rect: 217156 36.00
09/18/1998 02:30:14pm

SEP 1 8 1998

OREGON TITLE INS. CO. 128795W

STATUTORY BARGAIN AND SALE DEED
(Individual)

(Above Space Reserved for Recorder's Use)

Gerald J Ouellette, Liz A Ouellette and Rosemary Rubsam

conveys to
Gerald J Ouellette and Liz A Ouellette, as tenants by the entirety

the following described real property in the State of Oregon and County of Washington :

That portion of the North half of the Northeast quarter of Section 6, Township 3 South, Range 1 West of the Willamette Meridian, in the County of Washington and State of Oregon, described as follows:

BEGINNING at the Southwest corner of the North half of the Northeast quarter of said Section 6; thence East along the South line there, 1100 feet to the true place of beginning; thence East along said South line 228 feet; thence North parallel to the East line of said Section 6, a distance of 1320 feet; thence West along the North line of said Section 6, a distance of 528 feet; thence South parallel to the East line of said Section 6, a distance of 448.8 feet; thence East along a line parallel with the North line of said Section 6, a distance of 300 feet; thence South parallel to the East line of said Section 6, a distance of 871.2 feet to the true point of beginning.

Tax Account Number(s): R586100

The true consideration for this conveyance is $0.00

THIS INSTRUMENT WILL NOT ALLOW USE OF THE PROPERTY DESCRIBED IN THIS INSTRUMENT IN VIOLATION OF APPLICABLE LAND USE LAWS AND REGULATIONS. BEFORE SIGNING OR ACCEPTING THIS INSTRUMENT, THE PERSON ACQUIRING FEE TITLE TO THE PROPERTY SHOULD CHECK WITH THE APPROPRIATE CITY OR COUNTY PLANNING DEPARTMENT TO VERIFY APPROVED USES AND TO DETERMINE ANY LIMITS ON LAWSUITS AGAINST FARMING OR FOREST PRACTICES AS DEFINED IN ORS 30.930.

DATED this 14 day of September, 1998.

Gerald J Ouellette

Liz A Ouellette

Rosemary Rubsam

(Continued)

Order No.: 128795w

1-2

STATUTORY BARGAIN AND SALE DEED
(CONTINUED)

ACKNOWLEDGEMENTS (Continued) Order No.: 128795w

SEP 1 8 1998

STATE OF OREGON, COUNTY OF)ss.
The foregoing instrument was acknowledged before me this 14 day of September by Gerald J Ouellette and Liz A Ouellette.

Laura J Weber
Notary Public for Oregon
My Commission Expires:

OFFICIAL SEAL
LAURA J. WEBER
NOTARY PUBLIC-OREGON
COMMISSION NO. 058165
MY COMMISSION EXPIRES OCT 2, 2000

STATE OF OREGON, COUNTY OF)ss.
The foregoing instrument was acknowledged before me this 14 day of September 1998 by Rosemary Rubsam.

Laura J Weber
Notary Public for Oregon
My Commission Expires:

OFFICIAL SEAL
LAURA J. WEBER
NOTARY PUBLIC-OREGON
COMMISSION NO. 058165
MY COMMISSION EXPIRES OCT 2, 2000

2

Chicago Title
Company of Oregon

PRELIMINARY REPORT

In response to the application for a policy of title insurance referenced herein Chicago Title Company of Oregon hereby reports that it is prepared to issue, or cause to be issued, as of the specified date, a policy or policies of title insurance describing the land and the estate or interest hereinafter set forth, insuring against loss which may be sustained by reason of any defect, lien or encumbrance not shown or referred to as an exception herein or not excluded from coverage pursuant to the printed Schedules, Conditions and Stipulations or Conditions of said policy forms.

The printed Exceptions and Exclusions from the coverage of said policy or policies are set forth in Exhibit One. Copies of the policy forms should be read. They are available from the office which issued this report.

This report (and any supplements or amendments hereto) is issued solely for the purpose of facilitating the issuance of a policy of title insurance and no liability is assumed hereby.

The policy(s) of title insurance to be issued hereunder will be policy(s) of Chicago Title Insurance Company, a/an Florida corporation.

Please read the exceptions shown or referred to herein and the Exceptions and Exclusions set forth in Exhibit One of this report carefully. The Exceptions and Exclusions are meant to provide you with notice of matters which are not covered under the terms of the title insurance policy and should be carefully considered.

It is important to note that this preliminary report is not a written representation as to the condition of title and may not list all liens, defects and encumbrances affecting title to the land.

This preliminary report is for the exclusive use of the parties to the contemplated transaction, and the Company does not have any liability to any third parties nor any liability until the full premium is paid and a policy is issued. Until all necessary documents are placed of record, the Company reserves the right to amend or supplement this preliminary report.

Countersigned

Maggie Metcalf

Chicago Title
Company of Oregon
1433 SW 6th Avenue, Portland, OR 97201
(503)646-4444 FAX (503)469-4198

PRELIMINARY REPORT

TITLE OFFICER: Kevin Kimball **ORDER NO.:** 472519001911

TO: Chicago Title Insurance Company
Zachary Taylor
10151 SE Sunnyside Road, Ste 300
Clackamas, OR 97015

OWNER/SELLER: Bonnie J. David

BUYER/BORROWER: TBD

PROPERTY ADDRESS: 17117 SW Brookman Road, Sherwood, OR 97140

EFFECTIVE DATE: April 11, 2019, 12:00 AM

1. THE POLICY AND ENDORSEMENTS TO BE ISSUED AND THE RELATED CHARGES ARE:

	AMOUNT	PREMIUM
	$ TBD	$ TBD
Owner's Standard		
Government Lien Search		$ 25.00

2. THE ESTATE OR INTEREST IN THE LAND HEREINAFTER DESCRIBED OR REFERRED TO COVERED BY THIS REPORT IS:

   A Fee

3. TITLE TO SAID ESTATE OR INTEREST AT THE DATE HEREOF IS VESTED IN:

   Bonnie J. David

4. THE LAND REFERRED TO IN THIS REPORT IS SITUATED IN THE CITY OF SHERWOOD, COUNTY OF WASHINGTON, STATE OF OREGON, AND IS DESCRIBED AS FOLLOWS:

   SEE EXHIBIT "A" ATTACHED HERETO AND MADE A PART HEREOF

EXHIBIT "A"

Legal Description

A tract of land situated in Section 6, Township 3 South, Range 1 West of the Willamette Meridian, in the City of Sherwood, Washington County, Oregon, more particularly described as follows, to-wit:

Beginning at the Southwest corner of that certain tract described in deed to Charles H. Hays recorded in Book 124, Page 444, Deed Records of Washington County, Oregon, being also the Southwest corner of the North one-half of the Northeast quarter of said Section 6; thence East along the South line thereof, 800 feet to the true point of beginning of the tract herein described; thence East along said South line 300 feet to a point; thence North and parallel with the West line of the Northeast quarter of said Section 6 a distance of 871.2 feet to a point; thence West and parallel with North line of said Section 6 a distance of 300 feet to a point; thence South and parallel with said West line, 871.2 feet to the true point of beginning.

AS OF THE DATE OF THIS REPORT, ITEMS TO BE CONSIDERED AND EXCEPTIONS TO COVERAGE IN ADDITION TO THE PRINTED EXCEPTIONS AND EXCLUSIONS IN THE POLICY FORM WOULD BE AS FOLLOWS:

GENERAL EXCEPTIONS:

1. Taxes or assessments which are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the Public Records; proceedings by a public agency which may result in taxes or assessments, or notices of such proceedings, whether or not shown by the records of such agency or by the Public Records.

2. Any facts, rights, interests or claims, which are not shown by the Public Records but which could be ascertained by an inspection of the Land or which may be asserted by persons in possession thereof.

3. Easements, or claims thereof, which are not shown by the Public Records; reservations or exceptions in patents or in Acts authorizing the issuance thereof; water rights, claims or title to water.

4. Any encroachment, encumbrance, violation, variation or adverse circumstance affecting the Title that would be disclosed by an accurate and complete land survey of the Land and not shown by the Public Records. The term "encroachment" includes encroachments of existing improvements located on the Land onto adjoining land, and encroachments onto the Land of existing improvements located on adjoining land.

5. Any lien, or right to a lien, for services, labor, material or equipment rental, or for contributions due to the State of Oregon for unemployment compensation or worker's compensation, heretofore or hereafter furnished, imposed by law and not shown by the Public Records.

SPECIFIC ITEMS AND EXCEPTIONS:

6. City Liens, if any, in favor of the City of Sherwood.

7. The Land has been classified as Forestland, as disclosed by the tax roll. If the Land becomes disqualified, said Land may be subject to additional taxes and/or penalties.

8. Any adverse claim based upon the assertion that:

   a) Some portion of said Land has been created by artificial means, or has accreted to such portion so created.

   b) Some portion of said Land has been brought within the boundaries thereof by an avulsive movement of Cedar Creek or has been formed by accretion to any such portion.

9. Rights and easements for navigation and fishery which may exist over that portion of said Land lying beneath the waters of Cedar Creek.

10. Rights of the public to any portion of the Land lying within the area commonly known as SW Brookman Road.

11. Please be advised that our search did not disclose any open Deeds of Trust of record. If you should have knowledge of any outstanding obligation, please contact the Title Department immediately for further review prior to closing.

12. If requested to issue an extended coverage ALTA loan policy, the following matters must be addressed:

a) The rights of tenants holding under unrecorded leases or tenancies
b) Matters disclosed by a statement as to parties in possession and as to any construction, alterations or repairs to the Land within the last 75 days. The Company must be notified in the event that any funds are to be used for construction, alterations or repairs.
c) Any facts which would be disclosed by an accurate survey of the Land

ADDITIONAL REQUIREMENTS/NOTES:

A. Note: Property taxes for the fiscal year shown below are paid in full.

Fiscal Year:	2018-2019
Amount:	$6,090.72
Levy Code:	088.14
Account No.:	R586119
Map No.:	3S16-00101

Prior to close of escrow, please contact the Tax Collector's Office to confirm all amounts owing, including current fiscal year taxes, supplemental taxes, escaped assessments and any delinquencies.

B. Washington County imposes a transfer tax of $1.00 per $1,000 (or fraction thereof) of the selling price in a real estate transfer, unless the county approves an exemption application. Exemption criteria and applications are available at the county's website, see: http://www.co.washington.or.us/AssessmentTaxation/Recording/TransferTaxExemption/index.cfm.

C. Note: The name(s) of the proposed insured(s) furnished with this application for title insurance is/are:

No names were furnished with the application. Please provide the name(s) of the buyers as soon as possible.

D. Note: No utility search has been made or will be made for water, sewer or storm drainage charges unless the City/Service District claims them as liens (i.e. foreclosable) and reflects them on its lien docket as of the date of closing. Buyers should check with the appropriate city bureau or water service district and obtain a billing cutoff. Such charges must be adjusted outside of escrow.

E. Notice: Please be aware that due to the conflict between federal and state laws concerning the cultivation, distribution, manufacture or sale of marijuana, the Company is not able to close or insure any transaction involving Land that is associated with these activities.

F. Recording Charge (Per Document) is the following:

County	First Page	Each Additional Page
Multnomah	$82.00	$5.00
Washington	$81.00	$5.00
Clackamas	$93.00	$5.00
Yamhill	$81.00	$5.00

Note: When possible the company will record electronically. An additional charge of $5.00 applies to each document that is recorded electronically.

G. In addition to the standard policy exceptions, the exceptions enumerated above shall appear on the final 2006 ALTA Policy unless removed prior to issuance.

H. THE FOLLOWING NOTICE IS REQUIRED BY STATE LAW: YOU WILL BE REVIEWING, APPROVING AND SIGNING IMPORTANT DOCUMENTS AT CLOSING. LEGAL CONSEQUENCES FOLLOW FROM THE SELECTION AND USE OF THESE DOCUMENTS. YOU MAY CONSULT AN ATTORNEY ABOUT THESE DOCUMENTS. YOU SHOULD CONSULT AN ATTORNEY IF YOU HAVE QUESTIONS OR CONCERNS ABOUT THE TRANSACTION OR ABOUT THE DOCUMENTS. IF YOU WISH TO REVIEW TRANSACTION DOCUMENTS THAT YOU HAVE NOT SEEN, PLEASE CONTACT THE ESCROW AGENT.

I. Note: This map/plat is being furnished as an aid in locating the herein described Land in relation to adjoining streets, natural boundaries and other land. Except to the extent a policy of title insurance is expressly modified by endorsement, if any, the Company does not insure dimensions, distances or acreage shown thereon.

EXHIBIT ONE

2006 AMERICAN LAND TITLE ASSOCIATION LOAN POLICY (06-17-06)
EXCLUSIONS FROM COVERAGE

The following matters are expressly excluded from the coverage of this policy and the Company will not pay loss or damage, costs, attorneys' fees or expenses that arise by reason of:

1. (a) Any law, ordinance or governmental regulation (including but not limited to building and zoning) restricting, regulating, prohibiting or relating to
   (i) the occupancy, use, or enjoyment of the Land;
   (ii) the character, dimensions or location of any improvement erected on the land;
   (iii) the subdivision of land; or
   (iv) environmental protection;
   or the effect of any violation of these laws, ordinances or governmental regulations. This Exclusion 1(a) does not modify or limit the coverage provided under Covered Risk 5.
   (b) Any governmental police power. This Exclusion 1(b) does not modify or limit the coverage provided under Covered Risk 6.
2. Rights of eminent domain. This Exclusion does not modify or limit the coverage provided under Covered Risk 7 or 8.
3. Defects, liens, encumbrances, adverse claims, or other matters
   (a) created, suffered, assumed or agreed to by the Insured Claimant;
   (b) not known to the Company, not recorded in the Public Records at Date of Policy, but known to the Insured Claimant and not disclosed in writing to the Company by the Insured Claimant prior to the date the Insured Claimant became an Insured under this policy;
   (c) resulting in no loss or damage to the Insured Claimant;
   (d) attaching or created subsequent to Date of Policy (however, this does not modify or limit the coverage provided under Covered Risk 11, 13, or 14); or
   (e) resulting in loss or damage that would not have been sustained if the Insured Claimant had paid value for the Insured Mortgage.
4. Unenforceability of the lien of the Insured Mortgage because of the inability or failure of an Insured to comply with the applicable doing-business laws of the state where the Land is situated.
5. Invalidity or unenforceability in whole or in part of the lien of the Insured Mortgage that arises out of the transaction evidenced by the Insured Mortgage and is based upon usury or any consumer credit protection or truth-in-lending law.
6. Any claim, by reason of the operation of federal bankruptcy, state insolvency or similar creditors' rights laws, that the transaction creating the lien of the Insured Mortgage, is
   (a) a fraudulent conveyance or fraudulent transfer, or
   (b) a preferential transfer for any reason not stated in the Covered Risk 13(b) of this policy.
7. Any lien on the Title for real estate taxes or assessments imposed by governmental authority and created or attaching between Date of Policy and the date of recording of the Insured Mortgage in the Public Records. This Exclusion does not modify or limit the coverage provided under Covered Risk 11(b).

The above policy form may be issued to afford either Standard Coverage or Extended Coverage. In addition to the above Exclusions from Coverage, the Exceptions from Coverage in a Standard Coverage policy will also include the following Exceptions from Coverage.

SCHEDULE B - GENERAL EXCEPTIONS FROM COVERAGE

This policy does not insure against loss or damage (and the Company will not pay costs, attorneys' fees or expenses) which arise by reason of:

1. Taxes or assessments which are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the Public Records; proceedings by a public agency which may result in taxes or assessments, or notices of such proceedings, whether or not shown by the records of such agency or by the Public Records.
2. Facts, rights, interests or claims which are not shown by the Public Records but which could be ascertained by an inspection of the Land or by making inquiry of persons in possession thereof.
3. Easements, or claims of easement, not shown by the Public Records; reservations or exceptions in patents or in Acts authorizing the issuance thereof; water rights, claims or title to water.
4. Any encroachment, encumbrance, violation, variation, or adverse circumstance affecting the Title that would be disclosed by an accurate and complete land survey of the Land. The term "encroachment" includes encroachments of existing improvements located on the Land onto adjoining land, and encroachments onto the Land of existing improvements located on adjoining land.
5. Any lien for services, labor or material heretofore or hereafter furnished, or for contributions due to the State of Oregon for unemployment compensation or worker's compensation, imposed by law and not shown by the Public Records.

2006 AMERICAN LAND TITLE ASSOCIATION OWNER'S POLICY (06-17-06)
EXCLUSIONS FROM COVERAGE

The following matters are expressly excluded from the coverage of this policy and the Company will not pay loss or damage, costs, attorneys' fees or expenses that arise by reason of:

1. (a) Any law, ordinance or governmental regulation (including but not limited to building and zoning) restricting, regulating, prohibiting or relating to
   (i) the occupancy, use, or enjoyment of the Land;
   (ii) the character, dimensions or location of any improvement erected on the land;
   (iii) the subdivision of land; or
   (iv) environmental protection;
   or the effect of any violation of these laws, ordinances or governmental regulations. This Exclusion 1(a) does not modify or limit the coverage provided under Covered Risk 5.
   (b) Any governmental police power. This Exclusion 1(b) does not modify or limit the coverage provided under Covered Risk 6.
2. Rights of eminent domain. This Exclusion does not modify or limit the coverage provided under Covered Risk 7 or 8.
3. Defects, liens, encumbrances, adverse claims, or other matters
   (a) created, suffered, assumed or agreed to by the Insured Claimant;
   (b) not known to the Company, not recorded in the Public Records at Date of Policy, but known to the Insured Claimant and not disclosed in writing to the Company by the Insured Claimant prior to the date the Insured Claimant became an Insured under this policy;
   (c) resulting in no loss or damage to the Insured Claimant;
   (d) attaching or created subsequent to Date of Policy (however, this does not modify or limit the coverage provided under Covered Risk 9 and 10); or
   (e) resulting in loss or damage that would not have been sustained if the Insured Claimant had paid value for the Title.
4. Any claim, by reason of the operation of federal bankruptcy, state insolvency or similar creditors' rights laws, that the transaction creating the lien of the Insured Mortgage, is
   (a) a fraudulent conveyance or fraudulent transfer, or
   (b) a preferential transfer for any reason not stated in the Covered Risk 9 of this policy.
7. Any lien on the Title for real estate taxes or assessments imposed by governmental authority and created or attaching between Date of Policy and the date of recording of the deed or other instrument of transfer in the Public Records that vests Title as shown in Schedule A.

The above policy form may be issued to afford either Standard Coverage or Extended Coverage. In addition to the above Exclusions from Coverage, the Exceptions from Coverage in a Standard Coverage policy will also include the following Exceptions from Coverage.

SCHEDULE B - GENERAL EXCEPTIONS FROM COVERAGE

This policy does not insure against loss or damage (and the Company will not pay costs, attorneys' fees or expenses) which arise by reason of:

1. Taxes or assessments which are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the Public Records; proceedings by a public agency which may result in taxes or assessments, or notices of such proceedings, whether or not shown by the records of such agency or by the Public Records.
2. Facts, rights, interests or claims which are not shown by the Public Records but which could be ascertained by an inspection of the Land or by making inquiry of persons in possession thereof.
3. Easements, or claims of easement, not shown by the Public Records; reservations or exceptions in patents or in Acts authorizing the issuance thereof; water rights, claims or title to water.
4. Any encroachment, encumbrance, violation, variation, or adverse circumstance affecting the Title that would be disclosed by an accurate and complete land survey of the Land. The term "encroachment" includes encroachments of existing improvements located on the Land onto adjoining land, and encroachments onto the Land of existing improvements located on adjoining land.
5. Any lien for services, labor or material heretofore or hereafter furnished, or for contributions due to the State of Oregon for unemployment compensation or worker's compensation, imposed by law and not shown by the Public Records.

WIRE SAFE™ | Inquire before you wire!

WIRE FRAUD ALERT

This Notice is not intended to provide legal or professional advice.
If you have any questions, please consult with a lawyer.

All parties to a real estate transaction are targets for wire fraud and many have lost hundreds of thousands of dollars because they simply relied on the wire instructions received via email, without further verification. **If funds are to be wired in conjunction with this real estate transaction, we strongly recommend verbal verification of wire instructions through a known, trusted phone number prior to sending funds.**

In addition, the following non-exclusive self-protection strategies are recommended to minimize exposure to possible wire fraud.

- **NEVER RELY** on emails purporting to change wire instructions. Parties to a transaction rarely change wire instructions in the course of a transaction.
- **ALWAYS VERIFY** wire instructions, specifically the ABA routing number and account number, by calling the party who sent the instructions to you. DO NOT use the phone number provided in the email containing the instructions, use phone numbers you have called before or can otherwise verify. **Obtain the number of relevant parties to the transaction as soon as an escrow account is opened.** DO NOT send an email to verify as the email address may be incorrect or the email may be intercepted by the fraudster.
- **USE COMPLEX EMAIL PASSWORDS** that employ a combination of mixed case, numbers, and symbols. Make your passwords greater than eight (8) characters. Also, change your password often and do NOT reuse the same password for other online accounts.
- **USE MULTI-FACTOR AUTHENTICATION** for email accounts. Your email provider or IT staff may have specific instructions on how to implement this feature.

For more information on wire-fraud scams or to report an incident, please refer to the following links:

Federal Bureau of Investigation:
http://www.fbi.gov

Internet Crime Complaint Center:
http://www.ic3.gov

FIDELITY NATIONAL FINANCIAL
PRIVACY NOTICE
Revised May 1, 2018

Fidelity National Financial, Inc. and its majority-owned subsidiary companies (collectively, "FNF", "our," or "we") respect and are committed to protecting your privacy. This Privacy Notice explains how we collect, use, and protect personal information, when and to whom we disclose such information, and the choices you have about the use and disclosure of that information.

Types of Information Collected

We may collect two types of information from you: Personal Information and Browsing Information.

Personal Information. FNF may collect the following categories of Personal Information:

- contact information (e.g., name, address, phone number, email address);
- demographic information (e.g., date of birth, gender, marital status);
- identity information (e.g. Social Security Number, driver's license, passport, or other government ID number);
- financial account information (e.g. loan or bank account information); and
- other personal information necessary to provide products or services to you.

Browsing Information. FNF may automatically collect the following types of Browsing Information when you access an FNF website, online service, or application (each an "FNF Website") from your Internet browser, computer, and/or mobile device:

- Internet Protocol (IP) address and operating system;
- browser version, language, and type;
- domain name system requests; and
- browsing history on the FNF Website, such as date and time of your visit to the FNF Website and visits to the pages within the FNF Website.

How Personal Information is Collected

We may collect Personal Information about you from:

- information we receive from you on applications or other forms;
- information about your transactions with FNF, our affiliates, or others; and
- information we receive from consumer reporting agencies and/or governmental entities, either directly from these entities or through others.

How Browsing Information is Collected

If you visit or use an FNF Website, Browsing Information may be collected during your visit. Like most websites, our servers automatically log each visitor to the FNF Website and may collect the Browsing Information described above. We use Browsing Information for system administration, troubleshooting, fraud investigation, and to improve our websites. Browsing Information generally does not reveal anything personal about you, though if you have created a user account for an FNF Website and are logged into that account, the FNF Website may be able to link certain browsing activity to your user account.

Other Online Specifics

Cookies. When you visit an FNF Website, a "cookie" may be sent to your computer. A cookie is a small piece of data that is sent to your Internet browser from a web server and stored on your computer's hard drive. Information gathered using cookies helps us improve your user experience. For example, a cookie can help the website load properly or can customize the display page based on your browser type and user preferences. You can choose whether or not to accept cookies by changing your Internet browser settings. Be aware that doing so may impair or limit some functionality of the FNF Website.

Web Beacons. We use web beacons to determine when and how many times a page has been viewed. This information is used to improve our websites.

Do Not Track. Currently our FNF Websites do not respond to "Do Not Track" features enabled through your browser.

Links to Other Sites. FNF Websites may contain links to other websites. FNF is not responsible for the privacy practices or the content of any of those other websites. We advise you to read the privacy policy of every website you visit.

Use of Personal Information

FNF uses Personal Information for three main purposes:

- To provide products and services to you or in connection with a transaction involving you.
- To improve our products and services.
- To communicate with you about our, our affiliates', and third parties' products and services, jointly or independently.

When Information Is Disclosed

We may make disclosures of your Personal Information and Browsing Information in the following circumstances:

- to enable us to detect or prevent criminal activity, fraud, material misrepresentation, or nondisclosure;
- to nonaffiliated service providers who provide or perform services or functions on our behalf and who agree to use the information only to provide such services or functions;
- to nonaffiliated third party service providers with whom we perform joint marketing, pursuant to an agreement with them to jointly market financial products or services to you;
- to law enforcement or authorities in connection with an investigation, or in response to a subpoena or court order; or
- in the good-faith belief that such disclosure is necessary to comply with legal process or applicable laws, or to protect the rights, property, or safety of FNF, its customers, or the public.

The law does not require your prior authorization and does not allow you to restrict the disclosures described above. Additionally, we may disclose your information to third parties for whom you have given us authorization or consent to make such disclosure. We do not otherwise share your Personal Information or Browsing Information with nonaffiliated third parties, except as required or permitted by law.

We reserve the right to transfer your Personal Information, Browsing Information, and any other information, in connection with the sale or other disposition of all or part of the FNF business and/or assets, or in the event of bankruptcy, reorganization, insolvency, receivership, or an assignment for the benefit of creditors. By submitting Personal Information and/or Browsing Information to FNF, you expressly agree and consent to the use and/or transfer of the foregoing information in connection with any of the above described proceedings.

Please see **"Choices With Your Information"** to learn the disclosures you can restrict.

Security of Your Information

We maintain physical, electronic, and procedural safeguards to guard your Personal Information. We limit access to nonpublic personal information about you to employees who need to know that information to do their job. When we provide Personal Information to others as discussed in this Privacy Notice, we expect that they process such information in compliance with our Privacy Notice and in compliance with applicable privacy laws.

Choices With Your Information

If you do not want FNF to share your information with our affiliates to directly market to you, you may send an "opt out" request by email, phone, or physical mail as directed at the end of this Privacy Notice. We do not share your Personal Information with nonaffiliates for their use to direct market to you.

Whether you submit Personal Information or Browsing Information to FNF is entirely up to you. If you decide not to submit Personal Information or Browsing Information, FNF may not be able to provide certain services or products to you.

For California Residents: We will not share your Personal Information or Browsing Information with nonaffiliated third parties, except as permitted by California law.

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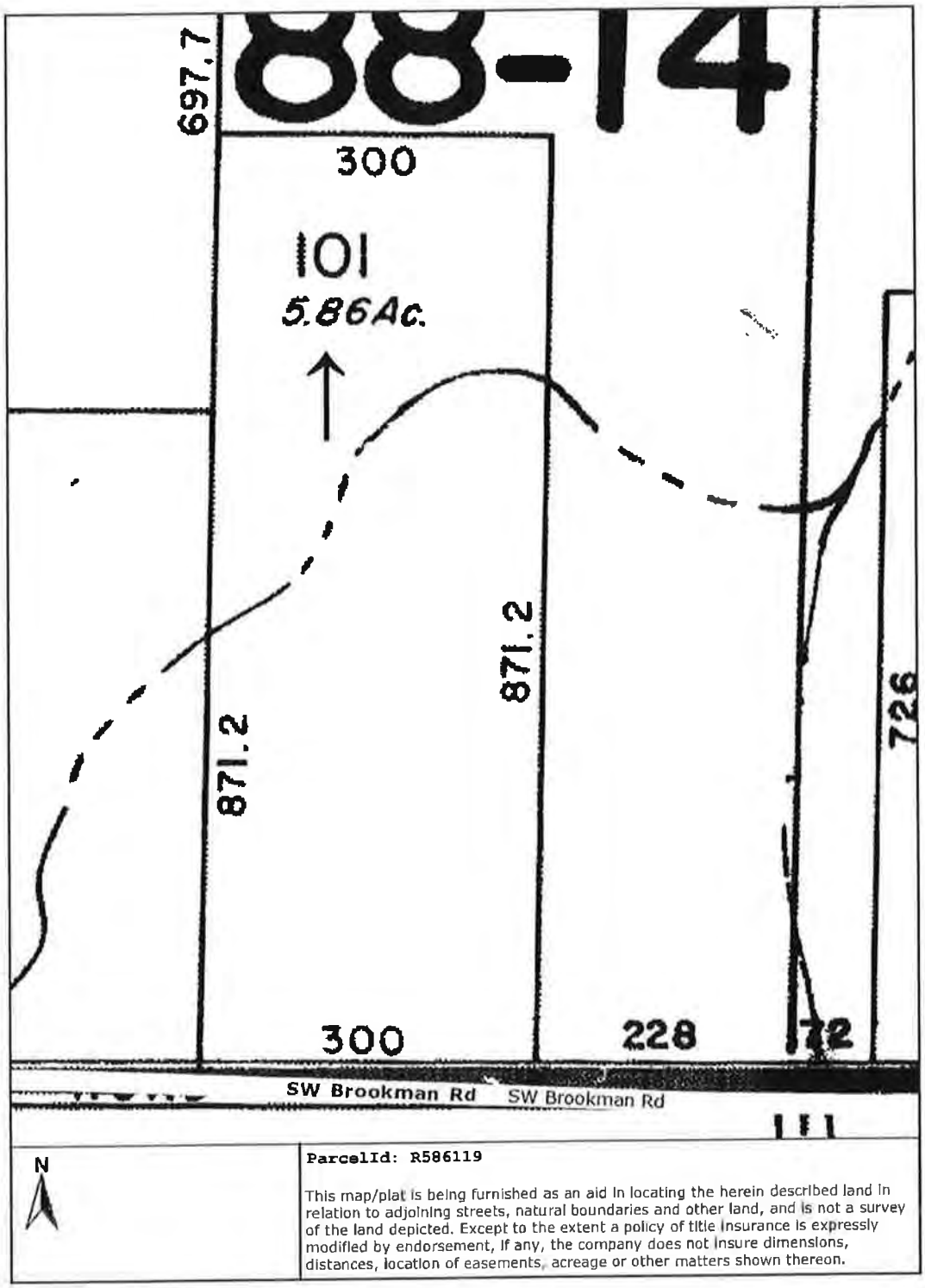
Fidelity National Financial, Inc.
601 Riverside Avenue,
Jacksonville, Florida 32204
Attn: Chief Privacy Officer


88-14
697.7
300
101
5.86Ac.
871.2
871.2
726
300
228
72
SW Brookman Rd
SW Brookman Rd
111
N
ParcelId: R586119
This map/plat is being furnished as an aid in locating the herein described land in relation to adjoining streets, natural boundaries and other land, and is not a survey of the land depicted. Except to the extent a policy of title insurance is expressly modified by endorsement, if any, the company does not insure dimensions, distances, location of easements, acreage or other matters shown thereon.

SEP 23 1999

6-6
320
10

Title Order No. 99174161
Escrow No. 99174161

After Recording Return To:
Mr. and Mrs. Douglas K. David
17117 SW Brookman Road
Sherwood, Oregon 97140

Name, Address, Zip
Until a change is requested all tax statements shall be sent to the following address:
Mr. and Mrs. Douglas K. David
17117 SW Brookman Road
Sherwood, Oregon 97140

Name, Address, Zip

STATE OF OREGON
County of Washington } ss

I, Jerry R. Hanson, Director of Assessment and Taxation, and Ex-Officio County Clerk for said county, do hereby certify that the within instrument of writing was received and recorded in book of records of said county.

Jerry R. Hanson, Director of Assessment and Taxation, Ex-Officio County Clerk

Doc : 99109559
Rect: 240564 361.00
09/23/1999 02:32:23pm

YC

99174 Pacific NW Title

STATUTORY WARRANTY DEED

Emma J. Weston, Grantor, conveys and warrants to Douglas K. David and Bonnie J. David, Grantee, the following described real property free of encumbrances, except as specifically set forth herein situated in Washington County, Oregon, to wit:

See Exhibit A attached hereto and made a part hereof.

This property is free from encumbrances, EXCEPT: 1999-2000 Taxes, a lien not yet payable; Rights of the public in and to any portion of the premises lying within the boundaries of SW Brookman Road; All matters arising from any shifting in the course of Cedar Creek including but not limited to accretion, relation and avulsion;

THIS INSTRUMENT WILL NOT ALLOW USE OF THE PROPERTY DESCRIBED IN THIS INSTRUMENT IN VIOLATION OF APPLICABLE LAND USE LAWS AND REGULATIONS. BEFORE SIGNING OR ACCEPTING THIS INSTRUMENT, THE PERSON ACQUIRING FEE TITLE TO THE PROPERTY SHOULD CHECK WITH THE APPROPRIATE CITY OR COUNTY PLANNING DEPARTMENT TO VERIFY APPROVED USES AND TO DETERMINE ANY LIMITS ON LAWSUITS AGAINST FARMING OR FOREST PRACTICES AS DEFINED IN ORS 30.930.

The true consideration for this conveyance is $320,000.00. (Here comply with the requirements of ORS 93.030)

Dated this September 22, 1999

Emma J. Weston by Duaine Stanley Weston,
Her attorney in fact

WASHINGTON COUNTY
REAL PROPERTY TRANSFER TAX
$320.00 9-23-99
FEE PAID DATE

STATE OF OREGON
County of Washington } ss

On this September 22, 1999, before me, the undersigned, personally appeared the within named Duaine Stanley Weston, attorney in fact for Emma J. Weston known to me to be the identical individuals who executed the within instrument and acknowledged to me that he executed the same freely and voluntarily.

Notary Public for the State of Oregon
My commission expires: 6/23/01

OFFICIAL SEAL
YVONNE M CLIFFORD
NOTARY PUBLIC - OREGON
COMMISSION NO. 301361
MY COMMISSION EXPIRES JUNE 23, 2001

ORSTWD

1-3

SEP 23 1999

Exhibit A

A tract of land situated in Section 6, Township 3 South, Range 1 West of the Willamette Meridian, Washington County, Oregon, more particularly described as follows, to-wit:

Beginning at the Southwest corner of that certain tract described in deed to Charles H. Hays recorded in Book 124, page 444, Deed Records of Washington County, Oregon, being also the Southwest corner of the North one-half of the Northeast quarter of said Section 6; thence East along the South line thereof, 800 feet to the true point of beginning of the tract herein described; thence East along said South line 300 feet to a point; thence North and parallel with the West line of the Northeast quarter of said Section 6 a distance of 871.2 feet to a point; thence West and parallel with North line of said Section 6 a distance of 300 feet to a point; thence South and parallel with said West line, 871.2 feet to the true point of beginning.

ORSTWD

SEP 23 1995

6/21/95-571

CERTIFICATION OF VITAL RECORD

01044
Local File Number

CENTER FOR HEALTH STATISTICS 130-
CERTIFICATE OF DEATH

State File Number

1. Decedent's Name (First, Middle, Last): Lowell Eugene WESTON
2. Sex: Male
3. Date of Death: June 19, 1995
4. Social Security Number: 544-12-8221
5a. Age Last Birthday (Years): 74
6. Birthplace (City and State or Foreign Country): Creston, Iowa
7. Date of Birth: October 10, 1920
8. Was Decedent Ever in U.S. Armed Forces?: [X] Yes
9a. Place of Death: Hospital: [X] Inpatient
9b. Facility Name: Meridian Park Hospital
9c. City, Town or Location of Death: Tualatin
9d. County of Death: Clackamas
10a. Decedent's Usual Occupation: Technician
10b. Kind of Business/Industry: Civil Service
11. Marital Status: Married
12. Spouse: Emma Jean Weston
13a. Residence - State: Oregon
13b. County: Washington
13c. City, Town or Location: Sherwood
13d. Street and Number: 17117 SW Brookman Rd.
13e. Inside City Limits: [ ] Yes [ ] No
13f. Zip Code: 97140
14. Was Decedent of Hispanic Origin?: No
15. Race: White
16. Decedent's Education: 12
17. Father - Name: Claude J. Weston
18. Mother - Name: Pearl Butts
19. Informant - Name and Relationship to Decedent: Duaine Weston- Son
20a. Method of Disposition: [X] Burial [ ] Cremation [ ] Removal from State [ ] Donation [ ] Other (Specify)
20b. Place of Disposition: Willamette National Cemetery
20c. Location - City or Town, State: Portland, Oregon
21a. Signature of Funeral Service Licensee or Person Acting as Such: [signature]
21b. License Number: 3050
22. Name and Address of Facility: LINCOLN WILLAMETTE FUNERAL DIRECTORS 9775 SE MT SCOTT, PORTLAND, OR 97266
23. Date Filed: JUN 26 1995
24. Registrar's Signature: [signature]
25. Did hospital representative make request for anatomical gift consent? [ ] Yes [ ] No
26. Was gift made? [ ] Yes [ ] No [ ] Unk

TO BE COMPLETED BY CERTIFYING PHYSICIAN

27. Time of Death: 9:30 PM
28. Was Medical Examiner Notified? [ ] Yes [ ] No
29. To the best of my knowledge, death occurred at the time, date, place and due to the cause(s) and manner stated. (Signature): N Crumpacker
30. Date Signed: 6-22-95

TO BE COMPLETED ONLY BY MEDICAL EXAMINER

31a. Time of Death:
31b. Date Pronounced Dead:
32. On the basis of examination and/or investigation, in my opinion death occurred at the time, date, place and due to the cause(s) and manner stated. (Signature)
33. Date Signed: County:

34. Name, Title, Address and Zip of Certifier/Medical Examiner: Nancy Crumpacker, M.D., 6475 SW Borland St. Suite M Tualatin, Oregon 97062
35. Name of Attending Physician if Other Than Certifier:

36. Immediate Cause: Part I (a) Lymphoma — Interval between onset and death: 5 mos
Due to, or as a consequence of: (b)
Due to, or as a consequence of: (c)
Part II. Other Significant Conditions: Acute respiratory failure, sepsis, perforated colon
37. Did tobacco use contribute to the death? [ ] Yes [ ] Probably [ ] No [ ] Unknown
38. Autopsy: [ ] Yes [X] No
39. If yes, were findings considered in determining cause of death? [ ] Yes [ ] No [ ] N/A
40. Manner of Death: [X] Natural [ ] Accident [ ] Suicide [ ] Homicide [ ] Other [ ] Pending Investigation [ ] Undetermined Manner [ ] Legal Intervention
41a. Date of Injury:
41b. Time of Injury:
41c. Injury at Work: [ ] Yes [ ] No
41d. Describe How Injury Occurred:
41e. Place of Injury:
41f. Location:

RESERVED FOR REGISTRAR'S USE

ORIGINAL-VITAL STATISTICS COPY

THIS IS A TRUE AND EXACT REPRODUCTION OF THE DOCUMENT OFFICIALLY REGISTERED AT THE OFFICE OF THE CLACKAMAS COUNTY REGISTRAR.

DATE ISSUED: JUN 26 1995

3

[signature]
THOMAS M. TROXEL
COUNTY REGISTRAR
CLACKAMAS COUNTY, OREGON

KITTELSON & ASSOCIATES
851 SW 6th AVENUE, SUITE 600
PORTLAND, OR 97204
P 503.228.5230 F 503.273.8169

February 12, 2020 Project #: 24316

Bob Galati, PE
City of Sherwood
22560 SW Pine Street
Sherwood, OR 97140

RE: The Reserve at Cedar Creek Transportation Impact Analysis – Sherwood, Oregon

Dear Bob:

This letter presents a revised transportation impact analysis prepared for The Reserve at Cedar Creek project. This study concludes that the proposed residential subdivision can be developed in accordance with traffic operations requirements of the City of Sherwood Municipal Code as well as applicable Washington County and Oregon Department of Transportation (ODOT) mobility targets assuming provision of recommended transportation mitigation measures.

Five off-site study intersections were identified that require mitigation to comply with applicable agency requirements in the future. These mitigation measures are not triggered by the proposed development but rather by growth in regional traffic. As discussed herein, the proposed homes have an incremental additional traffic impact at each of the five intersections. The recommended mitigation associated with The Reserve development is:

- With site development and subject to City review, pay a proportionate share contribution (estimated to be $69,163 in total) towards future improvements at the following intersections:
  - SW Sunset Boulevard/SW Woodhaven Drive (study intersection #2): $6,549 toward the construction of a planned future traffic signal;
  - SW Sunset Boulevard/SW Timbrel Lane (study intersection #3): $4,987 toward the construction of a planned future mini-roundabout;
  - SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard (study intersection #4): $17,086 toward the construction of a planned future traffic signal; and
  - SW Baker Road-SW Murdock Road/SW Sunset Boulevard (study intersection #5): $40,541 toward the construction of planned future north and southbound turn lanes.
- Coordinate with the City, ODOT, and Washington County to identify and implement an appropriate mitigation measure at the stop-controlled Highway 99W/SW Brookman Road-SW Chapman Road intersection. This mitigation could be provided via either 1) payment of a proportionate share contribution to the planned future intersection signalization; 2) restriction of the eastbound Chapman Road approach to right-turns only; or, 3) some other measure to be identified by the review agencies.

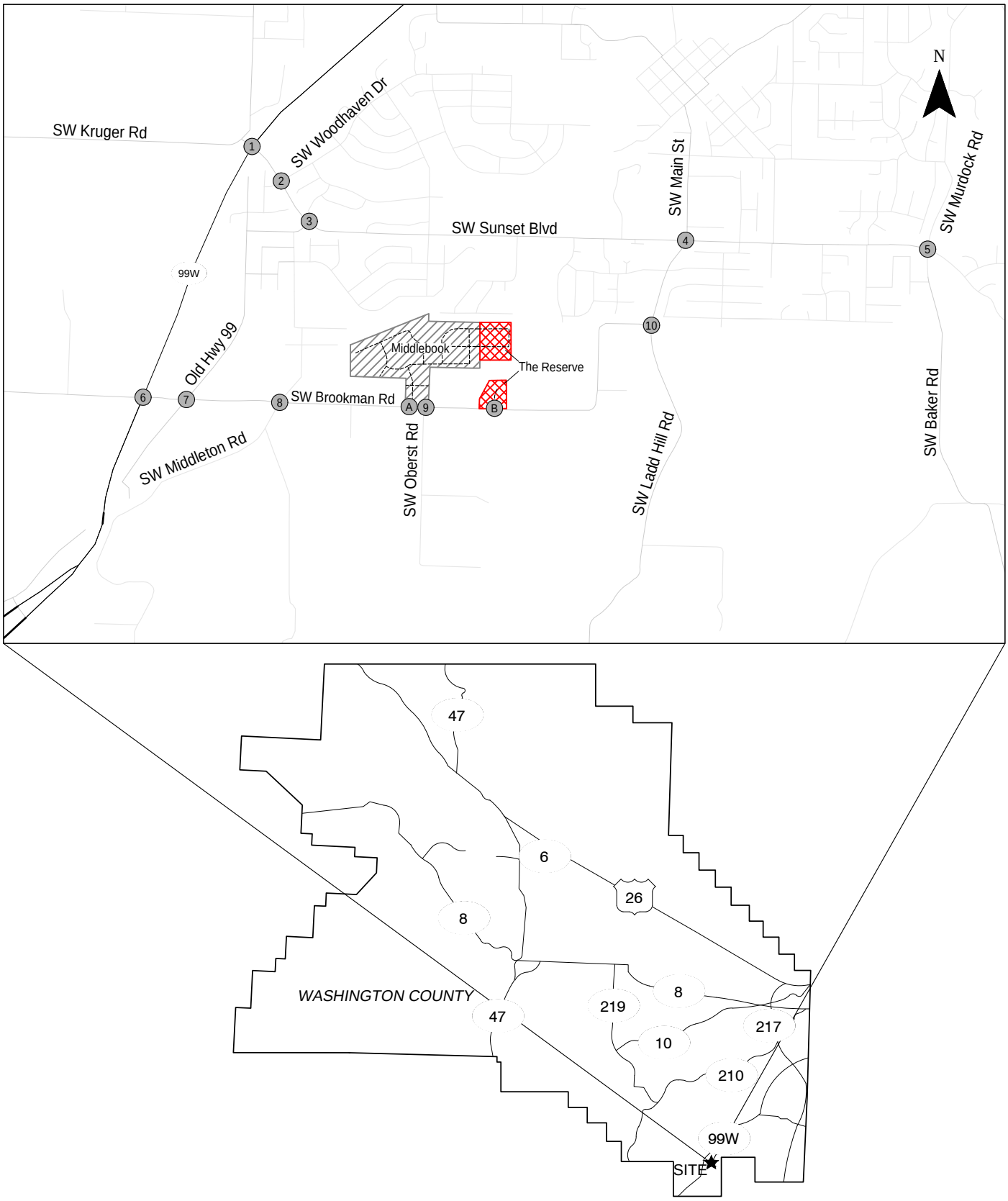
Additional details of the study methodology, findings, and recommendations are provided herein.

INTRODUCTION

The Applicant, David Weekley Homes, is proposing to develop up to 59 detached single-family homes within a residential subdivision on land located along the north side of SW Brookman Road that is within the City limits. The site vicinity is shown in Figure 1 and a conceptual site plan is provided in Figure 2.

The site is separated by Cedar Creek with 44 homes located north of the creek and 15 homes to the south. Access to the 44 homes on the northern portion of the site would be provided via new public roadway connections to the recently approved Middlebrook Residential Subdivision (Reference 1) located to the west of the proposed homes. These connections will provide the proposed development with access to a planned new public roadway connection to SW Brookman Road through Middlebrook (see Intersection A in Figure 1). Access to the southern 15 homes is proposed at a new public street connection to SW Brookman Road (Intersection B in Figure 1). This new connection will have a cul-de-sac on the north end of the street due to the inability to feasibly cross Cedar Creek at this location.

Construction is expected to begin in 2021 (after completion of the approved Middlebrook Residential Subdivision) with buildout and occupancy anticipated by 2024.



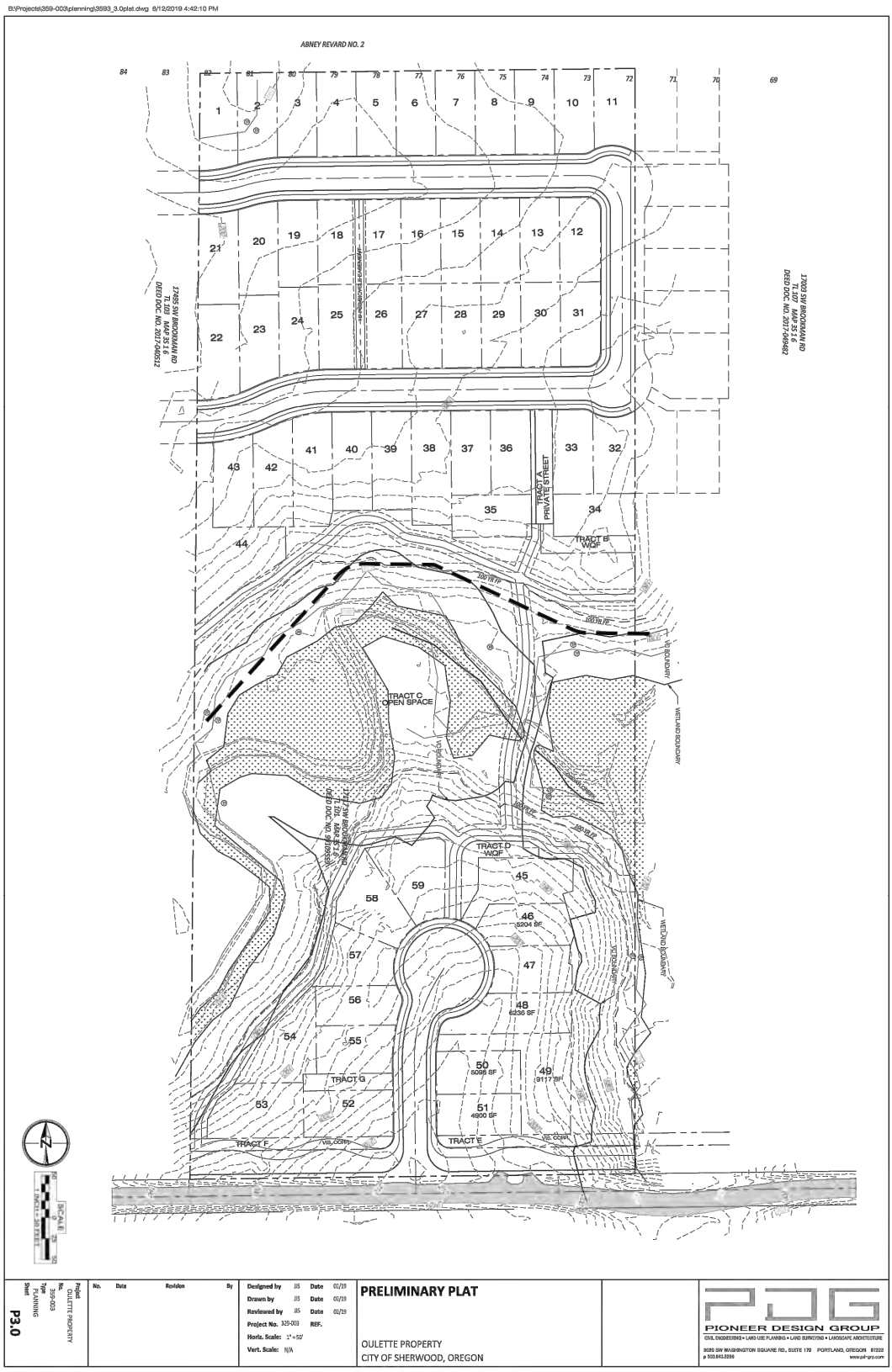
Site Vicinity Map
Sherwood, Oregon

Figure
1

(##) - Study Intersections

C:\KAI Applications\Autodesk\TEMP\AcPublish_28344\24316_The Reserve_Figures_LIRIRO_NP_2020-02-11.dwg Feb 11, 2020 - 3:21pm - nick Layout Tab: 1_VicinityMap

KITTELSON & ASSOCIATES



Site Plan provided by PDG, dated August 15, 2019.

Proposed Site Plan
Sherwood, Oregon

Figure
2

STUDY METHODOLOGY

The Traffic Impact Analysis (TIA) addresses the requirements of City of Sherwood Municipal Code Section 16.106.080 as well as applicable Washington County and ODOT review requirements. The study methodology, assumptions and scope were determined based on a review of existing travel patterns, the City of Sherwood's Development Code and direction provided by DKS Associates (the City's traffic engineer). The study intersections and requirements are the same as was required for the recently approved Middlebrook Residential Subdivision.

Analysis Scenarios

Weekday AM and PM peak hour traffic conditions were assessed for the following analysis scenarios:

- Existing conditions
- Year 2024 background conditions (without the proposed homes)
- Year 2024 total conditions (with buildout of the proposed homes)

Study Intersections

City of Sherwood Municipal Code Section 16.106.080 requires analysis of all intersections where fifty (50) or more peak hour vehicle trips can be expected to result from the development. The intersections included in this study are identical to the Middlebrook Subdivision study for consistency; however, only the proposed shared site driveway on SW Brookman Road is projected to experience 50 or more peak hour vehicle trips.

The study intersections are listed below, including a numerical ID corresponding with report figures:

1. Highway 99W/SW Elwert Road-SW Sunset Boulevard
2. SW Woodhaven Drive/SW Sunset Boulevard
3. SW Timbrel Lane/SW Sunset Boulevard
4. SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard
5. SW Baker Road-SW Murdock Road/SW Sunset Boulevard
6. Highway 99W/SW Brookman Road-SW Chapman Road
7. Old Highway 99 W/SW Brookman Road
8. SW Middleton Road/SW Brookman Road
9. SW Oberst Road/SW Brookman Road
10. SW Ladd Hill Road/SW Brookman Road

A. Middlebrook Subdivision Access-Future Shared Northern Site Access/SW Brookman Road

B. Future Southern Site Access/SW Brookman Road

All level-of-service analyses described in this report were performed in accordance with the procedures stated in the *Highway Capacity Manual* (HCM). The 6th Edition of the HCM (Reference 2) was used to assess unsignalized[1] study intersection operations while the 2000 Edition of the HCM (Reference 3) was used to assess signalized intersection performance. The operational analysis presented in this report was competed using Synchro software.

Performance Measures & Operating Standards

The volume-to-capacity (V/C) ratio is the principle performance measure documented in this report. V/C operating standards adopted by Washington County, ODOT and the City are summarized below.

Washington County Operating Standards

Washington County has jurisdiction over SW Brookman Road. The County has defined operating standards for signalized and stop controlled intersections assuming a peak hour (60-minute analysis) period as follows:

- **Signalized intersections:** the maximum peak hour intersection V/C ratio shall be no greater than 0.99.
- **Unsignalized intersections:** no movement shall experience a V/C ratio greater than 0.99.

ODOT Mobility Targets

ODOT operates and maintains Highway 99W (Pacific Highway West). ODOT's operating mobility target for signalized intersections along Highway 99W in the study area is an intersection V/C ratio no greater than 0.99 during the peak 15-minutes per Table 7 of the *Oregon Highway Plan* (Reference 4). For unsignalized intersections, the target for the state highway approaches is a V/C ratio no greater than 0.99 during the peak 15-minutes. Non-state highway approaches are expected to operate at a V/C ratio no greater than identified in Table 6 of the *Oregon Highway Plan* for district/local interest roads. The target for the Brookman Road and Chapman Road approaches to Highway 99W is a V/C ratio no greater than 0.95.

Sherwood Operating Standards

The City defers to ODOT and Washington County standards for facilities under their jurisdiction. For intersections in the City but on the Metro-designated Arterial and Throughway Network, the applicable standard is a V/C ratio less than or equal to 0.99 in both the highest hour and the second hour during the PM peak period. Roadways on the Arterial and Throughway Network include SW Sunset Boulevard, SW Murdock Road, SW Elwert Road, SW Main Street, and SW Ladd Hill Road (*City of Sherwood Transportation System Plan, TSP,* Reference 5). Table 1 summarizes the minimum operating thresholds by study intersection.

[1] HCM 2000 procedures were used to assess intersection operations under existing conditions. The existing conditions analysis for this study are reported directly from the Middlebrook Subdivision traffic study (Reference 1).

Table 1: Study Intersection Performance Standard

	Intersection	Traffic Control	Responsible Agency	Performance Standard
1	Highway 99W/ SW Elwert Road-SW Sunset Boulevard	Signal	ODOT	Intersection V/C ≤ 0.99
2	SW Woodhaven Drive/ SW Sunset Boulevard	TWSC	City	Movement V/C ≤ 0.99[1]
3	SW Timbrel Lane/SW Sunset Boulevard	TWSC	City	Movement V/C ≤ 0.99[1]
4	SW Ladd Hill Road-SW Main Street/ SW Sunset Boulevard	AWSC	City	Movement V/C ≤ 0.99[1]
5	SW Baker Road-SW Murdock Road/ SW Sunset Boulevard	AWSC	City	Movement V/C ≤ 0.99[1]
6	Highway 99W/SW Brookman Road-SW Chapman Road	TWSC	ODOT	Movement V/C ≤ 0.99 for Highway 99W approaches, movement V/C ≤ 0.95 for SW Brookman Road and SW Chapman Road
7	Old Highway 99 W/SW Brookman Road	TWSC	County	Movement V/C ≤ 0.99
8	SW Middleton Road/SW Brookman Road	TWSC	County	Movement V/C ≤ 0.99
9	SW Oberst Rd/SW Brookman Road	TWSC	County	Movement V/C ≤ 0.99
10	SW Ladd Hill Road/SW Brookman Road	TWSC	County	Movement V/C ≤ 0.99[1]
A	Middlebrook Access-Future Northern Site Shared Access/SW Brookman Road	TWSC (Proposed)	County	Movement V/C ≤ 0.99
B	Future Southern Site Access/ SW Brookman Road	TWSC (Proposed)	County	Movement V/C ≤ 0.99

[1]These roadways are located on the Arterial and Throughway Network (Metro Designation,)
TWSC = Two-way stop-control, AWSC = All-way stop-control

Turn Lane Warrants

Per discussions with Washington County Department of Land Use and Transportation, left-turn lane needs along SW Brookman Road were assessed using turn lane warrants contained in the *Harmelink Methodology assuming a posted speed of 35 miles per hour* (Reference 6). Washington County policy's is to require a right-turn deceleration lane on roadways with a daily traffic volume greater than 10,000 and with a posted speed of 35 miles per hour (mph) or more in situations where the inbound right-turn movement exceeds 40 vehicles during the AM or PM peak hour.

REPORT FORMAT

This report addresses the following transportation issues:

- Existing land use and transportation system conditions within the site vicinity;
- Planned developments and transportation improvements in the study area;
- Forecast year 2024 background peak hour traffic conditions (prior to site development);
- Site trip generation and trip distribution estimates;
- Forecast year 2024 total traffic peak hour conditions (with site development);
- Turn lane and vehicle queuing needs at key study area intersections;
- Site access compliance with Washington County access management requirements; and
- Conclusions and recommendations.

EXISTING CONDITIONS

The existing conditions analysis identifies site conditions and the current operational and geometric characteristics of roadways within the study area. The purpose of this section is to set the stage for a basis of comparison to future conditions.

Site Conditions and Adjacent Land Uses

Today, the parcels comprising the site include a combination of properties occupied by two single-family homes with private driveway access to SW Brookman Road.

The site is bordered primarily by undeveloped lands and single family subdivisions. Cedar Creek bisects the property today.

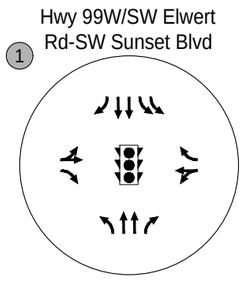
Transportation Facilities

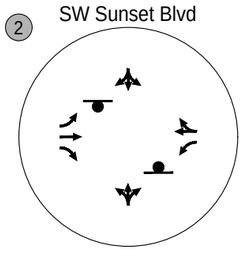
Table 2 provides a summary of transportation facilities (including pedestrian and bicycle facilities) in the site vicinity while Figure 3 illustrates the existing lane configurations and traffic control devices at the study intersections.

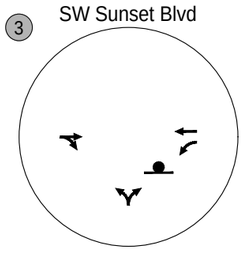
Table 2: Existing Transportation Facilities

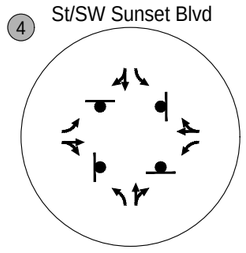
Roadway	Classification[1]	Jurisdiction	Vehicle Lanes	Posted Speed	Sidewalks Present?	Bike Lanes Present?	On-Street Parking Allowed?
SW Pacific Highway 99W	Principal Arterial	ODOT	4 lanes	45-55 mph[2]	No	Yes	No
SW Sunset Boulevard	Arterial	City	2 lanes	35 mph	Yes	Yes	No
SW Woodhaven Drive	Neighborhood[3]	City	2 lanes	25 mph	Partial[4]	No	Yes
SW Timbrel Lane	Collector	City	2 lanes	Unposted	Yes	No	No
SW Main Street	Arterial	City	2 lanes	20 mph	Yes	No	No
SW Ladd Hill Road	Arterial	City	2 lanes	25 mph	Yes	Partial[5]	No
SW Murdock Road	Arterial	City	2 lanes	35 mph	Partial[6]	No	No
SW Baker Road	Arterial	City	2 lanes	35 mph	Partial[7]	No	No
SW Brookman Road	Arterial	County	2 lanes	35 mph	No	No	No
Old Highway 99W	Collector	City	2 lanes	35 mph	No	No	No
SW Middleton Road	Neighborhood[8]	City	2 lanes	Unposted	No	No	No
SW Oberst Road	Local	City	2 lanes	Unposted	No	No	No

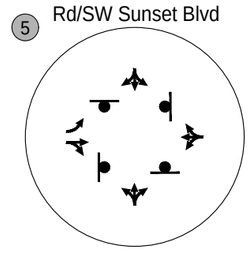
[1] Source: *City of Sherwood Transportation System Plan*.
[2]The speed limit on SW Pacific Highway 99W changes between SW Sunset Boulevard and SW Brookman Road. The posted speed is 45 miles per hour at the intersection of SW Sunset Boulevard and 55 miles per hour at the intersection of SW Brookman Road.
[3]SW Woodhaven Drive is classified as a neighborhood roadway north of SW Sunset Boulevard. It is designated a local street to the south.
[4]There is a gap in sidewalk on the north side of SW Woodhaven Drive between SW Sunset Boulevard and SW Fitch Drive.
[5]There are bike lanes on SW Ladd Hill Road between SW Willow Drive and SW Sunset Boulevard.
[6]There are sidewalks on the west side of SW Murdock Road.
[7]There are sidewalks on the west side of SW Baker Road.
[8]SW Middleton Road is classified as a neighborhood roadway north of SW Brookman Road. It is designated a local street to the south.

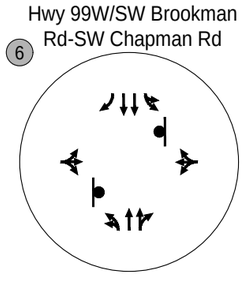


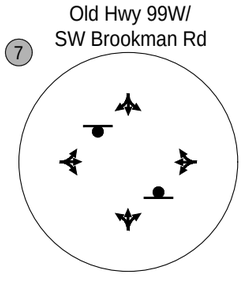


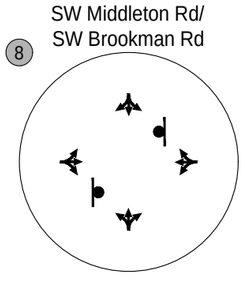


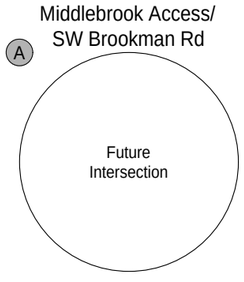


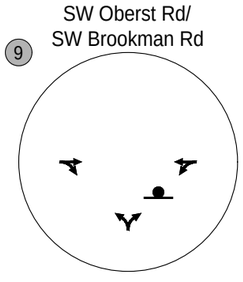


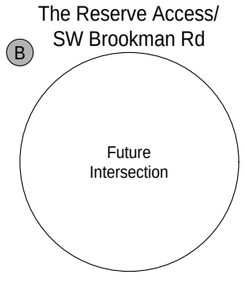


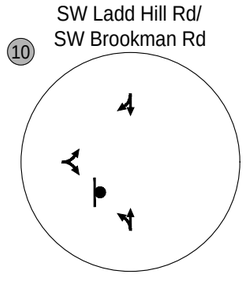












- STOP SIGN
- TRAFFIC SIGNAL

Existing Lane Configurations and Traffic Control Devices
Sherwood, Oregon

Figure 3

Pedestrian and Bicycle Facilities

Table 2 highlights pedestrian and bicycle facilities available in the larger area surrounding the site. There are no sidewalks or bicycle lanes provided along SW Brookman Road serving the site today, though the proposed development and the previously approved Middlebrook Residential Subdivision will provide frontage improvements.

Transit Facilities

Transit service in Sherwood is currently provided by TriMet; however, there is no scheduled fixed route service in walking or cycling distance of the site nor along SW Brookman Road or Highway 99W.. The closest fixed route transit service is currently available at the Sherwood Park and Ride located in the downtown area north of SW Sunset Boulevard (Reference 7).

TRAFFIC SAFETY

Crash history was reviewed for the study intersections in an effort to identify potential intersection safety issues. Crash data for the study intersections were obtained from ODOT for the five-year period from January 1, 2013 through December 31, 2017. Table 3 illustrates the crashes reported at the study intersections. *Appendix A* contains the ODOT crash data.

Table 3: Intersection Crash History (January 1, 2013 through December 31, 2017)

Location		Collision Type						Severity		Total
		Rear-end	Turning	Angle	Backing	Bicyclist	Fixed Object	PDO[1]	Injury	
1	Highway 99W/SW Elwert Road-SW Sunset Boulevard	22	6	1	0	0	0	15	14	29
2	SW Woodhaven Drive/SW Sunset Boulevard	1	1	0	0	0	0	2	0	2
3	SW Timbrel Lane/SW Sunset Boulevard	0	0	0	0	0	0	0	0	0
4	SW Ladd Hill Rd.-SW Main St./SW Sunset Boulevard	2	2	1	0	0	1	3	3	6
5	SW Baker Road-SW Murdock Road/SW Sunset Boulevard	2	0	0	0	0	0	1	1	2
6	Highway 99W/SW Brookman Road-SW Chapman Road	1	7	9	0	0	0	12	5	17
7	Old Highway 99 W/SW Brookman Road	0	0	0	0	0	0	0	0	0
8	SW Middleton Road/SW Brookman Road	0	0	0	0	1	0	0	1	1
9	SW Oberst Road/SW Brookman Road	0	0	0	0	0	0	0	0	0
10	SW Ladd Hill Road/SW Brookman Road	0	0	0	0	0	0	0	0	0
A	Middlebrook Access-Future Northern Site Access/SW Brookman Road	Future Intersection								
B	Future Southern Site Access/ SW Brookman Road	Future Intersection								

[1]PDO – Property damage only

Critical crash rates were calculated for each of the study intersections following the analysis methodology presented in ODOT's *SPR 667 Assessment of Statewide Intersection Safety Performance* (Reference 8). SPR 667 provided average crash rates at a variety of intersection configurations in Oregon based on number of approaches and traffic control types. The average crash rate represents the approximate number of crashes that are "expected" at a study intersection. Additionally, this average crash rate was used to calculate the critical crash rate for each study intersection, based on the *Highway Safety Manual* methodology (Reference 9). The critical crash rate is calculated for each intersection based on the average crash rate for each facility and serves as a threshold for further analysis.

Table 4 summarizes the critical crash rate for each intersection and compares those values to the observed crash rate. Per ODOT, if the observed crash rate at the study location exceeds the critical rate, it is a possible indication that the location is exceeding average crash rates.

Table 4: Intersection Crash Rate Assessment (January 1, 2013 through December 31, 2017)

Location		Total Crashes	Observed Crash Rate	Critical Crash Rate by Intersection Type	Observed Crash Rate > Critical Crash Rate by Intersection	Critical Crash Rate by Volume	Observed Crash Rate > Critical Crash Rate by Volume	90th Percentile Rate by Intersection Type	Observed Crash Rate > 90th Percentile Rate
1	Highway 99W/SW Elwert Road-SW Sunset Boulevard	29	0.39	0.62	No	0.53	No	0.86	No
2	SW Woodhaven Drive/ SW Sunset Boulevard	2	0.11	0.40	No	0.40	No	0.41	No
3	SW Timbrel Lane/ SW Sunset Boulevard	0	0.00	0.41	No	0.42	No	0.41	No
4	SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard	6	0.27	0.38	No	0.38	No	0.41	No
5	SW Baker Road-SW Murdock Road/SW Sunset Boulevard	2	0.10	0.38	No	0.39	No	0.41	No
6	Highway 99W/SW Brookman Road-SW Chapman Road	17	0.26	0.63	No	0.54	No	0.86	No
7	Old Highway 99 W/ SW Brookman Road	0	0.00	0.85	No	0.72	No	0.41	No
8	SW Middleton Road/ SW Brookman Road	1	0.33	0.78	No	0.66	No	0.41	No
9	SW Oberst Road/ SW Brookman Road	0	0.00	0.74	No	0.77	No	0.29	No
10	SW Ladd Hill Road/ SW Brookman Road	0	0.00	0.49	No	0.51	No	0.29	No

Crash rate – Crashes per million entering vehicles

As shown in Table 4, the observed crash rate is below the critical crash rate by the intersection type at all of the study intersections.

ODOT SPIS List

ODOT provides an annual list of safety priority index system (SPIS) locations which are based on reported crash data. The intent of the SPIS list is to identify roadway segments exhibiting an unusually high occurrence of crashes and is used to select locations for investigation. The segment on Highway 99W in the vicinity of SW Elwert Road-SW Sunset Boulevard is listed in the top 5% SPIS sites and the

Highway 99W/SW Brookman Road-SW Chapman Road intersection is listed as a top 10% SPIS location (both listings appear in the year 2017 SPIS list, the version available at the time this report was prepared).

Washington County SPIS List

Washington County also maintains a SPIS list to identify existing hazardous intersections for potential safety improvements. Intersections are included in the County SPIS list if they have three or more crashes or if they have one or more severe injury or fatal crashes within three consecutive years. The intersection of Highway 99W/SW Brookman Road-SW Chapman Road appears on the most recent Washington County SPIS list (2013-2015).

SW Elwert Road-SW Sunset Boulevard Intersection Configuration Changes

Washington County is reconstructing the SW Elwert Road-SW Sunset Boulevard intersection in conjunction with a Major Streets Transportation Improvement Program (MSTIP) project. The intersection reconstruction includes new turn lanes, traffic signal changes, as well as reconstruction of the west approach.

Highway 99W/SW Brookman Road-SW Chapman Road Intersection Configuration Changes

The City of Sherwood TSP includes an unfunded project to realign SW Brookman Road to intersect with Highway 99W approximately ¼ mile north of its current location and signalize the intersection. A corridor study was underway at the time this report was being prepared to further evaluate future intersection and roadway alignment options. In the interim, the approved Middlebrook Residential Subdivision development is required to restrict turn movements on the westbound intersection approach to right-turns only as a safety mitigation measure as per ODOT direction[2].

No new safety-based mitigation needs were identified at the study intersections based on the crash data review. The City may want to consider modifying the existing north-south stop control at the SW Middleton Road/SW Brookman Road intersection to east-west stop control or all-way stop control as traffic volumes on SW Brookman Road continue to grow and recognizing the existing east-west sight distance limitations at the intersection.

[2] Direction per January 30, 2020 ODOT Response letter for ODOT Case #10514 (Reserve at Cedar Creek) and subsequent guidance from ODOT Region 1 staff.

TRAFFIC VOLUMES AND PEAK HOUR OPERATIONS

Traffic counts were obtained at the study intersections on a typical mid-week day in 2017[3] for the Middlebrook Residential Subdivision and were re-used in this study with approval by City staff. These counts were conducted during the morning (7:00 – 9:00 AM) and evening (4:00 – 6:00 PM) hours. *Appendix B* contains the traffic count sheets used in this study.

An assessment of 95th percentile queues under all scenarios is provided in *Appendix D*. Queues were reported from Synchro. As indicated in the summary, all but the following 95th percentile queues can be accommodated within available storage:

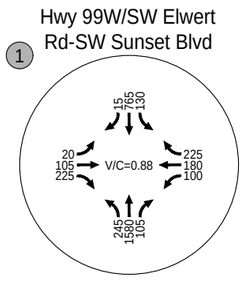
- The eastbound left-turn/through movement and eastbound right-turn movement at the intersection of Highway 99W/SW Elwert Road-SW Sunset Boulevard (study intersection #1) extend beyond the adjacent intersection at SW Kruger Road/SW Elwert Road during the weekday AM and weekday PM peak hour.
- The northbound left-turn movement at the intersection of Highway 99W/SW Elwert Road-SW Sunset Boulevard (study intersection #1) exceeds the available striped storage by one to two vehicles during the weekday PM peak hour.
- The 95th percentile queue for the southbound through/right-turn movement at the intersection of SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard (study intersection #4) extends beyond the adjacent intersection at SW Cornerstone Lane during the weekday PM peak hour.

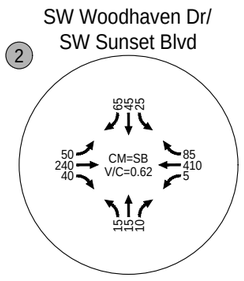
[3] Refer to the traffic count summaries in *Appendix B* for specific count dates which occurred in May, September, October and November of 2017.

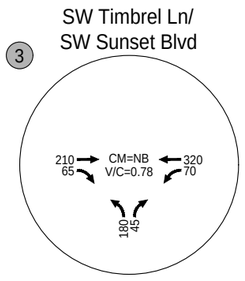
Figure 4 and Figure 5 present the existing traffic conditions for the weekday AM and PM peak hours, respectively. Each of the study intersections operate in compliance with the respective mobility standards today, though the Highway 99W/SW Elwert Road-SW Sunset Boulevard intersection is approaching capacity during the weekday PM peak hour. *Appendix C* includes the existing conditions level-of-service worksheets.

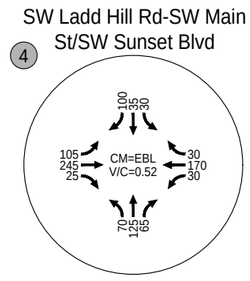
An assessment of 95th percentile queues under all scenarios is provided in *Appendix D*. Queues were reported from Synchro. As indicated in the summary, all but the following 95th percentile queues can be accommodated within available storage:

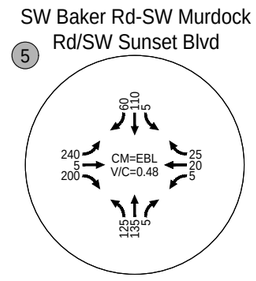
- The eastbound left-turn/through movement and eastbound right-turn movement at the intersection of Highway 99W/SW Elwert Road-SW Sunset Boulevard (study intersection #1) extend beyond the adjacent intersection at SW Kruger Road/SW Elwert Road during the weekday AM and weekday PM peak hour.
- The northbound left-turn movement at the intersection of Highway 99W/SW Elwert Road-SW Sunset Boulevard (study intersection #1) exceeds the available striped storage by one to two vehicles during the weekday PM peak hour.
- The 95th percentile queue for the southbound through/right-turn movement at the intersection of SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard (study intersection #4) extends beyond the adjacent intersection at SW Cornerstone Lane during the weekday PM peak hour.

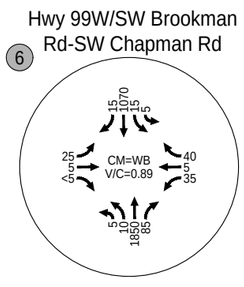


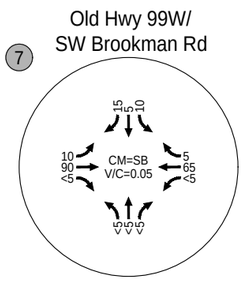


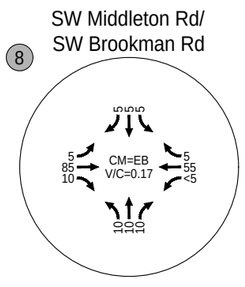


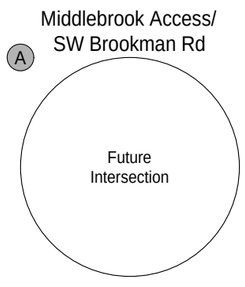


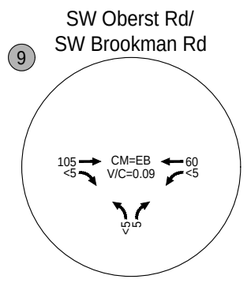


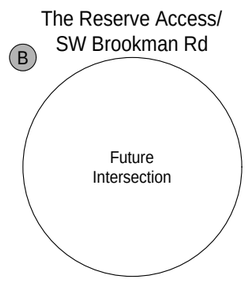


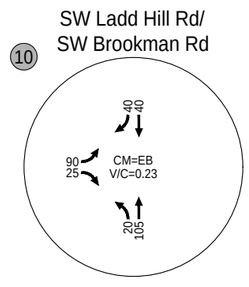












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LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED/AWSC) / CRITICAL MOVEMENT LEVEL OF SERVICE (TWSC)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED/AWSC) / CRITICAL MOVEMENT CONTROL DELAY (TWSC)
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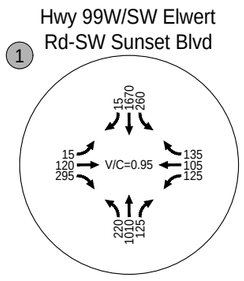
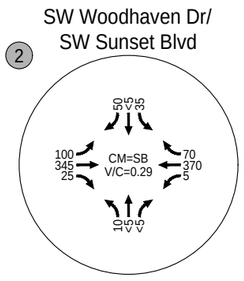
TWSC = TWO-WAY STOP CONTROL
AWSC= ALL-WAY STOP CONTROL

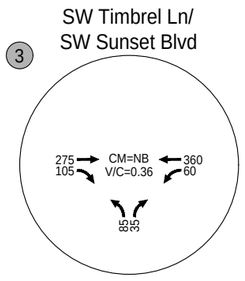
Existing Intersection Operations
Weekday AM Peak Hour
Sherwood, Oregon

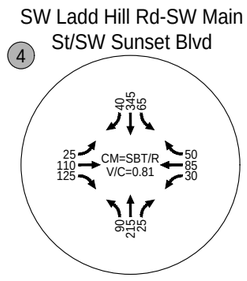
Figure 4

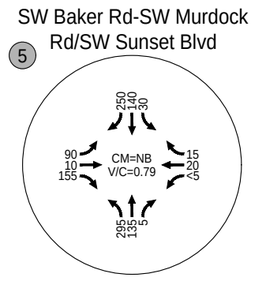
KITTELSON & ASSOCIATES

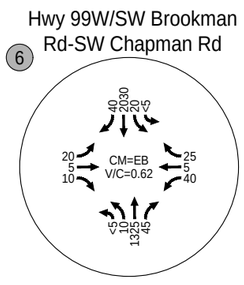


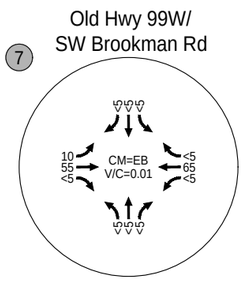


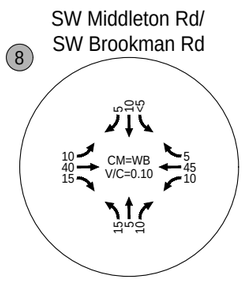


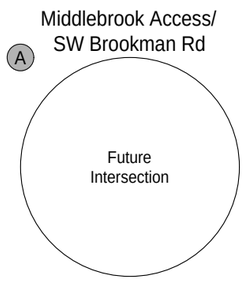


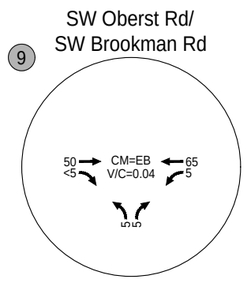


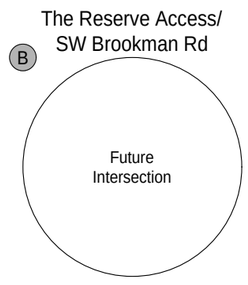


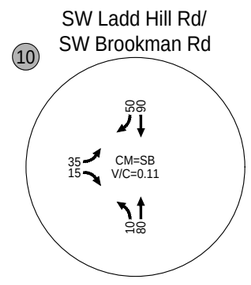












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Existing Intersection Operations
Weekday PM Peak Hour
Sherwood, Oregon

Figure 5

KITTELSON & ASSOCIATES

YEAR 2024 BACKGROUND TRAFFIC CONDITIONS

The background traffic analysis identifies how the study area's transportation system will operate in 2024, the year the proposed homes are expected to be built out. This analysis includes traffic growth due to development within the study area but does not include traffic from the proposed development.

Approved In-Process Developments

Three in-process developments were identified by City staff including:

- The Sherwood Hotel located on SW Meinecke Road at Highway 99W;
- The Sherwood High School relocation to a site northeast of the intersection of SW Elwert Road and SW Kruger Road, east of Highway 99W; and
- The Middlebrook Residential Subdivision development directly west of the proposed development.

All three developments were included as in-process as part of this study under 2024 background traffic.

Planned Transportation Improvements

The following improvements at the Highway 99W/SW Elwert Road-SW Sunset Boulevard intersection (study intersection #1) were included in the year 2024 background and total traffic conditions scenarios per City staff direction:

- Addition of a second northbound left turn lane (required as part of the *Sherwood High School Transportation Planning Rule Analysis*, as documented in the Sherwood High School Transportation Impact Study, Reference 10);
- Widening the west leg of the intersection to provide a left-turn, through lane, and through/right-turn lane (per preliminary drawings provided by County staff); and
- Widening the east leg of the intersection to provide a left-turn, through lane, and through/right-turn lane (per preliminary drawings provided by County staff).

In addition, the westbound Highway 99W/SW Brookman Road-SW Chapman Road intersection approach (study intersection #6) will be restricted to right-turns only as required of the Middlebrook Subdivision development.

Figure 6 shows the assumed 2024 background lane configurations and traffic control devices.

Background Traffic Volumes and Conditions

Year 2024 background traffic volumes were developed by rerouting westbound left-turn and through movements from the Highway 99W/SW Brookman Road-SW Chapman Road intersection reflective of the planned westbound right-turn only restriction (study intersection #6) and then increasing the traffic volumes by 1% annually along Highway 99W and 2% annually on all other approaches as per City direction. Traffic volumes from the in-process hotel development, the high school relocation, and the

Middlebrook development were then added, assuming rerouting where appropriate due to the westbound right-turn only restriction at Highway 99W.

Figure 7 and Figure 8 report the 2024 background traffic volumes and operating conditions at the study intersections during the weekday AM and PM peak hours, respectively. As seen in the figures, the following intersections are projected to exceed operational standards:

- The signalized Highway 99W/SW Elwert Road-SW Sunset Boulevard intersection (study intersection #1) is projected to exceed ODOT's standard of a V/C ratio less than or equal to 0.99 during the weekday PM peak hour (V/C = 1.06).
- The southbound approach to the stop-controlled SW Woodhaven Drive/SW Sunset Boulevard intersection (study intersection #2) is projected to operate with a V/C ratio greater than 1.0 during the weekday AM peak hour, exceeding the City's 0.99 V/C ratio standard for the first hour.
- The northbound approach to the stop-controlled SW Timbrel Lane/SW Sunset Boulevard intersection (study intersection #3) is projected to operate with a V/C ratio greater than 1.0 during the weekday AM peak hour, exceeding the City's 0.99 V/C standard.
- The southbound through/right lane at the all-way stop controlled SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard intersection (study intersection #4) is projected to operate with a V/C ratio of 1.10, exceeding the City's 0.99 V/C standard.
- The northbound approach to the all-way stop controlled SW Baker Road-SW Murdock Road/SW Sunset Boulevard intersection (study intersection #5) is projected to operate with a V/C ratio of 1.02 during the weekday PM peak hour, exceeding the City's 0.99 V/C ratio standard.
- The eastbound approach to the stop-controlled Highway 99W/SW Brookman Road-SW Chapman Road intersection (study intersection #6) is projected to with a V/C ratio greater than 1.0 during the weekday PM peak hour, exceeding the ODOT's 0.95 V/C mobility target for the stop controlled movement. The planned interim westbound turn movement restriction does not impact eastbound movements whereas ultimately the intersection will be realigned and signalized per the City's TSP.

Potential future mitigations are further discussed under total traffic conditions. *Appendix E* includes the year 2024 background conditions level-of-service worksheets.

An assessment of 95th percentile queues under all scenarios is provided in *Appendix D*. Queues were reported from Synchro. As indicated in the summary, beyond the locations discussed under existing conditions, 95th percentile queues can be accommodated within available storage except for the following:

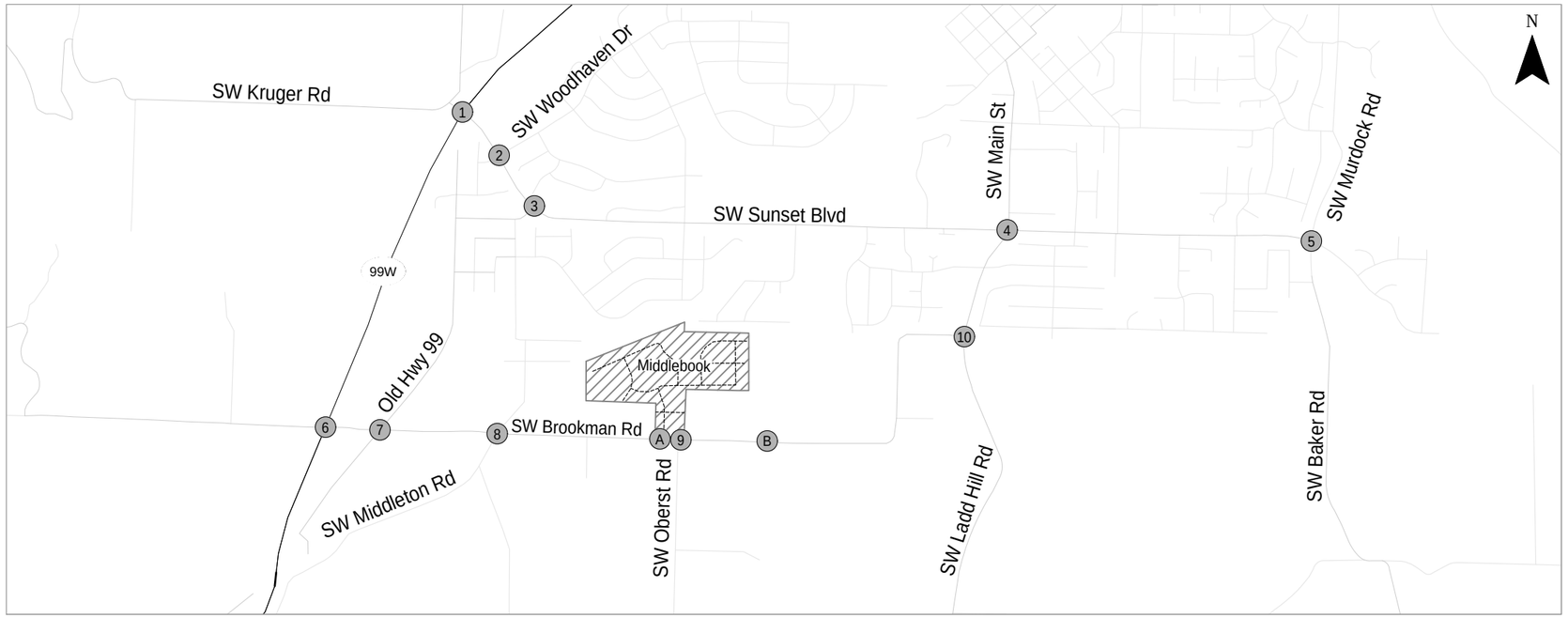
- The westbound left-turn movement at the intersection of Highway 99W/SW Elwert Road-SW Sunset Boulevard (study intersection #1) extends beyond the 185 foot storage during the weekday AM and PM peak hour.

- The 95th percentile queue for the northbound left-turn/through movement at the intersection of SW Timbrel Lane/SW Sunset Boulevard (study intersection #3) extends beyond the adjacent intersection at SW Middleton Road during the weekday AM peak hour.

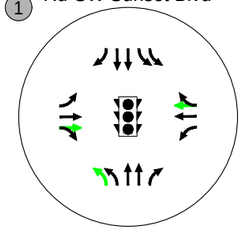
- The 95th percentile queue for the eastbound left turn at the intersection of SW Baker Road-SW Murdock Road/SW Sunset Boulevard (study intersection #5) extends beyond the available striped turn lane storage by one to two vehicles during the weekday AM peak hour.

- The 95th percentile queue for the eastbound left turn at the intersection of SW Baker Road-SW Murdock Road/SW Sunset Boulevard (study intersection #5) extends beyond the adjacent intersection at SW Cornerstone Lane by one vehicle during the weekday PM peak hour.

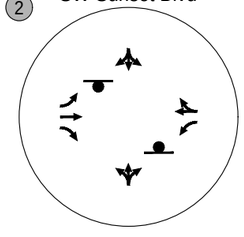
Compared to existing conditions, the queue for the northbound left-turn movement at the intersection of Highway 99W/SW Elwert Road-SW Sunset Boulevard (#1) is no longer projected to exceed storage with the planned second turn-lane in place (i.e., the Washington County MSTIP project mitigates the existing northbound left-turn lane storage issue).



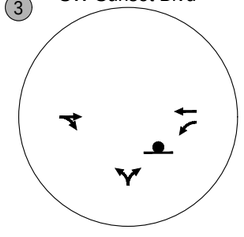
1 Hwy 99W/SW Elwert Rd-SW Sunset Blvd



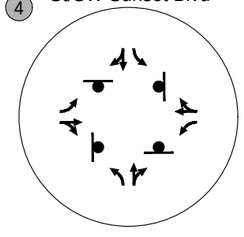
2 SW Woodhaven Dr/ SW Sunset Blvd



3 SW Timbrel Ln/ SW Sunset Blvd



4 SW Ladd Hill Rd-SW Main St/SW Sunset Blvd



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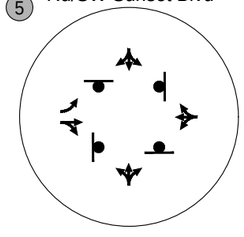
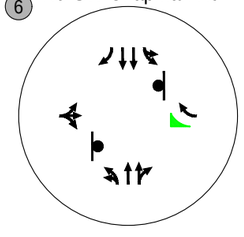
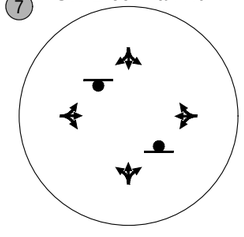


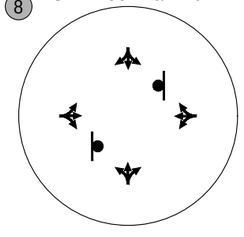
6 Hwy 99W/SW Brookman Rd-SW Chapman Rd



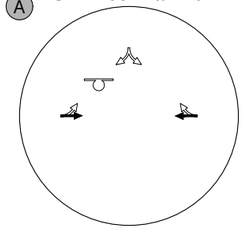
7 Old Hwy 99W/ SW Brookman Rd



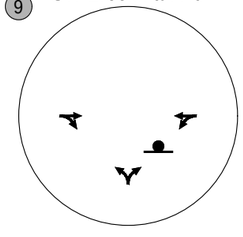
8 SW Middleton Rd/ SW Brookman Rd



A Middlebrook Access/ SW Brookman Rd



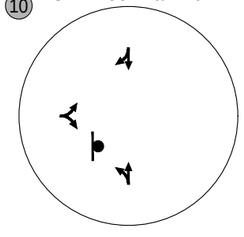
9 SW Oberst Rd/ SW Brookman Rd



B The Reserve Access/ SW Brookman Rd

Future Intersection

10 SW Ladd Hill Rd/ SW Brookman Rd

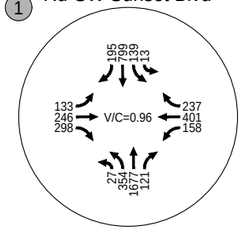


- STOP SIGN
- TRAFFIC SIGNAL
- RIGHT ONLY
- EXISTING
- PLANNED IMPROVEMENT
- MOVEMENT/IMPROVEMENT ADDED WITH MIDDLEBROOK DEVELOPMENT

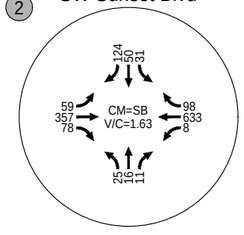
Year 2024 Background Assumed Lane Configurations and Traffic Control Devices Sherwood, Oregon

Figure 6

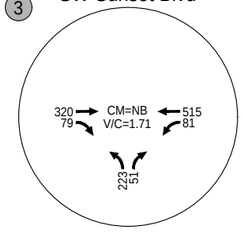
1 Hwy 99W/SW Elwert Rd-SW Sunset Blvd



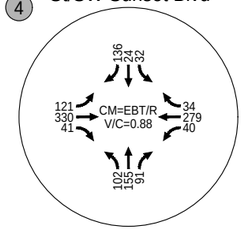
2 SW Woodhaven Dr/ SW Sunset Blvd



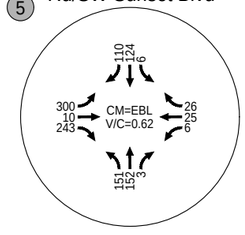
3 SW Timbrel Ln/ SW Sunset Blvd



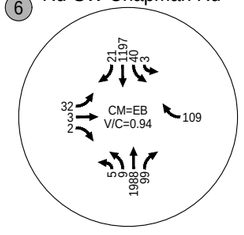
4 SW Ladd Hill Rd-SW Main St/SW Sunset Blvd



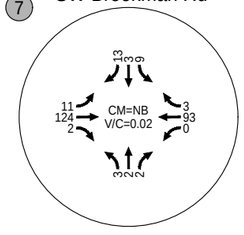
5 SW Baker Rd-SW Murdock Rd/SW Sunset Blvd



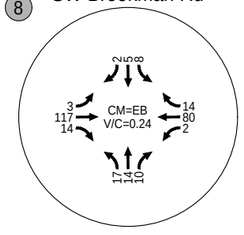
6 Hwy 99W/SW Brookman Rd-SW Chapman Rd



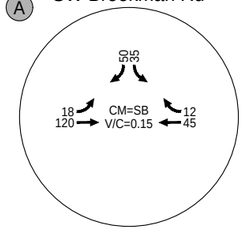
7 Old Hwy 99W/ SW Brookman Rd



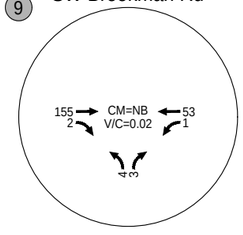
8 SW Middleton Rd/ SW Brookman Rd



A Middlebrook Access/ SW Brookman Rd



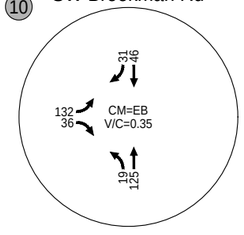
9 SW Oberst Rd/ SW Brookman Rd



B The Reserve Access/ SW Brookman Rd

Future Intersection

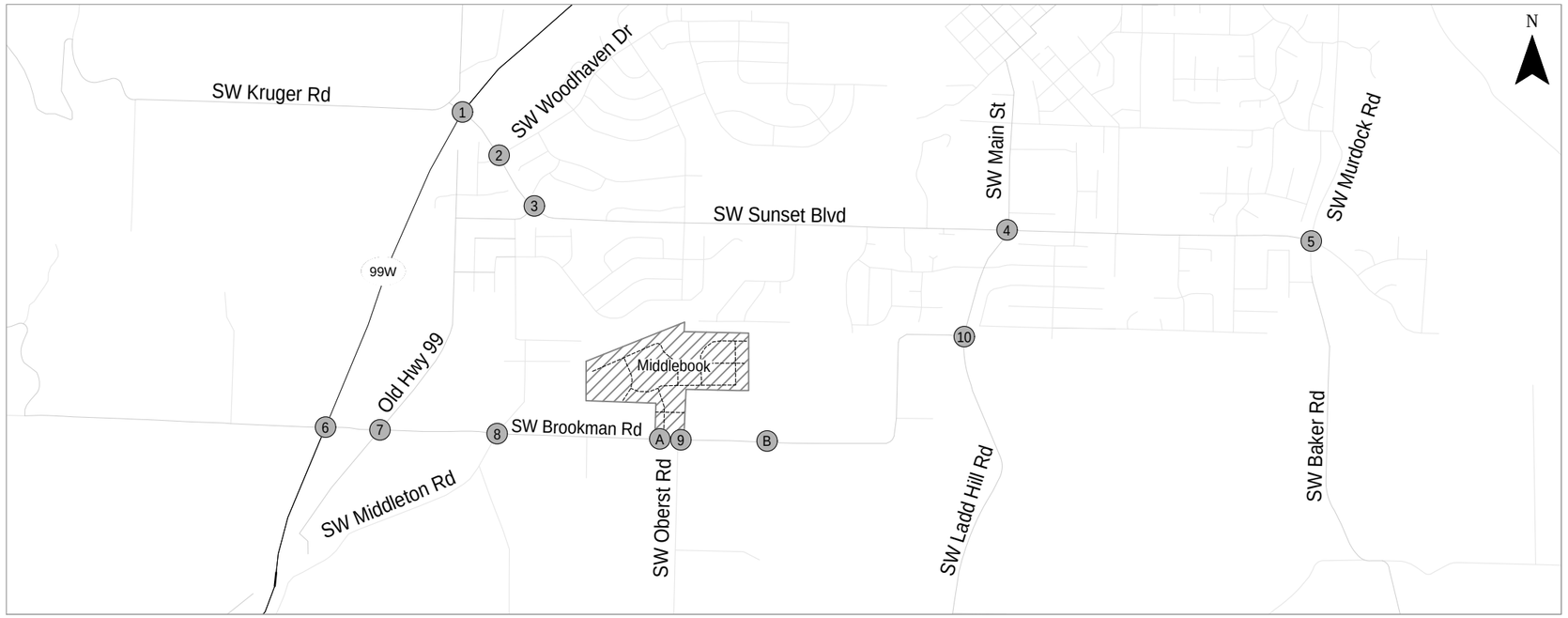
10 SW Ladd Hill Rd/ SW Brookman Rd

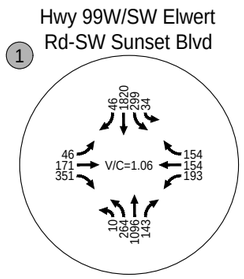


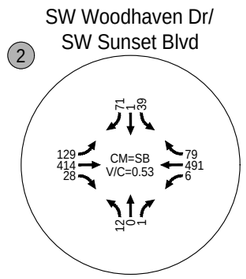
CM = CRITICAL MOVEMENT (TWSC)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED/AWSC) / CRITICAL MOVEMENT LEVEL OF SERVICE (TWSC)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED/AWSC) / CRITICAL MOVEMENT CONTROL DELAY (TWSC)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO
TWSC = TWO-WAY STOP CONTROL
AWSC= ALL-WAY STOP CONTROL

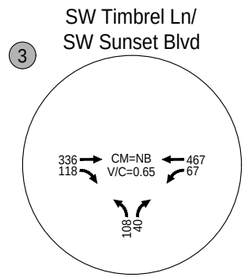
Year 2024 Background Intersection Operations Weekday AM Peak Hour Sherwood, Oregon

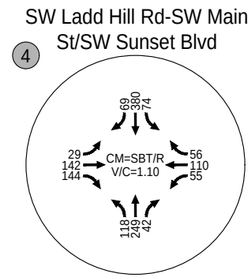
Figure 7

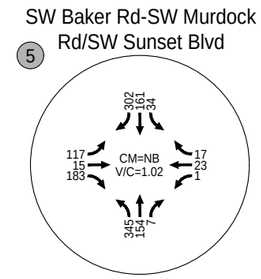


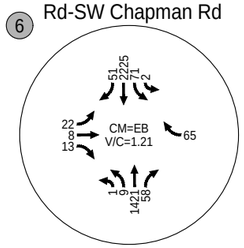


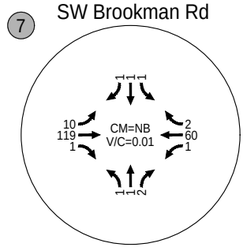


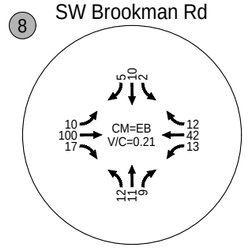


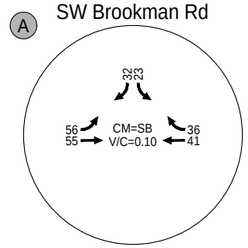


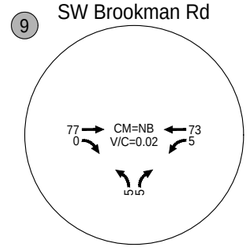


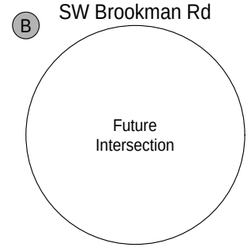


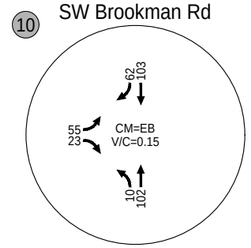












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Year 2024 Background Intersection Operations Weekday PM Peak Hour Sherwood, Oregon

Figure 8

KITTELSON & ASSOCIATES

PROPOSED DEVELOPMENT PLAN

The proposed subdivision consists of 59 detached single-family homes. Access to 44 of the homes on the north portion of the site is proposed via a public street connection on SW Brookman Road to be shared with the previously approved Middlebrook Residential Subdivision (Study Intersection A in Figure 9). A second public street connection to SW Brookman Road is proposed to provide access to 15 homes located on the southern side of Cedar Creek and will replace two existing site driveways (Study Intersection B). The lane configurations and traffic control devices assumed for the year 2024 total traffic conditions are shown in Figure 9. The two existing single-family homes on site will be removed and the existing accesses to SW Brookman Road vacated.

Trip Generation Estimate

Trip generation estimates for the proposed subdivision were prepared based on information presented in the *Trip Generation Manual* (Reference 10) and are shown in Table 5. Note that the estimates in Table 5 are presented assuming a trip credit for the two existing homes on site today.

Table 5: Trip Generation Estimate

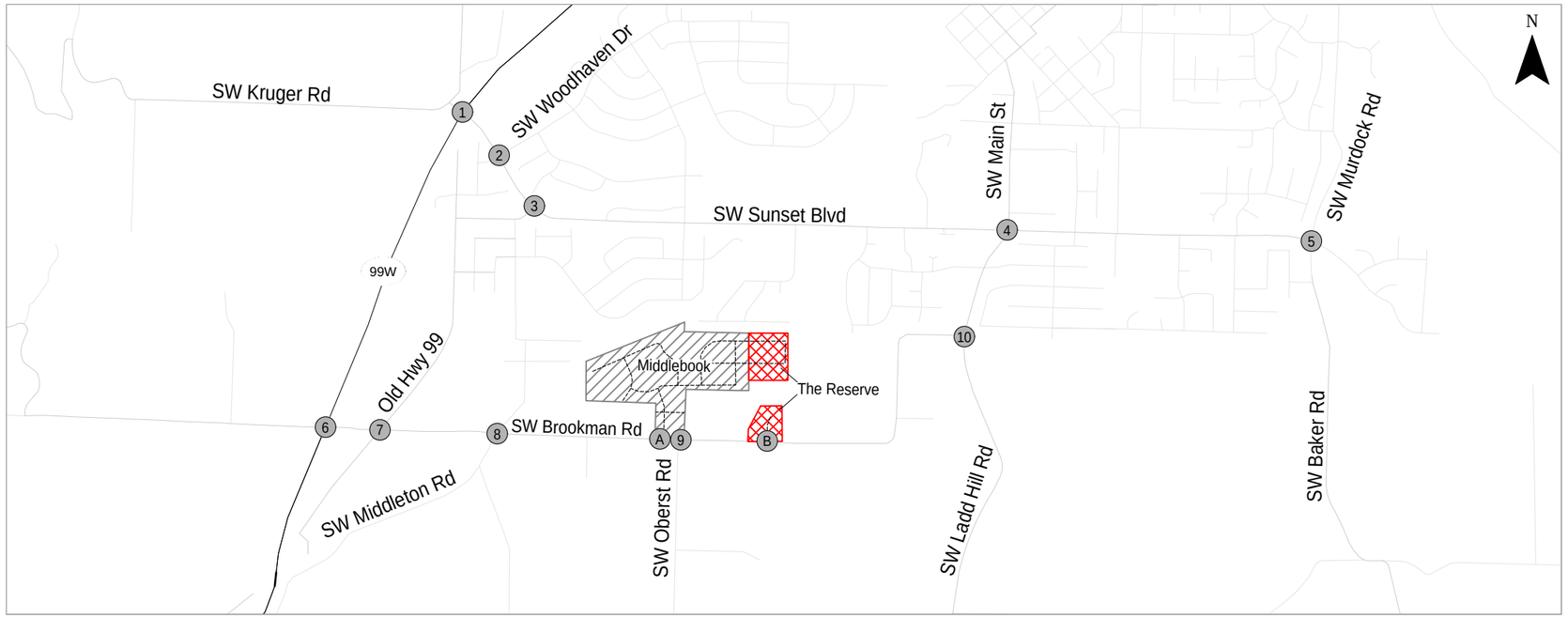
Land Use	ITE Code	Size	Daily Trips	Weekday AM Peak Hour			Weekday PM Peak Hour		
				Total	In	Out	Total	In	Out
Single-Family Detached (lots 1 to 44)	210	43 units[1]	406	38	10	28	45	28	17
Single-Family Detached (lots 45 to 59)	210	14 units[2]	132	12	3	9	15	9	6
TOTAL		**57 units**	**538**	**50**	**13**	**37**	**60**	**37**	**23**

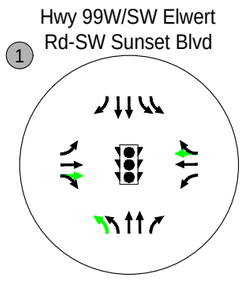
Note: Per direction from ODOT and the City, the average rate was used for the daily trip generation and the fitted curve equation for the weekday AM and PM peak hour trip generation.
[1]There is one single-family detached home on-site currently, so the trip generation is based on 43 units (44 proposed units minus 1 existing unit).
[2]There is one single-family detached home on-site currently, so the trip generation is based on 14 units (15 proposed units minus 1 existing unit).

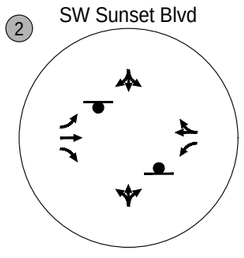
As shown in Table 5, the proposed development is estimated to generate an additional 538 daily trips, including 50 trips during the weekday AM peak hour and 60 trips during the weekday PM peak after accounting for the two existing homes on site.

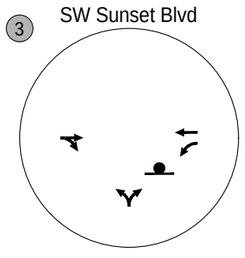
Trip Distribution & Assignment

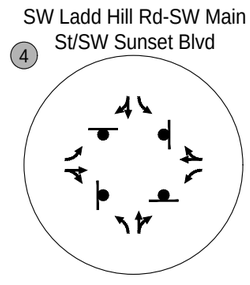
The assumed site trip distribution pattern is identical to the pattern previously assumed for the Middlebrook Residential Subdivision Study, which was developed considering existing traffic patterns and roadway connectivity. The trip distribution pattern was used to assign the weekday AM and PM peak hour site trips to the study intersections as shown in Figure 10 and Figure 11. Site trip routing was developed to reflect the planned westbound right-turn only restriction at the Highway 99W/SW Brookman Road/SW Chapman Road intersection.

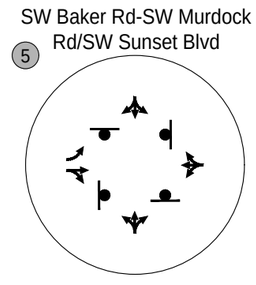


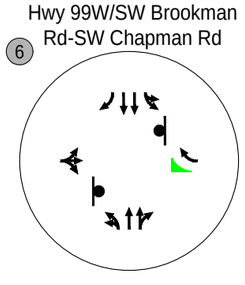


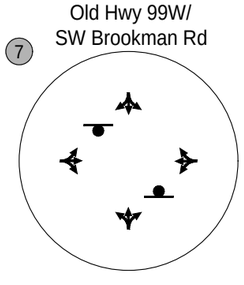


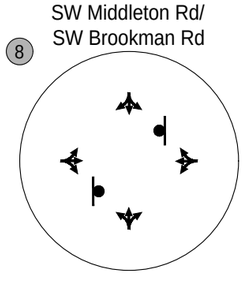


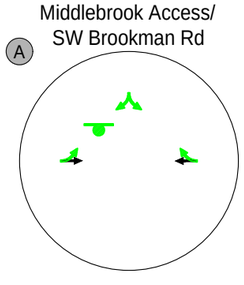


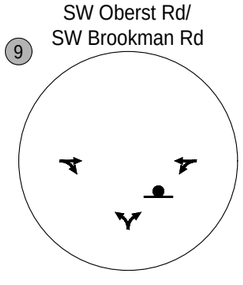


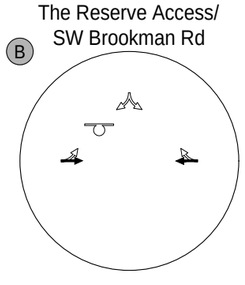


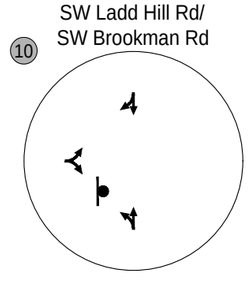










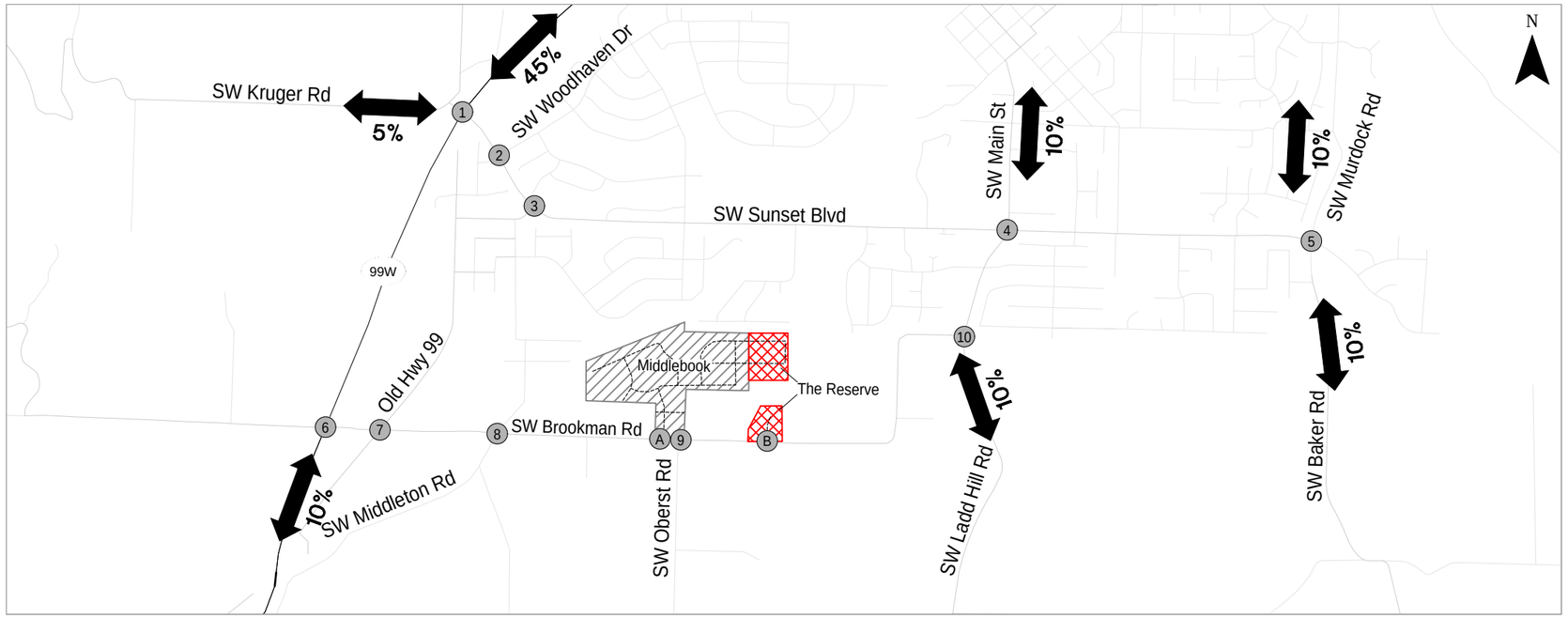


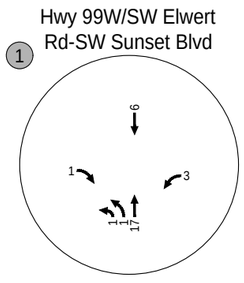
- STOP SIGN
- TRAFFIC SIGNAL
- RIGHT ONLY

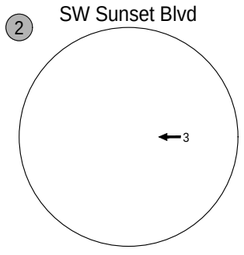
- EXISTING
- PLANNED IMPROVEMENT
- MOVEMENT ADDED WITH THE RESERVE DEVELOPMENT

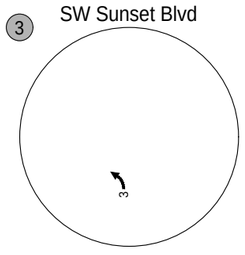
Year 2024 Total Assumed Lane Configurations and Traffic Control Devices
Sherwood, Oregon

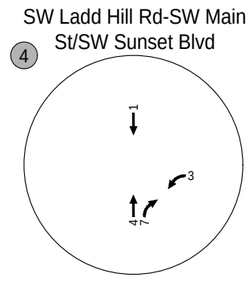
Figure 9

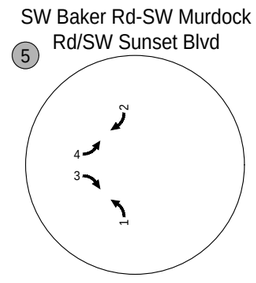


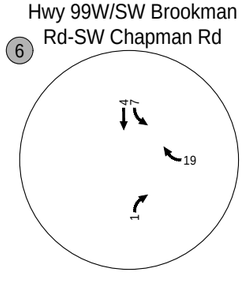


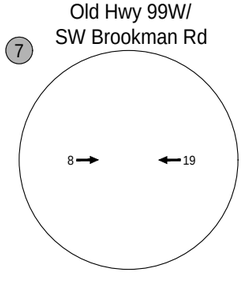


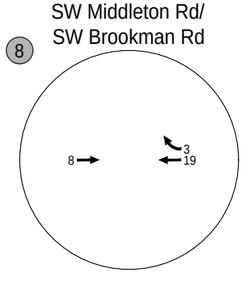


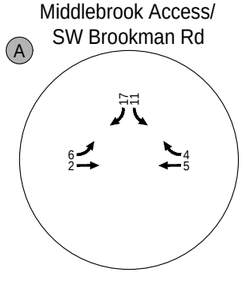


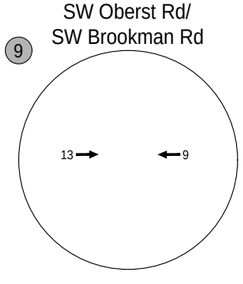


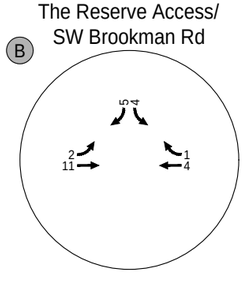


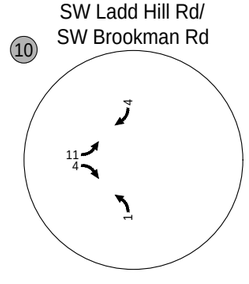






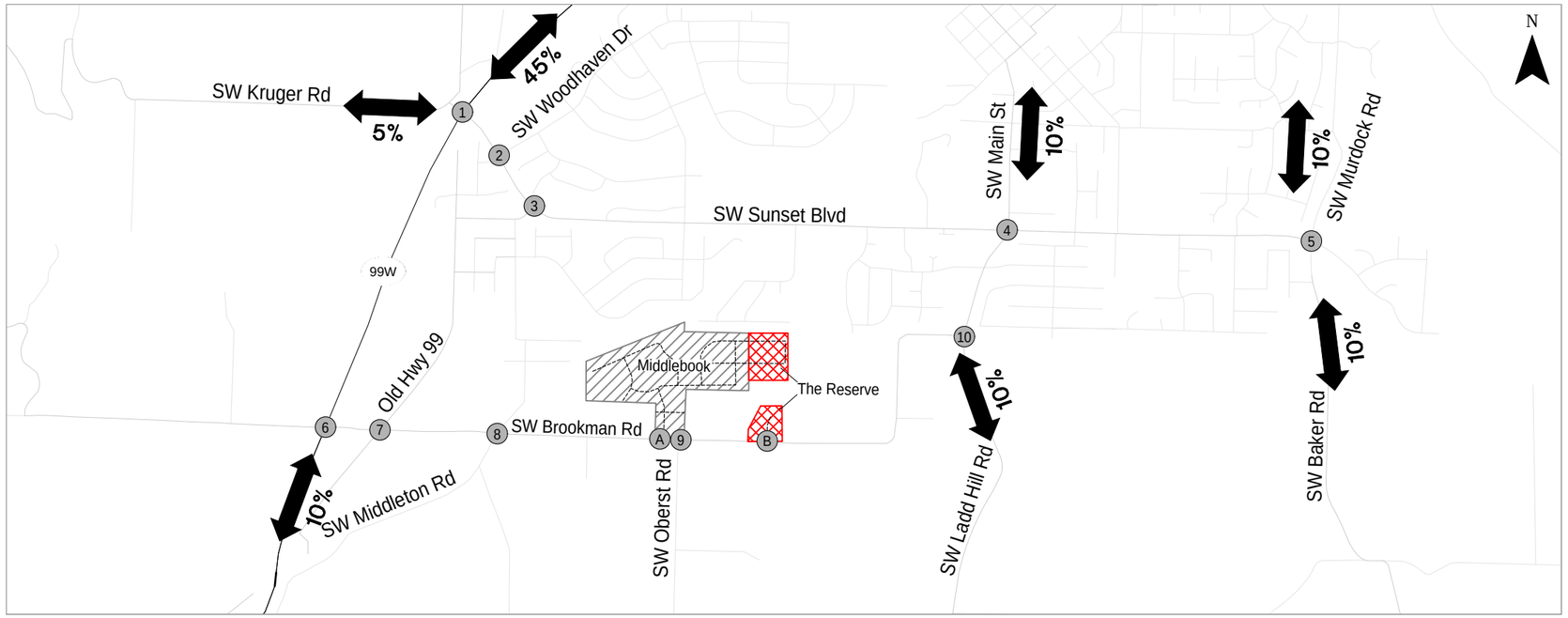


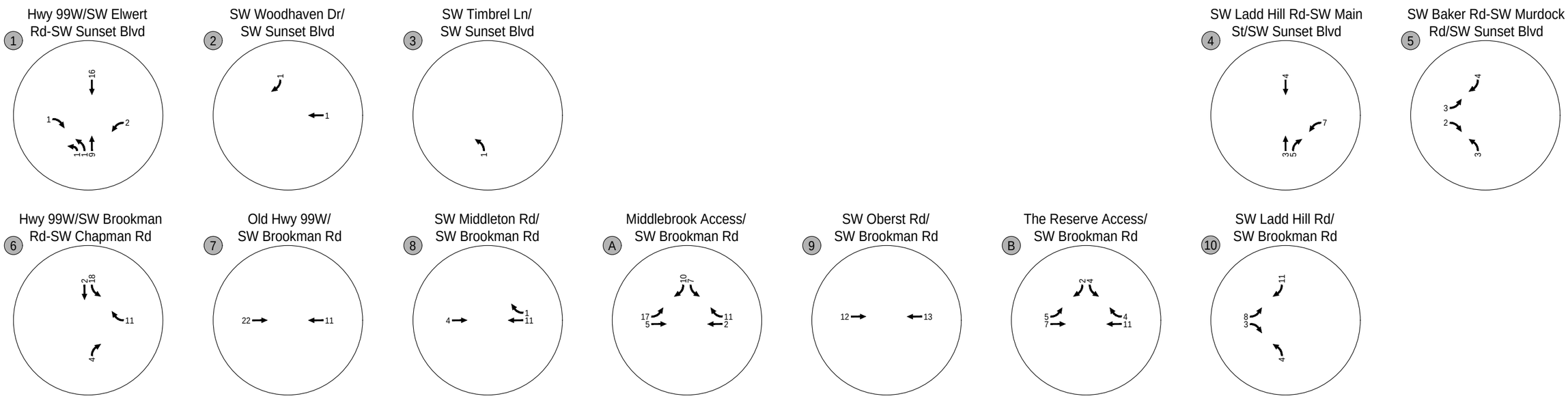




Assumed Trip Distribution and Assignment with Restricted Westbound Approach at Highway 99W/SW Brookman Road-SW Chapman Road
Weekday AM Peak Hour
Sherwood, Oregon

Figure
10





Assumed Trip Distribution and Assignment with Restricted Westbound Approach at Highway 99W/SW Brookman Road-SW Chapman Road
Weekday PM Peak Hour
Sherwood, Oregon

Figure 11

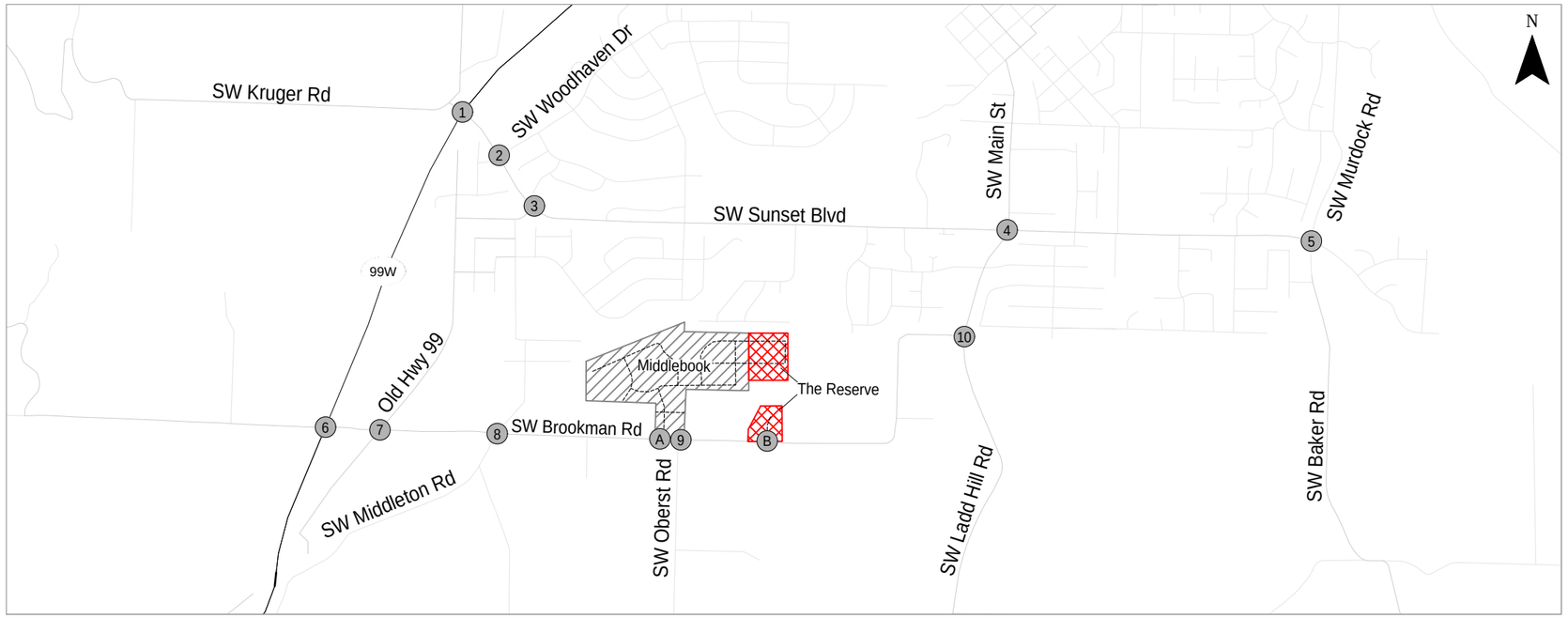
YEAR 2024 TOTAL TRAFFIC CONDITIONS

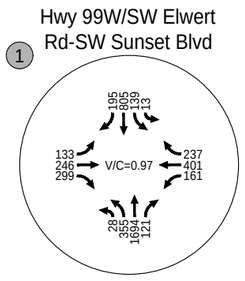
The 2024 total traffic conditions analysis forecasts how the study area's transportation system will operate with the inclusion of traffic from the proposed development and identifies traffic mitigation measures required to support the site. Future traffic conditions were estimated by adding site-generated traffic to the 2024 background traffic volumes for the weekday AM and PM peak hours to arrive at the 2024 total traffic volumes.

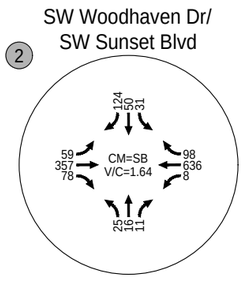
Figure 12 and Figure 13 report the 2024 total traffic volumes and operating conditions for the weekday AM and PM peak hours with site development. As seen in the figures, consistent with background conditions, the following intersections are projected to continue to exceed operational standards:

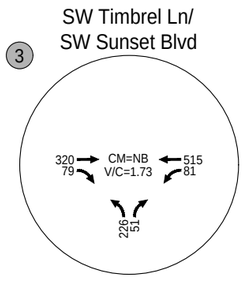
- The signalized Highway 99W/SW Elwert Road-SW Sunset Boulevard intersection (study intersection #1) is projected to continue to exceed capacity during the weekday PM peak hour (V/C ratio change from 1.06 under background traffic to 1.07 under total traffic).
- The southbound approach to the stop-controlled SW Woodhaven Drive/SW Sunset Boulevard intersection (study intersection #2) is projected to operate with a V/C ratio greater than 1.0 during the weekday AM peak hour. The proposed development adds no trips to the southbound approach.
- The northbound approach to the stop-controlled SW Timbrel Lane/SW Sunset Boulevard intersection (study intersection #3) is projected to operate with a V/C ratio greater than 1.0 during the weekday AM peak hour. The proposed development adds three trips to the northbound approach.
- The southbound through/right lane at the all-way stop controlled SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard intersection (study intersection #4) is projected to operate with a V/C ratio greater than 1.0 during the weekday PM peak hour.
- The northbound approach to the all-way stop controlled SW Baker Road-SW Murdock Road/SW Sunset Boulevard intersection (study intersection #5) is projected to operate with a V/C ratio of greater than 1.0 during the weekday PM peak hour.
- The eastbound approach to the stop-controlled Highway 99W/SW Brookman Road-SW Chapman Road intersection (study intersection #6) is projected to operate with a V/C ratio greater than 1.0 during the weekday AM and PM peak hours, exceeding ODOT's 0.95 V/C ratio mobility target for the stop controlled approach.

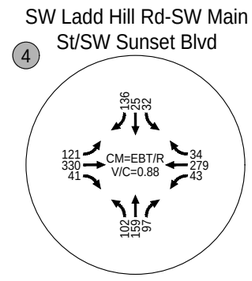
Operations and mitigation opportunities at these five intersections are discussed further below. *Appendix F* includes the year 2024 total traffic conditions level-of-service worksheets.

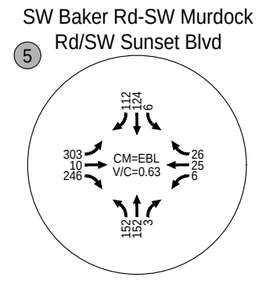


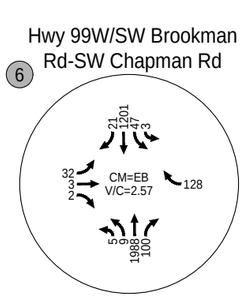


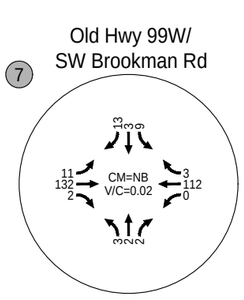


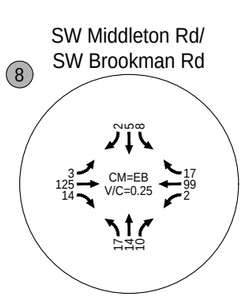


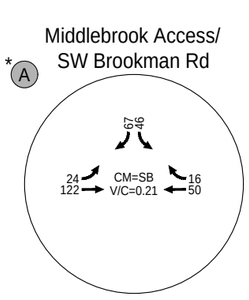


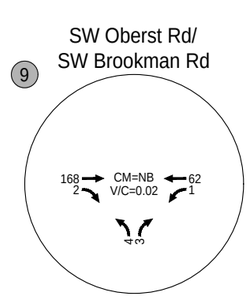


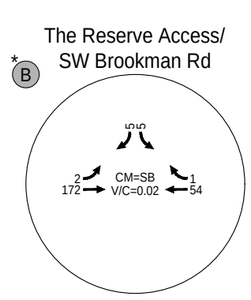


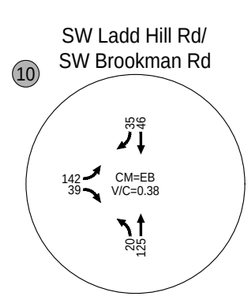










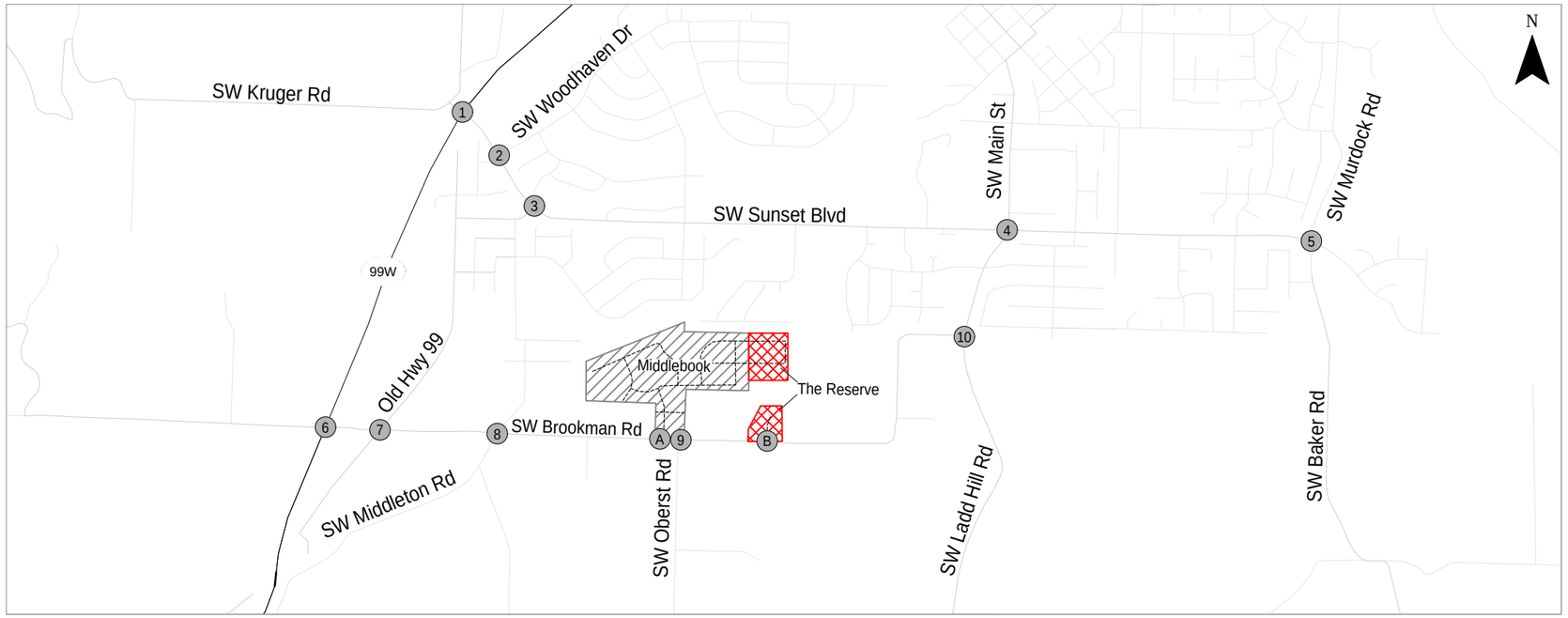


* Note: Trips were added to intersections A and B to account for rerouted trips associated with the existing two homes on site.

CM = CRITICAL MOVEMENT (TWSC)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED/AWSC) / CRITICAL MOVEMENT LEVEL OF SERVICE (TWSC)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED/AWSC) / CRITICAL MOVEMENT CONTROL DELAY (TWSC)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO
TWSC = TWO-WAY STOP CONTROL
AWSC= ALL-WAY STOP CONTROL

Year 2024 Total Intersection Operations Weekday AM Peak Hour Sherwood, Oregon

Figure 12



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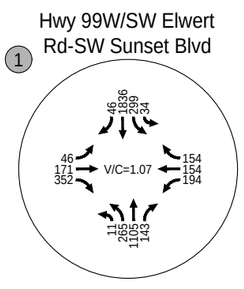
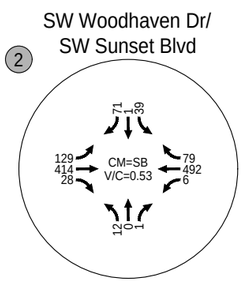
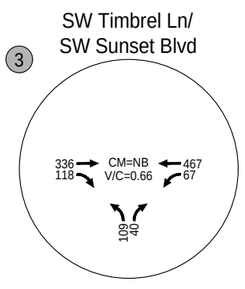


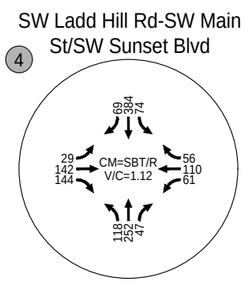
2 SW Woodhaven Dr/ SW Sunset Blvd



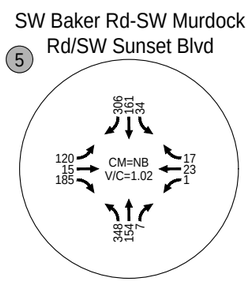
3 SW Timbrel Ln/ SW Sunset Blvd



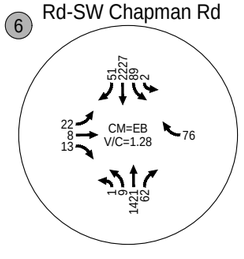
4 SW Ladd Hill Rd-SW Main St/SW Sunset Blvd



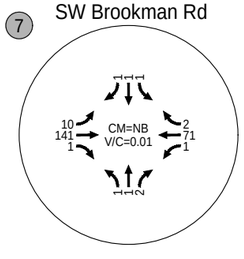
5 SW Baker Rd-SW Murdock Rd/SW Sunset Blvd



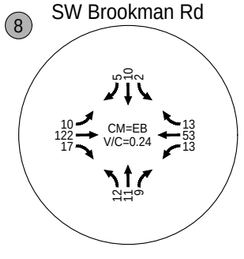
6 Hwy 99W/SW Brookman Rd-SW Chapman Rd



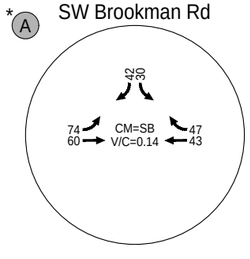
7 Old Hwy 99W/ SW Brookman Rd



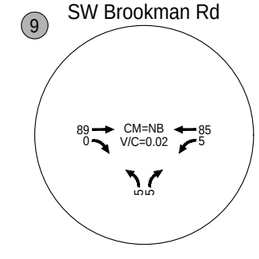
8 SW Middleton Rd/ SW Brookman Rd



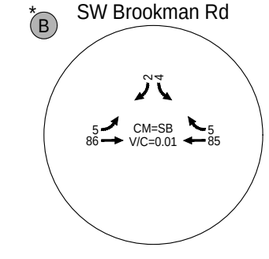
* A Middlebrook Access/ SW Brookman Rd



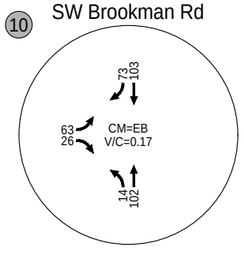
9 SW Oberst Rd/ SW Brookman Rd



* B The Reserve Access/ SW Brookman Rd



10 SW Ladd Hill Rd/ SW Brookman Rd



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TWSC = TWO-WAY STOP CONTROL
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Year 2024 Total Intersection Operations Weekday PM Peak Hour Sherwood, Oregon

Figure 13

KITTELSON & ASSOCIATES

Highway 99W/SW Elwert Road-SW Sunset Boulevard intersection (Study Intersection #1)

This intersection is projected to continue to exceed ODOT's 0.99 V/C mobility standard under weekday PM peak hour conditions under total traffic assuming completion of Washington County's MSTIP project. The proposed development results in the weekday PM peak hour V/C ratio change from 1.06 under background conditions to 1.07 with site traffic. Given that the already over-capacity V/C ratio change is less than 0.03[4] assuming no signal timing change, the City of Sherwood could make a finding that site development impacts do not require mitigation per ODOT Policy Statement findings relative to the change in V/C ratio. This potential finding could be considered recognizing the planned future signalization of the Highway 99W/SW Brookman Road-SW Chapman Road intersection (study intersection #6) will reduce westbound left-turn demand on Sunset Boulevard as well as northbound U-turn demand.

SW Woodhaven Drive/SW Sunset Boulevard (Study Intersection #2)

The southbound approach to this stop-controlled intersection is projected to operate at a V/C ratio of 1.63 under background traffic and a V/C ratio of 1.64 under total traffic conditions during the weekday AM peak hour. This intersection is identified for signalization in the City TSP.

Given that the intersection does not meet City operating standards under background conditions, no site trips are added to the critical stop-controlled approach and the planned future signalization cost is not proportionate to site trip impacts, site-impact mitigation is recommended through payment of a proportionate share contribution to the planned future signalization. The proposed proportionate share mitigation is discussed later in this report.

SW Timbrel Lane/SW Sunset Boulevard (Study Intersection #3)

The weekday AM peak hour V/C ratio of the northbound approach to this stop-controlled intersection is projected to change from 1.71 prior to site development to 1.73 with site development. The City plans construction of a roundabout at this intersection in the future.

Given that the intersection does not meet City operating standards under background conditions, the site adds three trips to the critical movement during the weekday AM peak hour and the planned future signalization cost is not proportionate to site trip impacts, site-impact mitigation is recommended through payment of a proportionate share contribution to the planned future roundabout. The proposed proportionate share mitigation is discussed later in this report.

[4] A May 25, 2011 Oregon Highway Plan Policy intent statement issued by ODOT indicates that "In applying OHP mobility standards to analyze mitigation, ODOT recognizes that there are many variables and levels of uncertainty in calculating volume-to-capacity ratios, particularly over the planning horizon. In applying the standards after negotiating reasonable levels of mitigation for actions required under OAR 660-012-0060, ODOT considers calculated values for volume-to-capacity ratios that are within 0.03 of the adopted standard in the OHP to be considered in compliance with the standard."

SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard (Study Intersection #4)

The weekday PM peak hour V/C ratio on the southbound approach to this all-way stop-controlled intersection is projected to change from 1.10 under background traffic to 1.12 with site traffic. This intersection is identified for signalization in the City TSP.

Given that the intersection does not meet City operating standards under background conditions and the planned future signalization cost is not proportionate to site trip impacts, site-impact mitigation is recommended through payment of a proportionate share contribution to the planned future signalization. The proposed proportionate share mitigation is discussed later in this report.

SW Baker Road-SW Murdock Road/SW Sunset Boulevard (Study Intersection #5)

The weekday PM peak hour V/C ratio on the northbound approach to this all-way stop-controlled intersection is projected to remain unchanged (at 1.02) with site development. Construction of a northbound left turn lane and a southbound right turn lane is planned in the Sherwood TSP.

Given that the intersection does not meet City operating standards under background conditions and the planned turn lane cost is not proportionate to site trip impacts, site-impact mitigation is recommended through payment of a proportionate share contribution to the planned future turn lane project. The proposed proportionate share mitigation is discussed later in this report.

Highway 99W/SW Brookman Road-SW Chapman Road intersection (Study Intersection #6)

The eastbound approach to the stop-controlled Highway 99W/SW Brookman Road-SW Chapman Road intersection is projected to operate with a V/C ratio greater than 1.0 during the weekday AM and PM peak hours with site development, exceeding ODOT's 0.95 V/C ratio mobility target for the stop controlled approach. The proposed development is not projected to add trips to the eastbound movement. Also, the City's Transportation System Plan anticipates future signalization of the intersection in conjunction with restoration of full turn movements (elimination of westbound right-turn restriction). Prior to signalization, restriction of the eastbound approach to right-turns only (mirroring the planned restriction on the westbound approach) would allow the intersection to operate within ODOT mobility targets (resulting in a projected westbound critical movement V/C ratio of 0.71 during the weekday AM peak hour and an eastbound critical movement V/C ratio of 0.23 during the weekday PM peak hour – refer to mitigated Synchro worksheets in Appendix F).

Given that 1) the intersection does not meet ODOT mobility targets under background conditions, 2) no site-generated trips are added to the eastbound approach and 3) the City, ODOT, and Washington County are currently developing refinement plans for the intersection mitigation, we conclude that site-impact mitigation to the intersection could be provided in the form of 1) payment of a proportionate share contribution to the planned future intersection signalization, 2) interim restriction of the eastbound Chapman Road approach to right-turns only, or 3) some other measure to be identified by the review agencies.

Proportional Share Mitigation Assessment

Proportional share mitigation calculations for both the SW Woodhaven Drive/SW Sunset Boulevard and SW Timbrel Lane/SW Sunset Boulevard intersections were prepared following the methodology used by the City of Sherwood to assess impacts of the previously approved Middlebrook Residential Subdivision. The same methodology was prepared for the other two intersections on Sunset Boulevard for City consideration. Table 6 presents the assumed mitigation measures and costs as well as the trip components and assessment methodology for the four study intersections.

Table 6: Proportional Share Methodology

	SW Sunset Blvd/ SW Woodhaven Dr (#2)	SW Sunset Blvd/ SW Timbrel Ln (#3)	SW Ladd Hill Rd.-SW Main St./SW Sunset Boulevard (#4)	SW Baker Rd.-SW Murdock Rd./ SW Sunset Boulevard (#5)
Mitigation Project Summary	Construct Traffic Signal	Construct Mini Roundabout	Construct Traffic Signal	Construct Northbound Left Turn lane & Southbound Right Turn lane
City TSP Project ID	Not applicable	D28	D26	D33
Peak Hour	Weekday AM	Weekday AM	Weekday PM	Weekday PM
Scenario when mitigation is triggered	No Build (2024)	No Build (2024)	No Build (2024)	No Build (2024)
Existing Total Entering Volume, TEV (X)	1,012	894	1,208	1,149
2024 No Build (Background with RIRO, Y)	1,490	1,270	1,467	1,359
2024 Project Trips (PT)	3	3	19	12
Background Growth (Z = Y – X)	478	376	259	210
Proportional Share (%)*	0.62%	0.79%	6.83%	5.41%
Mitigation Cost Estimate ($)	$1,050,000	$630,000	$250,000	$750,000
Cost Estimate Reference	DKS (Ref 10)	DKS (Ref 10)	TSP (Ref 5)	TSP (Ref 5)
Proportional Share Cost ($)**	$6,549	$4,987	$17,086	$40,541

*if 2024 mitigation is triggered in: Existing — Proportional Share % = PT / X
No Build/Build — Proportional Share % = PT / (PT+ Z)

** If intersection fails in AM and PM, use average of AM and PM proportional share (%) to estimate share cost ($)

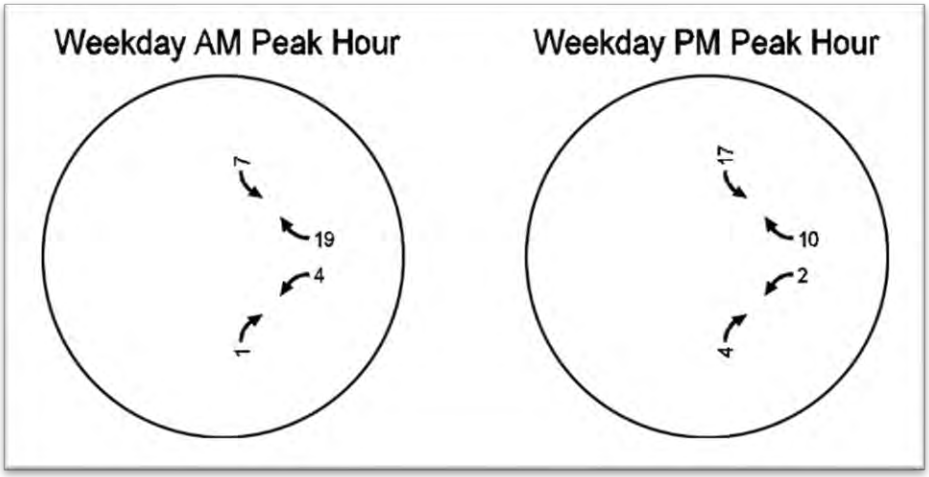
Source: *Sherwood High School Transportation Impact Study* (Reference 10)

In reviewing the proportional share estimates in Table 6, the City could consider:

- The extent to which the proportional share contributions will be Transportation Development Tax creditable (both the SW Woodhaven Drive/SW Sunset Boulevard and SW Timbrel Lane/SW Sunset Boulevard intersections were determined to be fully creditable for the previously approved Middlebrook Residential Subdivision).
- While the Reserve at Cedar Creek trip impacts at the two Sunset Boulevard study intersections can be mitigated through payment of a proportional share, the site-generated trips are expected to shift back to the Highway 99W/SW Brookman Road-SW Chapman Road intersection once the ultimate mitigation is implemented on Highway 99W and full turn movements are again provided at the Highway connection. Site mitigation would then no longer be required on Sunset Boulevard.

Exhibit 1 illustrates the projected number of site-generated peak hour trips that are expected to travel through the Highway 99W/SW Brookman Road-SW Chapman Road intersection once the ultimate mitigation is implemented at that location. This trip assignment is provided for informational purposes in case the City determines that proportional share payments are required at the Highway 99W/SW Brookman Road-SW Chapman Road.

Exhibit 1: Site Trips though Highway 99W/SW Brookman Road upon Ultimate Mitigation



SW Brookman Road Intersection Turn Lane Considerations at Site Access Points

In the future, SW Brookman Road is planned to be widened to a three- or five-lane arterial with a center left-turn lane. Each development fronting SW Brookman Road is currently expected to provide half-street right-of-way dedication to Washington County consistent with a future five-lane arterial.

Left-Turn Lane Needs Assessment

The location and configuration of the public street providing access to SW Brookman Road for both the Middlebrook Residential Subdivision and the 44 homes in the northern portion of the new residential subdivision (Study Intersection A) along with the Middlebrook Residential Subdivision frontage widening was previously approved with the Middlebrook Residential Subdivision. Although SW Brookman Road is being widened to provide half of the ultimate five-lane section along the Middlebrook Residential Subdivision frontage, the new frontage section SW Brookman Road is planned to be striped as a two-lane roadway (one lane in each direction) initially due to the relatively short frontage length and an inability to transition to a three-lane section within the frontage paving area.

While the two-lane roadway section was sufficient to support the Middlebrook Residential Subdivision, the need for an eastbound left-turn lane on SW Brookman Road into the shared access was re-assessed assuming the proposed new homes. The turn lane assessment was prepared using Harmelink volume-based criterion for left-turn lanes per Washington County direction. The projected weekday PM peak hour volumes with site development of the Reserve at Cedar Creek indicate that an eastbound left-turn lane is not needed with site development at the shared site access (Study Intersection A).

The potential need for an eastbound left-turn lane on SW Brookman Road at the east site access (Study Intersection B) was also evaluated and found to not be needed.

Right-turn Lane Needs Assessment

The projected westbound right-turn traffic volumes (well below 40 vehicles per hour) do not justify right-turn deceleration lanes at either of the site accesses on SW Brookman Road per Washington County criteria.

The turn lane analysis worksheets are provided in *Appendix G.*

SW BROOKMAN ROAD ACCESS MANAGEMENT

Washington County *Community Development Code* (Reference 12) Section 501 provides standards for access spacing along arterial roads. Per the code, when allowed, accesses to arterial facilities such as SW Brookman Road should be spaced at least 600 feet apart. Figure 14 is an influence area map that shows existing site driveways, the proposed site access as well as other existing accesses in the vicinity within 600 feet of the site frontage. The existing site driveways serving the two single family homes on the project site will each be closed as noted.

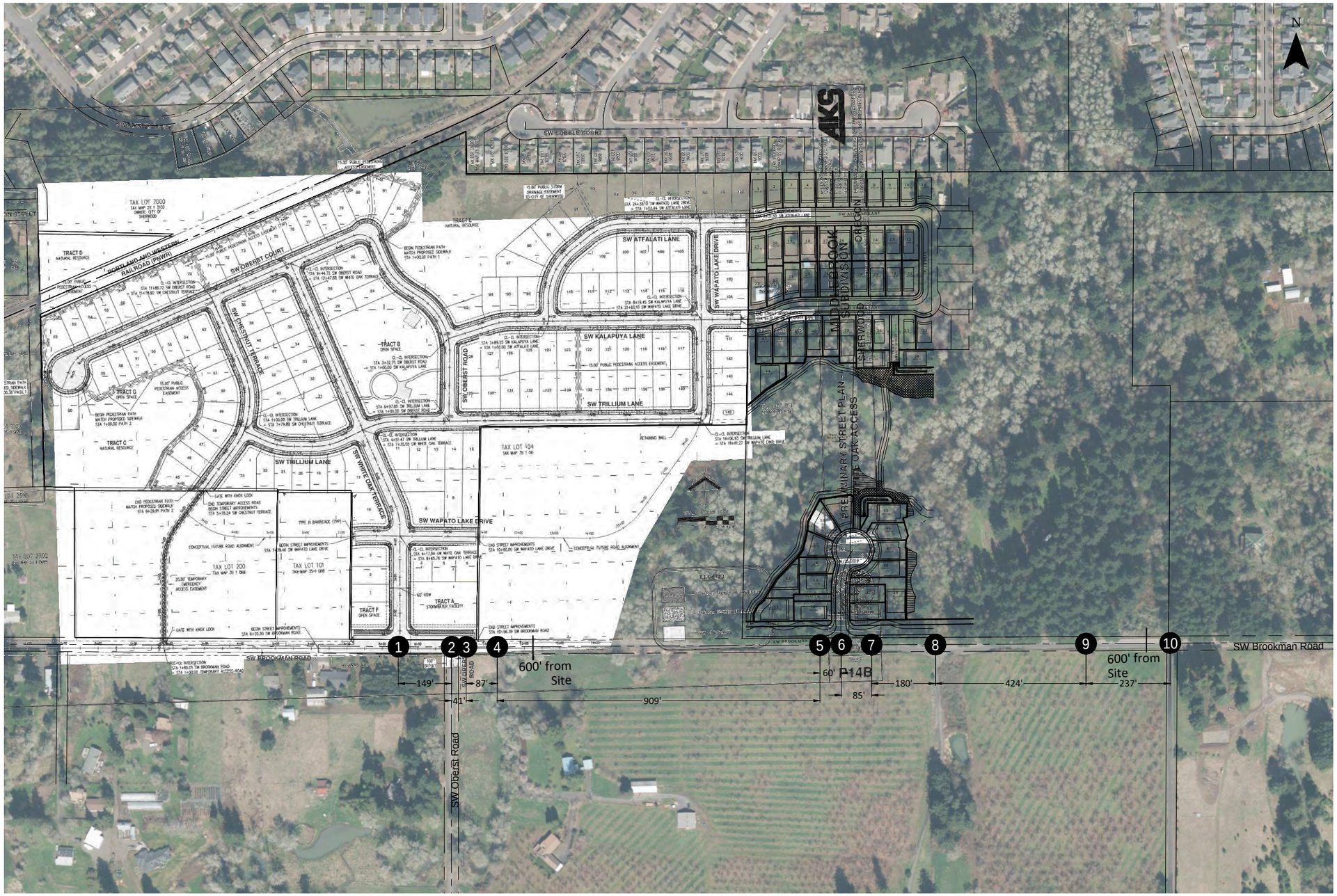
Middlebrook Shared Site Access (Study Intersection A)

The location of the proposed new connection to SW Brookman Road is situated west of the SW Oberst Road and was previously approved by both the City of Sherwood and Washington County. No additional analysis is required to support this access location.

The Reserve at Cedar Creek East Access (Study Intersection B)

The proposed eastern site access satisfies Washington County's minimum 600-foot spacing standard west of the site frontage along SW Brookman Road (the nearest driveway to the west is located over 900 feet away from Study Intersection B). The nearest driveway to the east of the access is located approximately 265 feet to the east, serving a single family home to the south (Driveway 8 on Figure 14)[5]. The next closest driveway is located over 600 feet to the east. Based on this review, the eastern proposed site access can satisfy the *Community Development Code* spacing requirements.

[5] Note that the existing site driveways identified as #5 and #7 in Figure 14 will be closed with the proposed development.



Influence Area Map
Sherwood, Oregon

Figure
14

KITTELSON & ASSOCIATES

Local Street Exception

Washington County previously approved the Middlebrook Shared Site Access (Study Intersection A). We expect the County will need to process an exception to allow the proposed eastern site access (Study Intersection B) local street connection to SW Brookman Road per CDC Section 501-8.5 which requires that direct access to arterials be from collector and other streets. Per the CDC 501-8.5, exceptions for local streets may be allowed through a Type II process when collector access is found to be unavailable and impracticable by the Director.

Support for granting the proposed local street connection is provided by multiple adopted documents guiding local area transportation needs. First, the City of Sherwood's adopted *Brookman Addition Concept Plan* (Reference 13) identifies only local street connections to SW Brookman Road in the area of the site. Further, the City's *Transportation System Plan* as well as the recently adopted minor amendments to the Transportation System Plan (Ordinance 2018-03) each show local street connections to SW Brookman Road along the site frontage as well as to the east and west. No planned north-south collector or arterial through the proposed site area is identified in any of the City's guiding documents. Considering the adopted planning documents and the creek crossing that would be required to connect the northern and southern portions of the site, the Washington County Director should make a determination that collector access is both unavailable and impracticable and that local access can be allowed as proposed in accordance with CDC 501-8.5. As noted above, the proposed local access (Study Intersection B) can satisfy County access spacing standards for SW Brookman Road.

QUEUING ASSESSMENT

A table summarizing the queueing assessment under all traffic scenarios is provided in Appendix D. Each location where the 95th percentile queue is projected to exceed storage under total traffic conditions is discussed below.

Highway 99W/SW Elwert Road-SW Sunset Boulevard (Study Intersection #1)

The 95th percentile queue for the eastbound left-turn and westbound left-turn at the signalized intersection of Highway 99W/SW Elwert Road-SW Sunset Boulevard are projected to exceed storage during the weekday AM and/or weekday PM peak hour.

Consistent with background conditions, the eastbound left-turn movement is projected to have a 95th percentile queue of 300 feet during the weekday AM peak hour, in excess of the 260 feet of storage planned for the intersection[6]. The proposed Reserve at Cedar Creek subdivision is not projected to add any trips to the eastbound left-turn.

[6] The analysis assumes the planned improvements at the intersection of Highway 99W/SW Elwert Road-SW Sunset Boulevard with the Sherwood High School project, including a second northbound left-turn lane, extended storage for the northbound and southbound left-turns, and exclusive eastbound and westbound left-turn lanes. In addition, the project relocated the intersection of SW Kruger Road and SW Elwert Road to provide additional storage on the eastbound approach to 99W.

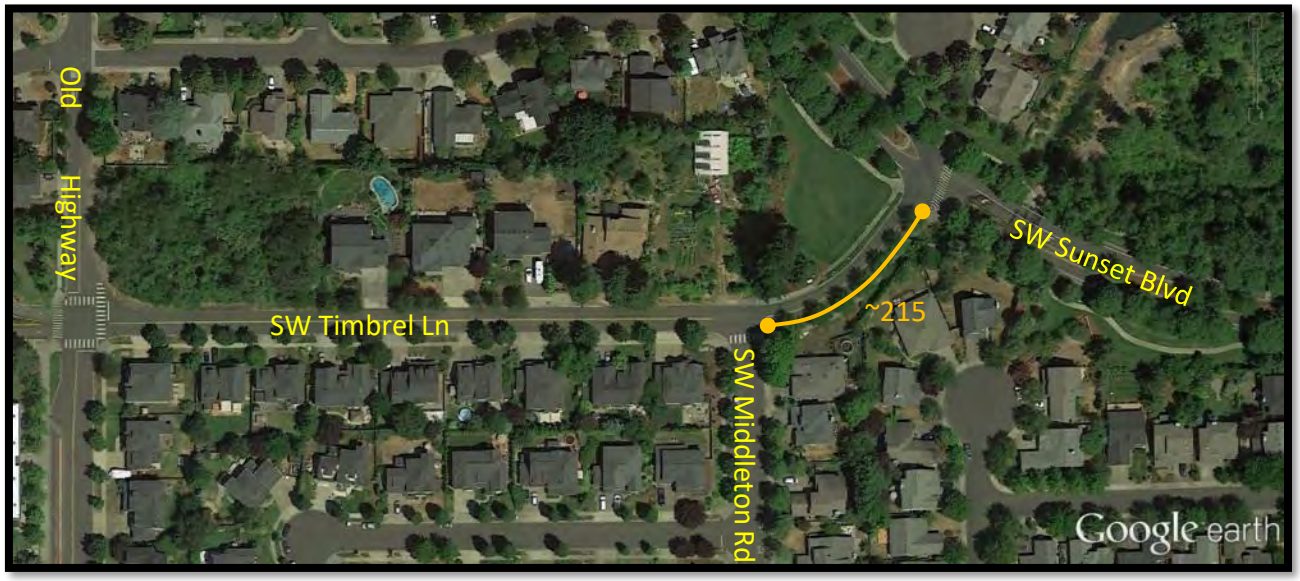
The 95th percentile queue for the westbound left-turn is expected to exceed the proposed 185 feet of queue storage during both the weekday AM and PM peak hour under background and total traffic conditions. The increase in queue during the weekday AM peak hour is in part due to the interim westbound right-turn only restriction at Highway 99W and SW Brookman Road-SW Chapman Road, which is expected to add vehicles to the westbound left-turn movement. The site is projected to add 3 westbound left-turns (of a total projected westbound left-turn volume of 161) during the weekday AM peak hour and 1 during the weekday PM peak hour. Once the interim westbound right-turn restriction is removed, the proposed residential development would not contribute any westbound left-turns to the intersection.

No mitigation is recommended at the Highway 99W/SW Elwert Road-SW Sunset Boulevard in conjunction with the proposed site development.

SW Timbrel Lane/SW Sunset Boulevard (Study Intersection #3)

The 95th percentile queue for the northbound through/left-turn movement at the two-way stop-controlled intersection of SW Timbrel Lane/SW Sunset Boulevard is projected to extend beyond the adjacent intersection of SW Middleton Road during the weekday AM peak hour under both background and total traffic conditions. No change in queue length is projected with site development. As illustrated in Exhibit 2, there is approximately 215 feet between the intersections.

Exhibit 2: SW Timbrel Lane/SW Sunset Boulevard



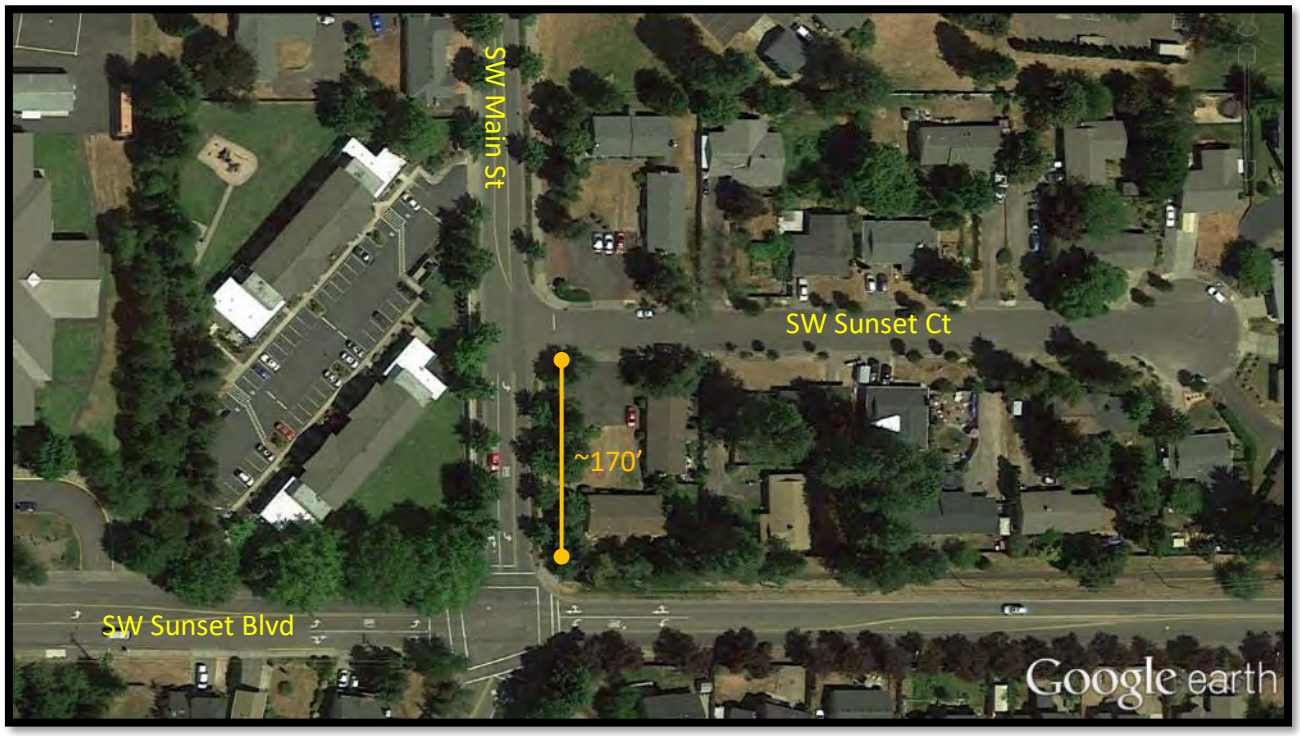
The site is projected to contribute 3 of the projected 226 northbound left-turns during the weekday AM peak hour. The projected site-generated trips are expected to travel north on SW Middleton Road and west of SW Sunset Boulevard to travel south on Highway 99W, given the westbound right-turn only restriction at Highway 99W and SW Brookman Road-SW Chapman Road. Once the interim turn restriction is removed, the proposed residential development would not contribute any northbound left-turns to the intersection.

As previously documented in Table 6, it is recommended that the proposed development pay a proportional share contribution towards capacity mitigation of the SW Timbrel Lane/SW Sunset Boulevard intersection. No additional mitigation beyond the proportional share payment is recommended.

SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard (Study Intersection #4)

The 95th percentile queue for the southbound through/right-turn movement at the all-way stop-controlled intersection of SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard is projected to extend beyond the adjacent intersection of SW Sunset Court (north of SW Sunset Boulevard) during the weekday PM peak hour under all scenarios studied. As illustrated in Exhibit 3, there is approximately 170 feet between the two intersections. The 95th percentile queue for the southbound through/right-turn during the weekday PM peak hour is projected to be 450 feet under both background and total traffic conditions. The site is anticipated to add 4 southbound vehicles to the intersection (of a total 453 southbound through and right-turns on the approach) over the course of the PM peak hour, having minimal impact to the queue. During the weekday PM peak hour, vehicles turning left from SW Sunset Court onto SW Main Street may experience incrementally longer delays waiting for a gap in traffic on SW Main Street as a result.

Exhibit 3: SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard



As previously documented in Table 6, it is recommended that the proposed development pay a proportional share contribution towards capacity mitigation of the SW Main Street/SW Sunset Boulevard intersection. No additional mitigation beyond the proportional share payment is recommended.

SW Baker Road-SW Murdock Road/SW Sunset Boulevard (Study Intersection #5)

The 95th percentile queue for the northbound movement at the all-way stop-controlled intersection of SW Baker Road-SW Murdock Road/SW Sunset Boulevard is projected to extend to adjacent intersection of SW Cornerstone Lane during the weekday PM peak hour under background and total traffic conditions. As illustrated in Exhibit 4, there is approximately 390 feet between the two intersections. The 95th percentile queue for the northbound approach during the weekday PM peak hour is projected to be 400 feet under both background and total traffic conditions. The site is anticipated to add 3 northbound left vehicles to the intersection (of a total 509 northbound vehicles on the approach) over the course of the weekday PM peak hour.

Exhibit 4: SW Baker Road-SW Murdock Road/SW Sunset Boulevard

As previously documented in Table 6, it is recommended that the proposed development pay a proportional share contribution towards capacity mitigation of the SW Baker Road-SW Murdock Road/SW Sunset Boulevard intersection. No additional mitigation beyond the proportional share payment is recommended.

Site Accesses/SW Brookman Road

Vehicle queuing conditions were assessed on the stop controlled approaches to both proposed site access connections to SW Brookwood Road as shown in Table 7. The queuing results indicate there will be adequate southbound queue storage at both proposed site access connections upon site development.

Table 7: Projected 95th Percentile Vehicle Queues for 2020 Total Traffic Conditions

Intersection		Movement	Assumed Storage Length	Weekday AM Peak Queue	Weekday PM Peak Queue	Storage Adequate? (Yes/No)
A	Future Site Access/ SW Brookman Road	Southbound	250[1] feet	25 feet	<25 feet	Yes
B	Future Site Access/ SW Brookman Road	Southbound	50[2] feet	<25 feet	<25 feet	Yes

Queues rounded up to the nearest 25 feet
[1]Approximate distance to first internal intersection
[2]Anticipated distance to first on-site residential driveway

COMPLIANCE WITH REQUIREMENTS IN THE SHERWOOD MUNICIPAL CODE

Section 16.106.080 of the Sherwood Municipal Code outlines the purpose, applicability, requirements, and approval criteria for a traffic impact analysis. The approval criteria provided in 16.106.080F are listed below with specific application to the proposed development.

1. The analysis complies with the requirements of 16.106.080.C

   Per 16.106.080.C:

   - *A pre-application conference was held involving the City, Washington County and ODOT (on July 21, 2018)*
   - *This TIA has been prepared by an Oregon Registered Professional Engineer*
   - *The latest edition of the Trip Generation Manual (10th Edition) was used. Per direction from ODOT and the City, the average rate was used for the daily trip generation and the fitted curve equation for the weekday AM and PM peak hour trip generation.*
   - *Intersection-level analysis was conducted at 12 study intersections identified in coordination with City staff and based on historic traffic impact studies in the area. These study intersections were analyzed even though only the western shared site access (Study Intersection A) was impacted by 50 or more peak hour trips.*
   - *The Transportation Planning Rule is not applicable to a land division application, per OAR 660-012-0060.*

2. The analysis demonstrates that adequate transportation facilities exist to serve the proposed development or identifies mitigation measures that resolve identified traffic safety problems in a manner that is satisfactory to the City Engineer and, when County or State highway facilities are affected, to Washington County and ODOT.

   This study addresses the adequacy of the transportation facilities and recommends mitigation at the impacted intersections through payment of proportionate share contributions.

3. For affected non-highway facilities, the TIA demonstrates that mobility and other applicable performance standards established in the adopted City TSP have been met.

The City's mobility performance standards have been applied, as documented in this study.

4. Proposed public improvements are designed and will be constructed to the street standards specified in Section 16.106.010 and the Engineering Design Manual, and to the access standards in Section 16.106.040.

The appropriate street and access standards will be applied to the development. The development plans will be subject to review and approval by the City.

5. Proposed public improvements and mitigation measures will provide safe connections across adjacent right-of-way (e.g., protected crossings) when pedestrian or bicycle facilities are present or planned on the far side of the right-of-way.

The project will provide a sidewalk and pavement widening for a future bike lane along the site frontage on Brookman Road. Off-site bicycle and pedestrian facilities are expected to be constructed in conjunction with future off-site development by others consistent with County and City frontage improvement requirements.

FINDINGS AND RECOMMENDATIONS

Based on the results of the transportation impact analysis, the proposed subdivision can be developed while maintaining acceptable operations at the study intersections. The analysis developed the following findings and recommendations.

Findings

- All study intersection operations currently satisfy City, County, and ODOT standards.
- All future scenarios evaluated in this study assume implementation of a westbound right-turn only restriction on Brookman Road at the Highway 99W/SW Brookman Road-SW Chapman Road intersection in conjunction with the previously approved Middlebrook Residential Subdivision.
- The proposed residential development is estimated to generate approximately 538 daily trips, including 50 trips during the weekday AM peak hour and 60 weekday PM peak trips after accounting for the two existing detached single-family homes on the site.
- Under background and total traffic conditions, six of the study intersections were found to not operate in accordance with the applicable standards:
    - The signalized Highway 99W/SW Elwert Road-SW Sunset Boulevard intersection (study intersection #1) will continue to exceed ODOT's 0.99 V/C threshold during the weekday PM peak hour.
        - The site development impacts do not require mitigation per ODOT Policy Statement findings relative to the change in V/C ratio. Further, removal of the interim westbound left-turn restriction and planned future signalization of the

Highway 99W/SW Brookman Road-SW Chapman Road intersection will reduce out-of-direction interim turn movements at the intersection.

- The southbound approach V/C ratio at the stop-controlled SW Woodhaven Drive/SW Sunset Boulevard intersection (study intersection #2) is projected to exceed City V/C ratio standards during the weekday AM peak hour.
- The northbound approach V/C ratio at the stop-controlled SW Timbrel Lane/SW Sunset Boulevard intersection (study intersection #3) is projected to exceed City V/C ratio standards during the weekday AM peak hour.
- The southbound through/right lane V/C ratio at the all-way stop controlled SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard intersection (study intersection #4) is projected to exceed City V/C ratio standards during the weekday PM peak hour.
- The northbound approach V/C ratio at the all-way stop controlled SW Baker Road-SW Murdock Road/SW Sunset Boulevard intersection (study intersection #5) is projected to exceed City V/C ratio standards during the weekday PM peak hour.
- The eastbound approach V/C ratio at the stop-controlled Highway 99W/SW Brookman Road-SW Chapman Road intersection (study intersection #6) is projected to exceed ODOT's 0.95 V/C mobility target during both the weekday AM and PM peak hours.
    - Note that the intersection does not meet ODOT mobility targets under background conditions, no site-generated trips are added to the eastbound approach and the City, ODOT, and Washington County are currently developing refinement plans for the intersection mitigation.

- The proposed new east site access on SW Brookman Road can comply with the Washington County *Community Development Code* minimum access spacing requirements.

Recommendations

Recommended transportation improvements to be implemented with site development include:

- With site development and subject to City review, pay a proportionate share contribution (estimated to be $69,163 in total) towards planned future improvements at the following study intersections:
    - Sunset Boulevard/Woodhaven Drive (study intersection #2): $6,549 toward the construction of a planned future traffic signal.
    - Sunset Boulevard/Timbrel Lane (study intersection #3): $4,987 toward the construction of a planned future mini-roundabout.
    - SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard (study intersection #4): $17,086 toward the construction of a planned future traffic signal.
    - SW Baker Road-SW Murdock Road/SW Sunset Boulevard (study intersection #5): $40,541 toward the construction of planned future north and southbound turn lanes.

- Coordinate with the City, ODOT, and Washington County to identify and implement an appropriate mitigation at the stop-controlled Highway 99W/SW Brookman Road-SW Chapman Road intersection. Mitigation to the intersection could be provided in the form of 1) payment of a proportionate share contribution to the planned future intersection signalization, 2) restriction of the eastbound Chapman Road approach to right-turns only, or 3) some other measure to be identified by the review agencies.

We trust that this letter adequately documents the transportation impacts associated with the proposed development. Please contact us if you have any questions or comments regarding the contents of this letter or the analyses performed.

Sincerely,
KITTELSON & ASSOCIATES, INC.

Chris Brehmer, PE
Senior Principal Engineer

Julia Kuhn, PE
Senior Principal Engineer

REFERENCES

1. Kittelson & Associates, Inc.. Middlebrook Residential Subdivision Transportation Impact Analysis and supplementary memorandums. 2019
2. Transportation Research Board. *Highway Capacity Manual*. 6th Edition. 2016.
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13. City of Sherwood. *Brookman Addition Concept Plan.* 2009.

Appendix A
ODOT Crash Data

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

99W Pacific Highway West (091) & SW Elwert Rd / SW Sunset Blvd
January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2017														
ANGLE	0	1	0	1	0	2	0	1	0	1	0	1	0	0
REAR-END	0	1	2	3	0	2	0	3	0	2	1	3	0	0
TURNING MOVEMENTS	0	1	1	2	0	2	0	2	0	1	1	2	0	0
2017 TOTAL	0	3	3	6	0	6	0	6	0	4	2	6	0	0
YEAR: 2016														
REAR-END	0	4	1	5	0	7	0	4	1	5	0	5	0	0
2016 TOTAL	0	4	1	5	0	7	0	4	1	5	0	5	0	0
YEAR: 2015														
REAR-END	0	0	3	3	0	0	0	3	0	3	0	3	0	0
TURNING MOVEMENTS	0	3	0	3	0	6	0	3	0	2	1	3	0	0
2015 TOTAL	0	3	3	6	0	6	0	6	0	5	1	6	0	0
YEAR: 2014														
REAR-END	0	2	5	7	0	3	1	4	3	7	0	7	0	0
TURNING MOVEMENTS	0	0	1	1	0	0	0	0	1	1	0	1	0	0
2014 TOTAL	0	2	6	8	0	3	1	4	4	8	0	8	0	0
YEAR: 2013														
REAR-END	0	2	2	4	0	5	0	4	0	3	1	4	0	0
2013 TOTAL	0	2	2	4	0	5	0	4	0	3	1	4	0	0
FINAL TOTAL	0	14	15	29	0	27	1	24	5	25	4	29	0	0

Disclaimers: *Effective 2016,* ***collection of "Property Damage Only" (PDO) crash data elements was reduced for vehicles and participants.*** *Age, Gender, License, Error and other elements are no longer available for PDO crash reporting. Please keep this in mind when comparing 2016 PDO crash data to prior years.*

A higher number of crashes may be reported as of 2011 compared to prior years. This does not necessarily reflect an increase in annual crashes. The higher numbers may result from a change to an internal departmental process that allows the Crash Analysis and Reporting Unit to add previously unavailable, non-fatal crash reports to the annual data file. Please be aware of this change when comparing pre-2011 crash statistics. For all disclaimers, see https://www.oregon.gov/ODOT/Data/documents/Crash_Data_Disclaimers.pdf.

091 PACIFIC HIGHWAY WEST

99W Pacific Highway West (091) & SW Elwert Rd / SW Sunset Blvd
January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	SPEED	ALC	DRUG	SCHL	WORK	DATE / DAY/TIME / LAT/LONG	COUNTY / CITY / URBAN AREA	RD# / CMPT/MLG / MILEPNT / LRS	FC / CONN # / STREET / SECOND STREET / INTERSECTION SEQ#	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS / (#LANES)	INT-REL / TRAF- / CNTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / VEH TYPE	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN EVENT	CAUSE
07197	N	N	N	N	N	10/23/2014	WASHINGTON	1 14		INTER	CROSS	N	N	RAIN	S-1STOP	01	NONE 0	STRGHT										27,29
CITY		N				Thu 4P	SHERWOOD	MN 0	SW PACIFIC HY 99W	NE		TRF SIGNAL	N	WET	REAR		PRVTE	NE SW									000	00
							PORTLAND UA	16.66	SW SUNSET BLVD	06	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	33	F	SUSP		016,026	038	27,29
No	*45 21*	*11.85*	*-122 52*	*4.18*				009100100S00	1															OR<25				
																02	NONE 0	STOP										
																	PRVTE	NE SW									011	00
																	PSNGR CAR		01	DRVR	NONE	43	F	OR-Y		000	000	00
																								OR<25				
04491	N	N	N			04/13/2016	WASHINGTON	2 14		INTER	CROSS	N	N	CLR	S-1STOP	01	NONE 9	STRGHT										29
NONE		N				Wed 5P	SHERWOOD	MN 0	SW PACIFIC HY 99W	NE		TRF SIGNAL	N	DRY	REAR		N/A	NE SW									000	00
							PORTLAND UA	16.66	SW SUNSET BLVD	06	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK		000	000	00
No	*45 21*	*11.45*	*-122 52*	*3.31*				009100200S00	1															UNK				
																02	NONE 9	STOP										
																	N/A	NE SW									011	00
																	PSNGR CAR		01	DRVR	NONE	00	U	UNK		000	000	00
																								UNK				
04670	N	N	N	N	N	07/31/2017	WASHINGTON	2 14		INTER	CROSS	N	N	CLR	S-STRGHT	01	NONE 0	STRGHT										07
CITY		N				Mon 4P	SHERWOOD	MN 0	SW ELWERT RD	NE		UNKNOWN	N	DRY	REAR		PRVTE	NE SW									000	00
							PORTLAND UA	16.66	SW PACIFIC HY 99W	06	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	16	M	OR-Y		043	000	07
No	*45 21*	*11.45*	*-122 52*	*3.31*				009100200S00	1															OR<25				
																			02	PSNG	INJC	18	F			000	000	00
																02	NONE 0	STRGHT										
																	PRVTE	NE SW									006	00
																	PSNGR CAR		01	DRVR	INJC	18	F	OR-Y		000	000	00
																								OR<25				
04289	N	N	N			04/27/2017	WASHINGTON	2 14		INTER	CROSS	N	N	CLR	S-1STOP	01	NONE 9	STRGHT										29
NONE		N				Thu 7A	SHERWOOD	MN 0	SW PACIFIC HY 99W	E		TRF SIGNAL	N	DRY	REAR		N/A	SE NW									000	00
							PORTLAND UA	16.66	SW SUNSET BLVD	06	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK		000	000	00
No	*45 21*	*11.45*	*-122 52*	*3.31*				009100200S00	1															UNK				
																02	NONE 9	STOP										
																	N/A	SE NW									013	00
																	PSNGR CAR		01	DRVR	NONE	00	U	UNK		000	000	00
																								UNK				
02885	N	N	N			05/22/2014	WASHINGTON	2 14		INTER	CROSS	N	N	CLR	S-1STOP	01	NONE 0	STRGHT										07
NONE		N				Thu 7A		MN 0		S		TRF SIGNAL	N	DRY	REAR		PRVTE	S N									000	00
							PORTLAND UA	16.66		06	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	42	M	OR-Y		026	000	07
No	*45 21*	*11.45*	*-122 52*	*3.31*				009100200S00																OR<25				

091 PACIFIC HIGHWAY WEST — 99W Pacific Highway West (091) & SW Elwert Rd / SW Sunset Blvd
January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	SPEED	ALC	DRUG	MC	SCHL	WORK	DATE / DAY/TIME / *LAT/LONG*	COUNTY / CITY / URBAN AREA	RD# CMPT/MLG MILEPNT LRS	FC	CONN # FIRST STREET / SECOND STREET / INTERSECTION SEQ#	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CNTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / VEH TYPE	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
																		02	NONE 0 / PRVTE	STOP / S N									011		00
																			PSNGR CAR		01	DRVR	NONE	43	M	OR-Y / OR<25		000	000		00
04595	N	N	N	N	N	N	08/11/2014	WASHINGTON	2 MN	14		INTER / S	CROSS 0	N / TRF SIGNAL	N	CLR / DRY	S-1STOP / REAR	01	NONE 0 / PRVTE	STRGHT / S N												07
CITY		N					Mon 8A		0						N														000		00
								PORTLAND UA	16.66			06	0		N	DAY	INJ		PSNGR CAR		01	DRVR	INJC	25	F	OR-Y / OR<25		026	000		07
No	*45*	*21*	*11.45*	*-122*	*52*	*3.31*			009100200S00																						
																		02	NONE 0 / PRVTE	STOP / S N									011		00
																			PSNGR CAR		01	DRVR	INJC	17	F	OR-Y / OR<25		000	000		00
03115	N	N	N				06/12/2013	WASHINGTON	2 MN	14		INTER / SW	CROSS 0	N / TRF SIGNAL	N	CLR / DRY	S-1STOP / REAR	01	NONE 0 / PRVTE	STRGHT / SW NE												07
NONE		N					Wed 9A	SHERWOOD	0		LEG TO ELWERT				N														000		00
								PORTLAND UA	16.66		SW PACIFIC HY 99W	06	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	F	UNK / UNK		043	000		07
No	*45*	*21*	*11.45*	*-122*	*52*	*3.31*			009100200S00		1																				
																		02	NONE 0 / PRVTE	STOP / SW NE									011		00
																			PSNGR CAR		01	DRVR	NONE	50	F	OR-Y / OR<25		000	000		00
05133	N	N	N	N	N	N	09/13/2013	WASHINGTON	2 MN	14		INTER / SW	CROSS 0	N / TRF SIGNAL	N	CLR / DRY	S-1STOP / REAR	01	NONE 0 / PRVTE	STRGHT / SW NE												27,07
CITY		N					Fri 9P	SHERWOOD	0		SW PACIFIC HY 99W				N														000		00
								PORTLAND UA	16.66		SW SUNSET BLVD	06	0		N	DLIT	INJ		PSNGR CAR		01	DRVR	NONE	22	M	OR-Y / OR<25		016,043,026	038		27,07
No	*45*	*21*	*11.45*	*-122*	*52*	*3.31*			009100200S00		1																				
																		02	NONE 0 / PRVTE	STOP / SW NE									011		00
																			PSNGR CAR		01	DRVR	INJC	79	M	OR-Y / OR<25		000	000		00
																					02	PSNG	INJC	60	F			000	000		00
																					03	PSNG	INJC	77	F			000	000		00
07058	N	N	N	N	N	N	12/04/2013	WASHINGTON	2 MN	14		INTER / SW	CROSS 0	N / TRF SIGNAL	N	CLR / DRY	S-1STOP / REAR	01	NONE 0 / PRVTE	STRGHT / SW NE												27,07
CITY		N					Wed 8A	SHERWOOD	0		SW PACIFIC HY 99W				N														000		00
								PORTLAND UA	16.66		SW SUNSET BLVD	06	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	61	M	OR-Y / OR<25		016,043,026	038		27,07
No	*45*	*21*	*11.45*	*-122*	*52*	*3.31*			009100200S00		1																				
																		02	NONE 0 / PRVTE	STOP / SW NE									011	013	00
																			PSNGR CAR		01	DRVR	INJC	64	F	OR-Y / OR<25		000	000		00

091 PACIFIC HIGHWAY WEST — 99W Pacific Highway West (091) & SW Elwert Rd / SW Sunset Blvd
January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	SPEED	ALC	DRUG	MC	SCHL	WORK	DATE / DAY/TIME / *LAT/LONG*	COUNTY / CITY / URBAN AREA	RD# CMPT/MLG MILEPNT LRS	FC	CONN # FIRST STREET / SECOND STREET / INTERSECTION SEQ#	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CNTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / VEH TYPE	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
																		03	NONE 0 / PRVTE	STOP / SW NE									022	013	00
																			PSNGR CAR		01	DRVR	NONE	20	F	OR-Y / OR<25		000	000		00
																		04	NONE 0 / PRVTE	STOP / SW NE									022		00
																			PSNGR CAR		01	DRVR	INJC	49	F	OR-Y / OR<25		000	000		00
01988	N	N	N	N	N	N	03/05/2014	WASHINGTON	2	14		INTER	CROSS	N	N	CLD	S-1STOP	01	NONE 0	STRGHT											29
CITY		N					Wed 3P	SHERWOOD	MN 0		SW PACIFIC HY 99W	SW		TRF SIGNAL	N	WET	REAR		PRVTE	SW NE								000		00
								PORTLAND UA	16.66		SW SUNSET BLVD	06	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	51	M	SUSP / OR<25		026	000		29
No	*45 21*		*11.45*	*-122*	*52*	*3.31*			009100200S00		1																			
																		02	NONE 0 / PRVTE	STOP / SW NE									011		00
																			PSNGR CAR		01	DRVR	NONE	42	F	EXP / OR<25		000	000		00
06054	N	N	N				10/15/2014	WASHINGTON	2	14		INTER	CROSS	N	N	RAIN	S-1STOP	01	NONE 0	STRGHT											29
NO RPT		N					Wed 7A	SHERWOOD	MN 0		SW PACIFIC HY 99W	SW		TRF SIGNAL	N	WET	REAR		PRVTE	SW NE								000		00
								PORTLAND UA	16.66		SW SUNSET BLVD	06	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	00	M	OR-Y / OR<25		026	000		29
No	*45 21*		*11.45*	*-122*	*52*	*3.31*			009100200S00		1																			
																		02	NONE 0 / PRVTE	STOP / SW NE									011		00
																			PSNGR CAR		01	DRVR	INJC	39	M	OR-Y / OR<25		000	000		00
04990	N	N	N	N	N	N	07/21/2015	WASHINGTON	2	14		INTER	CROSS	N	N	CLR	S-1STOP	01	NONE 0	STRGHT											07
CITY		N					Tue 4P	SHERWOOD	MN 0		SW ELWERT RD	SW		TRF SIGNAL	N	DRY	REAR		PRVTE	SW NE								000		00
								PORTLAND UA	16.66		SW PACIFIC HY 99W	06	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	29	F	SUSP / OR<25		043	000		07
No	*45 21*		*11.45*	*-122*	*52*	*3.31*			009100200S00		1																			
																		02	NONE 0 / PRVTE	STOP / SW NE									011		00
																			PSNGR CAR		01	DRVR	NONE	61	M	OR-Y / OR<25		000	000		00
05463	N	N	N				09/04/2015	WASHINGTON	2	14		INTER	CROSS	N	N	CLR	S-1STOP	01	NONE 0	STRGHT											29
NONE		N					Fri 11A	SHERWOOD	MN 0		SW PACIFIC HY 99W	SW		TRF SIGNAL	N	DRY	REAR		PRVTE	SW NE								000		00
								PORTLAND UA	16.66		SW SUNSET BLVD	06	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	18	M	OR-Y / OR<25		026	000		29
No	*45 21*		*11.45*	*-122*	*52*	*3.31*			009100200S00		1																			

091 PACIFIC HIGHWAY WEST

99W Pacific Highway West (091) & SW Elwert Rd / SW Sunset Blvd
January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	S P E E D C / D R U G A L / S U M J / G C H L / S W O R K	DATE / DAY/TIME / LAT/LONG	COUNTY / CITY / URBAN AREA	RD# FC / CMPT/MLG / MILEPNT / LRS	CONN # / FIRST STREET / SECOND STREET / INTERSECTION SEQ#	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) LEGS (#LANES)	INT-REL / TRAF- CNTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE TRLR QTY / OWNER / VEH TYPE	MOVE FROM TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
												02	NONE 0	STOP											
													PRVTE	SW NE									011		00
													PSNGR CAR		01	DRVR	NONE	00	M	OR-Y		000	000		00
																				OR<25					
01834	Y Y N N N	03/19/2016	WASHINGTON	2 14		INTER	CROSS	N	N	CLD	S-1STOP	01	NONE 0	STRGHT										013	07,30
CITY	N	Sat 6P	SHERWOOD	MN 0	SW PACIFIC HY 99W	SW		TRF SIGNAL	N	DRY	REAR		PRVTE	SW NE									000		00
			PORTLAND UA	16.66	SW SUNSET BLVD	06	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	23	M	NONE		043,050	000		07,30
No		45 21 11.45 -122 52 3.31		009100200S00	1															OR<25					
												02	NONE 0	STOP											
													PRVTE	SW NE									012	013	00
													PSNGR CAR		01	DRVR	INJC	46	M	OR-Y		000	000		00
																				OR<25					
															02	PSNG	INJC	28	F			000	000		00
												03	NONE 0	STOP											
													PRVTE	SW NE									022		00
													PSNGR CAR		01	DRVR	NONE	34	M	OR-Y		000	000		00
																				OR<25					
02965	N N N	05/06/2016	WASHINGTON	2 14		INTER	CROSS	N	N	CLR	S-1STOP	01	NONE 0	STRGHT											29
NONE	N	Fri 8A	SHERWOOD	MN 0	SW PACIFIC HY 99W	SW		TRF SIGNAL	N	DRY	REAR		PRVTE	SW NE									000		00
			PORTLAND UA	16.66	SW SUNSET BLVD	06	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	32	M	OR-Y		026	000		29
No		45 21 11.45 -122 52 3.31		009100200S00	1															OR<25					
												02	NONE 0	STOP											
													PRVTE	SW NE									011		00
													PSNGR CAR		01	DRVR	INJC	40	M	OR-Y		000	000		00
																				OR<25					
06420	N N N N N	09/22/2016	WASHINGTON	2 14		INTER	CROSS	N	N	CLD	S-STRGHT	01	NONE 0	STRGHT										087	07
CITY	N	Thu 5P	SHERWOOD	MN 0	SW PACIFIC HY 99W	SW		TRF SIGNAL	N	SNO	REAR		PRVTE	SW NE									000	087	00
			PORTLAND UA	16.66	SW SUNSET BLVD	06	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	17	M	OR-Y		043	000		07
No		45 21 11.45 -122 52 3.31		009100200S00	1															OR<25					
												02	NONE 0	STRGHT											
													PRVTE	SW NE									006	087	00
													PSNGR CAR		01	DRVR	INJC	28	F	OR-Y		000	000		00
																				OR<25					
08928	N N N	12/25/2016	WASHINGTON	2 14		INTER	CROSS	N	N	CLR	S-1STOP	01	NONE 0	STRGHT											29
NONE	N	Sun 12P	SHERWOOD	MN 0	SW PACIFIC HY 99W	SW		TRF SIGNAL	N	DRY	REAR		PRVTE	SW NE									000		00
			PORTLAND UA	16.66	SW SUNSET BLVD	06	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	58	M	OR-Y		026	000		29
No		45 21 11.45 -122 52 3.31		009100200S00	1															OR<25					

091 PACIFIC HIGHWAY WEST — 99W Pacific Highway West (091) & SW Elwert Rd / SW Sunset Blvd
January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	SPEED	ALC	DRUG	SCHL	WORK	DATE / DAY/TIME / *LAT/LONG*	COUNTY / CITY / URBAN AREA	RD# / CMPT/MLG / LRS	FC	CONN # / FIRST STREET / SECOND STREET / INTERSECTION SEQ#	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CNTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / VEH TYPE	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN EVENT	CAUSE
																	02	NONE 0 PRVTE	STOP SW NE									011	00
																		PSNGR CAR		01	DRVR	INJC	59	F	OR-Y OR<25		000	000	00
																				02	PSNG	INJC	40	M			000	000	00
																				03	PSNG	INJC	54	M			000	000	00
07321 CITY	N N	N	N	N	N	11/18/2017 Sat 8P	WASHINGTON SHERWOOD	2 14 MN 0		SW PACIFIC HY 99W	INTER SW	CROSS	N TRF SIGNAL	N	FOG DRY	S-STRGHT REAR	01	NONE 9 N/A	STRGHT SW NE										07 00
							PORTLAND UA	16.66		SW SUNSET BLVD	06	0		N	DARK	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000	00
No	*45 21*		*11.45*	*-122*	*52*	*3.31*	009100200	S00		1																			
																	02	NONE 9 N/A	STRGHT SW NE									006	00
																		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000	00
04827 CITY	N N	N	N	N	N	08/24/2015 Mon 1P	WASHINGTON SHERWOOD	2 14 MN 0		SW PACIFIC HY 99W	INTER CN	CROSS	N TRF SIGNAL	N	CLR DRY	ANGL-OTH TURN	01	NONE 0 PRVTE	STRGHT SW NE										04 00
							PORTLAND UA	16.66		SW SUNSET BLVD	02	0		N	DAY	INJ		PSNGR CAR		01	DRVR	INJB	93	F	OR-Y OR<25		020	000	04
No	*45 21*		*11.45*	*-122*	*52*	*3.31*	009100200	S00		1																			
																	02	NONE 0 PRVTE	TURN-L SE SW									000	00
																		PSNGR CAR		01	DRVR	INJB	35	F	OR-Y OR<25		000	000	00
																				02	PSNG	INJC	05	M			000	000	00
06861 CITY	N N	N	N	N	N	10/30/2017 Mon 6A	WASHINGTON SHERWOOD	2 14 MN 0		SW ELWERT RD	INTER CN	CROSS	N TRF SIGNAL	N	CLR DRY	O-1 L-TURN TURN	01	NONE 9 N/A	TURN-L SE SW										04 00
							PORTLAND UA	16.66		SW PACIFIC HY 99W	03	0		N	DLIT	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000	00
No	*45 21*		*11.45*	*-122*	*52*	*3.31*	009100200	S00		1																			
																	02	NONE 9 N/A	STRGHT NW SE									000	00
																		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000	00
00574 CITY	N N	N	N	N	N	01/31/2014 Fri 2P	WASHINGTON SHERWOOD	2 14 MN 0		SW PACIFIC HY 99W	INTER CN	CROSS	N L-GRN-SIG	N	CLD WET	O-1 L-TURN TURN	01	NONE 0 PRVTE	STRGHT SW NE										04 00
							PORTLAND UA	16.66		SW SUNSET BLVD	04	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	16	F	OR-Y OR<25		020	000	04
No	*45 21*		*11.45*	*-122*	*52*	*3.31*	009100200	S00		1																			
																	02	NONE 0 PRVTE	TURN-L NE SE									000	00
																		PSNGR CAR		01	DRVR	NONE	37	F	OR-Y OR<25		000	000	00

091 PACIFIC HIGHWAY WEST

99W Pacific Highway West (091) & SW Elwert Rd / SW Sunset Blvd
January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	S P E E L D / D R U A / C L M C J / G S W C O H R L K	DATE / DAY/TIME / *LAT/LONG*	COUNTY / CITY / URBAN AREA	RD# FC / CMPT/MLG / MILEPNT / LRS	CONN # / FIRST STREET / SECOND STREET / INTERSECTION SEQ#	RD CHAR / DIRECT / LOCTN	INT-TYP / (MEDIAN) / LEGS / (#LANES)	INT-REL / TRAF- / CNTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / VEH TYPE	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	A G E	S E X	LICNS / RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
05152	N N N N N	08/23/2017	WASHINGTON	2 14		INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE 0	STRGHT											04
CITY	N	Wed 12P	SHERWOOD	MN 0	SW PACIFIC HY 99W	CN		TRF SIGNAL	N	DRY	ANGL		PRVTE	SW NE									000		00
			PORTLAND UA	16.66	SW SUNSET BLVD	04	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	59	M	EXP		020	000		04
No		*45 21 11.45 -122 52 3.31*		009100200S00	1															OR<25					
												02	NONE 0	STRGHT											
													PRVTE	NW SE									000		00
													PSNGR CAR		01	DRVR	INJC	36	F	OR-Y		000	000		00
																				OR<25					
												03	NONE 0	TURN-R											
													PRVTE	SE NE									022		00
													PSNGR CAR		01	DRVR	INJC	19	F	OR-Y		000	000		00
																				OR<25					
06134	N N N N N	10/21/2013	WASHINGTON	1 14		INTER	CROSS	N	N	CLR	S-1STOP	01	NONE 0	STRGHT										002	27,07
CITY	N	Mon 4P		MN 0		NE		TRF SIGNAL	N	DRY	REAR		PRVTE	NE SW									000		00
			PORTLAND UA	16.67		06	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	23	F	OR-Y		016,043,026	038	002	27,07
No		*45 21 11.85 -122 52 4.18*		009100100S00																OR<25					
															02	PSNG	NO<5	03	M			000	010		00
												02	NONE 0	STOP											
													PRVTE	NE SW									011		00
													PSNGR CAR		01	DRVR	NONE	64	F	OR-Y		000	000		00
																				OR<25					
03548	N N N N N	06/25/2014	WASHINGTON	1 14		INTER	CROSS	N	N	CLR	S-1STOP	01	NONE 1	STRGHT											07
CITY	N	Wed 9A		MN 0		NE		TRF SIGNAL	N	DRY	REAR		PRVTE	NE SW									000		00
			PORTLAND UA	16.67		06	0		N	DAY	PDO		SEMI TOW		01	DRVR	NONE	63	M	OTH-Y		043,026	000		07
No		*45 21 11.85 -122 52 4.18*		009100100S00																N-RES					
												02	NONE 0	STOP											
													PRVTE	NE SW									011		00
													PSNGR CAR		01	DRVR	NONE	39	F	OR-Y		000	000		00
																				OR<25					
00404	N N N N N	01/23/2015	WASHINGTON	1 14		INTER	CROSS	N	N	CLR	O-1 L-TURN	01	NONE 0	STRGHT											04
COUNTY	N	Fri 6A		MN 0		CN		TRF SIGNAL	N	DRY	TURN		PRVTE	N S									000		00
			PORTLAND UA	16.67		01	0		N	DLIT	INJ		PSNGR CAR		01	DRVR	INJC	26	M	OR-Y		020	000		04
No		*45 21 11.85 -122 52 4.18*		009100100S00																OR<25					
												02	NONE 0	TURN-L											
													PRVTE	S W									000		00
													PSNGR CAR		01	DRVR	INJC	29	M	OR-Y		000	000		00
																				OR>25					

091 PACIFIC HIGHWAY WEST

99W Pacific Highway West (091) & SW Elwert Rd / SW Sunset Blvd
January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	S P E E D / A L C / D R U G M J / S C H L / W O R K	DATE / DAY/TIME / LAT/LONG	COUNTY / CITY / URBAN AREA	RD# FC / CMPT/MLG / MILEPNT / LRS	CONN # / FIRST STREET / SECOND STREET / INTERSECTION SEQ#	RD CHAR / DIRECT / LOCTN	INT-TYP / (MEDIAN) / LEGS / (#LANES)	INT-REL / TRAF- / CNTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / VEH TYPE	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
03342	N N N N N	06/06/2017	WASHINGTON	1 14		INTER	CROSS	N	N	CLR	O-1 L-TURN	01	NONE 0	TURN-L										087	27,04
CITY	N	Tue 2P		MN 0		CN		TRF SIGNAL	N	DRY	TURN		PRVTE	S W									000		00
			PORTLAND UA	16.67		01	0		N	DAY	INJ		PSNGR CAR		01	DRVR	INJB	21	M	OR-Y		016,004,020	038		27,04
No		45 21 11.85 -122 52 4.18		009100100S00																OR>25					
												02	NONE 0	STRGHT											
													PRVTE	N S									000	087	00
													PSNGR CAR		01	DRVR	INJC	25	F	OR-Y		000	000		00
																				OR<25					
															02	PSNG	NO<5	01	F			000	000		00
															03	PSNG	NO<5	02	F			000	000		00
03825	N N N	07/08/2015	WASHINGTON	1 14		INTER	CROSS	N	N	CLR	BIKE	01	NONE 0	TURN-L											02
NONE	N	Wed 7P		MN 0		CN		TRF SIGNAL	N	DRY	TURN		PRVTE	SE SW									000		00
			PORTLAND UA	16.67		03	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	25	F	OTH-Y		027	000		02
No		45 21 11.85 -122 52 4.18		009100100S00																OR<25					
														STRGHT	01	BIKE	INJB	23	M		02	000	035		00
														NW SE											

WASHINGTON COUNTY — 99W Pacific Highway West (091) & SW Elwert Rd / SW Sunset Blvd
January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	SPEED	ALC	DRUG/MJ	SCHL	WORK	DATE / DAY/TIME / *LAT/LONG*	MILEPNT / DIST FROM / INTERSECT	COUNTY ROADS FIRST STREET / SECOND STREET / INTERSECTION SEQ #	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS / (#LANES)	INT-REL / TRAF- / CONTL	OFF-RD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
04232	N	N	N			7/9/2014		SW ELWERT RD	INTER	CROSS	N	N	CLR	S-1STOP	01	NONE 0	STRGHT											07
NONE			N			Wed 4P	0	SW PACIFIC HY 99W	NW		TRF SIGNAL	N	DRY	REAR		PRVTE	NW SE										000		00
No						*45 21 11.85 -122 52 4.18*	1		06	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	M	OR-Y OR<25		026	000		07
															02	NONE 0	STOP											
																PRVTE	NW SE										011		00
																PSNGR CAR		01	DRVR	NONE	40	M	OR-Y OR<25		000	000		00

CITY OF SHERWOOD, WASHINGTON COUNTY — 99W Pacific Highway West (091) & SW Elwert Rd / SW Sunset Blvd

January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	SPED	ALC	DRUG/MJ	SCHL	WORK	DATE / DAY/TIME / *LAT/LONG*	FC / DISTNC	CITY STREET / FIRST STREET / SECOND STREET / INTERSECTION SEQ #	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS / (#LANES)	INT-REL / TRAF- / CONTL	OFF-RD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
02740	N	N	N			05/20/2015	17	SW PACIFIC HY 99W	INTER	CROSS	N	N	CLR	S-1STOP	01	NONE 0	STRGHT											29
NONE			N			Wed 1P	0	SW SUNSET BLVD	SE		TRF SIGNAL	N	DRY	REAR		PRVTE	SE NW									000		00
No						*45 21 11.45* *-122 52 3.31*	1		06	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	M	UNK UNK		026	000		29
															02	NONE 0	STOP									011		00
																PSNGR CAR		01	DRVR	NONE	23	F	OR-Y OR>25		000	000		00

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

SW Woodhaven Dr & SW Sunset Blvd
January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2017														
REAR-END	0	0	1	1	0	0	0	0	1	1	0	1	0	0
TURNING MOVEMENTS	0	0	1	1	0	0	0	0	1	1	0	1	0	0
2017 TOTAL	0	0	2	2	0	0	0	0	2	2	0	2	0	0
FINAL TOTAL	0	0	2	2	0	0	0	0	2	2	0	2	0	0

Disclaimers: *Effective 2016,* ***collection of "Property Damage Only" (PDO) crash data elements was reduced for vehicles and participants.*** *Age, Gender, License, Error and other elements are no longer available for PDO crash reporting. Please keep this in mind when comparing 2016 PDO crash data to prior years.*

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CITY OF SHERWOOD, WASHINGTON COUNTY — SW Woodhaven Dr & SW Sunset Blvd

January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	SPED	ALC	DRUG/MJ	SCHL	WORK	DATE / DAY/TIME / *LAT/LONG*	FC / DISTNC	CITY STREET / FIRST STREET / SECOND STREET / INTERSECTION SEQ #	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS / (#LANES)	INT-REL / TRAF- / CONTL	OFF-RD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
06431	N	N	N	N	N	10/14/2017	17	SW SUNSET BLVD	INTER	CROSS	N	N	CLD	S-1STOP	01	NONE 9	STRGHT											27,07
CITY			N			Sat 4P	0	SW WOODHAVEN DR	N		STOP SIGN	N	WET	REAR		N/A	N S									000		00
No	*45 21*		*6.37*			*-122 51 57.09*	1		06	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
															02	NONE 9	STOP											
																N/A	N S									011		00
																PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
01904	N	N	N	N	N	04/06/2017	17	SW SUNSET BLVD	INTER	CROSS	N	N	CLD	ANGL-OTH	01	NONE 9	STRGHT											03
CITY			N			Thu 1P	0	SW WOODHAVEN DR	CN		STOP SIGN	N	WET	TURN		N/A	S N									000		00
No	*45 21*		*6.37*			*-122 51 57.09*	1		03	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
															02	NONE 9	TURN-L											
																N/A	W N									000		00
																PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

SW Timbrel Ln & SW Sunset Blvd
January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR:														
TOTAL														
FINAL TOTAL														

Disclaimers: *Effective 2016,* ***collection of "Property Damage Only" (PDO) crash data elements was reduced for vehicles and participants.*** *Age, Gender, License, Error and other elements are no longer available for PDO crash reporting. Please keep this in mind when comparing 2016 PDO crash data to prior years.*

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OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

SW Ladd Hill Rd / SW Main St & SW Sunset Blvd
January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2017														
ANGLE	0	0	1	1	0	0	0	0	1	0	1	1	0	0
2017 TOTAL	0	0	1	1	0	0	0	0	1	0	1	1	0	0
YEAR: 2016														
REAR-END	0	0	1	1	0	0	0	1	0	1	0	1	0	0
TURNING MOVEMENTS	0	1	0	1	0	1	0	1	0	0	1	1	0	0
2016 TOTAL	0	1	1	2	0	1	0	2	0	1	1	2	0	0
YEAR: 2015														
REAR-END	0	1	0	1	0	1	0	1	0	0	1	1	0	0
TURNING MOVEMENTS	0	0	1	1	0	0	0	1	0	1	0	1	0	0
2015 TOTAL	0	1	1	2	0	1	0	2	0	1	1	2	0	0
YEAR: 2013														
FIXED / OTHER OBJECT	0	1	0	1	0	1	0	1	0	0	1	1	0	1
2013 TOTAL	0	1	0	1	0	1	0	1	0	0	1	1	0	1
FINAL TOTAL	0	3	3	6	0	3	0	5	1	2	4	6	0	1

Disclaimers: *Effective 2016,* ***collection of "Property Damage Only" (PDO) crash data elements was reduced for vehicles and participants.*** *Age, Gender, License, Error and other elements are no longer available for PDO crash reporting. Please keep this in mind when comparing 2016 PDO crash data to prior years.*

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CITY OF SHERWOOD, WASHINGTON COUNTY

SW Ladd Hill Rd / SW Main St & SW Sunset Blvd

January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	SPED	ALC	DRUG/MJ	SCHL	WORK	DATE / DAY/TIME / *LAT/LONG*	FC / DISTNC	CITY STREET / FIRST STREET / SECOND STREET / INTERSECTION SEQ #	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CONTL	OFF-RD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
06745	N	N	N			04/20/2013	16	SW LADD HILL RD	INTER	CROSS	N	Y	CLR	FIX OBJ	01	NONE 0	TURN-L										079	08
NO RPT			N			Sat 9P	0	SW SUNSET BLVD	S		STOP SIGN	N	DRY	FIX		PRVTE	E S									000	079	00
No	*45 20 59.00*		*-122 50 29.11*				1		05	0		N	DLIT	INJ		PSNGR CAR		01	DRVR	INJB	18	M	OR-Y OR<25		001	000		08
00519	N	Y	N	N	N	01/22/2016	17	SW LADD HILL RD	INTER	CROSS	N	N	CLR	ANGL-STP	01	NONE 0	TURN-R											08
CITY			N			Fri 8P	0	SW SUNSET BLVD	S		STOP SIGN	N	DRY	TURN		PRVTE	W S									000		00
No	*45 20 59.00*		*-122 50 29.11*				1		06	0		N	DLIT	INJ		PSNGR CAR		01	DRVR	NONE	44	F	OR-Y OR<25		001	000		08
															02	NONE 0	STOP											
																PRVTE	S N									012		00
																PSNGR CAR		01	DRVR	NONE	37	M	OTH-Y N-RES		000	000		00
															03	NONE 0	STOP											
																PRVTE	S N									012		00
																PSNGR CAR		01	DRVR	INJC	38	M	OR-Y OR<25		000	000		00
05834	N	N	N			08/30/2016	16	SW LADD HILL RD	INTER	CROSS	N	N	CLR	S-1STOP	01	NONE 9	STRGHT											29
NONE			N			Tue 7A	0	SW SUNSET BLVD	W		STOP SIGN	N	DRY	REAR		N/A	W E									000		00
No	*45 20 59.00*		*-122 50 29.11*				1		06	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
															02	NONE 9	STOP											
																N/A	W E									011		00
																PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
01656	N	N	N	N	N	03/30/2015	16	SW MAIN ST	INTER	CROSS	N	N	CLR	S-1STOP	01	NONE 0	STRGHT											29
CITY			N			Mon 7P	0	SW SUNSET BLVD	E		STOP SIGN	N	DRY	REAR		PRVTE	E W									000		00
No	*45 20 59.00*		*-122 50 29.11*				1		06	0		N	DLIT	INJ		PSNGR CAR		01	DRVR	NONE	22	F	OR-Y OR<25		026	000		29
															02	NONE 0	STOP											
																PRVTE	E W									011		00
																PSNGR CAR		01	DRVR	INJC	37	F	OR-Y OR<25		000	000		00
06555	N	N	N			10/19/2017	16	SW MAIN ST	INTER	CROSS	N	N	RAIN	ANGL-OTH	01	NONE 9	STRGHT											02
NO RPT			N			Thu 6A	0	SW SUNSET BLVD	CN		STOP SIGN	N	WET	ANGL		N/A	S N									000		00
No	*45 20 59.00*		*-122 50 29.11*				1		02	0		N	DLIT	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
															02	NONE 9	STRGHT											
																N/A	E W									000		00
																PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00

CITY OF SHERWOOD, WASHINGTON COUNTY — SW Ladd Hill Rd / SW Main St & SW Sunset Blvd

January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	SPEED	ALC	DRUG/MJ	SCHL	WORK	DATE / DAY/TIME / *LAT/LONG*	FC / DISTNC	CITY STREET / FIRST STREET / SECOND STREET / INTERSECTION SEQ #	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS / (#LANES)	INT-REL / TRAF- / CONTL	OFF-RD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
03798	N	N	N	N	N	07/07/2015	16	SW MAIN ST	INTER	CROSS	N	N	CLR	O-1 L-TURN	01	NONE 0	STRGHT											02
CITY			N			Tue 5P	0	SW SUNSET BLVD	CN		STOP SIGN	N	DRY	TURN		PRVTE	W E									015	00
No	*45 20 59.00*					*-122 50 29.11*	1		03	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	50	F	OR-Y OR<25		000	000		00
															02	NONE 0	TURN-L									015		00
																PSNGR CAR	E S	01	DRVR	NONE	61	F	OR-Y OR<25		004,028	000		02

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

SW Baker Rd / SW Murdock Rd & SW Sunset Blvd
January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2017														
REAR-END	0	1	1	2	0	4	1	1	1	2	0	2	0	0
2017 TOTAL	0	1	1	2	0	4	1	1	1	2	0	2	0	0
FINAL TOTAL	0	1	1	2	0	4	1	1	1	2	0	2	0	0

Disclaimers: *Effective 2016,* ***collection of "Property Damage Only" (PDO) crash data elements was reduced for vehicles and participants.*** *Age, Gender, License, Error and other elements are no longer available for PDO crash reporting. Please keep this in mind when comparing 2016 PDO crash data to prior years.*

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CITY OF SHERWOOD, WASHINGTON COUNTY

SW Baker Rd / SW Murdock Rd & SW Sunset Blvd

January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	SPED	ALC	DRUG/MJ	SCHL	WORK	DATE / DAY/TIME / *LAT/LONG*	FC / DISTNC	CITY STREET / FIRST STREET / SECOND STREET / INTERSECTION SEQ #	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS / (#LANES)	INT-REL / TRAF- / CONTL	OFF-RD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
03869	N	N	N	N	N	06/27/2017	16	MURDOCK RD	INTER	CROSS	N	N	CLR	S-1STOP	01	NONE 0	STRGHT											07
CITY			N			Tue 4P	0	SUNSET BLVD	N		STOP SIGN	N	DRY	REAR		PRVTE	N S										000		00
No	*45 20 58.65*					*-122 49 36.96*	1		06	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	19	F	OR-Y OR<25		043	000		07
															02	NONE 0	STOP											
																PRVTE	N S									011		00
																PSNGR CAR		01	DRVR	INJC	29	F	OR-Y OR<25		000	000		00
																		02	PSNG	INJC	01	M			000	000		00
																		03	PSNG	INJC	05	F			000	000		00
																		04	PSNG	INJC	03	M			000	000		00
06072	N	N	N			09/30/2017	16	MURDOCK RD	INTER	CROSS	N	N	CLD	S-1STOP	01	NONE 9	STRGHT											29
CITY			N			Sat 1P	0	SUNSET BLVD	N		STOP SIGN	N	WET	REAR		N/A	N S										000		00
No	*45 20 58.65*					*-122 49 36.96*	1		06	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
															02	NONE 9	STOP											
																N/A	N S									011		00
																TRUCK		01	DRVR	NONE	00	U	UNK UNK		000	000		00

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

99W Pacific Highway West (091) & SW Brookman Rd / SW Chapman Rd
January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2017														
ANGLE	0	2	2	4	0	2	0	1	3	1	3	4	0	0
REAR-END	0	0	1	1	0	0	0	0	1	1	0	1	0	0
TURNING MOVEMENTS	0	0	3	3	0	0	0	2	1	3	0	3	0	0
2017 TOTAL	0	2	6	8	0	2	0	3	5	5	3	8	0	0
YEAR: 2016														
ANGLE	0	0	1	1	0	0	0	0	1	1	0	1	0	0
TURNING MOVEMENTS	0	0	1	1	0	0	0	1	0	1	0	1	0	0
2016 TOTAL	0	0	2	2	0	0	0	1	1	2	0	2	0	0
YEAR: 2015														
ANGLE	0	1	0	1	0	1	0	1	0	1	0	1	0	0
TURNING MOVEMENTS	0	0	2	2	0	0	0	1	1	1	1	2	0	0
2015 TOTAL	0	1	2	3	0	1	0	2	1	2	1	3	0	0
YEAR: 2014														
ANGLE	0	2	0	2	0	3	0	1	1	1	1	2	0	0
TURNING MOVEMENTS	0	0	1	1	0	0	0	1	0	1	0	1	0	0
2014 TOTAL	0	2	1	3	0	3	0	2	1	2	1	3	0	0
YEAR: 2013														
ANGLE	0	0	1	1	0	0	0	0	1	1	0	1	0	0
2013 TOTAL	0	0	1	1	0	0	0	0	1	1	0	1	0	0
FINAL TOTAL	0	5	12	17	0	6	0	8	9	12	5	17	0	0

Disclaimers: *Effective 2016,* ***collection of "Property Damage Only" (PDO) crash data elements was reduced for vehicles and participants.*** *Age, Gender, License, Error and other elements are no longer available for PDO crash reporting. Please keep this in mind when comparing 2016 PDO crash data to prior years.*

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091 PACIFIC HIGHWAY WEST — 99W Pacific Highway West (091) & SW Brookman Rd / SW Chapman Rd
January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	S P E D	D R U G / A L C	S W C O H R J L K	DATE / DAY/TIME / *LAT/LONG*	COUNTY / CITY / URBAN AREA	RD# FC / CMPT/MLG / MILEPNT / LRS	CONN # / FIRST STREET / SECOND STREET / INTERSECTION SEQ#	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CNTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / VEH TYPE	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	A G E	S E X	LICNS RES	PED LOC	ERROR	ACTN EVENT	CAUSE
00536	Y	N	N N N	01/28/2017	WASHINGTON	2 14		INTER	CROSS	N	N	CLR	ANGL-STP	01	NONE 9	TURN-R										01,08
COUNTY		N		Sat 4P		MN 0		E		STOP SIGN	N	DRY	TURN		N/A	S E									000	00
					PORTLAND UA	17.46		06	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK		000	000	00
No	*45 20*		*32.90 -122*	*52 24.87*		009100200S00																UNK				
														02	NONE 9	STOP										
															N/A	E W									011	00
															PSNGR CAR		01	DRVR	NONE	00	U	UNK		000	000	00
																						UNK				
05762	N	N	N N N	09/18/2017	WASHINGTON	2 14		INTER	CROSS	N	N	RAIN	ANGL-OTH	01	NONE 9	STRGHT										27,02
COUNTY		N		Mon 10A		MN 0		S		STOP SIGN	N	WET	TURN		N/A	N S									000	00
					PORTLAND UA	17.46		03	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK		000	000	00
No	*45 20*		*32.90 -122*	*52 24.87*		009100200S00																UNK				
														02	NONE 9	TURN-R										
															N/A	W S									000	00
															PSNGR CAR		01	DRVR	NONE	00	U	UNK		000	000	00
																						UNK				
02243	N	N	N N N	04/27/2015	WASHINGTON	2 14		INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE 0	STRGHT										02
COUNTY		N		Mon 2P		MN 0		CN		STOP SIGN	N	DRY	ANGL		PRVTE	S N									000	00
					PORTLAND UA	17.46		01	0		N	DAY	INJ		MTRCYCLE		01	DRVR	INJA	68	M	OTH-Y		000	000	00
No	*45 20*		*32.90 -122*	*52 24.87*		009100200S00																N-RES				
														02	NONE 0	STRGHT										
															PRVTE	E W									015	00
															PSNGR CAR		01	DRVR	NONE	74	F	OR-Y		028	000	02
																						OR<25				
05349	N	N	N	09/22/2013	WASHINGTON	2 14		INTER	CROSS	N	N	RAIN	ANGL-OTH	01	NONE 0	STRGHT										02
NONE		N		Sun 11A		MN 0		CN		STOP SIGN	N	WET	ANGL		PRVTE	E W									000	00
					PORTLAND UA	17.46		02	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	F	OR-Y		028	000	02
No	*45 20*		*32.90 -122*	*52 24.87*		009100200S00																OR>25				
														02	NONE 0	STRGHT										
															PRVTE	S N									000	00
															PSNGR CAR		01	DRVR	NONE	73	F	OR-Y		000	000	00
																						OR<25				
																	02	PSNG	NO<5	03	F			000	000	00
03099	N	N	N	06/03/2014	WASHINGTON	2 14		INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE 0	TURN-L										08
NO RPT		N		Tue 5P		MN 0		CN		STOP SIGN	N	DRY	TURN		PRVTE	W N									000	00
					PORTLAND UA	17.46		02	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	F	UNK		001	000	08
No	*45 20*		*32.90 -122*	*52 24.87*		009100200S00																OR<25				

091 PACIFIC HIGHWAY WEST 99W Pacific Highway West (091) & SW Brookman Rd / SW Chapman Rd
January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	SPEED	ALC	DRUG	SCHL	WORK	DATE / DAY/TIME / *LAT/LONG*	COUNTY / CITY / URBAN AREA	RD# / CMPT/MLG / MILEPNT / LRS	FC / CONN # / FIRST STREET / SECOND STREET / INTERSECTION SEQ#	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CNTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / VEH TYPE	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN EVENT	CAUSE
																02	NONE 0 PRVTE	STRGHT S N									000	00
																	PSNGR CAR		01	DRVR	NONE	32	F	OTH-Y N-RES		000	000	00
03254 NO RPT	N N	N	N			05/18/2016 Wed 6A	WASHINGTON	2 14 MN 0		INTER CN	CROSS	N STOP SIGN	N	CLR DRY	O-1 L-TURN TURN	01	NONE 9 N/A	TURN-L W N										000	02 00
							PORTLAND UA	17.46		02	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK		000	000	00
No	*45 20*		*32.90 -122*	*52*	*24.87*			009100200S00																UNK				
																02	NONE 9 N/A	STRGHT E W									000	00
																	PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000	00
07481 COUNTY	N N	N	N	N	N	11/25/2017 Sat 8P	WASHINGTON	2 14 MN 0		INTER CN	CROSS	N STOP SIGN	N	CLD WET	ANGL-OTH ANGL	01	NONE 9 N/A	STRGHT W E										000	02,32 00
							PORTLAND UA	17.46		04	0		N	DARK	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK		000	000	00
No	*45 20*		*32.90 -122*	*52*	*24.87*			009100200S00																UNK				
																02	NONE 9 N/A	STRGHT S N									000	00
																	PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000	00
06064 NONE	N N	N	N			09/29/2017 Fri 2P	WASHINGTON	1 14 MN 0		INTER N	CROSS	N STOP SIGN	N	RAIN WET	S-1STOP REAR	01	NONE 9 N/A	STRGHT N S										000	29 00
							PORTLAND UA	17.47		06	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK		000	000	00
No	*45 20*		*32.89 -122*	*52*	*26.13*			009100100S00																UNK				
																02	NONE 9 N/A	STRGHT N S									000	00
																	PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000	00
00236 COUNTY	N N	N	N			01/15/2015 Thu 5P	WASHINGTON	1 14 MN 0		INTER CN	CROSS	N STOP SIGN	N	RAIN WET	ANGL-OTH TURN	01	NONE 0 PRVTE	STRGHT N S										000	02 00
							PORTLAND UA	17.47		01	0		N	DARK	PDO		PSNGR CAR		01	DRVR	NONE	20	M	OR-Y OR<25		000	000	00
No	*45 20*		*32.89 -122*	*52*	*26.13*			009100100S00																				
																02	NONE 0 PRVTE	TURN-L E S									015	00
																	PSNGR CAR		01	DRVR	NONE	25	F	OR-Y OR<25	028		000	02

091 PACIFIC HIGHWAY WEST — 99W Pacific Highway West (091) & SW Brookman Rd / SW Chapman Rd
January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	SPEED	ALC	DRUG	SCHL	WORK	DATE / DAY/TIME / *LAT/LONG*	COUNTY / CITY / URBAN AREA	RD# / CMPT/MILEPNT / LRS	FC / MLG / CONN # / FIRST STREET / SECOND STREET / INTERSECTION SEQ#	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CNTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / VEH TYPE	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN EVENT	CAUSE
08443	N	N	N	N	N	12/09/2016	WASHINGTON	1	14	INTER	CROSS	N	N	RAIN	ANGL-OTH	01	NONE	9	STRGHT									03
COUNTY		N				Fri 3P		MN	0	CN		STOP SIGN	N	WET	ANGL		N/A		N S								000	00
							PORTLAND UA	17.47		01	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK		000	000	00
No	*45 20*		*32.89 -122*	*52*	*26.13*			009100100S00																UNK				
																02	NONE	9	STRGHT									
																	N/A		E W								000	00
																	PSNGR CAR		01	DRVR	NONE	00	U	UNK		000	000	00
																								UNK				
01598	N	N	N			03/21/2017	WASHINGTON	1	14	INTER	CROSS	N	N	RAIN	ANGL-OTH	01	NONE	9	STRGHT									02
NO RPT		N				Tue 7A		MN	0	CN		STOP SIGN	N	WET	ANGL		N/A		E W								000	00
							PORTLAND UA	17.47		01	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK		000	000	00
No	*45 20*		*32.89 -122*	*52*	*26.13*			009100100S00																UNK				
																02	NONE	9	STRGHT									
																	N/A		N S								000	00
																	PSNGR CAR		01	DRVR	NONE	00	U	UNK		000	000	00
																								UNK				
07975	N	N	N			12/13/2017	WASHINGTON	1	14	INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE	0	STRGHT									03
COUNTY		N				Wed 7P		MN	0	CN		STOP SIGN	N	DRY	ANGL		PRVTE		E W								000	00
							PORTLAND UA	17.47		01	0		N	DARK	INJ		PSNGR CAR		01	DRVR	NONE	48	M	OR-Y		021	000	03
No	*45 20*		*32.89 -122*	*52*	*26.13*			009100100S00																OR<25				
																02	NONE	0	STRGHT									
																	PRVTE		N S								000	00
																	PSNGR CAR		01	DRVR	INJC	56	F	OR-Y		000	000	00
																								OR<25				
07202	N	N	N	N	N	12/01/2014	WASHINGTON	1	14	INTER	CROSS	N	N	CLD	ANGL-OTH	01	NONE	0	STRGHT									02
COUNTY		N				Mon 10A		MN	0	CN		STOP SIGN	N	DRY	ANGL		PRVTE		W E								015	00
							PORTLAND UA	17.47		03	0		N	DAY	INJ		PSNGR CAR		01	DRVR	INJA	56	F	OR-Y		028	000	02
No	*45 20*		*32.89 -122*	*52*	*26.13*			009100100S00																OR>25				
																02	NONE	0	STRGHT									
																	PRVTE		N S								000	00
																	PSNGR CAR		01	DRVR	NONE	29	F	OR-Y		000	000	00
																								OR<25				
																			02	PSNG	INJC	00	F			000	000	00
02701	N	N	N			05/18/2015	WASHINGTON	1	14	INTER	CROSS	N	N	CLR	O-1 L-TURN	01	NONE	0	STRGHT									02
NO RPT		N				Mon 5P		MN	0	CN		STOP SIGN	N	DRY	TURN		PRVTE		W E								000	00
							PORTLAND UA	17.47		03	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	40	F	OR-Y		000	000	00
No	*45 20*		*32.89 -122*	*52*	*26.13*			009100100S00																OR<25				

091 PACIFIC HIGHWAY WEST — 99W Pacific Highway West (091) & SW Brookman Rd / SW Chapman Rd
January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	SPEED	ALC	DRUG	SCHL	WORK	DATE / DAY/TIME / *LAT/LONG*	COUNTY / CITY / URBAN AREA	RD# / CMPT/MLG / MILEPNT / LRS	FC / CONN # / FIRST STREET / SECOND STREET / INTERSECTION SEQ#	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CNTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / VEH TYPE	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
																02	NONE 0 PRVTE	TURN-L E S									000		00
																	PSNGR CAR		01	DRVR	NONE	30	M	OR-Y OR<25		004,028	000		02
01335	N	N	N	N	N	03/08/2017	WASHINGTON	1 14		INTER	CROSS	N	N	RAIN	ANGL-OTH	01	NONE 0	STRGHT										058	02
COUNTY		N				Wed 5P		MN 0		CN		STOP SIGN	N	WET	ANGL		PRVTE	W E									000	053	00
							PORTLAND UA	17.47		03	0		N	DUSK	INJ		PSNGR CAR		01	DRVR	INJB	27	M	OR-Y OR<25		000	000		00
No	*45*	*20*	*32.89*	*-122*	*52*	*26.13*		009100100S00																					
																02	NONE 0 PRVTE	STRGHT N S									000		00
																	PSNGR CAR		01	DRVR	NONE	18	F	OR-Y OR<25		028	000		02
05249	N	N	N			08/27/2017	WASHINGTON	1 14		INTER	CROSS	N	N	CLR	O-1 L-TURN	01	NONE 9	TURN-L											02
NONE		N				Sun 12P		MN 0		CN		STOP SIGN	N	DRY	TURN		N/A	E S									000		00
							PORTLAND UA	17.47		03	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
No	*45*	*20*	*32.89*	*-122*	*52*	*26.13*		009100100S00																					
																02	NONE 9 N/A	STRGHT W E									000		00
																	PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
00180	N	N	N	N	N	01/11/2014	WASHINGTON	1 14		INTER	CROSS	N	N	RAIN	ANGL-OTH	01	NONE 0	STRGHT											02
COUNTY		N				Sat 11P		MN 0		CN		STOP SIGN	N	WET	ANGL		PRVTE	S N									000		00
							PORTLAND UA	17.47		04	0		N	DARK	INJ		PSNGR CAR		01	DRVR	INJC	30	F	OR-Y OR<25		000	000		00
No	*45*	*20*	*32.89*	*-122*	*52*	*26.13*		009100100S00																					
																02	NONE 0 PRVTE	STRGHT W E									015		00
																	PSNGR CAR		01	DRVR	NONE	16	M	OR-Y OR<25		028	000		02

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

SW Brookman Rd & SW Old Pacific Hwy 99W
January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR:														
TOTAL														
FINAL TOTAL														

Disclaimers: *Effective 2016,* ***collection of "Property Damage Only" (PDO) crash data elements was reduced for vehicles and participants.*** *Age, Gender, License, Error and other elements are no longer available for PDO crash reporting. Please keep this in mind when comparing 2016 PDO crash data to prior years.*

A higher number of crashes may be reported as of 2011 compared to prior years. This does not necessarily reflect an increase in annual crashes. The higher numbers may result from a change to an internal departmental process that allows the Crash Analysis and Reporting Unit to add previously unavailable, non-fatal crash reports to the annual data file. Please be aware of this change when comparing pre-2011 crash statistics. For all disclaimers, see https://www.oregon.gov/ODOT/Data/documents/Crash_Data_Disclaimers.pdf.

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

SW Brookman Rd & SW Middleton Rd
January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2016														
TURNING MOVEMENTS	0	1	0	1	0	1	0	1	0	0	1	1	0	0
2016 TOTAL	0	1	0	1	0	1	0	1	0	0	1	1	0	0
FINAL TOTAL	0	1	0	1	0	1	0	1	0	0	1	1	0	0

Disclaimers: *Effective 2016,* ***collection of "Property Damage Only" (PDO) crash data elements was reduced for vehicles and participants.*** *Age, Gender, License, Error and other elements are no longer available for PDO crash reporting. Please keep this in mind when comparing 2016 PDO crash data to prior years.*

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WASHINGTON COUNTY — SW Brookman Rd & SW Middleton Rd
January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	SPEED	ALC	DRUG/MJ	SCHL	WORK	DATE / DAY/TIME / *LAT/LONG*	MILEPNT / DIST FROM / INTERSECT	COUNTY ROADS FIRST STREET / SECOND STREET / INTERSECTION SEQ #	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS / (#LANES)	INT-REL / TRAF- / CONTL	OFF-RD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
08516	N	N	N	N	N	12/12/2016		SW BROOKMAN RD	INTER	CROSS	N	N	CLR	BIKE	01	NONE 0	TURN-L											02
COUNTY		N				Mon 6P	0	SW MIDDLETON RD	SW		STOP SIGN	N	DRY	TURN		PRVTE	SE SW									000		00
No						*45 20 32.70 -122 51 55.93*		1	05	0		N	DLIT	INJ		PSNGR CAR		01	DRVR	NONE	40	M	OR-Y OR<25		027	000		02
																	STRGHT NW SE	01	BIKE	INJB	15	M		01	000	035		00

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

SW Brookman Rd & SW Oberst Rd
January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR:														
TOTAL														
FINAL TOTAL														

Disclaimers: *Effective 2016,* ***collection of "Property Damage Only" (PDO) crash data elements was reduced for vehicles and participants.*** *Age, Gender, License, Error and other elements are no longer available for PDO crash reporting. Please keep this in mind when comparing 2016 PDO crash data to prior years.*

A higher number of crashes may be reported as of 2011 compared to prior years. This does not necessarily reflect an increase in annual crashes. The higher numbers may result from a change to an internal departmental process that allows the Crash Analysis and Reporting Unit to add previously unavailable, non-fatal crash reports to the annual data file. Please be aware of this change when comparing pre-2011 crash statistics. For all disclaimers, see https://www.oregon.gov/ODOT/Data/documents/Crash_Data_Disclaimers.pdf.

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

SW Brookman Rd & SW Ladd Hill Rd
January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR:														
TOTAL														
FINAL TOTAL														

Disclaimers: *Effective 2016,* ***collection of "Property Damage Only" (PDO) crash data elements was reduced for vehicles and participants.*** *Age, Gender, License, Error and other elements are no longer available for PDO crash reporting. Please keep this in mind when comparing 2016 PDO crash data to prior years.*

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ACTION CODE TRANSLATION LIST

ACTION CODE	SHORT DESCRIPTION	LONG DESCRIPTION
000	NONE	NO ACTION OR NON-WARRANTED
001	SKIDDED	SKIDDED
002	ON/OFF V	GETTING ON OR OFF STOPPED OR PARKED VEHICLE
003	LOAD OVR	OVERHANGING LOAD STRUCK ANOTHER VEHICLE, ETC.
006	SLOW DN	SLOWED DOWN
007	AVOIDING	AVOIDING MANEUVER
008	PAR PARK	PARALLEL PARKING
009	ANG PARK	ANGLE PARKING
010	INTERFERE	PASSENGER INTERFERING WITH DRIVER
011	STOPPED	STOPPED IN TRAFFIC NOT WAITING TO MAKE A LEFT TURN
012	STP/L TRN	STOPPED BECAUSE OF LEFT TURN SIGNAL OR WAITING, ETC.
013	STP TURN	STOPPED WHILE EXECUTING A TURN
014	EMR V PKD	EMERGENCY VEHICLE LEGALLY PARKED IN THE ROADWAY
015	GO A/STOP	PROCEED AFTER STOPPING FOR A STOP SIGN/FLASHING RED.
016	TRN A/RED	TURNED ON RED AFTER STOPPING
017	LOSTCTRL	LOST CONTROL OF VEHICLE
018	EXIT DWY	ENTERING STREET OR HIGHWAY FROM ALLEY OR DRIVEWAY
019	ENTR DWY	ENTERING ALLEY OR DRIVEWAY FROM STREET OR HIGHWAY
020	STR ENTR	BEFORE ENTERING ROADWAY, STRUCK PEDESTRIAN, ETC. ON SIDEWALK OR SHOULDER
021	NO DRVR	CAR RAN AWAY - NO DRIVER
022	PREV COL	STRUCK, OR WAS STRUCK BY, VEHICLE OR PEDESTRIAN IN PRIOR COLLISION BEFORE ACC. STABILIZED
023	STALLED	VEHICLE STALLED OR DISABLED
024	DRVR DEAD	DEAD BY UNASSOCIATED CAUSE
025	FATIGUE	FATIGUED, SLEEPY, ASLEEP
026	SUN	DRIVER BLINDED BY SUN
027	HDLGHTS	DRIVER BLINDED BY HEADLIGHTS
028	ILLNESS	PHYSICALLY ILL
029	THRU MED	VEHICLE CROSSED, PLUNGED OVER, OR THROUGH MEDIAN BARRIER
030	PURSUIT	PURSUING OR ATTEMPTING TO STOP A VEHICLE
031	PASSING	PASSING SITUATION
032	PRKOFFRD	VEHICLE PARKED BEYOND CURB OR SHOULDER
033	CROS MED	VEHICLE CROSSED EARTH OR GRASS MEDIAN
034	X N/SGNL	CROSSING AT INTERSECTION - NO TRAFFIC SIGNAL PRESENT
035	X W/ SGNL	CROSSING AT INTERSECTION - TRAFFIC SIGNAL PRESENT
036	DIAGONAL	CROSSING AT INTERSECTION - DIAGONALLY
037	BTWN INT	CROSSING BETWEEN INTERSECTIONS
038	DISTRACT	DRIVER'S ATTENTION DISTRACTED
039	W/TRAF-S	WALKING, RUNNING, RIDING, ETC., ON SHOULDER WITH TRAFFIC
040	A/TRAF-S	WALKING, RUNNING, RIDING, ETC., ON SHOULDER FACING TRAFFIC
041	W/TRAF-P	WALKING, RUNNING, RIDING, ETC., ON PAVEMENT WITH TRAFFIC
042	A/TRAF-P	WALKING, RUNNING, RIDING, ETC., ON PAVEMENT FACING TRAFFIC
043	PLAYINRD	PLAYING IN STREET OR ROAD
044	PUSH MV	PUSHING OR WORKING ON VEHICLE IN ROAD OR ON SHOULDER
045	WORK ON	WORKING IN ROADWAY OR ALONG SHOULDER
046	W/ TRAFIC	NON-MOTORIST WALKING, RUNNING, RIDING, ETC. WITH TRAFFIC
047	A/ TRAFIC	NON-MOTORIST WALKING, RUNNING, RIDING, ETC. FACING TRAFFIC
050	LAY ON RD	STANDING OR LYING IN ROADWAY
051	ENT OFFRD	ENTERING / STARTING IN TRAFFIC LANE FROM OFF ROAD
052	MERGING	MERGING

ACTION CODE TRANSLATION LIST

ACTION CODE	SHORT DESCRIPTION	LONG DESCRIPTION
055	SPRAY	BLINDED BY WATER SPRAY
088	OTHER	OTHER ACTION
099	UNK	UNKNOWN ACTION

CAUSE CODE TRANSLATION LIST

CAUSE CODE	SHORT DESCRIPTION	LONG DESCRIPTION
00	NO CODE	NO CAUSE ASSOCIATED AT THIS LEVEL
01	TOO-FAST	TOO FAST FOR CONDITIONS (NOT EXCEED POSTED SPEED
02	NO-YIELD	DID NOT YIELD RIGHT-OF-WAY
03	PAS-STOP	PASSED STOP SIGN OR RED FLASHER
04	DIS SIG	DISREGARDED TRAFFIC SIGNAL
05	LEFT-CTR	DROVE LEFT OF CENTER ON TWO-WAY ROAD; STRADDLING
06	IMP-OVER	IMPROPER OVERTAKING
07	TOO-CLOS	FOLLOWED TOO CLOSELY
08	IMP-TURN	MADE IMPROPER TURN
09	DRINKING	ALCOHOL OR DRUG INVOLVED
10	OTHR-IMP	OTHER IMPROPER DRIVING
11	MECH-DEF	MECHANICAL DEFECT
12	OTHER	OTHER (NOT IMPROPER DRIVING)
13	IMP LN C	IMPROPER CHANGE OF TRAFFIC LANES
14	DIS TCD	DISREGARDED OTHER TRAFFIC CONTROL DEVICE
15	WRNG WAY	WRONG WAY ON ONE-WAY ROAD; WRONG SIDE DIVIDED RO
16	FATIGUE	DRIVER DROWSY/FATIGUED/SLEEPY
17	ILLNESS	PHYSICAL ILLNESS
18	IN RDWY	NON-MOTORIST ILLEGALLY IN ROADWAY
19	NT VISBL	NON-MOTORIST NOT VISIBLE; NON-REFLECTIVE CLOTHIN
20	IMP PKNG	VEHICLE IMPROPERLY PARKED
21	DEF STER	DEFECTIVE STEERING MECHANISM
22	DEF BRKE	INADEQUATE OR NO BRAKES
24	LOADSHFT	VEHICLE LOST LOAD OR LOAD SHIFTED
25	TIREFAIL	TIRE FAILURE
26	PHANTOM	PHANTOM / NON-CONTACT VEHICLE
27	INATTENT	INATTENTION
28	NM INATT	NON-MOTORIST INATTENTION
29	F AVOID	FAILED TO AVOID VEHICLE AHEAD
30	SPEED	DRIVING IN EXCESS OF POSTED SPEED
31	RACING	SPEED RACING (PER PAR)
32	CARELESS	CARELESS DRIVING (PER PAR)
33	RECKLESS	RECKLESS DRIVING (PER PAR)
34	AGGRESV	AGGRESSIVE DRIVING (PER PAR)
35	RD RAGE	ROAD RAGE (PER PAR)
40	VIEW OBS	VIEW OBSCURED
50	USED MDN	IMPROPER USE OF MEDIAN OR SHOULDER
51	FAIL LN	FAILED TO MAINTAIN LANE
52	OFF RD	RAN OFF ROAD

COLLISION TYPE CODE TRANSLATION LIST

COLL CODE	SHORT DESCRIPTION	LONG DESCRIPTION
&	OTH	MISCELLANEOUS
-	BACK	BACKING
0	PED	PEDESTRIAN
1	ANGL	ANGLE
2	HEAD	HEAD-ON
3	REAR	REAR-END
4	SS-M	SIDESWIPE - MEETING
5	SS-O	SIDESWIPE - OVERTAKING
6	TURN	TURNING MOVEMENT
7	PARK	PARKING MANEUVER
8	NCOL	NON-COLLISION
9	FIX	FIXED OBJECT OR OTHER OBJECT

CRASH TYPE CODE TRANSLATION LIST

CRASH TYPE	SHORT DESCRIPTION	LONG DESCRIPTION
&	OVERTURN	OVERTURNED
0	NON-COLL	OTHER NON-COLLISION
1	OTH RDWY	MOTOR VEHICLE ON OTHER ROADWAY
2	PRKD MV	PARKED MOTOR VEHICLE
3	PED	PEDESTRIAN
4	TRAIN	RAILWAY TRAIN
6	BIKE	PEDALCYCLIST
7	ANIMAL	ANIMAL
8	FIX OBJ	FIXED OBJECT
9	OTH OBJ	OTHER OBJECT
A	ANGL-STP	ENTERING AT ANGLE - ONE VEHICLE STOPPED
B	ANGL-OTH	ENTERING AT ANGLE - ALL OTHERS
C	S-STRGHT	FROM SAME DIRECTION - BOTH GOING STRAIGHT
D	S-1TURN	FROM SAME DIRECTION - ONE TURN, ONE STRAIGHT
E	S-1STOP	FROM SAME DIRECTION - ONE STOPPED
F	S-OTHER	FROM SAME DIRECTION-ALL OTHERS, INCLUDING PARKING
G	O-STRGHT	FROM OPPOSITE DIRECTION - BOTH GOING STRAIGHT
H	O-1 L-TURN	FROM OPPOSITE DIRECTION-ONE LEFT TURN,ONE STRAIGHT
I	O-1STOP	FROM OPPOSITE DIRECTION - ONE STOPPED
J	O-OTHER	FROM OPPOSITE DIRECTION-ALL OTHERS INCL. PARKING

DRIVER LICENSE CODE TRANSLATION LIST

LIC CODE	SHORT DESC	LONG DESCRIPTION
0	NONE	NOT LICENSED (HAD NEVER BEEN LICENSED)
1	OR-Y	VALID OREGON LICENSE
2	OTH-Y	VALID LICENSE, OTHER STATE OR COUNTRY
3	SUSP	SUSPENDED/REVOKED
4	EXP	EXPIRED
8	N-VAL	OTHER NON-VALID LICENSE
9	UNK	UNKNOWN IF DRIVER WAS LICENSED AT TIME OF CRASH

DRIVER RESIDENCE CODE TRANSLATION LIST

RES CODE	SHORT DESC	LONG DESCRIPTION
1	OR<25	OREGON RESIDENT WITHIN 25 MILE OF HOME
2	OR>25	OREGON RESIDENT 25 OR MORE MILES FROM HOME
3	OR-?	OREGON RESIDENT - UNKNOWN DISTANCE FROM HOME
4	N-RES	NON-RESIDENT
9	UNK	UNKNOWN IF OREGON RESIDENT

ERROR CODE TRANSLATION LIST

ERROR CODE	SHORT DESCRIPTION	FULL DESCRIPTION
000	NONE	NO ERROR
001	WIDE TRN	WIDE TURN
002	CUT CORN	CUT CORNER ON TURN
003	FAIL TRN	FAILED TO OBEY MANDATORY TRAFFIC TURN SIGNAL, SIGN OR LANE MARKINGS
004	L IN TRF	LEFT TURN IN FRONT OF ONCOMING TRAFFIC
005	L PROHIB	LEFT TURN WHERE PROHIBITED
006	FRM WRNG	TURNED FROM WRONG LANE
007	TO WRONG	TURNED INTO WRONG LANE
008	ILLEG U	U-TURNED ILLEGALLY
009	IMP STOP	IMPROPERLY STOPPED IN TRAFFIC LANE
010	IMP SIG	IMPROPER SIGNAL OR FAILURE TO SIGNAL
011	IMP BACK	BACKING IMPROPERLY (NOT PARKING)
012	IMP PARK	IMPROPERLY PARKED
013	UNPARK	IMPROPER START LEAVING PARKED POSITION
014	IMP STRT	IMPROPER START FROM STOPPED POSITION
015	IMP LGHT	IMPROPER OR NO LIGHTS (VEHICLE IN TRAFFIC)
016	INATTENT	INATTENTION (FAILURE TO DIM LIGHTS PRIOR TO 4/1/97)
017	UNSF VEH	DRIVING UNSAFE VEHICLE (NO OTHER ERROR APPARENT)
018	OTH PARK	ENTERING/EXITING PARKED POSITION W/ INSUFFICIENT CLEARANCE; OTHER IMPROPER PARKING MANEUVER
019	DIS DRIV	DISREGARDED OTHER DRIVER'S SIGNAL
020	DIS SGNL	DISREGARDED TRAFFIC SIGNAL
021	RAN STOP	DISREGARDED STOP SIGN OR FLASHING RED
022	DIS SIGN	DISREGARDED WARNING SIGN, FLARES OR FLASHING AMBER
023	DIS OFCR	DISREGARDED POLICE OFFICER OR FLAGMAN
024	DIS EMER	DISREGARDED SIREN OR WARNING OF EMERGENCY VEHICLE
025	DIS RR	DISREGARDED RR SIGNAL, RR SIGN, OR RR FLAGMAN
026	REAR-END	FAILED TO AVOID STOPPED OR PARKED VEHICLE AHEAD OTHER THAN SCHOOL BUS
027	BIKE ROW	DID NOT HAVE RIGHT-OF-WAY OVER PEDALCYCLIST
028	NO ROW	DID NOT HAVE RIGHT-OF-WAY
029	PED ROW	FAILED TO YIELD RIGHT-OF-WAY TO PEDESTRIAN
030	PAS CURV	PASSING ON A CURVE
031	PAS WRNG	PASSING ON THE WRONG SIDE
032	PAS TANG	PASSING ON STRAIGHT ROAD UNDER UNSAFE CONDITIONS
033	PAS X-WK	PASSED VEHICLE STOPPED AT CROSSWALK FOR PEDESTRIAN
034	PAS INTR	PASSING AT INTERSECTION
035	PAS HILL	PASSING ON CREST OF HILL
036	N/PAS ZN	PASSING IN "NO PASSING" ZONE
037	PAS TRAF	PASSING IN FRONT OF ONCOMING TRAFFIC
038	CUT-IN	CUTTING IN (TWO LANES - TWO WAY ONLY)
039	WRNGSIDE	DRIVING ON WRONG SIDE OF THE ROAD (2-WAY UNDIVIDED ROADWAYS)

ERROR CODE TRANSLATION LIST

ERROR CODE	SHORT DESCRIPTION	FULL DESCRIPTION
040	THRU MED	DRIVING THROUGH SAFETY ZONE OR OVER ISLAND
041	F/ST BUS	FAILED TO STOP FOR SCHOOL BUS
042	F/SLO MV	FAILED TO DECREASE SPEED FOR SLOWER MOVING VEHICLE
043	TOO CLOSE	FOLLOWING TOO CLOSELY (MUST BE ON OFFICER'S REPORT)
044	STRDL LN	STRADDLING OR DRIVING ON WRONG LANES
045	IMP CHG	IMPROPER CHANGE OF TRAFFIC LANES
046	WRNG WAY	WRONG WAY ON ONE-WAY ROADWAY; WRONG SIDE DIVIDED ROAD
047	BASCRULE	DRIVING TOO FAST FOR CONDITIONS (NOT EXCEEDING POSTED SPEED)
048	OPN DOOR	OPENED DOOR INTO ADJACENT TRAFFIC LANE
049	IMPEDING	IMPEDING TRAFFIC
050	SPEED	DRIVING IN EXCESS OF POSTED SPEED
051	RECKLESS	RECKLESS DRIVING (PER PAR)
052	CARELESS	CARELESS DRIVING (PER PAR)
053	RACING	SPEED RACING (PER PAR)
054	X N/SGNL	CROSSING AT INTERSECTION, NO TRAFFIC SIGNAL PRESENT
055	X W/SGNL	CROSSING AT INTERSECTION, TRAFFIC SIGNAL PRESENT
056	DIAGONAL	CROSSING AT INTERSECTION - DIAGONALLY
057	BTWN INT	CROSSING BETWEEN INTERSECTIONS
059	W/TRAF-S	WALKING, RUNNING, RIDING, ETC., ON SHOULDER WITH TRAFFIC
060	A/TRAF-S	WALKING, RUNNING, RIDING, ETC., ON SHOULDER FACING TRAFFIC
061	W/TRAF-P	WALKING, RUNNING, RIDING, ETC., ON PAVEMENT WITH TRAFFIC
062	A/TRAF-P	WALKING, RUNNING, RIDING, ETC., ON PAVEMENT FACING TRAFFIC
063	PLAYINRD	PLAYING IN STREET OR ROAD
064	PUSH MV	PUSHING OR WORKING ON VEHICLE IN ROAD OR ON SHOULDER
065	WORK IN RD	WORKING IN ROADWAY OR ALONG SHOULDER
070	LAY ON RD	STANDING OR LYING IN ROADWAY
071	NM IMP USE	IMPROPER USE OF TRAFFIC LANE BY NON-MOTORIST
073	ELUDING	ELUDING / ATTEMPT TO ELUDE
079	F NEG CURV	FAILED TO NEGOTIATE A CURVE
080	FAIL LN	FAILED TO MAINTAIN LANE
081	OFF RD	RAN OFF ROAD
082	NO CLEAR	DRIVER MISJUDGED CLEARANCE
083	OVRSTEER	OVER-CORRECTING
084	NOT USED	CODE NOT IN USE
085	OVRLOAD	OVERLOADING OR IMPROPER LOADING OF VEHICLE WITH CARGO OR PASSENGERS
097	UNA DIS TC	UNABLE TO DETERMINE WHICH DRIVER DISREGARDED TRAFFIC CONTROL DEVICE

EVENT CODE TRANSLATION LIST

EVENT CODE	SHORT DESCRIPTION	LONG DESCRIPTION
001	FEL/JUMP	OCCUPANT FELL, JUMPED OR WAS EJECTED FROM MOVING VEHICLE
002	INTERFER	PASSENGER INTERFERED WITH DRIVER
003	BUG INTF	ANIMAL OR INSECT IN VEHICLE INTERFERED WITH DRIVER
004	INDRCT PED	PEDESTRIAN INDIRECTLY INVOLVED (NOT STRUCK)
005	SUB-PED	"SUB-PED": PEDESTRIAN INJURED SUBSEQUENT TO COLLISION, ETC.
006	INDRCT BIK	PEDALCYCLIST INDIRECTLY INVOLVED (NOT STRUCK)
007	HITCHIKR	HITCHHIKER (SOLICITING A RIDE)
008	PSNGR TOW	PASSENGER OR NON-MOTORIST BEING TOWED OR PUSHED ON CONVEYANCE
009	ON/OFF V	GETTING ON/OFF STOPPED/PARKED VEHICLE (OCCUPANTS ONLY; MUST HAVE PHYSICAL CONTACT W/ VEHIC
010	SUB OTRN	OVERTURNED AFTER FIRST HARMFUL EVENT
011	MV PUSHD	VEHICLE BEING PUSHED
012	MV TOWED	VEHICLE TOWED OR HAD BEEN TOWING ANOTHER VEHICLE
013	FORCED	VEHICLE FORCED BY IMPACT INTO ANOTHER VEHICLE, PEDALCYCLIST OR PEDESTRIAN
014	SET MOTN	VEHICLE SET IN MOTION BY NON-DRIVER (CHILD RELEASED BRAKES, ETC.)
015	RR ROW	AT OR ON RAILROAD RIGHT-OF-WAY (NOT LIGHT RAIL)
016	LT RL ROW	AT OR ON LIGHT-RAIL RIGHT-OF-WAY
017	RR HIT V	TRAIN STRUCK VEHICLE
018	V HIT RR	VEHICLE STRUCK TRAIN
019	HIT RR CAR	VEHICLE STRUCK RAILROAD CAR ON ROADWAY
020	JACKNIFE	JACKKNIFE; TRAILER OR TOWED VEHICLE STRUCK TOWING VEHICLE
021	TRL OTRN	TRAILER OR TOWED VEHICLE OVERTURNED
022	CN BROKE	TRAILER CONNECTION BROKE
023	DETACH TRL	DETACHED TRAILING OBJECT STRUCK OTHER VEHICLE, NON-MOTORIST, OR OBJECT
024	V DOOR OPN	VEHICLE DOOR OPENED INTO ADJACENT TRAFFIC LANE
025	WHEELOFF	WHEEL CAME OFF
026	HOOD UP	HOOD FLEW UP
028	LOAD SHIFT	LOST LOAD, LOAD MOVED OR SHIFTED
029	TIREFAIL	TIRE FAILURE
030	PET	PET: CAT, DOG AND SIMILAR
031	LVSTOCK	STOCK: COW, CALF, BULL, STEER, SHEEP, ETC.
032	HORSE	HORSE, MULE, OR DONKEY
033	HRSE&RID	HORSE AND RIDER
034	GAME	WILD ANIMAL, GAME (INCLUDES BIRDS; NOT DEER OR ELK)
035	DEER ELK	DEER OR ELK, WAPITI
036	ANML VEH	ANIMAL-DRAWN VEHICLE
037	CULVERT	CULVERT, OPEN LOW OR HIGH MANHOLE
038	ATENUATN	IMPACT ATTENUATOR
039	PK METER	PARKING METER
040	CURB	CURB (ALSO NARROW SIDEWALKS ON BRIDGES)
041	JIGGLE	JIGGLE BAR OR TRAFFIC SNAKE FOR CHANNELIZATION
042	GDRL END	LEADING EDGE OF GUARDRAIL
043	GARDRAIL	GUARD RAIL (NOT METAL MEDIAN BARRIER)
044	BARRIER	MEDIAN BARRIER (RAISED OR METAL)
045	WALL	RETAINING WALL OR TUNNEL WALL
046	BR RAIL	BRIDGE RAILING OR PARAPET (ON BRIDGE OR APPROACH)
047	BR ABUTMNT	BRIDGE ABUTMENT (INCLUDED "APPROACH END" THRU 2013)
048	BR COLMN	BRIDGE PILLAR OR COLUMN
049	BR GIRDR	BRIDGE GIRDER (HORIZONTAL BRIDGE STRUCTURE OVERHEAD)
050	ISLAND	TRAFFIC RAISED ISLAND
051	GORE	GORE
052	POLE UNK	POLE - TYPE UNKNOWN
053	POLE UTL	POLE - POWER OR TELEPHONE
054	ST LIGHT	POLE - STREET LIGHT ONLY
055	TRF SGNL	POLE - TRAFFIC SIGNAL AND PED SIGNAL ONLY
056	SGN BRDG	POLE - SIGN BRIDGE
057	STOPSIGN	STOP OR YIELD SIGN

EVENT CODE TRANSLATION LIST

EVENT CODE	SHORT DESCRIPTION	LONG DESCRIPTION
058	OTH SIGN	OTHER SIGN, INCLUDING STREET SIGNS
059	HYDRANT	HYDRANT
060	MARKER	DELINEATOR OR MARKER (REFLECTOR POSTS)
061	MAILBOX	MAILBOX
062	TREE	TREE, STUMP OR SHRUBS
063	VEG OHED	TREE BRANCH OR OTHER VEGETATION OVERHEAD, ETC.
064	WIRE/CBL	WIRE OR CABLE ACROSS OR OVER THE ROAD
065	TEMP SGN	TEMPORARY SIGN OR BARRICADE IN ROAD, ETC.
066	PERM SGN	PERMANENT SIGN OR BARRICADE IN/OFF ROAD
067	SLIDE	SLIDES, FALLEN OR FALLING ROCKS
068	FRGN OBJ	FOREIGN OBSTRUCTION/DEBRIS IN ROAD (NOT GRAVEL)
069	EQP WORK	EQUIPMENT WORKING IN/OFF ROAD
070	OTH EQP	OTHER EQUIPMENT IN OR OFF ROAD (INCLUDES PARKED TRAILER, BOAT)
071	MAIN EQP	WRECKER, STREET SWEEPER, SNOW PLOW OR SANDING EQUIPMENT
072	OTHER WALL	ROCK, BRICK OR OTHER SOLID WALL
073	IRRGL PVMT	OTHER BUMP (NOT SPEED BUMP), POTHOLE OR PAVEMENT IRREGULARITY (PER PAR)
074	OVERHD OBJ	OTHER OVERHEAD OBJECT (HIGHWAY SIGN, SIGNAL HEAD, ETC.); NOT BRIDGE
075	CAVE IN	BRIDGE OR ROAD CAVE IN
076	HI WATER	HIGH WATER
077	SNO BANK	SNOW BANK
078	LO-HI EDGE	LOW OR HIGH SHOULDER AT PAVEMENT EDGE
079	DITCH	CUT SLOPE OR DITCH EMBANKMENT
080	OBJ FRM MV	STRUCK BY ROCK OR OTHER OBJECT SET IN MOTION BY OTHER VEHICLE (INCL. LOST LOADS)
081	FLY-OBJ	STRUCK BY ROCK OR OTHER MOVING OR FLYING OBJECT (NOT SET IN MOTION BY VEHICLE)
082	VEH HID	VEHICLE OBSCURED VIEW
083	VEG HID	VEGETATION OBSCURED VIEW
084	BLDG HID	VIEW OBSCURED BY FENCE, SIGN, PHONE BOOTH, ETC.
085	WIND GUST	WIND GUST
086	IMMERSED	VEHICLE IMMERSED IN BODY OF WATER
087	FIRE/EXP	FIRE OR EXPLOSION
088	FENC/BLD	FENCE OR BUILDING, ETC.
089	OTHR CRASH	CRASH RELATED TO ANOTHER SEPARATE CRASH
090	TO 1 SIDE	TWO-WAY TRAFFIC ON DIVIDED ROADWAY ALL ROUTED TO ONE SIDE
091	BUILDING	BUILDING OR OTHER STRUCTURE
092	PHANTOM	OTHER (PHANTOM) NON-CONTACT VEHICLE
093	CELL PHONE	CELL PHONE (ON PAR OR DRIVER IN USE)
094	VIOL GDL	TEENAGE DRIVER IN VIOLATION OF GRADUATED LICENSE PGM
095	GUY WIRE	GUY WIRE
096	BERM	BERM (EARTHEN OR GRAVEL MOUND)
097	GRAVEL	GRAVEL IN ROADWAY
098	ABR EDGE	ABRUPT EDGE
099	CELL WTNSD	CELL PHONE USE WITNESSED BY OTHER PARTICIPANT
100	UNK FIXD	FIXED OBJECT, UNKNOWN TYPE.
101	OTHER OBJ	NON-FIXED OBJECT, OTHER OR UNKNOWN TYPE
102	TEXTING	TEXTING
103	WZ WORKER	WORK ZONE WORKER
104	ON VEHICLE	PASSENGER RIDING ON VEHICLE EXTERIOR
105	PEDAL PSGR	PASSENGER RIDING ON PEDALCYCLE
106	MAN WHLCHR	PEDESTRIAN IN NON-MOTORIZED WHEELCHAIR
107	MTR WHLCHR	PEDESTRIAN IN MOTORIZED WHEELCHAIR
108	OFFICER	LAW ENFORCEMENT / POLICE OFFICER
109	SUB-BIKE	"SUB-BIKE": PEDALCYCLIST INJURED SUBSEQUENT TO COLLISION, ETC.
110	N-MTR	NON-MOTORIST STRUCK VEHICLE
111	S CAR VS V	STREET CAR/TROLLEY (ON RAILS OR OVERHEAD WIRE SYSTEM) STRUCK VEHICLE
112	V VS S CAR	VEHICLE STRUCK STREET CAR/TROLLEY (ON RAILS OR OVERHEAD WIRE SYSTEM)
113	S CAR ROW	AT OR ON STREET CAR OR TROLLEY RIGHT-OF-WAY

EVENT CODE TRANSLATION LIST

EVENT CODE	SHORT DESCRIPTION	LONG DESCRIPTION
114	RR EQUIP	VEHICLE STRUCK RAILROAD EQUIPMENT (NOT TRAIN) ON TRACKS
115	DSTRCT GPS	DISTRACTED BY NAVIGATION SYSTEM OR GPS DEVICE
116	DSTRCT OTH	DISTRACTED BY OTHER ELECTRONIC DEVICE
117	RR GATE	RAIL CROSSING DROP-ARM GATE
118	EXPNSN JNT	EXPANSION JOINT
119	JERSEY BAR	JERSEY BARRIER
120	WIRE BAR	WIRE OR CABLE MEDIAN BARRIER
121	FENCE	FENCE
123	OBJ IN VEH	LOOSE OBJECT IN VEHICLE STRUCK OCCUPANT
124	SLIPPERY	SLIDING OR SWERVING DUE TO WET, ICY, SLIPPERY OR LOOSE SURFACE (NOT GRAVEL)
125	SHLDR	SHOULDER GAVE WAY
126	BOULDER	ROCK(S), BOULDER (NOT GRAVEL; NOT ROCK SLIDE)
127	LAND SLIDE	ROCK SLIDE OR LAND SLIDE
128	CURVE INV	CURVE PRESENT AT CRASH LOCATION
129	HILL INV	VERTICAL GRADE / HILL PRESENT AT CRASH LOCATION
130	CURVE HID	VIEW OBSCURED BY CURVE
131	HILL HID	VIEW OBSCURED BY VERTICAL GRADE / HILL
132	WINDOW HID	VIEW OBSCURED BY VEHICLE WINDOW CONDITIONS
133	SPRAY HID	VIEW OBSCURED BY WATER SPRAY
134	TORRENTIAL	TORRENTIAL RAIN (EXCEPTIONALLY HEAVY RAIN)

FUNCTIONAL CLASSIFICATION TRANSLATION LIST

FUNC CLASS	DESCRIPTION
01	RURAL PRINCIPAL ARTERIAL - INTERSTATE
02	RURAL PRINCIPAL ARTERIAL - OTHER
06	RURAL MINOR ARTERIAL
07	RURAL MAJOR COLLECTOR
08	RURAL MINOR COLLECTOR
09	RURAL LOCAL
11	URBAN PRINCIPAL ARTERIAL - INTERSTATE
12	URBAN PRINCIPAL ARTERIAL - OTHER FREEWAYS AND EXP
14	URBAN PRINCIPAL ARTERIAL - OTHER
16	URBAN MINOR ARTERIAL
17	URBAN MAJOR COLLECTOR
18	URBAN MINOR COLLECTOR
19	URBAN LOCAL
78	UNKNOWN RURAL SYSTEM
79	UNKNOWN RURAL NON-SYSTEM
98	UNKNOWN URBAN SYSTEM
99	UNKNOWN URBAN NON-SYSTEM

HIGHWAY COMPONENT TRANSLATION LIST

CODE	DESCRIPTION
0	MAINLINE STATE HIGHWAY
1	COUPLET
3	FRONTAGE ROAD
6	CONNECTION
8	HIGHWAY - OTHER

INJURY SEVERITY CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
1	KILL	FATAL INJURY (K)
2	INJA	SUSPECTED SERIOUS INJURY (A)
3	INJB	SUSPECTED MINOR INJURY (B)
4	INJC	POSSIBLE INJURY (C)
5	PRI	DIED PRIOR TO CRASH
7	NO<5	NO INJURY - 0 TO 4 YEARS OF AGE
9	NONE	NO APPARENT INJURY (O)

LIGHT CONDITION CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	UNK	UNKNOWN
1	DAY	DAYLIGHT
2	DLIT	DARKNESS - WITH STREET LIGHTS
3	DARK	DARKNESS - NO STREET LIGHTS
4	DAWN	DAWN (TWILIGHT)
5	DUSK	DUSK (TWILIGHT)

MEDIAN TYPE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	NONE	NO MEDIAN
1	RSDMD	SOLID MEDIAN BARRIER
2	DIVMD	EARTH, GRASS OR PAVED MEDIAN

MILEAGE TYPE CODE TRANSLATION LIST

CODE	LONG DESCRIPTION
0	REGULAR MILEAGE
T	TEMPORARY
Y	SPUR
Z	OVERLAPPING

MOVEMENT TYPE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	UNK	UNKNOWN
1	STRGHT	STRAIGHT AHEAD
2	TURN-R	TURNING RIGHT
3	TURN-L	TURNING LEFT
4	U-TURN	MAKING A U-TURN
5	BACK	BACKING
6	STOP	STOPPED IN TRAFFIC
7	PRKD-P	PARKED - PROPERLY
8	PRKD-I	PARKED - IMPROPERLY
9	PARKNG	PARKING MANEUVER

NON-MOTORIST LOCATION CODE TRANSLATION LIST

CODE	LONG DESCRIPTION
00	AT INTERSECTION - NOT IN ROADWAY
01	AT INTERSECTION - INSIDE CROSSWALK
02	AT INTERSECTION - IN ROADWAY, OUTSIDE CROSSWALK
03	AT INTERSECTION - IN ROADWAY, XWALK AVAIL UNKNWN
04	NOT AT INTERSECTION - IN ROADWAY
05	NOT AT INTERSECTION - ON SHOULDER
06	NOT AT INTERSECTION - ON MEDIAN
07	NOT AT INTERSECTION - WITHIN TRAFFIC RIGHT-OF-WAY
08	NOT AT INTERSECTION - IN BIKE PATH OR PARKING LANE
09	NOT-AT INTERSECTION - ON SIDEWALK
10	OUTSIDE TRAFFICWAY BOUNDARIES
13	AT INTERSECTION - IN BIKE LANE
14	NOT AT INTERSECTION - IN BIKE LANE
15	NOT AT INTERSECTION - INSIDE MID-BLOCK CROSSWALK
16	NOT AT INTERSECTION - IN PARKING LANE
18	OTHER, NOT IN ROADWAY
99	UNKNOWN LOCATION

ROAD CHARACTER CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	UNK	UNKNOWN
1	INTER	INTERSECTION
2	ALLEY	DRIVEWAY OR ALLEY
3	STRGHT	STRAIGHT ROADWAY
4	TRANS	TRANSITION
5	CURVE	CURVE (HORIZONTAL CURVE)
6	OPENAC	OPEN ACCESS OR TURNOUT
7	GRADE	GRADE (VERTICAL CURVE)
8	BRIDGE	BRIDGE STRUCTURE
9	TUNNEL	TUNNEL

PARTICIPANT TYPE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	OCC	UNKNOWN OCCUPANT TYPE
1	DRVR	DRIVER
2	PSNG	PASSENGER
3	PED	PEDESTRIAN
4	CONV	PEDESTRIAN USING A PEDESTRIAN CONVEYA
5	PTOW	PEDESTRIAN TOWING OR TRAILERING AN OB
6	BIKE	PEDALCYCLIST
7	BTOW	PEDALCYCLIST TOWING OR TRAILERING AN
8	PRKD	OCCUPANT OF A PARKED MOTOR VEHICLE
9	OTHR	OTHER TYPE OF NON-MOTORIST

TRAFFIC CONTROL DEVICE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
000	NONE	NO CONTROL
001	TRF SIGNAL	TRAFFIC SIGNALS
002	FLASHBCN-R	FLASHING BEACON - RED (STOP)
003	FLASHBCN-A	FLASHING BEACON - AMBER (SLOW)
004	STOP SIGN	STOP SIGN
005	SLOW SIGN	SLOW SIGN
006	REG-SIGN	REGULATORY SIGN
007	YIELD	YIELD SIGN
008	WARNING	WARNING SIGN
009	CURVE	CURVE SIGN
010	SCHL X-ING	SCHOOL CROSSING SIGN OR SPECIAL SIGNAL
011	OFCR/FLAG	POLICE OFFICER, FLAGMAN - SCHOOL PATROL
012	BRDG-GATE	BRIDGE GATE - BARRIER
013	TEMP-BARR	TEMPORARY BARRIER
014	NO-PASS-ZN	NO PASSING ZONE
015	ONE-WAY	ONE-WAY STREET
016	CHANNEL	CHANNELIZATION
017	MEDIAN BAR	MEDIAN BARRIER
018	PILOT CAR	PILOT CAR
019	SP PED SIG	SPECIAL PEDESTRIAN SIGNAL
020	X-BUCK	CROSSBUCK
021	THR-GN-SIG	THROUGH GREEN ARROW OR SIGNAL
022	L-GRN-SIG	LEFT TURN GREEN ARROW, LANE MARKINGS, OR SIGNAL
023	R-GRN-SIG	RIGHT TURN GREEN ARROW, LANE MARKINGS, OR SIGNAL
024	WIGWAG	WIGWAG OR FLASHING LIGHTS W/O DROP-ARM GATE
025	X-BUCK WRN	CROSSBUCK AND ADVANCE WARNING
026	WW W/ GATE	FLASHING LIGHTS WITH DROP-ARM GATES
027	OVRHD SGNL	SUPPLEMENTAL OVERHEAD SIGNAL (RR XING ONLY)
028	SP RR STOP	SPECIAL RR STOP SIGN
029	ILUM GRD X	ILLUMINATED GRADE CROSSING
037	RAMP METER	METERED RAMPS
038	RUMBLE STR	RUMBLE STRIP
090	L-TURN REF	LEFT TURN REFUGE (WHEN REFUGE IS INVOLVED)
091	R-TURN ALL	RIGHT TURN AT ALL TIMES SIGN, ETC.
092	EMR SGN/FL	EMERGENCY SIGNS OR FLARES
093	ACCEL LANE	ACCELERATION OR DECELERATION LANES
094	R-TURN PRO	RIGHT TURN PROHIBITED ON RED AFTER STOPPING
095	BUS STPSGN	BUS STOP SIGN AND RED LIGHTS
099	UNKNOWN	UNKNOWN OR NOT DEFINITE

VEHICLE TYPE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
00	PDO	NOT COLLECTED FOR PDO CRASHES
01	PSNGR CAR	PASSENGER CAR, PICKUP, LIGHT DELIVERY, ETC.
02	BOBTAIL	TRUCK TRACTOR WITH NO TRAILERS (BOBTAIL)
03	FARM TRCTR	FARM TRACTOR OR SELF-PROPELLED FARM EQUIPMENT
04	SEMI TOW	TRUCK TRACTOR WITH TRAILER/MOBILE HOME IN TOW
05	TRUCK	TRUCK WITH NON-DETACHABLE BED, PANEL, ETC.
06	MOPED	MOPED, MINIBIKE, SEATED MOTOR SCOOTER, MOTOR BIKE
07	SCHL BUS	SCHOOL BUS (INCLUDES VAN)
08	OTH BUS	OTHER BUS
09	MTRCYCLE	MOTORCYCLE, DIRT BIKE
10	OTHER	OTHER: FORKLIFT, BACKHOE, ETC.
11	MOTRHOME	MOTORHOME
12	TROLLEY	MOTORIZED STREET CAR/TROLLEY (NO RAILS/WIRES)
13	ATV	ATV
14	MTRSCTR	MOTORIZED SCOOTER (STANDING)
15	SNOWMOBILE	SNOWMOBILE
99	UNKNOWN	UNKNOWN VEHICLE TYPE

WEATHER CONDITION CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	UNK	UNKNOWN
1	CLR	CLEAR
2	CLD	CLOUDY
3	RAIN	RAIN
4	SLT	SLEET
5	FOG	FOG
6	SNOW	SNOW
7	DUST	DUST
8	SMOK	SMOKE
9	ASH	ASH

Appendix B
Traffic Counts

Type of peak hour being reported: Intersection Peak

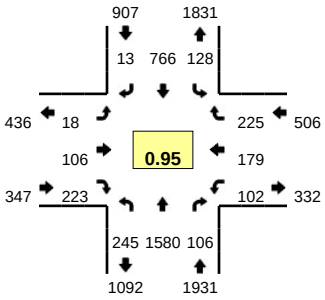
Method for determining peak hour: Total Entering Volume

LOCATION: SW Pacific Hwy -- SW Elwert Rd/SW Sunset Blvd

QC JOB #: 14401717

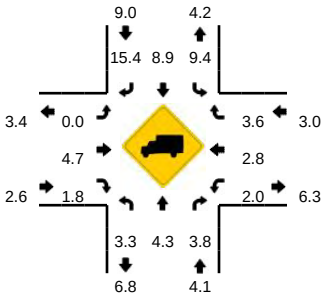
CITY/STATE: Sherwood, OR

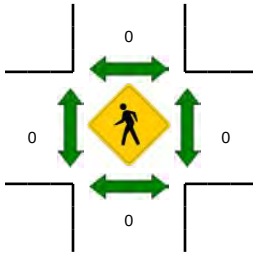
DATE: Thu, May 11 2017

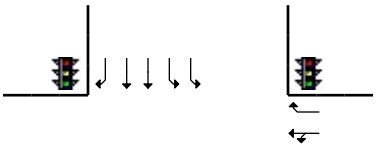


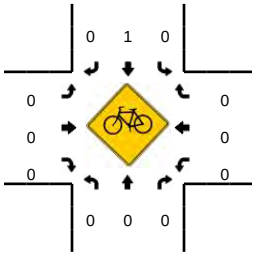
Peak-Hour: 7:05 AM -- 8:05 AM

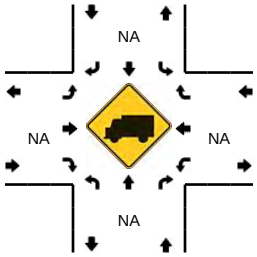
Peak 15-Min: 7:40 AM -- 7:55 AM

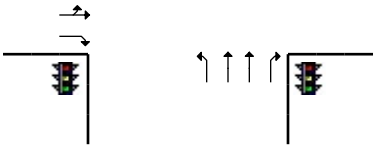


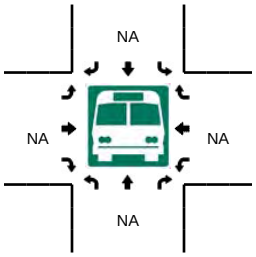












5-Min Count Period Beginning At	SW Pacific Hwy (Northbound)				SW Pacific Hwy (Southbound)				SW Elwert Rd/SW Sunset Blvd (Eastbound)				SW Elwert Rd/SW Sunset Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	22	126	6	0	2	43	0	1	0	5	15	0	11	13	12	0	256	
7:05 AM	10	136	9	0	3	71	2	0	3	5	19	0	8	8	17	0	291	
7:10 AM	20	118	8	0	8	54	1	1	1	7	25	0	14	19	12	0	288	
7:15 AM	34	127	9	0	6	44	1	1	1	9	17	0	9	15	19	0	292	
7:20 AM	23	140	8	0	5	60	0	0	3	5	16	0	16	8	16	0	300	
7:25 AM	22	154	14	0	7	76	1	0	0	5	14	0	3	15	16	0	327	
7:30 AM	19	119	7	0	11	50	1	1	4	14	20	0	4	21	17	0	288	
7:35 AM	22	123	5	0	12	52	1	1	1	9	14	0	13	25	16	0	294	
7:40 AM	20	139	9	0	13	64	0	1	1	9	14	0	7	19	19	0	315	
7:45 AM	23	122	7	0	20	69	2	2	2	9	21	0	7	15	23	0	322	
7:50 AM	14	121	8	0	11	100	2	0	0	13	24	0	8	14	23	0	338	
7:55 AM	26	115	10	0	17	59	1	1	2	10	20	0	7	11	29	0	308	3619
8:00 AM	11	166	12	1	7	67	1	0	0	11	19	0	6	9	18	0	328	3691
8:05 AM	8	79	9	0	8	63	0	1	1	5	26	0	10	5	15	0	230	3630
8:10 AM	16	81	4	0	6	48	0	3	2	2	11	0	7	14	12	0	206	3548
8:15 AM	12	133	6	0	6	83	0	1	1	4	12	0	5	7	12	0	282	3538
8:20 AM	23	98	8	0	6	40	0	4	0	6	16	0	7	8	7	0	223	3461
8:25 AM	11	110	9	0	6	55	0	2	2	2	19	0	7	8	9	0	240	3374
8:30 AM	16	76	5	0	13	51	0	3	0	3	10	0	7	6	14	0	204	3290
8:35 AM	17	128	7	0	7	66	2	1	1	8	13	0	5	9	11	0	275	3271
8:40 AM	9	112	11	0	9	62	1	1	1	3	10	0	3	4	3	0	229	3185
8:45 AM	8	93	8	0	7	60	0	0	1	4	10	0	11	8	17	0	227	3090
8:50 AM	9	96	11	0	3	59	0	1	1	7	23	0	7	6	12	0	235	2987
8:55 AM	9	86	6	0	8	74	1	3	1	8	8	0	5	3	11	0	223	2902

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	228	1528	96	0	176	932	16	12	12	124	236	0	88	192	260	0	3900
Heavy Trucks	12	68	4		12	60	4		0	4	0		0	4	16		184
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 5/19/2017 4:01 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: SW Woodhaven Dr -- SW Sunset Blvd

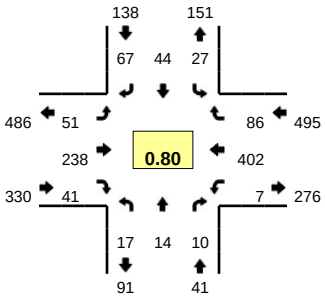
CITY/STATE: Sherwood, OR

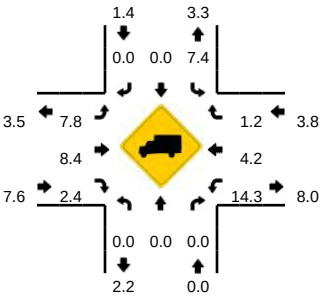
QC JOB #: 14538801

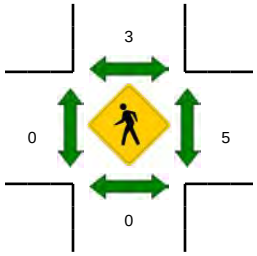
DATE: Thu, Oct 12 2017

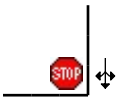
Peak-Hour: 7:10 AM -- 8:10 AM

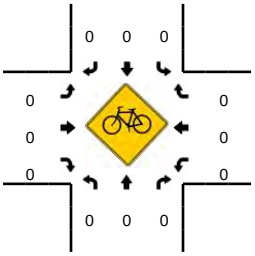
Peak 15-Min: 7:45 AM -- 8:00 AM

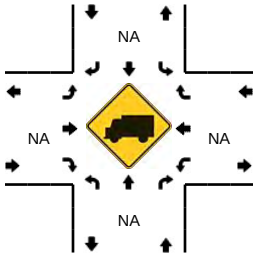


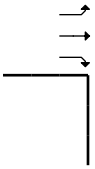


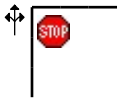


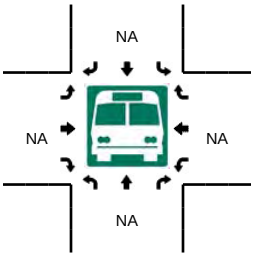












5-Min Count Period Beginning At	SW Woodhaven Dr (Northbound)				SW Woodhaven Dr (Southbound)				SW Sunset Blvd (Eastbound)				SW Sunset Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	0	1	0	0	1	4	0	4	7	1	0	0	32	3	0	53	
7:05 AM	6	1	1	0	0	0	3	0	2	17	0	0	0	27	2	0	59	
7:10 AM	1	0	0	0	4	0	7	0	1	13	1	0	0	32	0	1	60	
7:15 AM	0	0	0	0	1	0	6	0	0	19	2	0	0	31	2	0	61	
7:20 AM	0	0	0	0	0	0	3	0	3	15	3	0	0	36	5	0	65	
7:25 AM	2	1	0	0	2	4	9	0	1	20	0	0	1	29	7	0	76	
7:30 AM	1	1	1	0	2	6	5	0	3	14	3	0	0	38	9	0	83	
7:35 AM	4	0	1	0	3	6	5	0	2	25	10	0	0	32	11	0	99	
7:40 AM	1	1	0	0	2	11	5	0	2	27	10	0	2	31	5	0	97	
7:45 AM	2	2	0	0	1	13	10	0	5	26	7	0	1	39	9	0	115	
7:50 AM	1	3	2	0	7	2	3	0	7	21	1	0	1	31	12	0	91	
7:55 AM	3	3	4	0	1	0	7	0	11	26	3	0	1	36	13	0	108	967
8:00 AM	2	3	2	0	2	0	3	0	10	18	0	0	0	42	7	0	89	1003
8:05 AM	0	0	0	0	2	2	4	0	6	14	1	0	0	25	6	0	60	1004
8:10 AM	3	0	0	0	2	0	4	0	3	13	1	0	1	21	0	0	48	992
8:15 AM	1	1	0	0	1	0	2	0	3	16	1	0	0	17	1	0	43	974
8:20 AM	0	0	0	0	1	0	5	0	2	15	0	0	1	17	1	0	42	951
8:25 AM	1	0	0	0	0	1	2	0	7	10	0	0	0	24	1	0	46	921
8:30 AM	2	0	0	0	1	0	4	0	4	17	0	0	0	18	3	0	49	887
8:35 AM	1	1	0	0	0	0	3	0	7	11	0	0	0	21	3	0	47	835
8:40 AM	0	1	0	0	0	0	2	0	9	15	0	0	1	18	4	0	50	788
8:45 AM	2	0	1	0	0	1	5	0	2	7	0	0	0	27	6	0	51	724
8:50 AM	0	2	0	0	1	0	7	0	7	9	1	1	1	21	2	0	52	685
8:55 AM	1	0	0	0	3	0	4	0	11	9	0	0	0	13	3	0	44	621

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	24	32	24	0	36	60	80	0	92	292	44	0	12	424	136	0	1256
Heavy Trucks	0	0	0		4	0	0		4	28	0		0	24	4		64
Pedestrians		0				4				0				4			8
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 10/31/2017 8:48 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

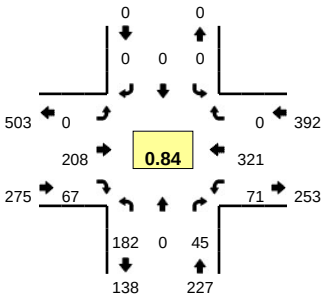
LOCATION: SW Timbrel Ln -- SW Sunset Blvd

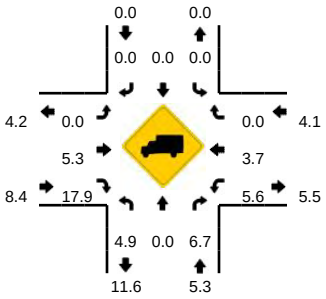
CITY/STATE: Sherwood, OR

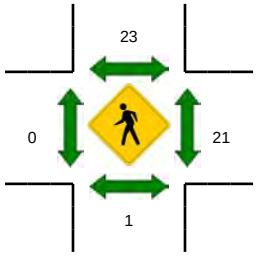
QC JOB #: 14538803

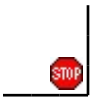
DATE: Thu, Oct 12 2017

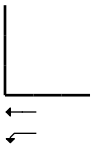
Peak-Hour: 7:10 AM -- 8:10 AM
Peak 15-Min: 7:40 AM -- 7:55 AM

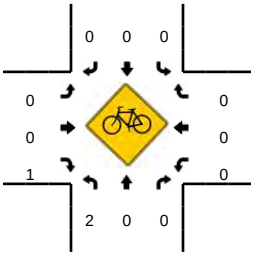


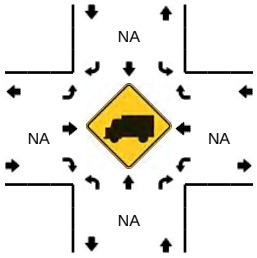


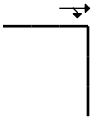


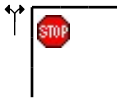


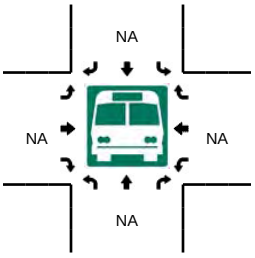












5-Min Count Period Beginning At	SW Timbrel Ln (Northbound)				SW Timbrel Ln (Southbound)				SW Sunset Blvd (Eastbound)				SW Sunset Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	9	0	1	0	0	0	0	0	0	9	0	0	0	25	0	0	44	
7:05 AM	8	0	3	0	0	0	0	0	0	16	2	0	1	20	0	0	50	
7:10 AM	11	0	2	0	0	0	0	0	0	12	4	0	3	25	0	0	57	
7:15 AM	8	0	1	0	0	0	0	0	0	20	2	0	2	23	0	0	56	
7:20 AM	11	0	4	0	0	0	0	0	0	13	1	0	5	31	0	0	65	
7:25 AM	15	0	3	0	0	0	0	0	0	15	8	0	7	22	0	0	70	
7:30 AM	24	0	4	0	0	0	0	0	0	15	2	0	8	25	0	0	78	
7:35 AM	14	0	4	0	0	0	0	0	0	21	7	0	13	24	0	0	83	
7:40 AM	18	0	5	0	0	0	0	0	0	21	8	0	13	32	0	0	97	
7:45 AM	19	0	3	0	0	0	0	0	0	17	7	0	11	27	0	0	84	
7:50 AM	25	0	4	0	0	0	0	0	0	19	10	0	7	19	0	0	84	
7:55 AM	20	0	12	0	0	0	0	0	0	22	9	0	1	29	0	0	93	861
8:00 AM	8	0	3	0	0	0	0	0	0	18	5	0	1	40	0	0	75	892
8:05 AM	9	0	0	0	0	0	0	0	0	15	4	0	0	24	0	0	52	894
8:10 AM	7	0	3	0	0	0	0	0	0	11	3	0	2	11	0	0	37	874
8:15 AM	5	0	0	0	0	0	0	0	0	16	0	0	1	14	0	0	36	854
8:20 AM	4	0	0	0	0	0	0	0	0	13	2	0	1	14	0	0	34	823
8:25 AM	8	0	3	0	0	0	0	0	0	11	2	0	1	17	0	0	42	795
8:30 AM	6	0	1	0	0	0	0	0	0	17	1	0	1	16	0	0	42	759
8:35 AM	6	0	0	0	0	0	0	0	0	9	1	0	3	18	0	0	37	713
8:40 AM	4	0	2	0	0	0	0	0	0	13	0	0	3	20	0	0	42	658
8:45 AM	4	0	2	0	0	0	0	0	0	9	1	0	2	25	0	0	43	617
8:50 AM	8	0	0	0	0	0	0	0	0	7	3	0	1	17	0	0	36	569
8:55 AM	5	0	3	0	0	0	0	0	0	7	5	0	0	10	0	0	30	506

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	248	0	48	0	0	0	0	0	0	228	100	0	124	312	0	0	1060
Heavy Trucks	16	0	8		0	0	0		0	8	20		8	16	0		76
Pedestrians		0				64				0				64			128
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 10/31/2017 8:48 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

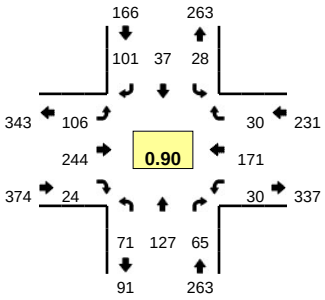
Method for determining peak hour: Total Entering Volume

LOCATION: SW Main St/SW Ladd Hill Rd -- SW Sunset Blvd

QC JOB #: 14487601

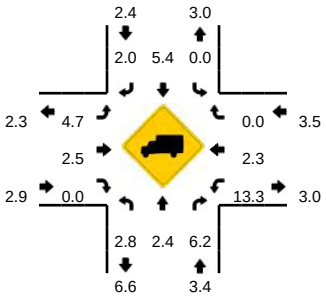
CITY/STATE: Sherwood, OR

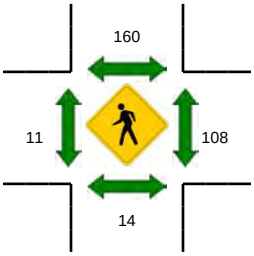
DATE: Tue, Sep 12 2017

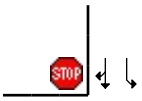


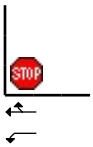
Peak-Hour: 7:05 AM -- 8:05 AM

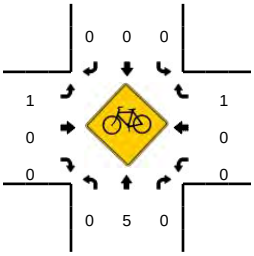
Peak 15-Min: 7:30 AM -- 7:45 AM

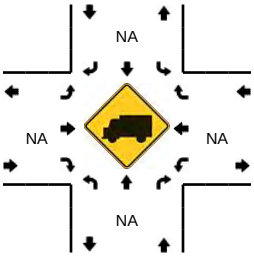


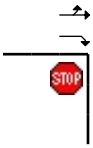


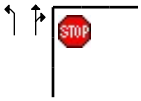


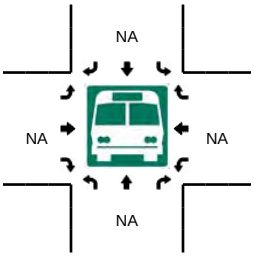












5-Min Count Period Beginning At	SW Main St/SW Ladd Hill Rd (Northbound)				SW Main St/SW Ladd Hill Rd (Southbound)				SW Sunset Blvd (Eastbound)				SW Sunset Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	3	8	2	0	0	2	2	0	7	16	1	0	1	8	2	0	52	
7:05 AM	4	6	7	0	0	2	2	0	4	19	1	0	1	12	2	0	60	
7:10 AM	4	11	3	0	1	3	5	0	5	19	1	0	1	14	4	0	71	
7:15 AM	1	12	6	0	1	3	8	0	6	21	1	0	1	11	3	0	74	
7:20 AM	8	12	6	0	0	1	10	0	9	17	4	0	2	24	2	0	95	
7:25 AM	9	11	6	0	0	2	7	0	9	23	1	0	2	17	4	0	91	
7:30 AM	5	13	8	0	4	1	11	0	11	22	2	0	5	14	2	0	98	
7:35 AM	8	10	4	0	4	2	13	0	13	21	0	0	1	13	4	0	93	
7:40 AM	17	11	1	0	3	2	14	0	12	14	1	0	6	14	2	0	97	
7:45 AM	8	12	2	0	5	5	9	0	15	15	1	0	2	15	0	0	89	
7:50 AM	3	14	8	0	2	2	8	0	14	23	4	0	1	12	4	0	95	
7:55 AM	1	8	8	0	3	9	7	0	3	23	3	0	4	11	0	0	80	995
8:00 AM	3	7	6	0	5	5	7	0	5	27	5	0	4	14	3	0	91	1034
8:05 AM	4	2	7	0	0	4	4	0	5	14	2	0	3	12	1	0	58	1032
8:10 AM	3	3	3	0	1	3	3	0	4	13	2	0	0	6	1	0	42	1003
8:15 AM	2	4	3	0	1	3	4	0	5	14	1	0	1	10	2	0	50	979
8:20 AM	2	6	1	0	1	2	3	0	5	14	5	0	2	9	1	0	51	935
8:25 AM	2	6	5	0	0	0	3	0	2	16	0	0	2	9	0	0	45	889
8:30 AM	2	1	4	0	0	2	2	0	1	8	0	0	2	6	1	0	29	820
8:35 AM	5	0	6	0	0	2	1	0	2	9	2	0	1	11	2	0	41	768
8:40 AM	3	4	5	0	0	1	3	0	2	11	0	0	3	8	2	0	42	713
8:45 AM	4	6	2	0	0	3	4	0	3	10	1	0	1	8	0	0	42	666
8:50 AM	5	5	2	0	1	3	3	0	4	10	3	0	3	12	3	0	54	625
8:55 AM	1	9	5	0	1	3	0	0	9	20	1	0	0	0	0	0	49	594

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	120	136	52	0	44	20	152	0	144	228	12	0	48	164	32	0	1152
Heavy Trucks	8	8	4		0	0	4		12	8	0		4	8	0		56
Pedestrians		24				360				4				236			624
Bicycles	0	0	0		0	0	0		1	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 9/20/2017 8:46 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

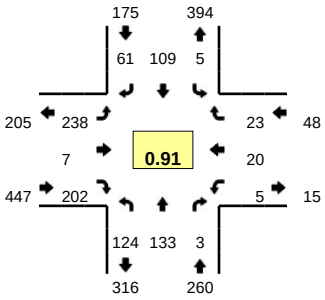
LOCATION: SW Murdock Rd/SW Baker Rd -- SW Sunset Blvd/McKinley Dr

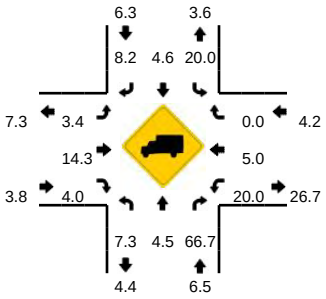
QC JOB #: 14548501

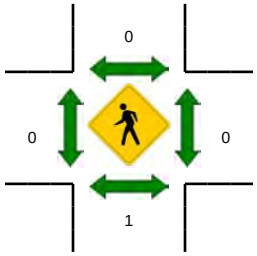
CITY/STATE: Sherwood, OR

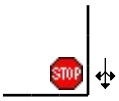
DATE: Wed, Oct 25 2017

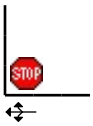
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:35 AM -- 7:50 AM

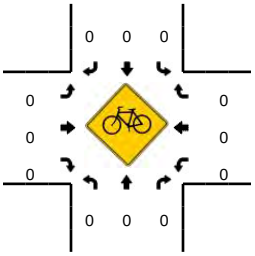


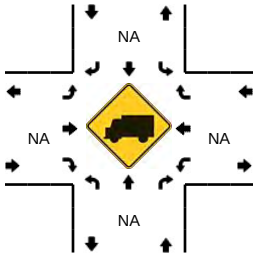


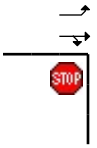


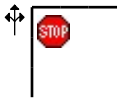


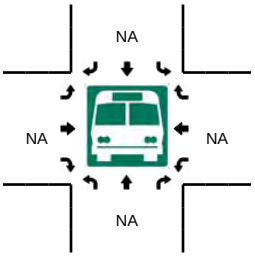












5-Min Count Period Beginning At	SW Murdock Rd/SW Baker Rd (Northbound)				SW Murdock Rd/SW Baker Rd (Southbound)				SW Sunset Blvd/McKinley Dr (Eastbound)				SW Sunset Blvd/McKinley Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	14	5	0	0	0	8	6	0	22	0	8	0	0	0	1	0	64	
7:05 AM	10	9	0	0	0	5	3	0	18	0	9	0	0	0	4	0	58	
7:10 AM	11	6	0	0	1	6	3	0	17	0	11	0	0	0	2	0	57	
7:15 AM	12	8	0	0	0	6	5	0	15	1	16	0	0	1	3	0	67	
7:20 AM	20	10	1	0	0	6	6	0	22	0	20	0	0	2	1	0	88	
7:25 AM	8	12	2	0	0	5	5	0	17	0	18	0	1	4	4	0	76	
7:30 AM	12	7	0	0	1	9	2	0	23	1	16	0	2	0	1	0	74	
7:35 AM	11	14	0	0	0	11	7	0	24	1	22	0	0	6	2	0	98	
7:40 AM	13	8	0	0	0	12	1	0	20	0	17	0	1	2	1	0	75	
7:45 AM	13	14	0	0	0	13	7	0	17	0	13	0	0	3	3	0	83	
7:50 AM	10	19	0	0	0	10	8	0	19	1	10	0	1	0	5	0	83	
7:55 AM	5	12	0	0	2	7	7	0	17	0	18	0	0	0	2	0	70	893
8:00 AM	2	6	0	0	1	11	4	0	25	1	20	0	0	1	0	0	71	900
8:05 AM	11	11	0	0	0	7	7	0	24	1	20	0	0	1	0	0	82	924
8:10 AM	7	12	0	0	1	12	2	0	15	1	12	0	0	0	1	0	63	930
8:15 AM	8	11	0	0	0	8	3	0	11	2	14	0	0	1	3	0	61	924
8:20 AM	9	9	0	0	0	7	6	0	9	0	16	0	0	1	2	0	59	895
8:25 AM	5	7	0	0	0	5	9	0	13	1	7	0	0	1	1	0	49	868
8:30 AM	3	10	0	0	2	5	3	0	17	0	13	0	0	0	0	0	53	847
8:35 AM	1	5	0	0	1	4	4	0	12	0	9	0	0	0	1	0	37	786
8:40 AM	4	7	0	0	0	6	6	0	21	0	13	0	0	1	2	0	60	771
8:45 AM	8	8	0	0	1	10	3	0	13	0	8	0	0	2	2	0	55	743
8:50 AM	6	12	0	0	1	7	6	0	17	0	15	0	0	0	0	0	64	724
8:55 AM	6	6	0	0	0	5	3	0	12	1	8	0	0	1	0	0	42	696

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	148	144	0	0	0	144	60	0	244	4	208	0	4	44	24	0	1024
Heavy Trucks	4	4	0		0	4	4		4	0	0		0	0	0		20
Pedestrians		4				0				0				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 10/31/2017 3:00 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

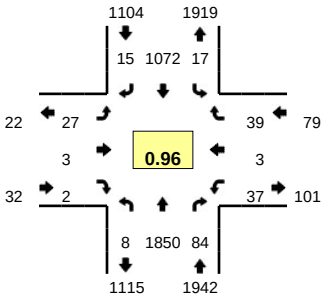
LOCATION: SW Pacific Hwy -- SW Chapman Rd

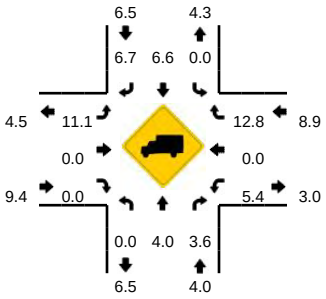
QC JOB #: 14401706

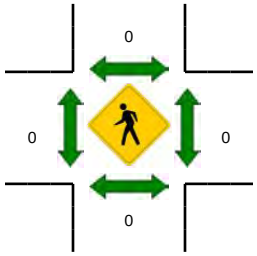
CITY/STATE: Sherwood, OR

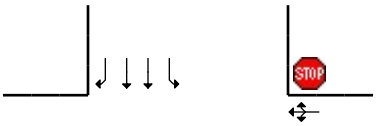
DATE: Thu, May 11 2017

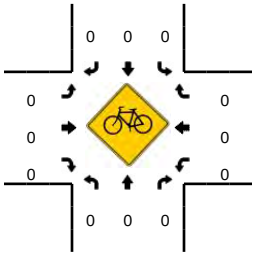
Peak-Hour: 7:05 AM -- 8:05 AM
Peak 15-Min: 7:30 AM -- 7:45 AM

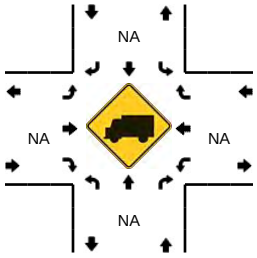


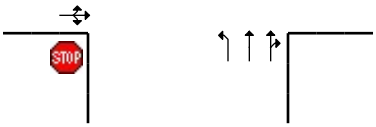


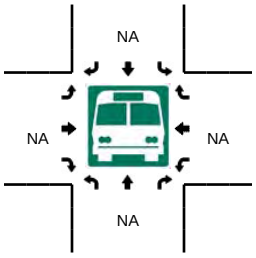












5-Min Count Period Beginning At	SW Pacific Hwy (Northbound)				SW Pacific Hwy (Southbound)				SW Chapman Rd (Eastbound)				SW Chapman Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	133	2	0	0	74	0	0	1	0	0	0	4	0	3	0	217	
7:05 AM	0	169	5	1	0	81	4	0	0	0	0	0	2	0	0	0	262	
7:10 AM	0	159	6	0	0	99	1	1	1	0	0	0	1	0	1	0	269	
7:15 AM	1	165	11	0	1	75	0	0	0	1	0	0	2	0	2	0	258	
7:20 AM	0	174	7	0	0	100	0	1	1	1	0	0	3	0	1	0	288	
7:25 AM	0	141	8	1	1	78	1	0	3	0	0	0	4	0	2	0	239	
7:30 AM	0	177	8	0	1	84	0	0	4	0	1	0	0	1	4	0	280	
7:35 AM	0	177	8	0	0	85	1	0	0	0	0	0	4	0	3	0	278	
7:40 AM	1	147	14	1	1	85	1	0	4	0	0	0	3	1	5	0	263	
7:45 AM	1	142	9	0	4	99	2	0	3	0	0	0	2	0	4	0	266	
7:50 AM	0	147	6	0	1	125	1	1	2	0	0	0	4	1	3	0	291	
7:55 AM	1	133	1	0	3	82	2	0	1	1	1	0	8	0	6	0	239	3150
8:00 AM	0	119	1	1	2	79	2	0	8	0	0	0	4	0	8	0	224	3157
8:05 AM	0	98	4	0	2	85	4	0	5	0	0	0	2	1	1	0	202	3097
8:10 AM	0	127	2	0	1	82	1	0	0	1	0	0	3	0	1	0	218	3046
8:15 AM	0	130	3	0	2	72	2	0	3	0	1	0	2	0	2	0	217	3005
8:20 AM	1	135	6	0	1	89	1	1	0	1	0	0	3	0	2	0	240	2957
8:25 AM	0	115	5	0	3	63	0	0	0	0	0	0	0	0	1	0	187	2905
8:30 AM	0	127	3	0	1	71	0	0	1	0	0	0	3	1	3	0	210	2835
8:35 AM	0	118	3	0	1	83	2	0	2	0	0	0	0	1	1	0	211	2768
8:40 AM	1	143	0	1	1	68	2	1	1	0	0	0	3	0	0	0	221	2726
8:45 AM	0	108	1	0	1	87	4	1	0	1	0	0	3	0	2	0	208	2668
8:50 AM	1	127	3	0	0	88	1	0	0	1	1	0	1	0	1	0	224	2601
8:55 AM	0	93	4	0	1	89	3	0	2	1	1	0	3	1	1	0	199	2561

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	4	2004	120	4	8	1016	8	0	32	0	4	0	28	8	48	0	3284
Heavy Trucks	0	64	4		0	100	0		0	0	0		4	0	4		176
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 5/19/2017 4:01 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: SW Old Hwy 99W -- SW Brookman Rd

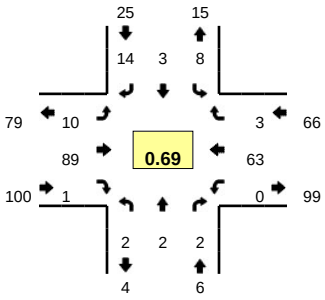
CITY/STATE: Sherwood, OR

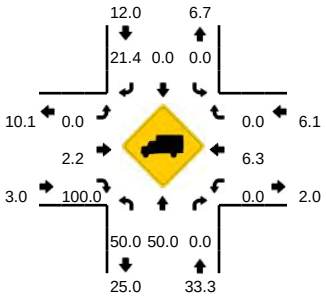
QC JOB #: 14401709

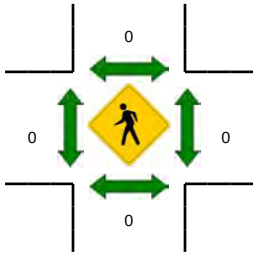
DATE: Thu, May 11 2017

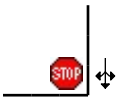
Peak-Hour: 7:10 AM -- 8:10 AM

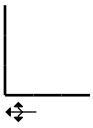
Peak 15-Min: 7:40 AM -- 7:55 AM

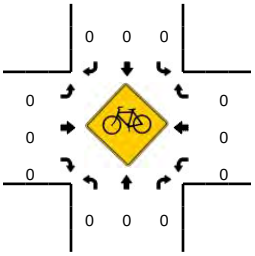


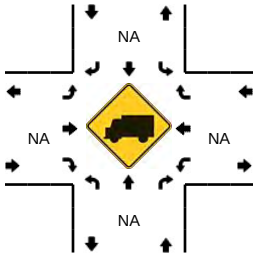


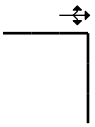


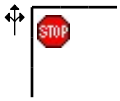


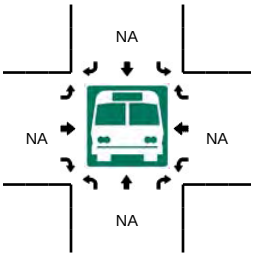












5-Min Count Period Beginning At	SW Old Hwy 99W (Northbound)				SW Old Hwy 99W (Southbound)				SW Brookman Rd (Eastbound)				SW Brookman Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	1	0	0	0	0	0	0	0	1	1	0	0	4	0	0	7	
7:05 AM	0	0	0	0	0	0	1	0	0	2	0	0	0	1	0	0	4	
7:10 AM	0	0	0	0	0	0	0	0	1	6	0	0	0	1	0	0	8	
7:15 AM	1	1	0	0	0	0	1	0	2	11	0	0	0	2	0	0	18	
7:20 AM	0	0	1	0	0	0	0	0	1	5	0	0	0	6	0	0	13	
7:25 AM	0	0	0	0	0	0	0	0	0	11	0	0	0	5	0	0	16	
7:30 AM	0	0	0	0	0	0	0	0	0	9	0	0	0	3	0	0	12	
7:35 AM	0	0	0	0	1	0	1	0	1	7	0	0	0	8	0	0	18	
7:40 AM	0	0	0	0	2	1	2	0	1	11	1	0	0	4	2	0	24	
7:45 AM	1	0	0	0	2	0	3	0	2	11	0	0	0	3	0	0	22	
7:50 AM	0	0	1	0	2	0	5	0	0	7	0	0	0	10	0	0	25	
7:55 AM	0	0	0	0	0	1	0	0	2	4	0	0	0	10	1	0	18	185
8:00 AM	0	1	0	0	0	0	1	0	0	1	0	0	0	8	0	0	11	189
8:05 AM	0	0	0	0	1	1	1	0	0	6	0	0	0	3	0	0	12	197
8:10 AM	0	0	0	0	0	0	1	0	0	5	0	0	0	2	0	0	8	197
8:15 AM	0	0	0	0	0	0	2	0	0	4	0	0	0	2	0	0	8	187
8:20 AM	0	0	0	0	0	0	0	0	0	7	0	0	0	5	0	0	12	186
8:25 AM	0	2	0	0	0	0	0	0	0	6	0	0	0	0	0	0	8	178
8:30 AM	0	0	0	0	0	0	1	0	1	3	0	0	0	4	0	0	9	175
8:35 AM	0	0	0	0	0	0	0	0	1	3	0	0	0	2	0	0	6	163
8:40 AM	0	2	0	0	0	1	0	0	0	0	0	0	0	3	0	0	6	145
8:45 AM	0	0	0	0	0	0	0	0	0	3	0	0	0	5	0	0	8	131
8:50 AM	0	0	0	0	0	1	1	0	0	2	0	0	0	4	0	0	8	114
8:55 AM	0	0	0	0	0	0	1	0	0	6	0	0	0	2	0	0	9	105

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	4	0	4	0	24	4	40	0	12	116	4	0	0	68	8	0	284
Heavy Trucks	4	0	0		0	0	12		0	0	4		0	4	0		24
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 5/19/2017 4:01 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: SW Middleton Rd -- SW Brookman Rd

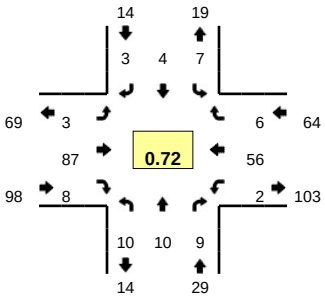
CITY/STATE: Sherwood, OR

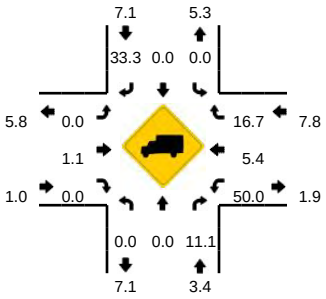
QC JOB #: 14401711

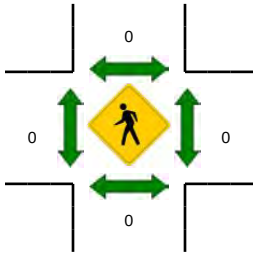
DATE: Thu, May 11 2017

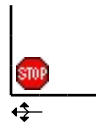
Peak-Hour: 7:15 AM -- 8:15 AM

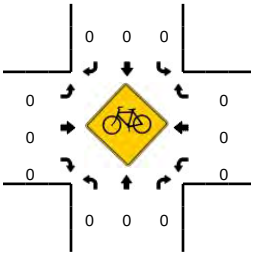
Peak 15-Min: 7:40 AM -- 7:55 AM

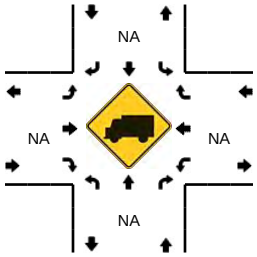


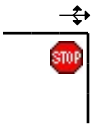


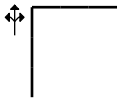


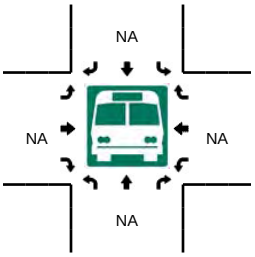












5-Min Count Period Beginning At	SW Middleton Rd (Northbound)				SW Middleton Rd (Southbound)				SW Brookman Rd (Eastbound)				SW Brookman Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3	
7:05 AM	0	0	0	0	1	0	0	0	0	2	1	0	0	1	0	0	5	
7:10 AM	0	1	0	0	0	0	0	0	0	5	0	0	0	1	0	0	7	
7:15 AM	0	0	0	0	1	0	0	0	1	10	0	0	0	4	0	0	16	
7:20 AM	1	2	1	0	0	0	0	0	0	8	0	0	1	3	0	0	16	
7:25 AM	1	0	0	0	0	0	0	0	0	9	1	0	0	5	0	0	16	
7:30 AM	1	2	1	0	2	1	0	0	0	9	0	0	0	4	0	0	20	
7:35 AM	0	0	1	0	0	0	0	0	1	8	0	0	0	8	0	0	18	
7:40 AM	1	5	1	0	2	0	1	0	0	10	0	0	0	4	2	0	26	
7:45 AM	0	0	2	0	1	1	0	0	1	12	2	0	1	5	1	0	26	
7:50 AM	2	0	0	0	1	0	0	0	0	10	1	0	0	5	0	0	19	
7:55 AM	0	0	1	0	0	2	1	0	0	3	1	0	0	8	1	0	17	189
8:00 AM	3	1	1	0	0	0	1	0	0	0	2	0	0	5	1	0	14	200
8:05 AM	1	0	0	0	0	0	0	0	0	5	1	0	0	2	0	0	9	204
8:10 AM	0	0	1	0	0	0	0	0	0	3	0	0	0	3	1	0	8	205
8:15 AM	1	0	0	0	0	0	0	0	0	5	1	0	0	1	0	0	8	197
8:20 AM	3	0	0	0	0	0	0	0	0	4	0	0	1	1	0	0	9	190
8:25 AM	0	0	1	0	0	0	0	0	2	6	1	0	0	0	0	0	10	184
8:30 AM	1	0	0	0	0	0	0	0	0	2	1	0	0	3	0	0	7	171
8:35 AM	0	0	0	0	1	0	0	0	0	3	0	0	0	2	0	0	6	159
8:40 AM	2	1	0	0	1	0	0	0	0	0	0	0	0	4	0	0	8	141
8:45 AM	1	0	0	0	0	0	0	0	0	2	0	0	1	2	1	0	7	122
8:50 AM	0	0	0	0	0	0	0	0	0	2	1	0	0	3	0	0	6	109
8:55 AM	0	0	0	0	0	0	1	0	0	6	0	0	0	1	0	0	8	100

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	20	12	0	16	4	4	0	4	128	12	0	4	56	12	0	284
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	4	4		8
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 5/19/2017 4:01 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

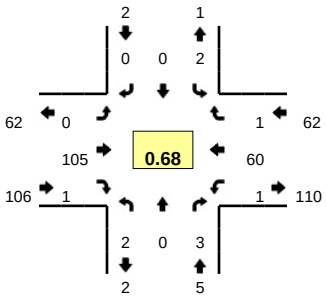
LOCATION: SW Oberst Rd -- SW Brookman Rd

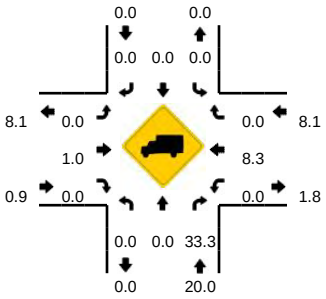
QC JOB #: 14401713

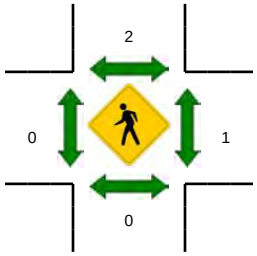
CITY/STATE: Sherwood, OR

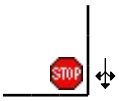
DATE: Thu, May 11 2017

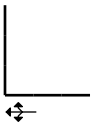
Peak-Hour: 7:10 AM -- 8:10 AM
Peak 15-Min: 7:40 AM -- 7:55 AM

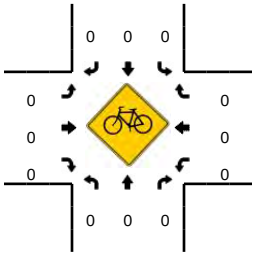


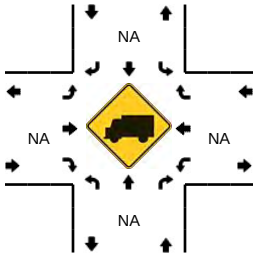


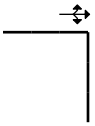


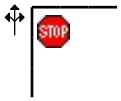


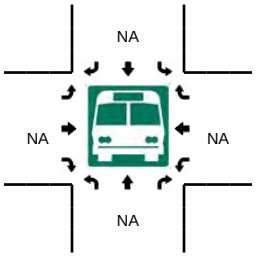












5-Min Count Period Beginning At	SW Oberst Rd (Northbound)				SW Oberst Rd (Southbound)				SW Brookman Rd (Eastbound)				SW Brookman Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	
7:05 AM	0	0	1	0	0	0	0	0	0	3	0	0	0	1	0	0	5	
7:10 AM	0	0	0	0	0	0	0	0	0	6	0	0	0	1	1	0	8	
7:15 AM	0	0	0	0	1	0	0	0	0	9	0	0	0	5	0	0	15	
7:20 AM	0	0	0	0	0	0	0	0	0	9	0	0	0	3	0	0	12	
7:25 AM	0	0	1	0	0	0	0	0	0	11	1	0	0	5	0	0	18	
7:30 AM	0	0	1	0	0	0	0	0	0	10	0	0	1	5	0	0	17	
7:35 AM	1	0	1	0	0	0	0	0	0	8	0	0	0	5	0	0	15	
7:40 AM	0	0	0	0	0	0	0	0	0	16	0	0	0	7	0	0	23	
7:45 AM	0	0	0	0	0	0	0	0	0	16	0	0	0	7	0	0	23	
7:50 AM	1	0	0	0	0	0	0	0	0	10	0	0	0	7	0	0	18	
7:55 AM	0	0	0	0	0	0	0	0	0	4	0	0	0	6	0	0	10	166
8:00 AM	0	0	0	0	0	0	0	0	0	2	0	0	0	6	0	0	8	172
8:05 AM	0	0	0	0	1	0	0	0	0	4	0	0	0	3	0	0	8	175
8:10 AM	1	0	0	0	0	0	0	0	0	4	0	0	0	2	0	0	7	174
8:15 AM	0	0	0	0	0	0	0	0	0	5	0	0	0	1	0	0	6	165
8:20 AM	0	0	1	0	0	0	0	0	0	2	0	0	0	2	0	0	5	158
8:25 AM	0	0	0	0	0	0	0	0	0	7	0	0	0	1	0	0	8	148
8:30 AM	0	0	0	0	0	0	0	0	0	4	0	0	0	2	0	0	6	137
8:35 AM	0	0	0	0	0	0	0	0	0	5	0	0	0	1	0	0	6	128
8:40 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	5	0	0	6	111
8:45 AM	0	0	0	0	0	0	0	0	0	1	0	0	1	3	0	0	5	93
8:50 AM	0	0	0	0	1	0	0	0	0	3	0	0	0	2	0	0	6	81
8:55 AM	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	5	76

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	4	0	0	0	0	0	0	0	0	168	0	0	0	84	0	0	256
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	8	0		8
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 5/23/2017 9:22 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: SW Ladd Hill Rd -- SW Brookman Rd

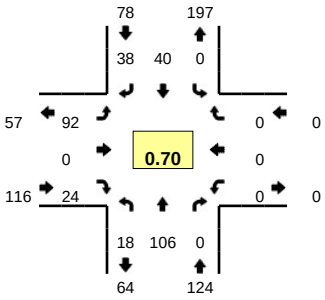
CITY/STATE: Sherwood, OR

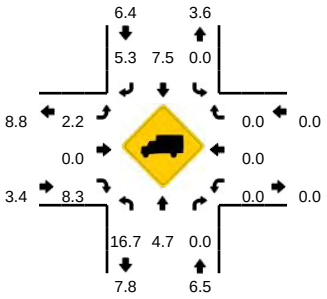
QC JOB #: 14401715

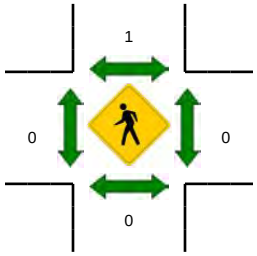
DATE: Thu, May 11 2017

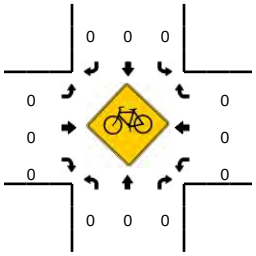
Peak-Hour: 7:10 AM -- 8:10 AM

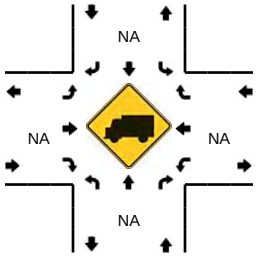
Peak 15-Min: 7:40 AM -- 7:55 AM

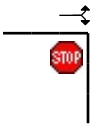


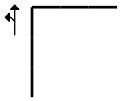


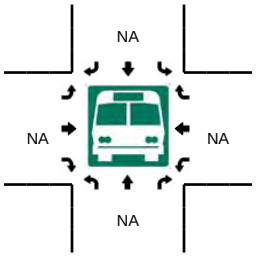












5-Min Count Period Beginning At	SW Ladd Hill Rd (Northbound)				SW Ladd Hill Rd (Southbound)				SW Brookman Rd (Eastbound)				SW Brookman Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	2	0	0	0	0	0	0	2	0	1	0	0	0	0	0	5	
7:05 AM	0	5	0	0	0	0	0	0	1	0	0	0	0	0	0	0	6	
7:10 AM	1	7	0	0	0	3	2	0	7	0	2	0	0	0	0	0	22	
7:15 AM	0	5	0	0	0	3	3	0	5	0	3	0	0	0	0	0	19	
7:20 AM	2	8	0	0	0	1	1	0	4	0	3	0	0	0	0	0	19	
7:25 AM	1	4	0	0	0	2	4	0	4	0	1	0	0	0	0	0	16	
7:30 AM	3	12	0	0	0	5	2	0	13	0	3	0	0	0	0	0	38	
7:35 AM	3	8	0	0	0	0	2	0	10	0	2	0	0	0	0	0	25	
7:40 AM	0	17	0	0	0	5	5	0	10	0	3	1	0	0	0	0	41	
7:45 AM	2	12	0	0	0	2	5	0	13	0	2	0	0	0	0	0	36	
7:50 AM	5	9	0	0	0	4	4	0	13	0	1	0	0	0	0	0	36	
7:55 AM	1	11	0	0	0	6	3	0	5	0	4	0	0	0	0	0	30	293
8:00 AM	0	5	0	0	0	6	2	0	2	0	0	0	0	0	0	0	15	303
8:05 AM	0	8	0	0	0	3	5	0	5	0	0	0	0	0	0	0	21	318
8:10 AM	0	7	0	0	0	5	0	0	4	0	1	0	0	0	0	0	17	313
8:15 AM	0	7	0	0	0	1	1	0	3	0	1	0	0	0	0	0	13	307
8:20 AM	1	3	0	0	0	3	0	0	2	0	2	0	0	0	0	0	11	299
8:25 AM	0	5	0	0	0	3	3	0	6	0	1	0	0	0	0	0	18	301
8:30 AM	0	2	0	0	0	4	0	0	4	0	0	0	0	0	0	0	10	273
8:35 AM	0	5	0	0	0	6	3	0	1	0	0	0	0	0	0	0	15	263
8:40 AM	2	3	0	0	0	5	2	0	3	0	2	0	0	0	0	0	17	239
8:45 AM	0	4	0	0	0	5	3	0	0	0	1	0	0	0	0	0	13	216
8:50 AM	1	4	0	0	0	4	1	0	1	0	1	0	0	0	0	0	12	192
8:55 AM	1	7	0	0	0	6	0	0	5	0	0	0	0	0	0	0	19	181

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	28	152	0	0	0	44	56	0	144	0	24	4	0	0	0	0	452
Heavy Trucks	0	0	0		0	0	8		0	0	4		0	0	0		12
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 5/19/2017 4:01 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

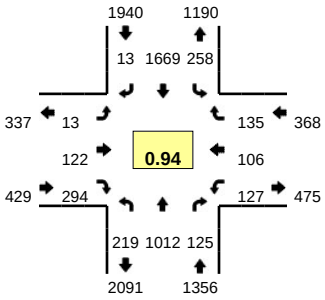
Method for determining peak hour: Total Entering Volume

LOCATION: SW Pacific Hwy -- SW Elwert Rd/SW Sunset Blvd

QC JOB #: 14401718

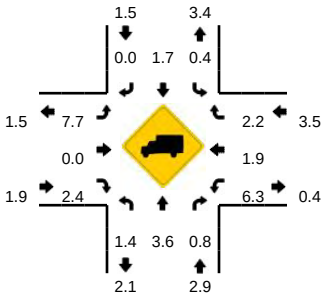
CITY/STATE: Sherwood, OR

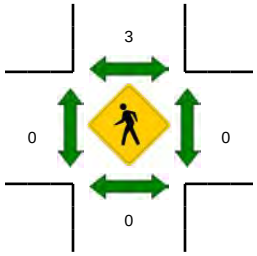
DATE: Thu, May 11 2017

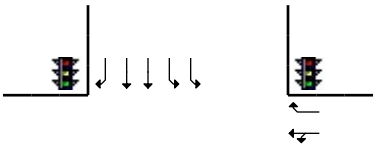


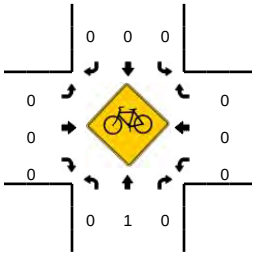
Peak-Hour: 4:40 PM -- 5:40 PM

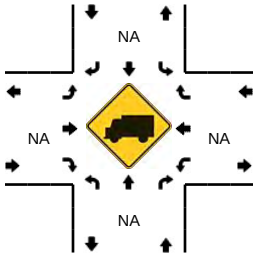
Peak 15-Min: 5:10 PM -- 5:25 PM

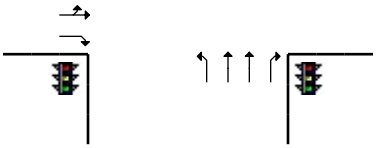


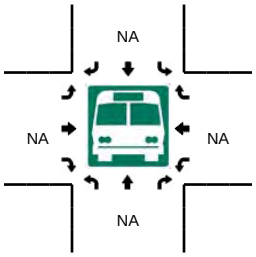












5-Min Count Period Beginning At	SW Pacific Hwy (Northbound)				SW Pacific Hwy (Southbound)				SW Elwert Rd/SW Sunset Blvd (Eastbound)				SW Elwert Rd/SW Sunset Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	15	71	6	1	11	141	3	4	3	11	27	0	10	6	6	0	315	
4:05 PM	4	62	14	0	14	154	0	1	0	12	26	0	7	5	11	0	310	
4:10 PM	12	76	3	0	11	132	0	2	0	10	27	0	9	8	10	0	300	
4:15 PM	13	96	13	1	10	111	3	3	1	7	25	0	11	8	15	0	317	
4:20 PM	16	91	13	1	13	149	0	5	0	12	18	0	13	7	11	0	349	
4:25 PM	13	82	5	0	12	140	2	3	1	9	21	0	12	10	16	0	326	
4:30 PM	22	73	10	0	12	110	3	2	0	11	28	0	6	7	11	0	295	
4:35 PM	16	82	8	0	19	121	2	6	0	11	26	0	10	8	11	0	320	
4:40 PM	24	100	17	1	13	129	1	2	0	7	29	0	12	8	9	0	352	
4:45 PM	23	79	9	0	19	136	0	3	1	7	22	0	11	19	15	0	344	
4:50 PM	22	87	11	0	22	124	1	3	2	12	27	0	11	10	12	0	344	
4:55 PM	14	78	16	0	25	136	1	1	2	6	28	0	12	8	18	0	345	3917
5:00 PM	19	77	8	0	10	117	0	5	2	11	29	0	9	11	10	0	308	3910
5:05 PM	13	63	8	0	16	153	2	2	0	12	22	0	17	6	16	0	330	3930
5:10 PM	16	80	9	0	22	158	0	0	1	13	23	0	13	4	10	0	349	3979
5:15 PM	15	95	17	0	14	157	2	2	5	7	22	0	11	10	8	0	365	4027
5:20 PM	14	108	4	0	25	154	1	4	0	12	22	0	12	9	12	0	377	4055
5:25 PM	22	75	7	0	16	142	1	5	0	13	24	0	6	8	7	0	326	4055
5:30 PM	21	93	11	0	25	110	2	1	0	9	27	0	7	6	11	0	323	4083
5:35 PM	15	77	8	0	21	153	2	2	0	13	19	0	6	7	7	0	330	4093
5:40 PM	17	89	9	0	21	131	0	7	0	10	25	0	4	8	8	0	329	4070
5:45 PM	17	88	13	0	8	136	3	1	1	5	26	0	7	8	11	0	324	4050
5:50 PM	19	87	15	0	22	134	0	3	1	11	25	0	10	5	11	0	343	4049
5:55 PM	17	64	8	0	31	134	4	2	0	12	15	0	11	6	11	0	315	4019

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	180	1132	120	0	244	1876	12	24	24	128	268	0	144	92	120	0	4364
Heavy Trucks	8	40	4		0	20	0		4	0	8		8	0	0		92
Pedestrians		0				8				0				0			8
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 5/19/2017 4:01 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

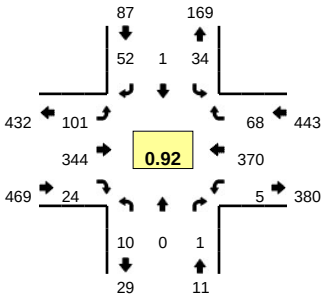
Method for determining peak hour: Total Entering Volume

LOCATION: SW Woodhaven Dr -- SW Sunset Blvd

QC JOB #: 14538802

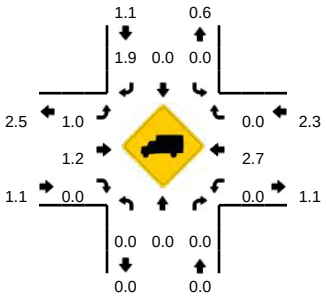
CITY/STATE: Sherwood, OR

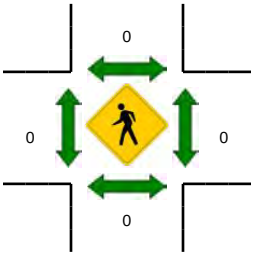
DATE: Thu, Oct 12 2017

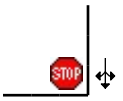


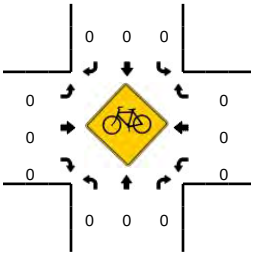
Peak-Hour: 4:45 PM -- 5:45 PM

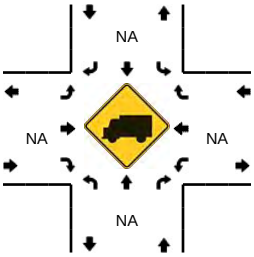
Peak 15-Min: 5:15 PM -- 5:30 PM

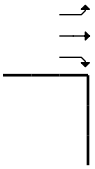


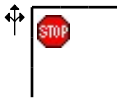


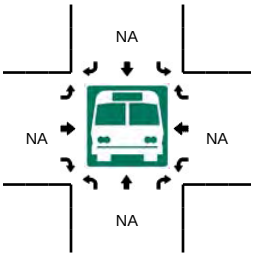












5-Min Count Period Beginning At	SW Woodhaven Dr (Northbound)				SW Woodhaven Dr (Southbound)				SW Sunset Blvd (Eastbound)				SW Sunset Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	0	0	2	0	3	0	8	20	1	0	0	20	2	0	56	
4:05 PM	0	2	1	0	4	0	3	0	7	19	1	0	0	21	3	0	61	
4:10 PM	0	0	0	0	1	0	6	0	3	19	1	0	0	19	3	0	52	
4:15 PM	0	0	0	0	3	0	2	0	6	20	1	0	2	33	5	0	72	
4:20 PM	0	0	0	0	2	0	2	0	3	18	1	0	0	25	3	0	54	
4:25 PM	1	0	0	0	4	0	3	0	7	15	0	0	0	22	6	0	58	
4:30 PM	0	0	0	0	3	0	3	0	6	20	2	0	0	26	0	0	60	
4:35 PM	0	0	1	0	2	0	2	0	9	30	0	0	1	22	1	0	68	
4:40 PM	1	0	0	0	4	0	5	0	5	24	2	1	1	27	3	0	73	
4:45 PM	1	0	0	0	5	0	2	0	8	24	3	0	1	31	5	0	80	
4:50 PM	3	0	0	0	3	0	6	0	10	21	1	0	0	28	4	1	77	
4:55 PM	1	0	1	0	1	0	1	0	5	28	1	0	1	28	10	0	77	788
5:00 PM	1	0	0	0	1	0	6	0	11	35	2	0	1	26	4	0	87	819
5:05 PM	0	0	0	0	2	0	5	0	10	34	3	0	1	30	5	0	90	848
5:10 PM	0	0	0	0	4	0	5	0	3	21	1	0	0	29	7	0	70	866
5:15 PM	1	0	0	0	2	0	4	0	8	26	4	0	0	42	3	0	90	884
5:20 PM	0	0	0	0	2	0	2	0	9	40	1	0	0	35	9	0	98	928
5:25 PM	1	0	0	0	7	1	9	0	8	25	3	0	0	27	4	0	85	955
5:30 PM	2	0	0	0	1	0	2	0	10	31	2	0	0	30	6	0	84	979
5:35 PM	0	0	0	0	4	0	4	0	8	28	2	0	0	35	3	0	84	995
5:40 PM	0	0	0	0	2	0	6	0	11	31	1	0	0	29	8	0	88	1010
5:45 PM	0	0	0	0	3	0	6	0	9	17	2	0	0	21	9	0	67	997
5:50 PM	2	0	0	0	0	0	7	0	9	17	2	0	0	28	6	0	71	991
5:55 PM	0	0	0	0	3	0	4	0	9	32	2	0	0	16	3	0	69	983

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	8	0	0	0	44	4	60	0	100	364	32	0	0	416	64	0	1092
Heavy Trucks	0	0	0		0	0	4		0	0	0		0	20	0		24
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 10/31/2017 8:48 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: SW Timbrel Ln -- SW Sunset Blvd

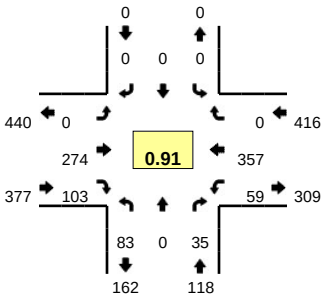
CITY/STATE: Sherwood, OR

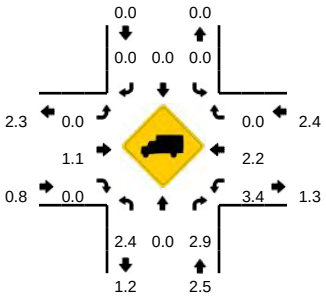
QC JOB #: 14538804

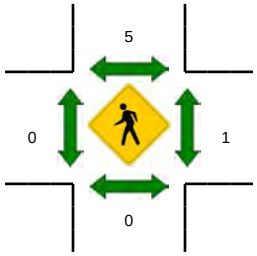
DATE: Thu, Oct 12 2017

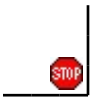
Peak-Hour: 4:45 PM -- 5:45 PM

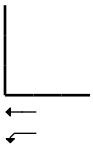
Peak 15-Min: 5:15 PM -- 5:30 PM

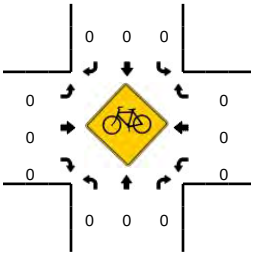


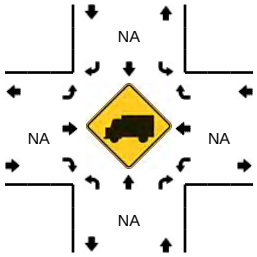


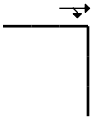


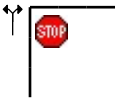


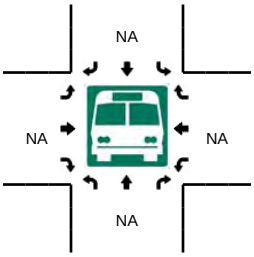












5-Min Count Period Beginning At	SW Timbrel Ln (Northbound)				SW Timbrel Ln (Southbound)				SW Sunset Blvd (Eastbound)				SW Sunset Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	5	0	2	0	0	0	0	0	0	15	5	0	1	17	0	0	45	
4:05 PM	6	0	0	0	0	0	0	0	0	21	5	0	0	16	0	0	48	
4:10 PM	1	0	1	0	0	0	0	0	0	13	9	0	5	24	0	0	53	
4:15 PM	10	0	1	0	0	0	0	0	0	21	3	0	4	26	0	0	65	
4:20 PM	12	0	7	0	0	0	0	0	0	18	3	0	2	18	0	0	60	
4:25 PM	9	0	4	0	0	0	0	0	0	15	5	0	4	21	0	0	58	
4:30 PM	5	0	4	0	0	0	0	0	0	16	6	0	4	21	0	0	56	
4:35 PM	4	0	2	0	0	0	0	0	0	25	8	0	4	22	0	0	65	
4:40 PM	3	0	4	0	0	0	0	0	0	20	10	0	3	29	0	0	69	
4:45 PM	14	0	1	0	0	0	0	0	0	17	12	0	4	21	0	0	69	
4:50 PM	7	0	2	0	0	0	0	0	0	17	8	0	5	25	0	0	64	
4:55 PM	10	0	2	0	0	0	0	0	0	27	2	0	4	34	0	0	79	731
5:00 PM	3	0	5	0	0	0	0	0	0	24	12	0	6	25	0	0	75	761
5:05 PM	4	0	2	0	0	0	0	0	0	33	3	0	8	32	0	0	82	795
5:10 PM	8	0	1	0	0	0	0	0	0	15	11	0	4	29	0	0	68	810
5:15 PM	6	0	3	0	0	0	0	0	0	18	10	0	8	37	0	0	82	827
5:20 PM	8	0	6	0	0	0	0	0	0	31	7	0	4	38	0	0	94	861
5:25 PM	4	0	5	0	0	0	0	0	0	22	13	0	3	26	0	0	73	876
5:30 PM	7	0	2	0	0	0	0	0	0	25	7	0	7	27	0	0	75	895
5:35 PM	7	0	4	0	0	0	0	0	0	24	5	0	3	32	0	0	75	905
5:40 PM	5	0	2	0	0	0	0	0	0	21	13	0	3	31	0	0	75	911
5:45 PM	6	0	1	0	0	0	0	0	0	14	4	0	4	23	0	0	52	894
5:50 PM	9	0	1	0	0	0	0	0	0	13	7	0	6	26	0	0	62	892
5:55 PM	3	0	1	0	0	0	0	0	0	22	7	0	3	15	0	0	51	864

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	72	0	56	0	0	0	0	0	0	284	120	0	60	404	0	0	996
Heavy Trucks	4	0	4		0	0	0		0	0	0		0	16	0		24
Pedestrians		0				4				0				4			8
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 10/31/2017 8:48 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: User-Defined

Method for determining peak hour: Total Entering Volume

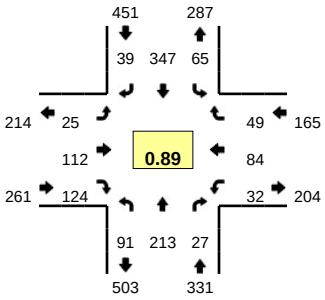
LOCATION: SW Main St/SW Ladd Hill Rd -- SW Sunset Blvd

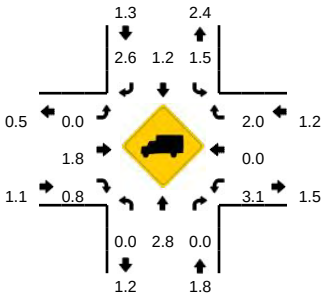
QC JOB #: 14487602

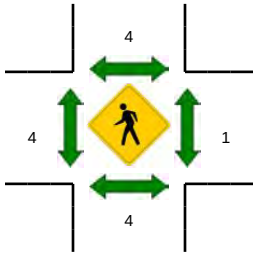
CITY/STATE: Sherwood, OR

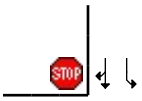
DATE: Tue, Sep 12 2017

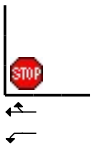
Peak-Hour: 4:40 PM -- 5:40 PM
Peak 15-Min: 5:15 PM -- 5:30 PM

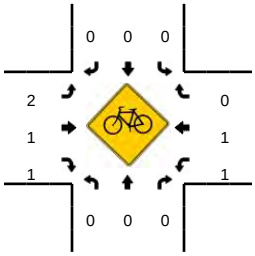


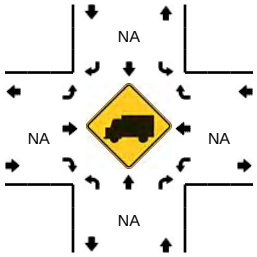


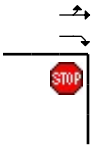


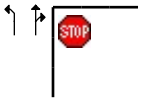


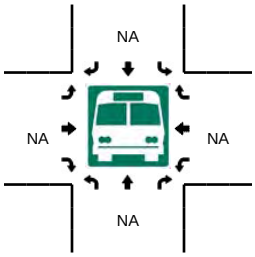












5-Min Count Period Beginning At	SW Main St/SW Ladd Hill Rd (Northbound)				SW Main St/SW Ladd Hill Rd (Southbound)				SW Sunset Blvd (Eastbound)				SW Sunset Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	2	12	3	0	5	22	2	0	1	5	8	0	3	3	2	0	68	
4:05 PM	5	10	2	0	7	18	1	0	3	5	14	0	4	4	3	0	76	
4:10 PM	6	10	2	0	1	25	2	0	3	7	9	0	3	5	3	0	76	
4:15 PM	1	8	3	0	6	19	2	0	3	6	8	0	2	3	1	0	62	
4:20 PM	7	14	3	0	6	21	2	0	1	3	8	0	2	3	2	1	73	
4:25 PM	6	13	1	0	5	20	3	0	4	4	7	0	3	5	4	0	75	
4:30 PM	10	14	2	0	9	31	4	0	0	5	5	0	2	4	3	0	89	
4:35 PM	2	15	3	0	5	24	3	0	1	7	12	0	2	3	4	0	81	
4:40 PM	3	14	1	0	3	35	6	0	2	10	8	0	4	5	3	0	94	
4:45 PM	2	26	2	0	6	27	4	0	4	10	9	0	2	8	4	0	104	
4:50 PM	10	15	3	0	3	36	2	0	1	6	13	0	1	4	6	0	100	
4:55 PM	3	17	2	0	5	34	4	0	0	10	8	0	3	7	3	0	96	994
5:00 PM	6	17	4	0	6	26	3	0	2	7	10	0	3	12	3	0	99	1025
5:05 PM	6	13	2	0	5	28	7	0	2	10	14	0	2	5	9	0	103	1052
5:10 PM	5	22	2	0	6	23	0	0	1	11	12	0	2	3	4	0	91	1067
5:15 PM	13	18	4	0	5	26	3	0	1	9	10	0	5	9	2	0	105	1110
5:20 PM	13	27	0	0	9	34	2	0	4	12	12	0	3	8	1	0	125	1162
5:25 PM	17	14	1	0	8	29	1	0	5	8	13	0	1	11	1	0	109	1196
5:30 PM	7	17	5	0	2	27	2	0	2	8	11	0	1	6	6	0	94	1201
5:35 PM	6	13	1	0	7	22	5	0	1	11	4	0	5	6	7	0	88	1208
5:40 PM	12	20	2	0	3	19	2	0	1	10	7	0	1	3	2	0	82	1196
5:45 PM	6	22	1	0	2	20	4	0	3	5	9	0	5	5	5	0	87	1179
5:50 PM	6	11	1	0	2	30	2	0	2	10	10	0	4	7	1	0	86	1165
5:55 PM	9	22	0	0	4	23	4	0	2	10	13	0	5	4	3	0	99	1168

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	172	236	20	0	88	356	24	0	40	116	140	0	36	112	16	0	1356
Heavy Trucks	0	12	0		0	0	0		0	4	0		4	0	0		20
Pedestrians		0				12				0				0			12
Bicycles	0	0	0		0	0	0		0	0	0		0	1	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 2/23/2018 2:12 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

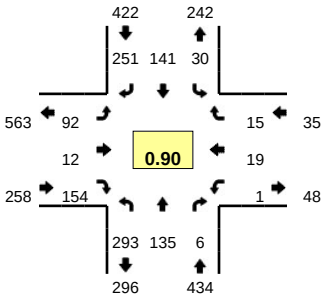
LOCATION: SW Murdock Rd/SW Baker Rd -- SW Sunset Blvd/McKinley Dr

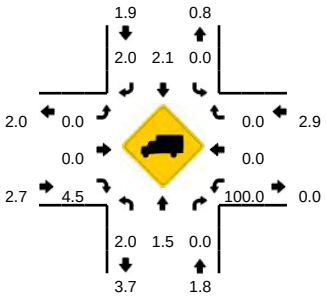
QC JOB #: 14548502

CITY/STATE: Sherwood, OR

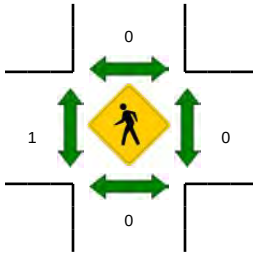
DATE: Wed, Oct 25 2017

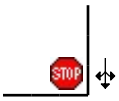
Peak-Hour: 4:45 PM -- 5:45 PM
Peak 15-Min: 5:05 PM -- 5:20 PM

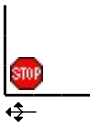


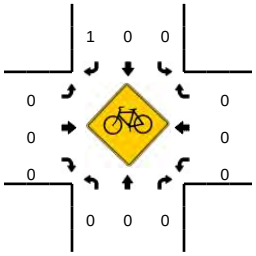


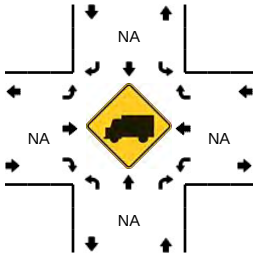
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

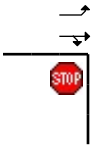


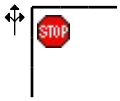


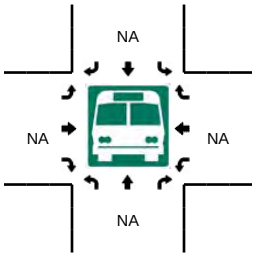












5-Min Count Period Beginning At	SW Murdock Rd/SW Baker Rd (Northbound)				SW Murdock Rd/SW Baker Rd (Southbound)				SW Sunset Blvd/McKinley Dr (Eastbound)				SW Sunset Blvd/McKinley Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	16	9	0	0	1	8	14	0	10	0	10	0	0	2	1	0	71	
4:05 PM	13	11	0	0	2	10	17	0	8	2	12	0	0	0	0	0	75	
4:10 PM	16	11	0	0	4	11	18	0	4	3	9	0	0	0	0	0	76	
4:15 PM	21	6	0	0	3	8	16	0	9	0	7	0	0	1	0	0	71	
4:20 PM	14	7	1	0	1	15	23	0	8	0	9	0	0	0	1	0	79	
4:25 PM	24	6	1	0	1	5	12	0	7	1	2	0	0	0	0	0	59	
4:30 PM	19	12	0	0	1	13	10	0	6	0	16	0	0	1	0	0	78	
4:35 PM	14	8	0	0	1	14	18	0	7	0	13	0	0	0	0	0	75	
4:40 PM	24	11	1	0	1	11	16	0	2	0	10	0	0	0	0	0	76	
4:45 PM	25	13	0	0	0	17	28	0	12	0	9	0	0	2	1	0	107	
4:50 PM	26	12	0	0	2	11	27	0	6	1	17	0	0	2	3	0	107	
4:55 PM	25	14	1	0	3	8	26	0	11	1	10	0	0	1	2	0	102	976
5:00 PM	14	9	1	0	1	12	14	0	5	0	11	0	0	1	3	0	71	976
5:05 PM	25	13	0	0	5	11	19	0	9	1	17	0	0	2	0	0	102	1003
5:10 PM	34	14	1	0	5	14	15	0	6	2	16	0	1	4	0	0	112	1039
5:15 PM	19	14	0	0	5	14	22	0	9	0	16	0	0	2	3	0	104	1072
5:20 PM	29	4	1	0	0	6	20	0	4	3	10	0	0	1	1	0	79	1072
5:25 PM	27	6	0	0	5	14	17	0	10	2	14	0	0	0	0	0	95	1108
5:30 PM	20	12	1	0	2	12	21	0	9	0	16	0	0	1	2	0	96	1126
5:35 PM	23	10	1	0	1	9	20	0	5	1	7	0	0	1	0	0	78	1129
5:40 PM	26	14	0	0	1	13	22	0	6	1	11	0	0	2	0	0	96	1149
5:45 PM	21	11	0	0	0	15	16	0	6	0	10	0	0	0	2	0	81	1123
5:50 PM	20	7	0	0	3	8	16	0	9	2	10	0	0	0	0	0	75	1091
5:55 PM	15	9	0	0	2	9	20	0	6	1	8	0	0	0	2	0	72	1061

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	164	4	0	60	156	224	0	96	12	196	0	4	32	12	0	1272
Heavy Trucks	8	0	0		0	8	0		0	0	8		4	0	0		28
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	1		0	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 10/31/2017 3:00 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

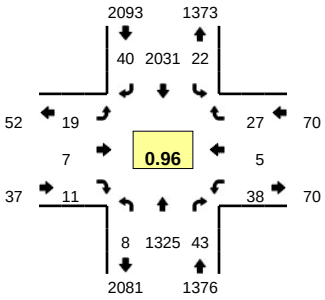
Method for determining peak hour: Total Entering Volume

LOCATION: SW Pacific Hwy -- SW Chapman Rd

CITY/STATE: Sherwood, OR

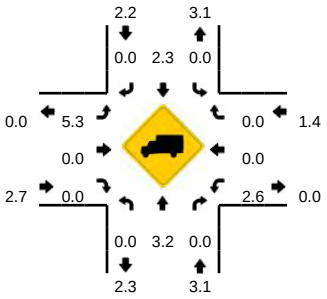
QC JOB #: 14401707

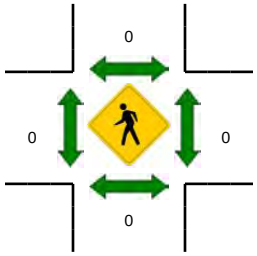
DATE: Thu, May 11 2017

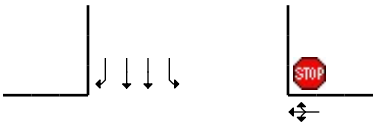


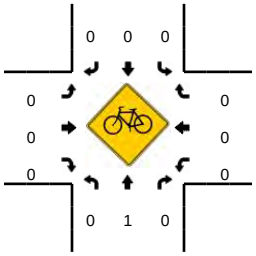
Peak-Hour: 4:35 PM -- 5:35 PM

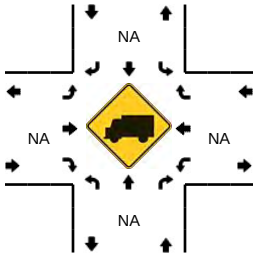
Peak 15-Min: 5:10 PM -- 5:25 PM

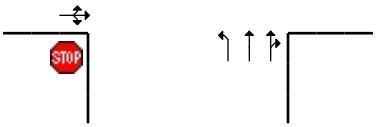


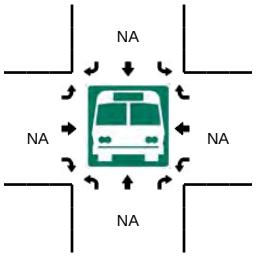












5-Min Count Period Beginning At	SW Pacific Hwy (Northbound)				SW Pacific Hwy (Southbound)				SW Chapman Rd (Eastbound)				SW Chapman Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	89	1	0	1	184	2	0	1	1	0	0	2	0	0	0	281	
4:05 PM	0	72	6	1	0	166	3	0	0	0	1	0	5	0	0	0	254	
4:10 PM	1	103	2	1	1	160	1	0	1	0	1	0	3	0	1	0	275	
4:15 PM	0	126	4	0	1	163	4	0	4	0	0	0	4	0	2	0	308	
4:20 PM	0	124	1	0	1	153	1	0	1	0	0	0	4	0	0	0	285	
4:25 PM	1	92	5	0	1	172	4	0	1	0	0	0	4	0	2	0	282	
4:30 PM	1	102	2	0	3	149	0	0	0	0	0	0	4	0	2	0	263	
4:35 PM	2	114	0	0	1	153	3	0	2	2	0	0	1	0	4	0	282	
4:40 PM	0	117	2	0	3	149	4	0	5	1	3	0	6	0	4	0	294	
4:45 PM	0	108	2	0	0	176	3	0	3	1	1	0	3	0	5	0	302	
4:50 PM	0	117	5	0	2	177	4	0	0	1	1	0	4	1	1	0	313	
4:55 PM	2	121	3	0	1	173	5	0	0	0	1	0	1	0	3	0	310	3449
5:00 PM	0	102	6	0	4	159	1	1	0	0	2	0	3	0	1	0	279	3447
5:05 PM	0	91	2	0	2	183	3	0	1	0	1	0	0	1	0	0	284	3477
5:10 PM	0	110	6	0	4	187	2	1	4	0	0	0	5	0	1	0	320	3522
5:15 PM	2	119	3	0	1	189	5	0	0	1	1	0	2	1	1	0	325	3539
5:20 PM	1	107	1	1	0	161	3	0	2	0	0	0	6	0	5	0	287	3541
5:25 PM	0	114	6	0	2	177	5	0	1	0	1	0	4	0	0	0	310	3569
5:30 PM	0	105	7	0	0	147	2	0	1	1	0	0	3	2	2	0	270	3576
5:35 PM	0	100	0	0	1	164	2	1	1	0	1	0	4	1	2	0	277	3571
5:40 PM	0	132	4	0	0	156	2	0	1	0	1	0	0	0	1	0	297	3574
5:45 PM	0	114	4	0	0	149	1	0	4	0	0	0	5	0	2	0	279	3551
5:50 PM	0	93	3	0	3	158	1	0	0	4	0	0	5	1	1	0	269	3507
5:55 PM	0	82	3	0	2	151	0	0	1	2	0	0	5	0	1	0	247	3444

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	1344	40	4	20	2148	40	4	24	4	4	0	52	4	28	0	3728
Heavy Trucks	0	44	0		0	40	0		0	0	0		0	0	0		84
Pedestrians		0				0				0				0			0
Bicycles	0	1	0		0	0	0		0	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 5/19/2017 4:01 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

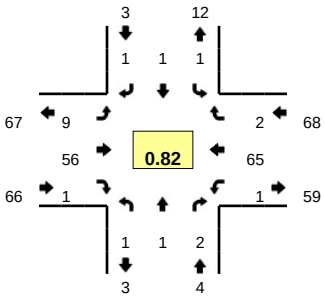
LOCATION: SW Old Hwy 99W -- SW Brookman Rd

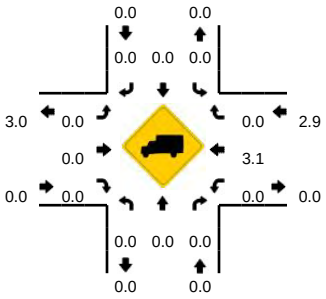
CITY/STATE: Sherwood, OR

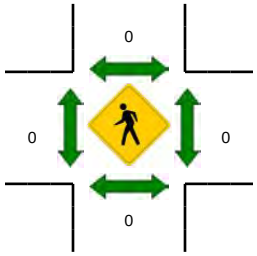
QC JOB #: 14401710

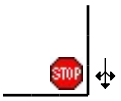
DATE: Thu, May 11 2017

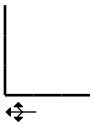
Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 5:05 PM -- 5:20 PM

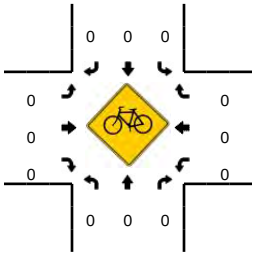


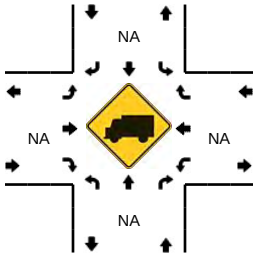


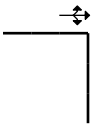


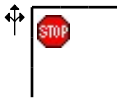


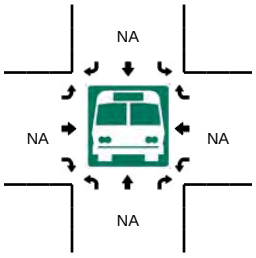












5-Min Count Period Beginning At	SW Old Hwy 99W (Northbound)				SW Old Hwy 99W (Southbound)				SW Brookman Rd (Eastbound)				SW Brookman Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	0	0	0	0	0	0	2	1	0	0	0	1	0	0	4	
4:05 PM	0	0	1	0	0	0	0	0	0	6	0	0	1	5	0	0	13	
4:10 PM	0	0	0	0	1	0	0	0	0	3	0	0	0	4	0	0	8	
4:15 PM	0	0	0	0	1	0	2	0	2	4	0	0	0	3	0	0	12	
4:20 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	4	0	0	5	
4:25 PM	0	0	0	0	0	0	0	0	1	2	0	0	0	5	0	0	8	
4:30 PM	0	0	0	0	0	0	1	0	1	4	0	0	0	3	0	0	9	
4:35 PM	0	0	0	0	0	0	0	0	0	1	0	0	1	3	1	0	6	
4:40 PM	0	0	0	0	0	0	1	0	1	3	0	0	0	9	0	0	14	
4:45 PM	0	0	0	0	0	0	0	0	0	4	0	0	0	5	0	0	9	
4:50 PM	0	0	0	0	1	0	0	0	1	5	0	0	0	5	0	0	12	
4:55 PM	0	0	0	0	0	0	0	0	0	5	0	0	0	6	0	0	11	111
5:00 PM	0	0	0	0	0	1	0	0	4	4	1	0	0	5	0	0	15	122
5:05 PM	0	0	2	0	0	0	0	0	0	6	0	0	0	2	0	0	10	119
5:10 PM	0	1	0	0	0	0	0	0	0	8	0	0	0	4	1	0	14	125
5:15 PM	0	0	0	0	0	0	0	0	2	5	0	0	0	12	0	0	19	132
5:20 PM	0	0	0	0	0	0	0	0	1	1	0	0	0	6	0	0	8	135
5:25 PM	1	0	0	0	0	0	0	0	0	7	0	0	0	2	0	0	10	137
5:30 PM	0	0	0	0	0	0	0	0	0	7	0	0	0	6	0	0	13	141
5:35 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	4	0	0	5	140
5:40 PM	0	0	0	0	0	0	0	0	0	4	0	0	1	1	0	0	6	132
5:45 PM	0	0	0	0	0	0	0	0	1	4	0	0	0	7	0	0	12	135
5:50 PM	0	0	0	0	0	0	0	0	1	7	0	0	0	6	0	0	14	137
5:55 PM	0	0	0	0	0	0	0	0	1	5	0	0	0	5	0	0	11	137

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	4	8	0	0	0	0	0	8	76	0	0	0	72	4	0	172
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	0	0		0
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 5/19/2017 4:01 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

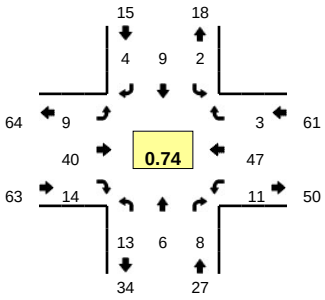
LOCATION: SW Middleton Rd -- SW Brookman Rd

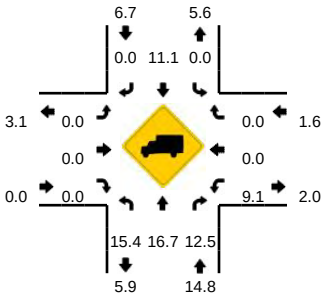
QC JOB #: 14401712

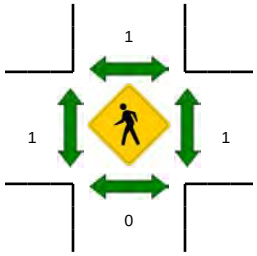
CITY/STATE: Sherwood, OR

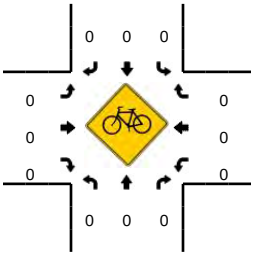
DATE: Thu, May 11 2017

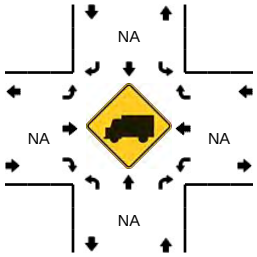
Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:05 PM -- 5:20 PM

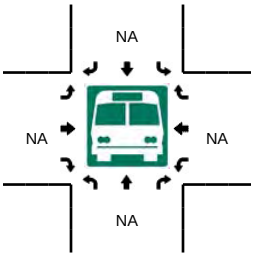












5-Min Count Period Beginning At	SW Middleton Rd (Northbound)				SW Middleton Rd (Southbound)				SW Brookman Rd (Eastbound)				SW Brookman Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	0	0	1	0	0	0	0	1	0	0	0	2	0	0	4	
4:05 PM	0	0	0	0	0	2	1	0	0	7	0	0	0	4	0	0	14	
4:10 PM	1	0	1	0	0	0	0	0	1	3	0	0	0	3	0	0	9	
4:15 PM	3	0	0	0	0	0	0	0	1	3	1	0	0	1	0	0	9	
4:20 PM	0	0	1	0	0	0	0	0	0	1	0	0	0	4	0	0	6	
4:25 PM	0	0	0	0	0	0	0	0	0	2	0	0	1	5	0	0	8	
4:30 PM	0	0	0	0	0	0	0	0	0	1	2	0	0	2	0	0	5	
4:35 PM	0	0	1	0	1	0	0	0	0	2	0	0	0	4	1	0	9	
4:40 PM	3	0	0	0	0	0	0	0	0	2	0	0	0	7	0	0	12	
4:45 PM	1	0	0	0	2	0	2	0	1	2	1	0	1	4	0	0	14	
4:50 PM	2	0	0	0	0	1	1	0	0	6	1	0	1	2	1	0	15	
4:55 PM	0	0	0	0	0	0	0	0	0	5	0	0	1	3	0	0	9	114
5:00 PM	2	0	1	0	0	0	1	0	0	4	0	0	0	2	0	0	10	120
5:05 PM	0	0	1	0	0	1	0	0	0	7	1	0	1	3	0	0	14	120
5:10 PM	1	1	1	0	1	3	0	0	0	4	1	0	0	5	0	0	17	128
5:15 PM	2	2	0	0	0	1	0	0	1	4	3	0	2	10	0	0	25	144
5:20 PM	2	0	1	0	0	0	0	0	0	0	0	0	3	3	1	0	10	148
5:25 PM	0	0	1	0	0	0	0	0	2	5	1	0	0	3	0	0	12	152
5:30 PM	1	1	0	0	0	0	1	0	3	3	1	0	0	5	0	0	15	162
5:35 PM	1	0	1	0	0	1	0	0	0	1	1	0	1	2	0	0	8	161
5:40 PM	2	1	1	0	0	2	0	0	1	1	0	0	2	1	1	0	12	161
5:45 PM	1	1	1	0	0	0	2	0	2	3	1	0	1	3	1	0	16	163
5:50 PM	0	0	0	0	1	0	0	0	0	4	3	0	1	7	0	0	16	164
5:55 PM	1	0	0	0	0	1	0	0	0	4	2	0	0	3	0	0	11	166

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	12	8	0	4	20	0	0	4	60	20	0	12	72	0	0	224
Heavy Trucks	0	0	4		0	0	0		0	0	0		0	0	0		4
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 5/19/2017 4:01 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: SW Oberst Rd -- SW Brookman Rd

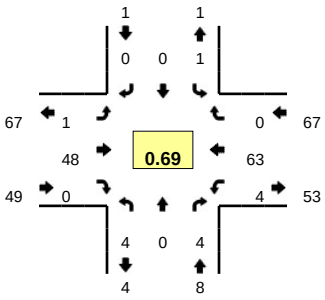
CITY/STATE: Sherwood, OR

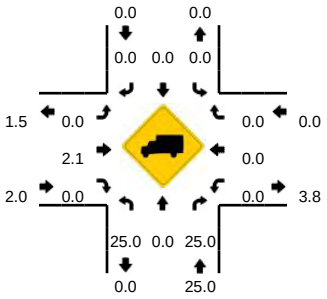
QC JOB #: 14401714

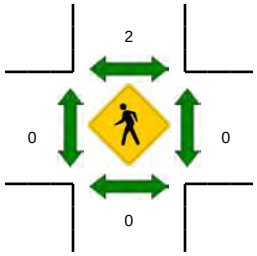
DATE: Thu, May 11 2017

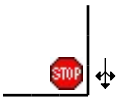
Peak-Hour: 4:55 PM -- 5:55 PM

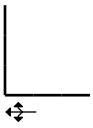
Peak 15-Min: 5:05 PM -- 5:20 PM

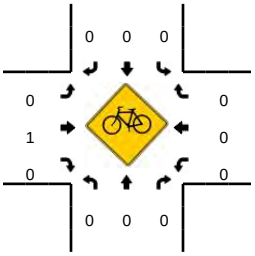


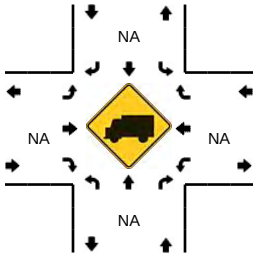


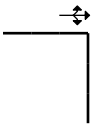


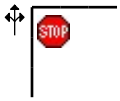


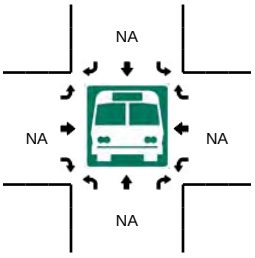












5-Min Count Period Beginning At	SW Oberst Rd (Northbound)				SW Oberst Rd (Southbound)				SW Brookman Rd (Eastbound)				SW Brookman Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	0	0	0	0	0	0	0	3	0	0	0	1	0	0	4	
4:05 PM	0	0	0	0	0	0	0	0	0	6	0	0	0	6	0	0	12	
4:10 PM	0	0	0	0	0	0	0	0	0	3	1	0	0	2	0	0	6	
4:15 PM	0	0	0	0	0	0	0	0	0	3	0	0	0	1	0	0	4	
4:20 PM	0	0	0	0	0	0	0	0	0	3	0	0	0	5	0	0	8	
4:25 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	5	1	0	8	
4:30 PM	0	0	0	0	0	0	1	0	0	0	1	0	0	4	0	0	6	
4:35 PM	0	0	0	0	0	0	0	0	0	3	0	0	0	5	0	0	8	
4:40 PM	0	0	0	0	0	0	0	0	0	2	1	0	0	6	0	0	9	
4:45 PM	1	0	0	0	0	0	0	0	0	1	1	0	0	6	0	0	9	
4:50 PM	0	0	0	0	0	0	0	0	0	7	1	0	1	2	0	0	11	
4:55 PM	0	0	0	0	0	0	0	0	0	4	0	0	0	5	0	0	9	94
5:00 PM	1	0	1	0	0	0	0	0	0	3	0	0	0	3	0	0	8	98
5:05 PM	0	0	0	0	0	0	0	0	1	7	0	0	0	4	0	0	12	98
5:10 PM	0	0	0	0	0	0	0	0	0	7	0	0	3	4	0	0	14	106
5:15 PM	0	0	0	0	0	0	0	0	0	5	0	0	1	13	0	0	19	121
5:20 PM	2	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	6	119
5:25 PM	0	0	1	0	0	0	0	0	0	5	0	0	0	3	0	0	9	120
5:30 PM	0	0	0	0	1	0	0	0	0	3	0	0	0	5	0	0	9	123
5:35 PM	0	0	0	0	0	0	0	0	0	3	0	0	0	5	0	0	8	123
5:40 PM	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0	0	6	120
5:45 PM	0	0	1	0	0	0	0	0	0	3	0	0	0	5	0	0	9	120
5:50 PM	1	0	1	0	0	0	0	0	0	5	0	0	0	9	0	0	16	125
5:55 PM	0	0	0	0	0	0	0	0	0	4	0	0	1	2	0	0	7	123

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	0	0	0	0	4	76	0	0	16	84	0	0	180
Heavy Trucks	0	0	0		0	0	0		0	4	0		0	0	0		4
Pedestrians		0				4				0				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 5/23/2017 9:22 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: SW Ladd Hill Rd -- SW Brookman Rd

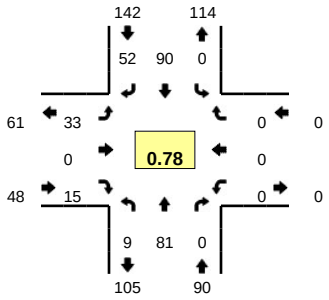
CITY/STATE: Sherwood, OR

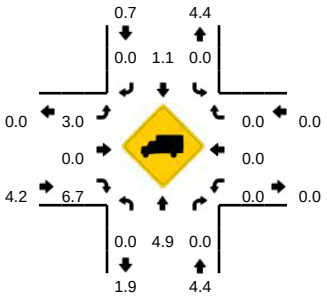
QC JOB #: 14401716

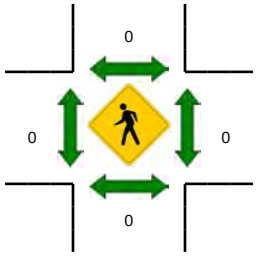
DATE: Thu, May 11 2017

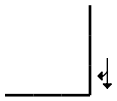
Peak-Hour: 4:45 PM -- 5:45 PM

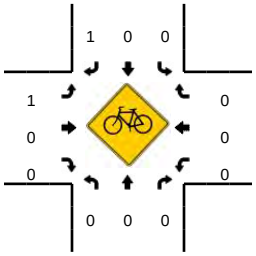
Peak 15-Min: 5:05 PM -- 5:20 PM

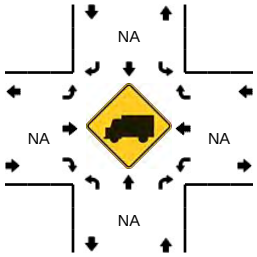


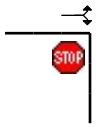


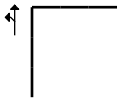


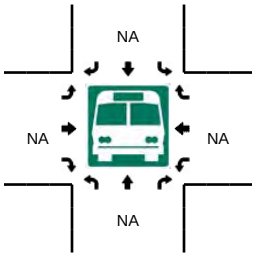












5-Min Count Period Beginning At	SW Ladd Hill Rd (Northbound)				SW Ladd Hill Rd (Southbound)				SW Brookman Rd (Eastbound)				SW Brookman Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	7	0	0	0	6	3	0	1	0	1	0	0	0	0	0	18	
4:05 PM	2	4	0	0	0	3	4	0	2	0	2	0	0	0	0	0	17	
4:10 PM	1	6	0	0	0	4	0	0	4	0	1	0	0	0	0	0	16	
4:15 PM	1	5	0	0	0	10	0	0	2	0	1	0	0	0	0	0	19	
4:20 PM	2	7	0	0	0	3	5	0	2	0	1	0	0	0	0	0	20	
4:25 PM	1	10	0	0	0	4	6	0	0	0	0	0	0	0	0	0	21	
4:30 PM	2	4	0	0	0	5	1	0	1	0	1	0	0	0	0	0	14	
4:35 PM	1	7	0	0	0	5	2	0	2	0	0	0	0	0	0	0	17	
4:40 PM	2	4	0	0	0	5	4	0	2	0	0	0	0	0	0	0	17	
4:45 PM	2	9	0	0	0	8	3	0	1	0	2	0	0	0	0	0	25	
4:50 PM	1	1	0	0	0	7	4	0	2	0	1	0	0	0	0	0	16	
4:55 PM	0	8	0	0	0	6	5	0	4	0	1	0	0	0	0	0	24	224
5:00 PM	0	7	0	0	0	2	1	0	5	0	0	0	0	0	0	0	15	221
5:05 PM	1	10	0	0	0	11	7	0	2	0	1	0	0	0	0	0	32	236
5:10 PM	2	5	0	0	0	8	7	0	6	0	2	0	0	0	0	0	30	250
5:15 PM	2	9	0	0	0	5	6	0	3	0	3	0	0	0	0	0	28	259
5:20 PM	0	7	0	0	0	10	5	0	0	0	0	0	0	0	0	0	22	261
5:25 PM	1	5	0	0	0	14	4	0	3	0	1	0	0	0	0	0	28	268
5:30 PM	0	6	0	0	0	5	2	0	3	0	2	0	0	0	0	0	18	272
5:35 PM	0	5	0	0	0	5	4	0	2	0	1	0	0	0	0	0	17	272
5:40 PM	0	9	0	0	0	9	4	0	2	0	1	0	0	0	0	0	25	280
5:45 PM	1	3	0	0	0	5	9	0	3	0	1	0	0	0	0	0	22	277
5:50 PM	1	4	0	0	0	2	5	0	4	0	0	0	0	0	0	0	16	277
5:55 PM	0	4	0	0	0	9	2	0	5	0	2	0	0	0	0	0	22	275

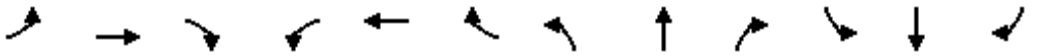
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	20	96	0	0	0	96	80	0	44	0	24	0	0	0	0	0	360
Heavy Trucks	0	4	0		0	4	0		4	0	4		0	0	0		16
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	1		0	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 5/19/2017 4:01 PM

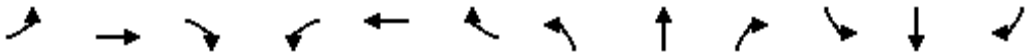
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Appendix C Existing Conditions Level of Service Worksheets



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	106	223	102	179	225	245	1580	106	128	766	13
Future Volume (vph)	18	106	223	102	179	225	245	1580	106	128	766	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			-1%			2%	
Total Lost time (s)		6.0	6.0		6.0	6.0	5.0	6.0	6.0	5.0	6.0	6.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00		0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1809	1583		1818	1553	1761	3489	1561	3180	3279	1361
Flt Permitted		0.91	1.00		0.79	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1667	1583		1471	1553	1761	3489	1561	3180	3279	1361
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	19	112	235	107	188	237	258	1663	112	135	806	14
RTOR Reduction (vph)	0	0	171	0	0	109	0	0	27	0	0	8
Lane Group Flow (vph)	0	131	64	0	295	128	258	1663	85	135	806	6
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	5%	2%	2%	3%	4%	3%	4%	4%	9%	9%	15%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			6
Actuated Green, G (s)		35.0	35.0		35.0	35.0	23.8	65.1	65.1	11.2	52.5	52.5
Effective Green, g (s)		35.0	35.0		35.0	35.0	23.8	65.1	65.1	11.2	52.5	52.5
Actuated g/C Ratio		0.27	0.27		0.27	0.27	0.19	0.51	0.51	0.09	0.41	0.41
Clearance Time (s)		6.0	6.0		6.0	6.0	5.0	6.0	6.0	5.0	6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	5.4	5.4	3.5	5.4	5.4
Lane Grp Cap (vph)		454	431		401	423	326	1770	792	277	1341	556
v/s Ratio Prot							c0.15	c0.48		0.04	0.25	
v/s Ratio Perm		0.08	0.04		c0.20	0.08			0.05			0.00
v/c Ratio		0.29	0.15		0.74	0.30	0.79	0.94	0.11	0.49	0.60	0.01
Uniform Delay, d1		36.8	35.4		42.4	37.0	49.9	29.7	16.5	55.8	29.7	22.5
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.4	0.2		6.9	0.4	12.3	10.7	0.1	1.6	1.2	0.0
Delay (s)		37.2	35.5		49.3	37.4	62.2	40.4	16.6	57.4	30.9	22.5
Level of Service		D	D		D	D	E	D	B	E	C	C
Approach Delay (s)		36.1			44.0			41.9			34.5	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM 2000 Control Delay	39.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	128.3	Sum of lost time (s)	17.0
Intersection Capacity Utilization	83.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	51	238	41	7	410	86	17	14	10	27	44	67
Future Volume (Veh/h)	51	238	41	7	410	86	17	14	10	27	44	67
Sign Control		Free			Free			Stop			Stop	
Grade		-1%			1%			-2%			0%	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	64	298	51	9	513	108	21	18	13	34	55	84
Pedestrians					5						3	
Lane Width (ft)					12.0						12.0	
Walking Speed (ft/s)					3.5						3.5	
Percent Blockage					0						0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		648										
pX, platoon unblocked												
vC, conflicting volume	624			349			1068	1068	303	1041	1065	570
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	624			349			1068	1068	303	1041	1065	570
tC, single (s)	4.2			4.2			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.3			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	93			99			83	91	98	80	73	84
cM capacity (veh/h)	926			1146			127	206	738	174	207	523

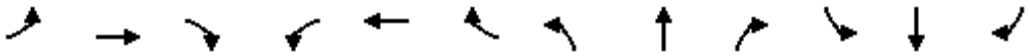
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	SB 1
Volume Total	64	298	51	9	621	52	173
Volume Left	64	0	0	9	0	21	34
Volume Right	0	0	51	0	108	13	84
cSH	926	1700	1700	1146	1700	192	278
Volume to Capacity	0.07	0.18	0.03	0.01	0.37	0.27	0.62
Queue Length 95th (ft)	6	0	0	1	0	26	96
Control Delay (s)	9.2	0.0	0.0	8.2	0.0	30.6	37.1
Lane LOS	A			A		D	E
Approach Delay (s)	1.4			0.1		30.6	37.1
Approach LOS						D	E

Intersection Summary				
Average Delay	6.8			
Intersection Capacity Utilization	48.8%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	208	67	71	321	182	45
Future Volume (Veh/h)	208	67	71	321	182	45
Sign Control	Free			Free	Stop	
Grade	-1%			1%	0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	248	80	85	382	217	54
Pedestrians				21	1	
Lane Width (ft)				12.0	12.0	
Walking Speed (ft/s)				3.5	3.5	
Percent Blockage				2	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	1264					
pX, platoon unblocked						
vC, conflicting volume			329		841	310
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			329		841	310
tC, single (s)			4.2		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.4
p0 queue free %			93		29	92
cM capacity (veh/h)			1207		307	704

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	328	85	382	271
Volume Left	0	85	0	217
Volume Right	80	0	0	54
cSH	1700	1207	1700	346
Volume to Capacity	0.19	0.07	0.22	0.78
Queue Length 95th (ft)	0	6	0	161
Control Delay (s)	0.0	8.2	0.0	44.3
Lane LOS		A		E
Approach Delay (s)	0.0	1.5		44.3
Approach LOS				E

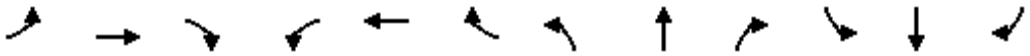
Intersection Summary			
Average Delay	11.9		
Intersection Capacity Utilization	42.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	106	244	24	30	171	30	71	127	65	28	37	101
Future Volume (vph)	106	244	24	30	171	30	71	127	65	28	37	101
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	118	271	27	33	190	33	79	141	72	31	41	112

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	118	298	33	223	79	213	31	153
Volume Left (vph)	118	0	33	0	79	0	31	0
Volume Right (vph)	0	27	0	33	0	72	0	112
Hadj (s)	0.58	-0.03	0.72	-0.07	0.55	-0.18	0.50	-0.46
Departure Headway (s)	6.9	6.3	7.3	6.5	7.2	6.5	7.4	6.4
Degree Utilization, x	0.23	0.52	0.07	0.40	0.16	0.39	0.06	0.27
Capacity (veh/h)	495	550	465	527	469	522	451	520
Control Delay (s)	10.7	14.8	9.6	12.6	10.4	12.3	9.7	10.6
Approach Delay (s)	13.6		12.2		11.8		10.5	
Approach LOS	B		B		B		B	

Intersection Summary				
Delay	12.3			
Level of Service	B			
Intersection Capacity Utilization	49.2%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	238	7	202	5	20	23	124	133	3	5	109	61
Future Volume (vph)	238	7	202	5	20	23	124	133	3	5	109	61
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	262	8	222	5	22	25	136	146	3	5	120	67

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	262	230	52	285	192
Volume Left (vph)	262	0	5	136	5
Volume Right (vph)	0	222	25	3	67
Hadj (s)	0.55	-0.60	-0.20	0.20	-0.09
Departure Headway (s)	6.5	5.4	6.0	5.8	5.7
Degree Utilization, x	0.48	0.34	0.09	0.46	0.31
Capacity (veh/h)	528	642	520	580	585
Control Delay (s)	14.2	10.0	9.6	13.7	11.2
Approach Delay (s)	12.2		9.6	13.7	11.2
Approach LOS	B		A	B	B

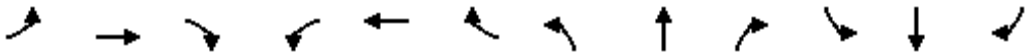
Intersection Summary				
Delay	12.3			
Level of Service	B			
Intersection Capacity Utilization	53.6%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (veh/h)	27	3	2	37	3	39	4	8	1850	84	3	17
Future Volume (Veh/h)	27	3	2	37	3	39	4	8	1850	84	3	17
Sign Control		Stop			Stop				Free			
Grade		0%			0%				0%			
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	28	3	2	39	3	41	0	8	1927	88	0	18
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type									Raised			
Median storage veh)									2			
Upstream signal (ft)												
pX, platoon unblocked							0.00				0.00	
vC, conflicting volume	2175	3184	558	2585	3156	1008	0	1133			0	2015
vC1, stage 1 conf vol	1153	1153		1987	1987							
vC2, stage 2 conf vol	1022	2031		598	1169							
vCu, unblocked vol	2175	3184	558	2585	3156	1008	0	1133			0	2015
tC, single (s)	7.7	6.5	6.9	7.6	6.5	7.2	0.0	4.1			0.0	4.1
tC, 2 stage (s)	6.7	5.5		6.6	5.5							
tF (s)	3.6	4.0	3.3	3.5	4.0	3.4	0.0	2.2			0.0	2.2
p0 queue free %	76	96	100	32	97	81	0	99			0	94
cM capacity (veh/h)	119	76	478	58	93	220	0	624			0	287

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	33	83	8	1285	730	18	558	558	16
Volume Left	28	39	8	0	0	18	0	0	0
Volume Right	2	41	0	0	88	0	0	0	16
cSH	118	93	624	1700	1700	287	1700	1700	1700
Volume to Capacity	0.28	0.89	0.01	0.76	0.43	0.06	0.33	0.33	0.01
Queue Length 95th (ft)	26	125	1	0	0	5	0	0	0
Control Delay (s)	46.7	147.1	10.8	0.0	0.0	18.4	0.0	0.0	0.0
Lane LOS	E	F	B			C			
Approach Delay (s)	46.7	147.1	0.0			0.3			
Approach LOS	E	F							

Intersection Summary				
Average Delay	4.3			
Intersection Capacity Utilization	64.9%	ICU Level of Service		C
Analysis Period (min)	15			

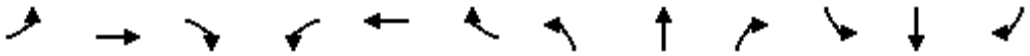
Movement	SBT	SBR
Lane Configurations		
Traffic Volume (veh/h)	1072	15
Future Volume (Veh/h)	1072	15
Sign Control	Free	
Grade	0%	
Peak Hour Factor	0.96	0.96
Hourly flow rate (vph)	1117	16
Pedestrians		
Lane Width (ft)		
Walking Speed (ft/s)		
Percent Blockage		
Right turn flare (veh)		
Median type	Raised	
Median storage veh)	2	
Upstream signal (ft)		
pX, platoon unblocked		
vC, conflicting volume		
vC1, stage 1 conf vol		
vC2, stage 2 conf vol		
vCu, unblocked vol		
tC, single (s)		
tC, 2 stage (s)		
tF (s)		
p0 queue free %		
cM capacity (veh/h)		
Direction, Lane #		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	89	1	0	63	3	2	2	2	8	3	14
Future Volume (Veh/h)	10	89	1	0	63	3	2	2	2	8	3	14
Sign Control		Free			Free			Stop			Stop	
Grade		0%			2%			2%			-2%	
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69
Hourly flow rate (vph)	14	129	1	0	91	4	3	3	3	12	4	20
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	95			130			272	252	130	255	251	93
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	95			130			272	252	130	255	251	93
tC, single (s)	4.1			4.1			7.6	7.0	6.2	7.1	6.5	6.4
tC, 2 stage (s)												
tF (s)	2.2			2.2			4.0	4.5	3.3	3.5	4.0	3.5
p0 queue free %	99			100			99	99	100	98	99	98
cM capacity (veh/h)	1512			1468			573	571	926	693	650	914

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	144	95	9	36
Volume Left	14	0	3	12
Volume Right	1	4	3	20
cSH	1512	1468	656	794
Volume to Capacity	0.01	0.00	0.01	0.05
Queue Length 95th (ft)	1	0	1	4
Control Delay (s)	0.8	0.0	10.6	9.8
Lane LOS	A		B	A
Approach Delay (s)	0.8	0.0	10.6	9.8
Approach LOS			B	A

Intersection Summary				
Average Delay	2.0			
Intersection Capacity Utilization	22.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	87	8	2	56	6	10	10	9	7	4	3
Future Volume (Veh/h)	3	87	8	2	56	6	10	10	9	7	4	3
Sign Control		Stop			Stop			Free			Free	
Grade		-1%			1%			-2%			0%	
Peak Hour Factor	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
Hourly flow rate (vph)	4	121	11	3	78	8	14	14	13	10	6	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	124	83	8	148	78	20	10			27		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	124	83	8	148	78	20	10			27		
tC, single (s)	7.1	6.5	6.2	7.6	6.6	6.4	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	4.0	4.0	3.5	2.2			2.2		
p0 queue free %	99	85	99	100	90	99	99			99		
cM capacity (veh/h)	776	797	1080	625	794	1015	1623			1600		

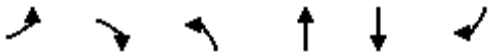
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	136	89	41	20
Volume Left	4	3	14	10
Volume Right	11	8	13	4
cSH	814	802	1623	1600
Volume to Capacity	0.17	0.11	0.01	0.01
Queue Length 95th (ft)	15	9	1	0
Control Delay (s)	10.3	10.0	2.5	3.7
Lane LOS	B	B	A	A
Approach Delay (s)	10.3	10.0	2.5	3.7
Approach LOS	B	B		

Intersection Summary				
Average Delay	8.6			
Intersection Capacity Utilization	16.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	105	1	1	60	2	3
Future Volume (Veh/h)	105	1	1	60	2	3
Sign Control	Free			Free	Stop	
Grade	-3%			2%	1%	
Peak Hour Factor	0.68	0.68	0.68	0.68	0.68	0.68
Hourly flow rate (vph)	154	1	1	88	3	4
Pedestrians				1		
Lane Width (ft)				12.0		
Walking Speed (ft/s)				3.5		
Percent Blockage				0		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			155		244	156
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			155		244	156
tC, single (s)			4.1		6.4	6.5
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.6
p0 queue free %			100		100	100
cM capacity (veh/h)			1438		748	814

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	155	89	7
Volume Left	0	1	3
Volume Right	1	0	4
cSH	1700	1438	784
Volume to Capacity	0.09	0.00	0.01
Queue Length 95th (ft)	0	0	1
Control Delay (s)	0.0	0.1	9.6
Lane LOS		A	A
Approach Delay (s)	0.0	0.1	9.6
Approach LOS			A

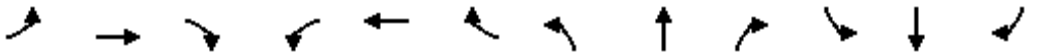
Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	15.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	92	24	18	106	40	38
Future Volume (Veh/h)	92	24	18	106	40	38
Sign Control	Stop			Free	Free	
Grade	2%			-1%	0%	
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70
Hourly flow rate (vph)	131	34	26	151	57	54
Pedestrians					1	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	288	84	111			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	288	84	111			
tC, single (s)	6.4	6.3	4.3			
tC, 2 stage (s)						
tF (s)	3.5	3.4	2.4			
p0 queue free %	81	96	98			
cM capacity (veh/h)	688	959	1390			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	165	177	111
Volume Left	131	26	0
Volume Right	34	0	54
cSH	731	1390	1700
Volume to Capacity	0.23	0.02	0.07
Queue Length 95th (ft)	22	1	0
Control Delay (s)	11.4	1.3	0.0
Lane LOS	B	A	
Approach Delay (s)	11.4	1.3	0.0
Approach LOS	B		

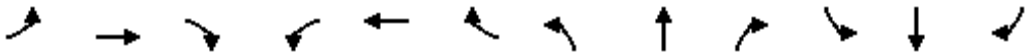
Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	26.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	122	294	127	106	135	219	1012	125	258	1669	13
Future Volume (vph)	13	122	294	127	106	135	219	1012	125	258	1669	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			-1%			2%	
Total Lost time (s)		6.0	6.0		6.0	6.0	5.0	6.0	6.0	5.0	6.0	6.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes		1.00	1.00		1.00	0.98	1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00		0.97	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1876	1583		1775	1558	1796	3489	1587	3467	3504	1599
Flt Permitted		0.94	1.00		0.66	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1765	1583		1195	1558	1796	3489	1587	3467	3504	1599
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	14	130	313	135	113	144	233	1077	133	274	1776	14
RTOR Reduction (vph)	0	0	235	0	0	85	0	0	32	0	0	7
Lane Group Flow (vph)	0	144	78	0	248	59	233	1077	101	274	1776	7
Confl. Peds. (#/hr)	3					3						
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	8%	0%	2%	6%	2%	2%	1%	4%	1%	0%	2%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			6
Actuated Green, G (s)		35.2	35.2		35.2	35.2	24.6	86.5	86.5	18.2	80.1	80.1
Effective Green, g (s)		35.2	35.2		35.2	35.2	24.6	86.5	86.5	18.2	80.1	80.1
Actuated g/C Ratio		0.22	0.22		0.22	0.22	0.16	0.55	0.55	0.12	0.51	0.51
Clearance Time (s)		6.0	6.0		6.0	6.0	5.0	6.0	6.0	5.0	6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	5.4	5.4	3.5	5.4	5.4
Lane Grp Cap (vph)		395	355		268	349	281	1923	874	402	1788	816
v/s Ratio Prot							c0.13	0.31		0.08	c0.51	
v/s Ratio Perm		0.08	0.05		c0.21	0.04			0.06			0.00
v/c Ratio		0.36	0.22		0.93	0.17	0.83	0.56	0.12	0.68	0.99	0.01
Uniform Delay, d1		51.4	49.6		59.6	49.1	64.1	22.8	16.9	66.6	38.1	18.9
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.6	0.3		35.4	0.2	17.9	0.7	0.1	4.9	19.7	0.0
Delay (s)		52.0	50.0		94.9	49.3	82.1	23.5	17.0	71.5	57.8	18.9
Level of Service		D	D		F	D	F	C	B	E	E	B
Approach Delay (s)		50.6			78.2			32.4			59.4	
Approach LOS		D			E			C			E	

Intersection Summary			
HCM 2000 Control Delay	51.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	156.9	Sum of lost time (s)	17.0
Intersection Capacity Utilization	98.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	101	344	24	5	370	68	10	0	1	34	1	52
Future Volume (Veh/h)	101	344	24	5	370	68	10	0	1	34	1	52
Sign Control		Free			Free			Stop			Stop	
Grade		-1%			1%			-2%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	110	374	26	5	402	74	11	0	1	37	1	57
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		648										
pX, platoon unblocked				0.98			0.98	0.98	0.98	0.98	0.98	
vC, conflicting volume	476			400			1064	1080	374	1044	1069	439
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	476			380			1056	1072	354	1036	1061	439
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	90			100			93	100	100	81	99	91
cM capacity (veh/h)	1091			1168			168	196	682	191	198	618

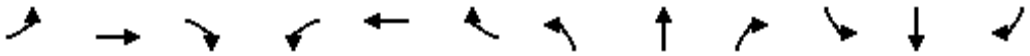
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	SB 1
Volume Total	110	374	26	5	476	12	95
Volume Left	110	0	0	5	0	11	37
Volume Right	0	0	26	0	74	1	57
cSH	1091	1700	1700	1168	1700	179	326
Volume to Capacity	0.10	0.22	0.02	0.00	0.28	0.07	0.29
Queue Length 95th (ft)	8	0	0	0	0	5	30
Control Delay (s)	8.7	0.0	0.0	8.1	0.0	26.5	20.5
Lane LOS	A			A		D	C
Approach Delay (s)	1.9			0.1		26.5	20.5
Approach LOS						D	C

Intersection Summary				
Average Delay	3.0			
Intersection Capacity Utilization	43.9%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	276	103	59	360	83	35
Future Volume (Veh/h)	276	103	59	360	83	35
Sign Control	Free			Free	Stop	
Grade	-1%			1%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	303	113	65	396	91	38
Pedestrians				1		
Lane Width (ft)				12.0		
Walking Speed (ft/s)				3.5		
Percent Blockage				0		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	1264					
pX, platoon unblocked						
vC, conflicting volume			416		886	360
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			416		886	360
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		69	94
cM capacity (veh/h)			1138		297	681

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	416	65	396	129
Volume Left	0	65	0	91
Volume Right	113	0	0	38
cSH	1700	1138	1700	356
Volume to Capacity	0.24	0.06	0.23	0.36
Queue Length 95th (ft)	0	5	0	40
Control Delay (s)	0.0	8.4	0.0	20.7
Lane LOS		A		C
Approach Delay (s)	0.0	1.2		20.7
Approach LOS				C

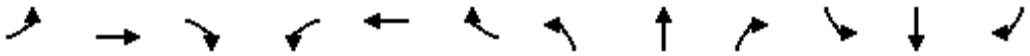
Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	41.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	25	112	124	32	84	49	91	213	27	65	347	39
Future Volume (vph)	25	112	124	32	84	49	91	213	27	65	347	39
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	28	126	139	36	94	55	102	239	30	73	390	44

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	28	265	36	149	102	269	73	434
Volume Left (vph)	28	0	36	0	102	0	73	0
Volume Right (vph)	0	139	0	55	0	30	0	44
Hadj (s)	0.50	-0.34	0.55	-0.25	0.50	-0.03	0.53	-0.05
Departure Headway (s)	7.9	7.0	8.2	7.4	7.5	6.9	7.3	6.7
Degree Utilization, x	0.06	0.52	0.08	0.31	0.21	0.52	0.15	0.81
Capacity (veh/h)	429	478	405	449	460	489	475	524
Control Delay (s)	10.2	16.2	10.7	12.4	11.3	16.0	10.3	30.8
Approach Delay (s)	15.6		12.1		14.7		27.9	
Approach LOS	C		B		B		D	

Intersection Summary				
Delay	19.5			
Level of Service	C			
Intersection Capacity Utilization	56.1%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	92	12	154	1	19	15	293	135	6	30	141	251
Future Volume (vph)	92	12	154	1	19	15	293	135	6	30	141	251
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	102	13	171	1	21	17	326	150	7	33	157	279

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	102	184	39	483	469
Volume Left (vph)	102	0	1	326	33
Volume Right (vph)	0	171	17	7	279
Hadj (s)	0.50	-0.57	-0.21	0.15	-0.31
Departure Headway (s)	7.7	6.6	7.3	5.9	5.5
Degree Utilization, x	0.22	0.34	0.08	0.79	0.72
Capacity (veh/h)	430	488	422	597	629
Control Delay (s)	11.6	11.7	10.9	27.4	21.1
Approach Delay (s)	11.7		10.9	27.4	21.1
Approach LOS	B		B	D	C

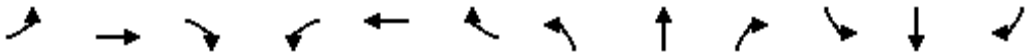
Intersection Summary				
Delay	21.1			
Level of Service	C			
Intersection Capacity Utilization	70.0%	ICU Level of Service	C	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (veh/h)	19	7	11	38	5	27	1	8	1325	43	2	22
Future Volume (Veh/h)	19	7	11	38	5	27	1	8	1325	43	2	22
Sign Control		Stop			Stop				Free			
Grade		0%			0%				0%			
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	20	7	11	40	5	28	0	8	1380	45	0	23
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type									Raised			
Median storage veh)									2			
Upstream signal (ft)												
pX, platoon unblocked							0.00				0.00	
vC, conflicting volume	2898	3603	1058	2537	3622	712	0	2158			0	1425
vC1, stage 1 conf vol	2162	2162		1418	1418							
vC2, stage 2 conf vol	736	1441		1118	2204							
vCu, unblocked vol	2898	3603	1058	2537	3622	712	0	2158			0	1425
tC, single (s)	7.6	6.5	6.9	7.6	6.5	6.9	0.0	4.1			0.0	4.1
tC, 2 stage (s)	6.6	5.5		6.6	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	0.0	2.2			0.0	2.2
p0 queue free %	53	90	95	61	92	93	0	97			0	95
cM capacity (veh/h)	43	71	224	103	64	379	0	252			0	484

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	38	73	8	920	505	23	1058	1058	42
Volume Left	20	40	8	0	0	23	0	0	0
Volume Right	11	28	0	0	45	0	0	0	42
cSH	62	135	252	1700	1700	484	1700	1700	1700
Volume to Capacity	0.62	0.54	0.03	0.54	0.30	0.05	0.62	0.62	0.02
Queue Length 95th (ft)	64	66	2	0	0	4	0	0	0
Control Delay (s)	130.4	59.2	19.7	0.0	0.0	12.8	0.0	0.0	0.0
Lane LOS	F	F	C			B			
Approach Delay (s)	130.4	59.2	0.1			0.1			
Approach LOS	F	F							

Intersection Summary				
Average Delay	2.6			
Intersection Capacity Utilization	67.9%	ICU Level of Service	C	
Analysis Period (min)	15			

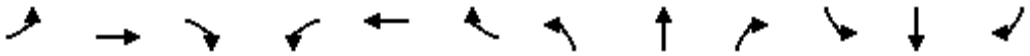
Movement	SBT	SBR
Lane Configurations		
Traffic Volume (veh/h)	2031	40
Future Volume (Veh/h)	2031	40
Sign Control	Free	
Grade	0%	
Peak Hour Factor	0.96	0.96
Hourly flow rate (vph)	2116	42
Pedestrians		
Lane Width (ft)		
Walking Speed (ft/s)		
Percent Blockage		
Right turn flare (veh)		
Median type	Raised	
Median storage veh)	2	
Upstream signal (ft)		
pX, platoon unblocked		
vC, conflicting volume		
vC1, stage 1 conf vol		
vC2, stage 2 conf vol		
vCu, unblocked vol		
tC, single (s)		
tC, 2 stage (s)		
tF (s)		
p0 queue free %		
cM capacity (veh/h)		
Direction, Lane #		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	56	1	1	65	2	1	1	2	1	1	1
Future Volume (Veh/h)	9	56	1	1	65	2	1	1	2	1	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			2%			2%			-2%	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	11	68	1	1	79	2	1	1	2	1	1	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	81			69			174	174	68	175	173	80
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	81			69			174	174	68	175	173	80
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	100	100	100
cM capacity (veh/h)	1529			1545			787	718	1000	785	718	986

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	80	82	4	3
Volume Left	11	1	1	1
Volume Right	1	2	2	1
cSH	1529	1545	858	815
Volume to Capacity	0.01	0.00	0.00	0.00
Queue Length 95th (ft)	1	0	0	0
Control Delay (s)	1.1	0.1	9.2	9.4
Lane LOS	A	A	A	A
Approach Delay (s)	1.1	0.1	9.2	9.4
Approach LOS			A	A

Intersection Summary				
Average Delay	0.9			
Intersection Capacity Utilization	18.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	40	14	11	47	3	13	6	8	2	9	4
Future Volume (Veh/h)	9	40	14	11	47	3	13	6	8	2	9	4
Sign Control		Stop			Stop			Free			Free	
Grade		-1%			1%			-2%			0%	
Peak Hour Factor	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74
Hourly flow rate (vph)	12	54	19	15	64	4	18	8	11	3	12	5
Pedestrians		1			1						1	
Lane Width (ft)		12.0			12.0						12.0	
Walking Speed (ft/s)		3.5			3.5						3.5	
Percent Blockage		0			0						0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	108	78	16	117	74	16	18			20		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	108	78	16	117	74	16	18			20		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.3	2.3			2.2		
p0 queue free %	99	93	98	98	92	100	99			100		
cM capacity (veh/h)	808	804	1069	775	807	1068	1517			1608		

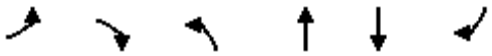
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	85	83	37	20
Volume Left	12	15	18	3
Volume Right	19	4	11	5
cSH	852	811	1517	1608
Volume to Capacity	0.10	0.10	0.01	0.00
Queue Length 95th (ft)	8	9	1	0
Control Delay (s)	9.7	9.9	3.6	1.1
Lane LOS	A	A	A	A
Approach Delay (s)	9.7	9.9	3.6	1.1
Approach LOS	A	A		

Intersection Summary				
Average Delay	8.0			
Intersection Capacity Utilization	16.1%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	48	0	4	63	4	4
Future Volume (Veh/h)	48	0	4	63	4	4
Sign Control	Free			Free	Stop	
Grade	-3%			2%	1%	
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69
Hourly flow rate (vph)	70	0	6	91	6	6
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			70		173	70
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			70		173	70
tC, single (s)			4.1		6.7	6.5
tC, 2 stage (s)						
tF (s)			2.2		3.7	3.5
p0 queue free %			100		99	99
cM capacity (veh/h)			1544		764	932

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	70	97	12
Volume Left	0	6	6
Volume Right	0	0	6
cSH	1700	1544	840
Volume to Capacity	0.04	0.00	0.01
Queue Length 95th (ft)	0	0	1
Control Delay (s)	0.0	0.5	9.4
Lane LOS		A	A
Approach Delay (s)	0.0	0.5	9.4
Approach LOS			A

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	16.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	33	15	9	81	90	52
Future Volume (Veh/h)	33	15	9	81	90	52
Sign Control	Stop			Free	Free	
Grade	2%			-1%	0%	
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	42	19	12	104	115	67
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	276	148	182			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	276	148	182			
tC, single (s)	6.4	6.3	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.4	2.2			
p0 queue free %	94	98	99			
cM capacity (veh/h)	705	885	1405			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	61	116	182
Volume Left	42	12	0
Volume Right	19	0	67
cSH	753	1405	1700
Volume to Capacity	0.08	0.01	0.11
Queue Length 95th (ft)	7	1	0
Control Delay (s)	10.2	0.8	0.0
Lane LOS	B	A	
Approach Delay (s)	10.2	0.8	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	21.8%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix D Queueing Summary

Appendix D. 95th Percentile Queues

ID	Intersection	Existing				Year 2024 Background (LIRIRO at 99W/Brookman-Chapman)				Year 2024 Total Traffic (LIRIRO at 99W/Brookman-Chapman)			
		Movement	Storage (ft)	Weekday AM	Weekday PM	Movement	Storage (ft)	Weekday AM	Weekday PM	Movement	Storage (ft)	Weekday AM	Weekday PM
1	Highway 99W/SW Elwert Road-SW Sunset Boulevard	EBL/T	85 [1]	**150**	225	EBL	260 [1]	**300**	150	EBL	260 [1]	**300**	150
		EBR	85 [1]	75	**100**	EBT/R	500 [1]	275	350	EBT/R	500 [1]	275	350
		WBL/T	600 [1]	375	450	WBL	185 [3]	**375**	**375**	WBL	185 [3]	**375**	**375**
		WBR	140	150	100	WBT/R	600 [1]	400	125	WBT/R	600 [1]	400	125
		NBL	320	300	**350**	NBL	490	300	300	NBL	490	325	300
		NBR	150	75	75	NBR	150	75	50	NBR	150	75	50
		SBL	210	100	200	SBL	460	150	225	SBL	460	150	225
		SBR	300	<25	<25	SBR	300	50	<25	SBR	300	50	<25
2	SW Woodhaven Drive/SW Sunset Boulevard	EBL	90	<25	<25	EBL	90	<25	<25	EBL	90	<25	<25
		EBR	150	<25	<25	EBR	150	<25	<25	EBR	150	<25	<25
		WBL	125	<25	<25	WBL	125	<25	<25	WBL	125	<25	<25
		WBT/R	675 [1]	<25	<25	WBT/R	675 [1]	<25	<25	WBT/R	675 [1]	<25	<25
		NBL/T/R	190 [1]	50	<25	NBL/T/R	190 [1]	175	<25	NBL/T/R	190 [1]	175	<25
		SBL/T/R	460 [1]	100	50	SBL/T/R	460 [1]	450	75	SBL/T/R	460 [1]	450	75
3	SW Timbrel Lane/SW Sunset Boulevard	EBT/R	675 [1]	<25	<25	EBT/R	675 [1]	<25	<25	EBT/R	675 [1]	<25	<25
		WBL	115	<25	<25	WBL	115	<25	<25	WBL	115	<25	<25
		NBL/R	215 [1]	175	50	NBL/R	215 [1]	**575**	100	NBL/R	215 [1]	**575**	125
4	SW Ladd Hill Road-SW Main Street/SW Sunset Boulevard [2]	EBL	95	<25	<25	EBL	95	50	<25	EBL	95	50	<25
		EBT/R	700 [1]	100	100	EBT/R	700 [1]	250	150	EBT/R	700 [1]	250	150
		WBL	100	<25	<25	WBL	100	<25	<25	WBL	100	<25	<25
		WBT/R	740 [1]	75	50	WBT/R	740 [1]	175	75	WBT/R	740 [1]	175	75
		NBL	100	<25	<25	NBL	100	50	50	NBL	100	50	50
		NBT/R	470 [1]	50	100	NBT/R	470 [1]	100	150	NBT/R	470 [1]	125	175
		SBL	150	<25	<25	SBL	150	<25	<25	SBL	150	<25	<25
		SBT/R	170 [1]	50	**225**	SBT/R	170 [1]	50	**450**	SBT/R	170 [1]	50	**450**
5	SW Baker Road-SW Murdock Road/SW Sunset Boulevard [2]	EBL	95	75	<25	EBL	95	**125**	50	EBL	95	**125**	50
		EBT/R	880 [1]	50	50	EBT/R	880 [1]	75	75	EBT/R	880 [1]	75	75
		WBL/T/R	700 [1]	<25	<25	WBL/T/R	700 [1]	<25	<25	WBL/T/R	700 [1]	<25	<25
		NBL/T/R	390 [1]	75	200	NBL/T/R	390 [1]	100	**400**	NBL/T/R	390 [1]	100	**400**
		SBL/T/R	540 [1]	50	150	SBL/T/R	540 [1]	75	325	SBL/T/R	540 [1]	75	300
6	Highway 99W/SW Brookman Road-SW Chapman Road	EBL/T/R	1,000 [1]	50	75	EBL/T/R	1,000 [1]	100	125	EBL/T/R	1,000 [1]	150	125
		WBL/T/R	520 [1]	125	75	WBR	520 [1]	100	<25	WBR	520 [1]	125	<25
		NBL/U	260	<25	<25	NBL/U	260	<25	<25	NBL/U	260	<25	<25
		NBT/R	>1,000 [1]	<25	<25	NBT/R	>1,000 [1]	<25	<25	NBT/R	>1,000 [1]	<25	<25
		SBL/U	260	<25	<25	SBL/U	260	50	<25	SBL/U	260	50	<25
		SBR	255	<25	<25	SBR	255	<25	<25	SBR	255	<25	<25
7	Old Highway 99 W/SW Brookman Road	EBL/T/R	520 [1]	<25	<25	EBL/T/R	520 [1]	<25	<25	EBL/T/R	520 [1]	<25	<25
		WBL/T/R	220 [2]	<25	<25	WBL/T/R	220 [2]	<25	<25	WBL/T/R	220 [2]	<25	<25
		NBL/T/R	>1,000 [1]	<25	<25	NBL/T/R	>1,000 [1]	<25	<25	NBL/T/R	>1,000 [1]	<25	<25
		SBL/T/R	>1,000 [1]	<25	<25	SBL/T/R	>1,000 [1]	<25	<25	SBL/T/R	>1,000 [1]	<25	<25
8	SW Middleton Road/SW Brookman Road	EBL/T/R	>1,000 [2]	<25	<25	EBL/T/R	>1,000 [2]	<25	<25	EBL/T/R	>1,000 [2]	25	25
		WBL/T/R	>1,000 [1]	<25	<25	WBL/T/R	>1,000 [1]	<25	<25	WBL/T/R	>1,000 [1]	<25	<25
		NBL/T/R	400 [1]	<25	<25	NBL/T/R	400 [1]	<25	<25	NBL/T/R	400 [1]	<25	<25
		SBL/T/R	690 [2]	<25	<25	SBL/T/R	690 [2]	<25	<25	SBL/T/R	690 [2]	<25	<25
9	SW Oberst Road/SW Brookman Road	EBT/R	890 [1]	<25	<25	EBT/R	890 [1]	<25	<25	EBT/R	890 [1]	<25	<25
		WBL/T	100 [1]	<25	<25	WBL/T	100 [1]	<25	<25	WBL/T	100 [1]	<25	<25
		NBL/R	>1,000 [1]	<25	<25	NBL/R	>1,000 [1]	<25	<25	NBL/R	>1,000 [1]	<25	<25
10	SW Ladd Hill Road/SW Brookman Road	EBL/R	>1,000 [1]	<25	<25	EBL/R	>1,000 [1]	50	<25	EBL/R	>1,000 [1]	50	<25
		NBL/T	>1,000 [1]	<25	<25	NBL/T	>1,000 [1]	<25	<25	NBL/T	>1,000 [1]	<25	<25
		SBT/R	820 [1]	<25	<25	SBT/R	820 [1]	<25	<25	SBT/R	820 [1]	<25	<25
A	Middlebrook Access-Future Northern Site Access/SW Brookman Road					EBT/L	890 [1]	<25	<25	EBT/L	890 [1]	<25	<25
						WBT/R	100 [1]	<25	<25	WBT/R	100 [1]	<25	<25
						SBL/R	250 [1]	<25	<25	SBL/R	250 [1]	<25	<25
B	Future Southern Site Access/SW Brookman Road									EBT/L	>1000 [1]	<25	<25
										WBT/R	850 [1]	<25	<25
										SBL/R	250	<25	<25

[1] Distance to adjacent intersection

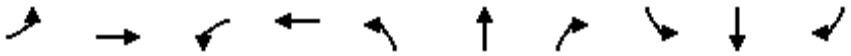
[2] Distance to railroad crossing

[3] Based on conceptual drawing provided by the City of Sherwood

Bold and grey shading indicates 95th percentile queue exceeds available storage

Yellow shading indicates change in lane configuration

Appendix E Background Conditions Level of Service Worksheets



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	140	573	166	671	401	1765	127	160	841	205
v/c Ratio	0.88	0.66	1.06	0.84	0.86	1.01	0.15	0.60	0.57	0.28
Control Delay	115.4	41.2	155.2	62.7	85.4	63.2	8.9	80.5	34.7	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	115.4	41.2	155.2	62.7	85.4	63.2	8.9	80.5	34.7	4.2
Queue Length 50th (ft)	150	198	~197	321	217	~1056	24	85	351	0
Queue Length 95th (ft)	#288	267	#357	399	#300	#1191	63	127	421	50
Internal Link Dist (ft)		574		568		888			476	
Turn Bay Length (ft)	260		185		490		150	460		300
Base Capacity (vph)	159	938	156	867	481	1746	823	283	1475	725
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.88	0.61	1.06	0.77	0.83	1.01	0.15	0.57	0.57	0.28

Intersection Summary

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	133	246	298	158	401	237	27	354	1677	121	13	139
Future Volume (vph)	133	246	298	158	401	237	27	354	1677	121	13	139
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%				-1%			
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0	4.0		4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.97	0.95	1.00		0.97
Frpb, ped/bikes	1.00	1.00		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	0.94			1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	1.00			0.95	1.00	1.00		0.95
Satd. Flow (prot)	1805	3248		1770	3298			3455	3489	1561		3204
Flt Permitted	0.95	1.00		0.95	1.00			0.95	1.00	1.00		0.95
Satd. Flow (perm)	1805	3248		1770	3298			3455	3489	1561		3204
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	140	259	314	166	422	249	28	373	1765	127	14	146
RTOR Reduction (vph)	0	139	0	0	54	0	0	0	0	42	0	0
Lane Group Flow (vph)	140	434	0	166	617	0	0	401	1765	85	0	160
Confl. Bikes (#/hr)												
Heavy Vehicles (%)	0%	2%	2%	2%	3%	4%	0%	2%	4%	4%	0%	9%
Turn Type	Prot	NA		Prot	NA		Prot	Prot	NA	Perm	Prot	Prot
Protected Phases	7	4		3	8		5	5	2		1	1
Permitted Phases										2		
Actuated Green, G (s)	13.5	33.7		13.5	33.7			20.3	77.1	77.1		12.2
Effective Green, g (s)	14.0	35.7		14.0	35.7			21.3	79.1	79.1		13.2
Actuated g/C Ratio	0.09	0.23		0.09	0.23			0.13	0.50	0.50		0.08
Clearance Time (s)	4.5	6.0		4.5	6.0			5.0	6.0	6.0		5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	5.4	5.4		3.5
Lane Grp Cap (vph)	159	733		156	745			465	1746	781		267
v/s Ratio Prot	0.08	0.13		c0.09	c0.19			c0.12	c0.51			0.05
v/s Ratio Perm										0.05		
v/c Ratio	0.88	0.59		1.06	0.83			0.86	1.01	0.11		0.60
Uniform Delay, d1	71.2	54.6		72.0	58.2			66.9	39.5	20.8		69.8
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00		1.00
Incremental Delay, d2	39.0	1.3		90.1	7.5			15.1	24.2	0.1		3.8
Delay (s)	110.2	55.9		162.1	65.8			82.0	63.7	21.0		73.7
Level of Service	F	E		F	E			F	E	C		E
Approach Delay (s)		66.6			84.9				64.5			
Approach LOS		E			F				E			

Intersection Summary			
HCM 2000 Control Delay	61.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	158.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	90.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBT	SBR
Lane Configurations		
Traffic Volume (vph)	799	195
Future Volume (vph)	799	195
Ideal Flow (vphpl)	1900	1900
Grade (%)	2%	
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frpb, ped/bikes	1.00	0.98
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3279	1361
Flt Permitted	1.00	1.00
Satd. Flow (perm)	3279	1361
Peak-hour factor, PHF	0.95	0.95
Adj. Flow (vph)	841	205
RTOR Reduction (vph)	0	113
Lane Group Flow (vph)	841	92
Confl. Bikes (#/hr)		1
Heavy Vehicles (%)	9%	15%
Turn Type	NA	Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	69.0	69.0
Effective Green, g (s)	71.0	71.0
Actuated g/C Ratio	0.45	0.45
Clearance Time (s)	6.0	6.0
Vehicle Extension (s)	5.4	5.4
Lane Grp Cap (vph)	1473	611
v/s Ratio Prot	0.26	
v/s Ratio Perm		0.07
v/c Ratio	0.57	0.15
Uniform Delay, d1	32.2	25.7
Progression Factor	1.00	1.00
Incremental Delay, d2	0.9	0.3
Delay (s)	33.2	26.0
Level of Service	C	C
Approach Delay (s)	37.3	
Approach LOS	D	

Intersection Summary

Intersection	
Int Delay, s/veh	66.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	59	357	78	8	633	98	25	16	11	31	50	124
Future Vol, veh/h	59	357	78	8	633	98	25	16	11	31	50	124
Conflicting Peds, #/hr	0	0	5	5	0	0	0	0	3	3	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	90	-	0	127	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-1	-	-	1	-	-	-2	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	7	0	0	14	4	1	8	8	2
Mvmt Flow	74	446	98	10	791	123	31	20	14	39	63	155

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	914	0	0	549	0	0	1581	1533	454	1536	1570	853
Stage 1	-	-	-	-	-	-	599	599	-	873	873	-
Stage 2	-	-	-	-	-	-	982	934	-	663	697	-
Critical Hdwy	4.1	-	-	4.17	-	-	6.84	6.14	6.01	7.18	6.58	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	5.84	5.14	-	6.18	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.84	5.14	-	6.18	5.58	-
Follow-up Hdwy	2.2	-	-	2.263	-	-	3.626	4.036	3.309	3.572	4.072	3.318
Pot Cap-1 Maneuver	754	-	-	996	-	-	98	137	624	92	107	359
Stage 1	-	-	-	-	-	-	500	521	-	337	360	-
Stage 2	-	-	-	-	-	-	318	379	-	441	434	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	754	-	-	991	-	-	~ 24	122	619	72	95	359
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 24	122	-	72	95	-
Stage 1	-	-	-	-	-	-	449	467	-	304	356	-
Stage 2	-	-	-	-	-	-	147	375	-	371	389	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.2	0.1	$ 451	$ 362.7
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	44	754	-	-	991	-	-	157
HCM Lane V/C Ratio	1.477	0.098	-	-	0.01	-	-	1.632
HCM Control Delay (s)	$ 451	10.3	-	-	8.7	-	-	$ 362.7
HCM Lane LOS	F	B	-	-	A	-	-	F
HCM 95th %tile Q(veh)	6.4	0.3	-	-	0	-	-	17.8

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

Intersection	
Int Delay, s/veh	83.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	320	79	81	515	223	51
Future Vol, veh/h	320	79	81	515	223	51
Conflicting Peds, #/hr	0	21	21	0	1	23
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	115	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-1	-	-	1	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	0	7	0	0	6	0
Mvmt Flow	381	94	96	613	265	61

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	496	0	1255	472
Stage 1	-	-	-	-	449	-
Stage 2	-	-	-	-	806	-
Critical Hdwy	-	-	4.1	-	6.46	6.2
Critical Hdwy Stg 1	-	-	-	-	5.46	-
Critical Hdwy Stg 2	-	-	-	-	5.46	-
Follow-up Hdwy	-	-	2.2	-	3.554	3.3
Pot Cap-1 Maneuver	-	-	1078	-	~ 186	596
Stage 1	-	-	-	-	635	-
Stage 2	-	-	-	-	433	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1056	-	~ 166	571
Mov Cap-2 Maneuver	-	-	-	-	~ 166	-
Stage 1	-	-	-	-	622	-
Stage 2	-	-	-	-	393	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.2	$ 382.7
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	191	-	-	1056	-
HCM Lane V/C Ratio	1.708	-	-	0.091	-
HCM Control Delay (s)	$ 382.7	-	-	8.8	-
HCM Lane LOS	F	-	-	A	-
HCM 95th %tile Q(veh)	22.4	-	-	0.3	-

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

Intersection	
Intersection Delay, s/veh	29.2
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	121	330	41	40	279	34	102	155	91	32	24	136
Future Vol, veh/h	121	330	41	40	279	34	102	155	91	32	24	136
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	5	2	0	13	2	0	3	2	6	0	5	2
Mvmt Flow	134	367	46	44	310	38	113	172	101	36	27	151
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	39.3	30.9	20.6	16.1
HCM LOS	E	D	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	63%	0%	89%	0%	89%	0%	15%
Vol Right, %	0%	37%	0%	11%	0%	11%	0%	85%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	102	246	121	371	40	313	32	160
LT Vol	102	0	121	0	40	0	32	0
Through Vol	0	155	0	330	0	279	0	24
RT Vol	0	91	0	41	0	34	0	136
Lane Flow Rate	113	273	134	412	44	348	36	178
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.279	0.613	0.315	0.892	0.109	0.773	0.092	0.409
Departure Headway (Hd)	8.878	8.074	8.439	7.79	8.793	8.005	9.331	8.279
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	405	448	429	470	408	452	384	434
Service Time	6.629	5.825	6.139	5.49	6.544	5.755	7.089	6.036
HCM Lane V/C Ratio	0.279	0.609	0.312	0.877	0.108	0.77	0.094	0.41
HCM Control Delay	15	22.9	15	47.2	12.6	33.2	13	16.7
HCM Lane LOS	B	C	B	E	B	D	B	C
HCM 95th-tile Q	1.1	4	1.3	9.7	0.4	6.7	0.3	2

Intersection	
Intersection Delay, s/veh	15.8
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	300	10	243	6	25	26	151	152	3	6	124	110
Future Vol, veh/h	300	10	243	6	25	26	151	152	3	6	124	110
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	8	0	2	6	2	2	1	4	1	0	2	0
Mvmt Flow	319	11	259	6	27	28	161	162	3	6	132	117
Number of Lanes	1	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	2
HCM Control Delay	16.9	10.6	16.8	13.4
HCM LOS	C	B	C	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	49%	100%	0%	11%	3%
Vol Thru, %	50%	0%	4%	44%	52%
Vol Right, %	1%	0%	96%	46%	46%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	306	300	253	57	240
LT Vol	151	300	0	6	6
Through Vol	152	0	10	25	124
RT Vol	3	0	243	26	110
Lane Flow Rate	326	319	269	61	255
Geometry Grp	2	7	7	5	2
Degree of Util (X)	0.558	0.62	0.423	0.114	0.422
Departure Headway (Hd)	6.169	6.992	5.661	6.779	5.956
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	583	514	632	532	600
Service Time	4.246	4.763	3.431	4.779	4.038
HCM Lane V/C Ratio	0.559	0.621	0.426	0.115	0.425
HCM Control Delay	16.8	20.6	12.6	10.6	13.4
HCM Lane LOS	C	C	B	B	B
HCM 95th-tile Q	3.4	4.2	2.1	0.4	2.1

Intersection	
Int Delay, s/veh	4.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations														
Traffic Vol, veh/h	32	3	2	0	0	109	5	9	1988	99	3	40	1197	21
Future Vol, veh/h	32	3	2	0	0	109	5	9	1988	99	3	40	1197	21
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	-	None	-	-	-	None
Storage Length	-	-	-	-	-	-	-	260	-	-	-	260	-	255
Veh in Median Storage, #	-	2	-	-	0	-	-	-	0	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-	0	-	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	11	0	0	5	0	13	0	0	4	4	0	0	7	7
Mvmt Flow	33	3	2	0	0	114	5	9	2071	103	3	42	1247	22

Major/Minor	Minor2			Minor1			Major1			Major2				
Conflicting Flow All	2401	3539	624	-	-	1087	1247	1269	0	0	2174	2174	0	0
Stage 1	1337	1337	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	1064	2202	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	7.72	6.5	6.9	-	-	7.16	6.4	4.1	-	-	6.4	4.1	-	-
Critical Hdwy Stg 1	6.72	5.5	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.72	5.5	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.61	4	3.3	-	-	3.43	2.5	2.2	-	-	2.5	2.2	-	-
Pot Cap-1 Maneuver	~ 15	6	433	0	0	194	234	554	-	-	59	249	-	-
Stage 1	149	224	-	0	0	-	-	-	-	-	-	-	-	-
Stage 2	223	83	-	0	0	-	-	-	-	-	-	-	-	-
Platoon blocked, %									-	-			-	-
Mov Cap-1 Maneuver	~ 5	4	433	-	-	194	371	371	-	-	156	156	-	-
Mov Cap-2 Maneuver	40	32	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	143	159	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	89	80	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	272.5	46.8	0.1	1.3
HCM LOS	F	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	371	-	-	41	194	156	-	-
HCM Lane V/C Ratio	0.039	-	-	0.94	0.585	0.287	-	-
HCM Control Delay (s)	15.1	-	-	272.5	46.8	37.2	-	-
HCM Lane LOS	C	-	-	F	E	E	-	-
HCM 95th %tile Q(veh)	0.1	-	-	3.7	3.2	1.1	-	-

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

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	11	124	2	0	93	3	3	2	2	9	3	13
Future Vol, veh/h	11	124	2	0	93	3	3	2	2	9	3	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	2	-	-	2	-	-	-2	-
Peak Hour Factor	69	69	69	69	69	69	69	69	69	69	69	69
Heavy Vehicles, %	0	2	100	0	6	0	50	50	0	0	0	21
Mvmt Flow	16	180	3	0	135	4	4	3	3	13	4	19

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	139	0	0	183	0	0	363	353	182	354	352	137
Stage 1	-	-	-	-	-	-	214	214	-	137	137	-
Stage 2	-	-	-	-	-	-	149	139	-	217	215	-
Critical Hdwy	4.1	-	-	4.1	-	-	8	7.4	6.4	6.7	6.1	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	7	6.4	-	5.7	5.1	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7	6.4	-	5.7	5.1	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.95	4.45	3.3	3.5	4	3.489
Pot Cap-1 Maneuver	1457	-	-	1404	-	-	493	483	857	629	599	870
Stage 1	-	-	-	-	-	-	674	629	-	884	799	-
Stage 2	-	-	-	-	-	-	739	688	-	809	746	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1457	-	-	1404	-	-	475	477	857	618	592	870
Mov Cap-2 Maneuver	-	-	-	-	-	-	475	477	-	618	592	-
Stage 1	-	-	-	-	-	-	666	621	-	873	799	-
Stage 2	-	-	-	-	-	-	719	688	-	793	737	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0	11.7	10.2
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	545	1457	-	-	1404	-	-	723
HCM Lane V/C Ratio	0.019	0.011	-	-	-	-	-	0.05
HCM Control Delay (s)	11.7	7.5	0	-	0	-	-	10.2
HCM Lane LOS	B	A	A	-	A	-	-	B
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	9.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	3	117	14	2	80	14	17	14	10	8	5	2
Future Vol, veh/h	3	117	14	2	80	14	17	14	10	8	5	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-1	-	-	1	-	-	-2	-	-	0	-
Peak Hour Factor	72	72	72	72	72	72	72	72	72	72	72	72
Heavy Vehicles, %	0	1	0	50	5	17	0	0	11	0	0	33
Mvmt Flow	4	163	19	3	111	19	24	19	14	11	7	3

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	170	112	9	196	106	26	10	0	0	33	0	0
Stage 1	31	31	-	74	74	-	-	-	-	-	-	-
Stage 2	139	81	-	122	32	-	-	-	-	-	-	-
Critical Hdwy	6.9	6.31	6.1	7.8	6.75	6.47	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	5.9	5.31	-	6.8	5.75	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.9	5.31	-	6.8	5.75	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.009	3.3	3.95	4.045	3.453	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	806	785	1079	662	774	1007	1623	-	-	1592	-	-
Stage 1	992	873	-	825	824	-	-	-	-	-	-	-
Stage 2	876	833	-	773	861	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	690	768	1079	536	757	1007	1623	-	-	1592	-	-
Mov Cap-2 Maneuver	690	768	-	536	757	-	-	-	-	-	-	-
Stage 1	977	867	-	813	812	-	-	-	-	-	-	-
Stage 2	730	821	-	612	855	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11	10.6	3	3.9
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1623	-	-	790	778	1592	-	-
HCM Lane V/C Ratio	0.015	-	-	0.236	0.171	0.007	-	-
HCM Control Delay (s)	7.3	0	-	11	10.6	7.3	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.9	0.6	0	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	155	2	1	53	4	3
Future Vol, veh/h	155	2	1	53	4	3
Conflicting Peds, #/hr	0	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-3	-	-	2	1	-
Peak Hour Factor	68	68	68	68	68	68
Heavy Vehicles, %	1	0	0	8	0	33
Mvmt Flow	228	3	1	78	6	4

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	231	0	310	231
Stage 1	-	-	-	-	230	-
Stage 2	-	-	-	-	80	-
Critical Hdwy	-	-	4.1	-	6.6	6.63
Critical Hdwy Stg 1	-	-	-	-	5.6	-
Critical Hdwy Stg 2	-	-	-	-	5.6	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.597
Pot Cap-1 Maneuver	-	-	1349	-	675	732
Stage 1	-	-	-	-	803	-
Stage 2	-	-	-	-	944	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1349	-	674	731
Mov Cap-2 Maneuver	-	-	-	-	674	-
Stage 1	-	-	-	-	803	-
Stage 2	-	-	-	-	943	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	10.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	697	-	-	1349	-
HCM Lane V/C Ratio	0.015	-	-	0.001	-
HCM Control Delay (s)	10.2	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection	
Int Delay, s/veh	6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	132	36	19	125	46	31
Future Vol, veh/h	132	36	19	125	46	31
Conflicting Peds, #/hr	1	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, %	2	-	-	-1	0	-
Peak Hour Factor	70	70	70	70	70	70
Heavy Vehicles, %	2	8	17	5	8	5
Mvmt Flow	189	51	27	179	66	44

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	322	88	110	0	-	0
Stage 1	88	-	-	-	-	-
Stage 2	234	-	-	-	-	-
Critical Hdwy	6.82	6.48	4.27	-	-	-
Critical Hdwy Stg 1	5.82	-	-	-	-	-
Critical Hdwy Stg 2	5.82	-	-	-	-	-
Follow-up Hdwy	3.518	3.372	2.353	-	-	-
Pot Cap-1 Maneuver	648	949	1392	-	-	-
Stage 1	926	-	-	-	-	-
Stage 2	784	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	634	949	1392	-	-	-
Mov Cap-2 Maneuver	634	-	-	-	-	-
Stage 1	906	-	-	-	-	-
Stage 2	784	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.1	1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1392	-	683	-	-
HCM Lane V/C Ratio	0.019	-	0.351	-	-
HCM Control Delay (s)	7.6	0	13.1	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	1.6	-	-

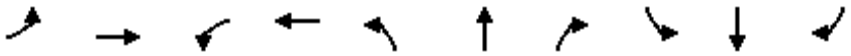
Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	18	120	45	12	35	50
Future Vol, veh/h	18	120	45	12	35	50
Conflicting Peds, #/hr	2	0	0	2	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	-3	1	-	0	-
Peak Hour Factor	68	68	68	68	68	68
Heavy Vehicles, %	0	1	8	0	0	0
Mvmt Flow	26	176	66	18	51	74

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	86	0	-	0	306	77
Stage 1	-	-	-	-	77	-
Stage 2	-	-	-	-	229	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1523	-	-	-	690	990
Stage 1	-	-	-	-	951	-
Stage 2	-	-	-	-	814	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1520	-	-	-	674	988
Mov Cap-2 Maneuver	-	-	-	-	674	-
Stage 1	-	-	-	-	931	-
Stage 2	-	-	-	-	812	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	10.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1520	-	-	-	829
HCM Lane V/C Ratio	0.017	-	-	-	0.151
HCM Control Delay (s)	7.4	0	-	-	10.1
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	49	555	205	328	292	1166	152	354	1936	49
v/c Ratio	0.86	1.11dr	0.96	0.35	1.51	0.77	0.19	0.79	1.09	0.06
Control Delay	150.3	71.8	114.7	22.5	299.5	39.2	3.3	74.2	82.9	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	150.3	71.8	114.7	22.5	299.5	39.2	3.3	74.2	82.9	0.1
Queue Length 50th (ft)	47	230	196	64	~197	496	0	168	~1080	0
Queue Length 95th (ft)	#130	#337	#360	108	#295	587	35	224	#1215	0
Internal Link Dist (ft)		1143		568		888			476	
Turn Bay Length (ft)	260		185		490		150	460		300
Base Capacity (vph)	57	611	213	960	193	1516	792	479	1784	859
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.91	0.96	0.34	1.51	0.77	0.19	0.74	1.09	0.06

Intersection Summary

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

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

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	46	171	351	193	154	154	10	264	1096	143	34	299
Future Volume (vph)	46	171	351	193	154	154	10	264	1096	143	34	299
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%				-1%			
Total Lost time (s)	4.5	6.0		4.5	6.0			5.0	6.0	6.0		5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.97	0.95	1.00		0.97
Frpb, ped/bikes	1.00	1.00		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	0.90		1.00	0.93			1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	1.00			0.95	1.00	1.00		0.95
Satd. Flow (prot)	1671	3203		1703	3274			3486	3489	1607		3460
Flt Permitted	0.95	1.00		0.95	1.00			0.95	1.00	1.00		0.95
Satd. Flow (perm)	1671	3203		1703	3274			3486	3489	1607		3460
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	49	182	373	205	164	164	11	281	1166	152	36	318
RTOR Reduction (vph)	0	82	0	0	123	0	0	0	0	86	0	0
Lane Group Flow (vph)	49	473	0	205	205	0	0	292	1166	66	0	354
Confl. Bikes (#/hr)												
Heavy Vehicles (%)	8%	0%	2%	6%	2%	2%	0%	1%	4%	1%	2%	0%
Turn Type	Prot	NA		Prot	NA		Prot	Prot	NA	Perm	Prot	Prot
Protected Phases	7	4		3	8		5	5	2		1	1
Permitted Phases										2		
Actuated Green, G (s)	5.0	23.3		18.1	36.4			8.0	62.8	62.8		18.7
Effective Green, g (s)	5.0	23.3		18.1	36.4			8.0	62.8	62.8		18.7
Actuated g/C Ratio	0.03	0.16		0.13	0.25			0.06	0.43	0.43		0.13
Clearance Time (s)	4.5	6.0		4.5	6.0			5.0	6.0	6.0		5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	5.4	5.4		3.5
Lane Grp Cap (vph)	57	516		213	825			193	1517	698		448
v/s Ratio Prot	0.03	c0.15		c0.12	0.06			c0.08	0.33			0.10
v/s Ratio Perm										0.04		
v/c Ratio	0.86	1.11dr		0.96	0.25			1.51	0.77	0.09		0.79
Uniform Delay, d1	69.4	59.6		62.8	43.1			68.2	34.6	24.0		60.9
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00		1.00
Incremental Delay, d2	69.8	21.0		50.7	0.2			255.7	2.9	0.1		9.4
Delay (s)	139.2	80.6		113.5	43.3			323.9	37.6	24.2		70.4
Level of Service	F	F		F	D			F	D	C		E
Approach Delay (s)		85.3			70.3				88.2			
Approach LOS		F			E				F			

Intersection Summary			
HCM 2000 Control Delay	82.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	144.4	Sum of lost time (s)	21.5
Intersection Capacity Utilization	102.8%	ICU Level of Service	G
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

Movement	SBT	SBR
Lane Configurations		
Traffic Volume (vph)	1820	46
Future Volume (vph)	1820	46
Ideal Flow (vphpl)	1900	1900
Grade (%)	2%	
Total Lost time (s)	6.0	6.0
Lane Util. Factor	0.95	1.00
Frpb, ped/bikes	1.00	0.98
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3504	1566
Flt Permitted	1.00	1.00
Satd. Flow (perm)	3504	1566
Peak-hour factor, PHF	0.94	0.94
Adj. Flow (vph)	1936	49
RTOR Reduction (vph)	0	24
Lane Group Flow (vph)	1936	25
Confl. Bikes (#/hr)		1
Heavy Vehicles (%)	2%	0%
Turn Type	NA	Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	73.5	73.5
Effective Green, g (s)	73.5	73.5
Actuated g/C Ratio	0.51	0.51
Clearance Time (s)	6.0	6.0
Vehicle Extension (s)	5.4	5.4
Lane Grp Cap (vph)	1783	797
v/s Ratio Prot	c0.55	
v/s Ratio Perm		0.02
v/c Ratio	1.09	0.03
Uniform Delay, d1	35.5	17.7
Progression Factor	1.00	1.00
Incremental Delay, d2	48.7	0.0
Delay (s)	84.2	17.7
Level of Service	F	B
Approach Delay (s)	80.7	
Approach LOS	F	

Intersection Summary

Intersection	
Int Delay, s/veh	4.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	129	414	28	6	491	79	12	0	1	39	1	71
Future Vol, veh/h	129	414	28	6	491	79	12	0	1	39	1	71
Conflicting Peds, #/hr	0	0	5	5	0	0	0	0	3	3	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	90	-	0	127	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-1	-	-	1	-	-	-2	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	1	1	0	0	3	0	0	0	0	0	0	2
Mvmt Flow	140	450	30	7	534	86	13	0	1	42	1	77

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	620	0	0	485	0	0	1365	1369	458	1340	1356	577
Stage 1	-	-	-	-	-	-	735	735	-	591	591	-
Stage 2	-	-	-	-	-	-	630	634	-	749	765	-
Critical Hdwy	4.11	-	-	4.1	-	-	6.7	6.1	6	7.1	6.5	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	5.7	5.1	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.7	5.1	-	6.1	5.5	-
Follow-up Hdwy	2.209	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.318
Pot Cap-1 Maneuver	965	-	-	1088	-	-	146	172	623	131	151	516
Stage 1	-	-	-	-	-	-	450	465	-	497	498	-
Stage 2	-	-	-	-	-	-	507	511	-	407	415	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	965	-	-	1083	-	-	109	146	618	115	128	516
Mov Cap-2 Maneuver	-	-	-	-	-	-	109	146	-	115	128	-
Stage 1	-	-	-	-	-	-	383	396	-	425	495	-
Stage 2	-	-	-	-	-	-	427	508	-	346	353	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.1	0.1	40.3	37
HCM LOS			E	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	116	965	-	-	1083	-	-	229
HCM Lane V/C Ratio	0.122	0.145	-	-	0.006	-	-	0.527
HCM Control Delay (s)	40.3	9.4	-	-	8.3	-	-	37
HCM Lane LOS	E	A	-	-	A	-	-	E
HCM 95th %tile Q(veh)	0.4	0.5	-	-	0	-	-	2.8

Intersection	
Int Delay, s/veh	6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	336	118	67	467	108	40
Future Vol, veh/h	336	118	67	467	108	40
Conflicting Peds, #/hr	0	21	21	0	1	23
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	115	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-1	-	-	1	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	1	0	3	2	2	3
Mvmt Flow	369	130	74	513	119	44

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	520	0	1117	478
Stage 1	-	-	-	-	455	-
Stage 2	-	-	-	-	662	-
Critical Hdwy	-	-	4.13	-	6.42	6.23
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.227	-	3.518	3.327
Pot Cap-1 Maneuver	-	-	1041	-	229	585
Stage 1	-	-	-	-	639	-
Stage 2	-	-	-	-	513	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1020	-	208	561
Mov Cap-2 Maneuver	-	-	-	-	208	-
Stage 1	-	-	-	-	626	-
Stage 2	-	-	-	-	475	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.1	42.4
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	251	-	-	1020	-
HCM Lane V/C Ratio	0.648	-	-	0.072	-
HCM Control Delay (s)	42.4	-	-	8.8	-
HCM Lane LOS	E	-	-	A	-
HCM 95th %tile Q(veh)	4	-	-	0.2	-

Intersection	
Intersection Delay, s/veh	49.9
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	29	142	144	55	110	56	118	249	42	74	380	69
Future Vol, veh/h	29	142	144	55	110	56	118	249	42	74	380	69
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	0	2	1	3	0	2	0	3	0	2	1	3
Mvmt Flow	33	160	162	62	124	63	133	280	47	83	427	78
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	29.2	17.7	26.7	94.1
HCM LOS	D	C	D	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	86%	0%	50%	0%	66%	0%	85%
Vol Right, %	0%	14%	0%	50%	0%	34%	0%	15%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	118	291	29	286	55	166	74	449
LT Vol	118	0	29	0	55	0	74	0
Through Vol	0	249	0	142	0	110	0	380
RT Vol	0	42	0	144	0	56	0	69
Lane Flow Rate	133	327	33	321	62	187	83	504
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.318	0.732	0.081	0.727	0.162	0.446	0.2	1.122
Departure Headway (Hd)	9.049	8.477	9.388	8.535	9.869	9.044	8.656	8.009
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	400	428	384	427	366	401	417	459
Service Time	6.749	6.177	7.088	6.235	7.569	6.744	6.356	5.709
HCM Lane V/C Ratio	0.333	0.764	0.086	0.752	0.169	0.466	0.199	1.098
HCM Control Delay	15.9	31.1	12.9	30.8	14.5	18.8	13.5	107.4
HCM Lane LOS	C	D	B	D	B	C	B	F
HCM 95th-tile Q	1.3	5.8	0.3	5.7	0.6	2.2	0.7	17.6

Intersection	
Intersection Delay, s/veh	47.9
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	117	15	183	1	23	17	345	154	7	34	161	302
Future Vol, veh/h	117	15	183	1	23	17	345	154	7	34	161	302
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	0	0	5	100	0	0	2	1	0	0	2	2
Mvmt Flow	130	17	203	1	26	19	383	171	8	38	179	336
Number of Lanes	1	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	2
HCM Control Delay	15.4	14.8	70.2	48.6
HCM LOS	C	B	F	E

Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	68%	100%	0%	2%	7%
Vol Thru, %	30%	0%	8%	56%	32%
Vol Right, %	1%	0%	92%	41%	61%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	506	117	198	41	497
LT Vol	345	117	0	1	34
Through Vol	154	0	15	23	161
RT Vol	7	0	183	17	302
Lane Flow Rate	562	130	220	46	552
Geometry Grp	2	7	7	5	2
Degree of Util (X)	1.023	0.299	0.442	0.127	0.94
Departure Headway (Hd)	6.553	8.491	7.233	10.33	6.13
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	551	426	497	349	591
Service Time	4.608	6.191	5.005	8.33	4.185
HCM Lane V/C Ratio	1.02	0.305	0.443	0.132	0.934
HCM Control Delay	70.2	14.8	15.7	14.8	48.6
HCM Lane LOS	F	B	C	B	E
HCM 95th-tile Q	15.3	1.2	2.2	0.4	12.3

Intersection	
Int Delay, s/veh	4.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations														
Traffic Vol, veh/h	22	8	13	0	0	65	1	9	1421	58	2	71	2225	51
Future Vol, veh/h	22	8	13	0	0	65	1	9	1421	58	2	71	2225	51
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	-	None	-	-	-	None
Storage Length	-	-	-	-	-	-	-	260	-	-	-	260	-	255
Veh in Median Storage, #	-	2	-	-	0	-	-	-	0	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-	0	-	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	5	0	0	3	0	0	0	0	3	0	0	0	2	0
Mvmt Flow	23	8	14	0	0	68	1	9	1480	60	2	74	2318	53

Major/Minor	Minor2			Minor1			Major1				Major2			
Conflicting Flow All	3230	4030	1159	-	-	770	2318	2371	0	0	1541	1540	0	0
Stage 1	2470	2470	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	760	1560	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	7.6	6.5	6.9	-	-	6.9	6.4	4.1	-	-	6.4	4.1	-	-
Critical Hdwy Stg 1	6.6	5.5	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.6	5.5	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.55	4	3.3	-	-	3.3	2.5	2.2	-	-	2.5	2.2	-	-
Pot Cap-1 Maneuver	~ 4	~ 3	192	0	0	348	47	208	-	-	152	437	-	-
Stage 1	29	61	-	0	0	-	-	-	-	-	-	-	-	-
Stage 2	358	175	-	0	0	-	-	-	-	-	-	-	-	-
Platoon blocked, %									-	-			-	-
Mov Cap-1 Maneuver	~ 3	~ 2	192	-	-	348	152	152	-	-	409	409	-	-
Mov Cap-2 Maneuver	25	40	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	27	50	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	269	163	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 384.7	17.8	0.2	0.5
HCM LOS	F	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	152	-	-	37	348	409	-	-
HCM Lane V/C Ratio	0.069	-	-	1.211	0.195	0.186	-	-
HCM Control Delay (s)	30.5	-	-	$ 384.7	17.8	15.8	-	-
HCM Lane LOS	D	-	-	F	C	C	-	-
HCM 95th %tile Q(veh)	0.2	-	-	4.6	0.7	0.7	-	-

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

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	10	119	1	1	60	2	1	1	2	1	1	1
Future Vol, veh/h	10	119	1	1	60	2	1	1	2	1	1	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	2	-	-	2	-	-	-2	-
Peak Hour Factor	82	82	82	82	82	82	82	82	82	82	82	82
Heavy Vehicles, %	0	0	0	0	3	0	0	0	0	0	0	0
Mvmt Flow	12	145	1	1	73	2	1	1	2	1	1	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	75	0	0	146	0	0	247	247	146	247	246	74
Stage 1	-	-	-	-	-	-	170	170	-	76	76	-
Stage 2	-	-	-	-	-	-	77	77	-	171	170	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.9	6.4	6.7	6.1	6
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.9	-	5.7	5.1	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.9	-	5.7	5.1	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1537	-	-	1448	-	-	692	641	899	731	678	997
Stage 1	-	-	-	-	-	-	821	748	-	946	843	-
Stage 2	-	-	-	-	-	-	929	828	-	852	776	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1537	-	-	1448	-	-	686	635	899	723	672	997
Mov Cap-2 Maneuver	-	-	-	-	-	-	686	635	-	723	672	-
Stage 1	-	-	-	-	-	-	814	742	-	938	842	-
Stage 2	-	-	-	-	-	-	926	827	-	842	770	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0.1	9.8	9.7
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	761	1537	-	-	1448	-	-	774
HCM Lane V/C Ratio	0.006	0.008	-	-	0.001	-	-	0.005
HCM Control Delay (s)	9.8	7.4	0	-	7.5	0	-	9.7
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	8.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	10	100	17	13	42	12	12	11	9	2	10	5
Future Vol, veh/h	10	100	17	13	42	12	12	11	9	2	10	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-1	-	-	1	-	-	-2	-	-	0	-
Peak Hour Factor	74	74	74	74	74	74	74	74	74	74	74	74
Heavy Vehicles, %	0	0	0	50	0	0	15	0	11	0	11	0
Mvmt Flow	14	135	23	18	57	16	16	15	12	3	14	7

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	114	83	18	156	80	21	21	0	0	27	0	0
Stage 1	24	24	-	53	53	-	-	-	-	-	-	-
Stage 2	90	59	-	103	27	-	-	-	-	-	-	-
Critical Hdwy	6.9	6.3	6.1	7.8	6.7	6.3	4.25	-	-	4.1	-	-
Critical Hdwy Stg 1	5.9	5.3	-	6.8	5.7	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.9	5.3	-	6.8	5.7	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.95	4	3.3	2.335	-	-	2.2	-	-
Pot Cap-1 Maneuver	873	815	1067	707	810	1062	1514	-	-	1600	-	-
Stage 1	1000	880	-	849	852	-	-	-	-	-	-	-
Stage 2	927	852	-	793	875	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	805	804	1067	597	799	1062	1514	-	-	1600	-	-
Mov Cap-2 Maneuver	805	804	-	597	799	-	-	-	-	-	-	-
Stage 1	989	878	-	840	843	-	-	-	-	-	-	-
Stage 2	842	843	-	655	873	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.4	10.2	2.8	0.9
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1514	-	-	832	782	1600	-	-
HCM Lane V/C Ratio	0.011	-	-	0.206	0.116	0.002	-	-
HCM Control Delay (s)	7.4	0	-	10.4	10.2	7.3	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.8	0.4	0	-	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	77	0	5	73	5	5
Future Vol, veh/h	77	0	5	73	5	5
Conflicting Peds, #/hr	0	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-3	-	-	2	1	-
Peak Hour Factor	68	68	68	68	68	68
Heavy Vehicles, %	2	0	0	0	0	33
Mvmt Flow	113	0	7	107	7	7

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	113	0	234	114
Stage 1	-	-	-	-	113	-
Stage 2	-	-	-	-	121	-
Critical Hdwy	-	-	4.1	-	6.6	6.63
Critical Hdwy Stg 1	-	-	-	-	5.6	-
Critical Hdwy Stg 2	-	-	-	-	5.6	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.597
Pot Cap-1 Maneuver	-	-	1489	-	749	858
Stage 1	-	-	-	-	911	-
Stage 2	-	-	-	-	903	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1489	-	745	857
Mov Cap-2 Maneuver	-	-	-	-	745	-
Stage 1	-	-	-	-	911	-
Stage 2	-	-	-	-	898	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	9.6
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	797	-	-	1489	-
HCM Lane V/C Ratio	0.018	-	-	0.005	-
HCM Control Delay (s)	9.6	-	-	7.4	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	55	23	10	102	103	62
Future Vol, veh/h	55	23	10	102	103	62
Conflicting Peds, #/hr	1	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, %	2	-	-	-1	0	-
Peak Hour Factor	78	78	78	78	78	78
Heavy Vehicles, %	3	7	0	5	1	0
Mvmt Flow	71	29	13	131	132	79

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	330	172	211	0	-	0
Stage 1	172	-	-	-	-	-
Stage 2	158	-	-	-	-	-
Critical Hdwy	6.83	6.47	4.1	-	-	-
Critical Hdwy Stg 1	5.83	-	-	-	-	-
Critical Hdwy Stg 2	5.83	-	-	-	-	-
Follow-up Hdwy	3.527	3.363	2.2	-	-	-
Pot Cap-1 Maneuver	639	851	1372	-	-	-
Stage 1	839	-	-	-	-	-
Stage 2	853	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	633	851	1372	-	-	-
Mov Cap-2 Maneuver	633	-	-	-	-	-
Stage 1	831	-	-	-	-	-
Stage 2	853	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.2	0.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1372	-	685	-	-
HCM Lane V/C Ratio	0.009	-	0.146	-	-
HCM Control Delay (s)	7.6	0	11.2	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.5	-	-

Intersection	
Int Delay, s/veh	4

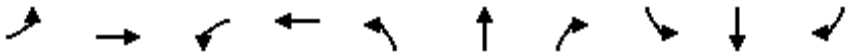
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	56	55	41	36	23	32
Future Vol, veh/h	56	55	41	36	23	32
Conflicting Peds, #/hr	2	0	0	2	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	-3	1	-	0	-
Peak Hour Factor	68	68	68	68	68	68
Heavy Vehicles, %	0	2	0	0	0	0
Mvmt Flow	82	81	60	53	34	47

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	115	0	-	0	335	89
Stage 1	-	-	-	-	89	-
Stage 2	-	-	-	-	246	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1487	-	-	-	664	975
Stage 1	-	-	-	-	940	-
Stage 2	-	-	-	-	800	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1484	-	-	-	623	973
Mov Cap-2 Maneuver	-	-	-	-	623	-
Stage 1	-	-	-	-	884	-
Stage 2	-	-	-	-	798	-

Approach	EB	WB	SB
HCM Control Delay, s	3.8	0	10.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1484	-	-	-	788
HCM Lane V/C Ratio	0.055	-	-	-	0.103
HCM Control Delay (s)	7.6	0	-	-	10.1
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.3

Appendix F Total Traffic Conditions Level of Service Worksheets



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	140	574	169	671	403	1783	127	160	847	205
v/c Ratio	0.88	0.66	1.08	0.84	0.86	1.02	0.15	0.60	0.58	0.28
Control Delay	115.4	41.2	159.9	62.7	85.7	65.8	8.9	80.5	34.9	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	115.4	41.2	159.9	62.7	85.7	65.8	8.9	80.5	34.9	4.2
Queue Length 50th (ft)	150	199	~203	321	218	~1077	24	85	354	0
Queue Length 95th (ft)	#288	267	#366	399	#303	#1211	63	127	425	50
Internal Link Dist (ft)		574		568		888			476	
Turn Bay Length (ft)	260		185		490		150	460		300
Base Capacity (vph)	159	939	156	867	481	1746	823	283	1475	725
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.88	0.61	1.08	0.77	0.84	1.02	0.15	0.57	0.57	0.28

Intersection Summary

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	133	246	299	161	401	237	28	355	1694	121	13	139
Future Volume (vph)	133	246	299	161	401	237	28	355	1694	121	13	139
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%				-1%			
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0	4.0		4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.97	0.95	1.00		0.97
Frpb, ped/bikes	1.00	1.00		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	0.94			1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	1.00			0.95	1.00	1.00		0.95
Satd. Flow (prot)	1805	3248		1770	3298			3455	3489	1561		3204
Flt Permitted	0.95	1.00		0.95	1.00			0.95	1.00	1.00		0.95
Satd. Flow (perm)	1805	3248		1770	3298			3455	3489	1561		3204
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	140	259	315	169	422	249	29	374	1783	127	14	146
RTOR Reduction (vph)	0	140	0	0	54	0	0	0	0	42	0	0
Lane Group Flow (vph)	140	434	0	169	617	0	0	403	1783	85	0	160
Confl. Bikes (#/hr)												
Heavy Vehicles (%)	0%	2%	2%	2%	3%	4%	0%	2%	4%	4%	0%	9%
Turn Type	Prot	NA		Prot	NA		Prot	Prot	NA	Perm	Prot	Prot
Protected Phases	7	4		3	8		5	5	2		1	1
Permitted Phases										2		
Actuated Green, G (s)	13.5	33.7		13.5	33.7			20.4	77.1	77.1		12.2
Effective Green, g (s)	14.0	35.7		14.0	35.7			21.4	79.1	79.1		13.2
Actuated g/C Ratio	0.09	0.23		0.09	0.23			0.14	0.50	0.50		0.08
Clearance Time (s)	4.5	6.0		4.5	6.0			5.0	6.0	6.0		5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	5.4	5.4		3.5
Lane Grp Cap (vph)	159	733		156	745			467	1746	781		267
v/s Ratio Prot	0.08	0.13		c0.10	c0.19			c0.12	c0.51			0.05
v/s Ratio Perm										0.05		
v/c Ratio	0.88	0.59		1.08	0.83			0.86	1.02	0.11		0.60
Uniform Delay, d1	71.2	54.6		72.0	58.2			66.9	39.5	20.8		69.8
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00		1.00
Incremental Delay, d2	39.0	1.3		96.1	7.5			15.1	27.0	0.1		3.8
Delay (s)	110.2	55.9		168.1	65.8			82.0	66.5	21.0		73.7
Level of Service	F	E		F	E			F	E	C		E
Approach Delay (s)		66.6			86.3				66.7			
Approach LOS		E			F				E			

Intersection Summary			
HCM 2000 Control Delay	62.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	158.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	90.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBT	SBR
Lane Configurations		
Traffic Volume (vph)	805	195
Future Volume (vph)	805	195
Ideal Flow (vphpl)	1900	1900
Grade (%)	2%	
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frpb, ped/bikes	1.00	0.98
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3279	1361
Flt Permitted	1.00	1.00
Satd. Flow (perm)	3279	1361
Peak-hour factor, PHF	0.95	0.95
Adj. Flow (vph)	847	205
RTOR Reduction (vph)	0	113
Lane Group Flow (vph)	847	92
Confl. Bikes (#/hr)		1
Heavy Vehicles (%)	9%	15%
Turn Type	NA	Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	68.9	68.9
Effective Green, g (s)	70.9	70.9
Actuated g/C Ratio	0.45	0.45
Clearance Time (s)	6.0	6.0
Vehicle Extension (s)	5.4	5.4
Lane Grp Cap (vph)	1471	610
v/s Ratio Prot	0.26	
v/s Ratio Perm		0.07
v/c Ratio	0.58	0.15
Uniform Delay, d1	32.4	25.8
Progression Factor	1.00	1.00
Incremental Delay, d2	1.0	0.3
Delay (s)	33.3	26.0
Level of Service	C	C
Approach Delay (s)	37.4	
Approach LOS	D	

Intersection Summary

Intersection	
Int Delay, s/veh	66.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	59	357	78	8	636	98	25	16	11	31	50	124
Future Vol, veh/h	59	357	78	8	636	98	25	16	11	31	50	124
Conflicting Peds, #/hr	0	0	5	5	0	0	0	0	3	3	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	90	-	0	127	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-1	-	-	1	-	-	-2	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	7	0	0	14	4	1	8	8	2
Mvmt Flow	74	446	98	10	795	123	31	20	14	39	63	155

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	918	0	0	549	0	0	1585	1537	454	1540	1574	857
Stage 1	-	-	-	-	-	-	599	599	-	877	877	-
Stage 2	-	-	-	-	-	-	986	938	-	663	697	-
Critical Hdwy	4.1	-	-	4.17	-	-	6.84	6.14	6.01	7.18	6.58	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	5.84	5.14	-	6.18	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.84	5.14	-	6.18	5.58	-
Follow-up Hdwy	2.2	-	-	2.263	-	-	3.626	4.036	3.309	3.572	4.072	3.318
Pot Cap-1 Maneuver	752	-	-	996	-	-	98	136	624	91	107	357
Stage 1	-	-	-	-	-	-	500	521	-	335	358	-
Stage 2	-	-	-	-	-	-	316	378	-	441	434	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	752	-	-	991	-	-	~ 24	121	619	71	95	357
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 24	121	-	71	95	-
Stage 1	-	-	-	-	-	-	449	467	-	302	354	-
Stage 2	-	-	-	-	-	-	146	374	-	371	389	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.2	0.1	$ 451	$ 367.5
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	44	752	-	-	991	-	-	156
HCM Lane V/C Ratio	1.477	0.098	-	-	0.01	-	-	1.643
HCM Control Delay (s)	$ 451	10.3	-	-	8.7	-	-	$ 367.5
HCM Lane LOS	F	B	-	-	A	-	-	F
HCM 95th %tile Q(veh)	6.4	0.3	-	-	0	-	-	17.9

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

Intersection	
Int Delay, s/veh	85.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	320	79	81	515	226	51
Future Vol, veh/h	320	79	81	515	226	51
Conflicting Peds, #/hr	0	21	21	0	1	23
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	115	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-1	-	-	1	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	0	7	0	0	6	0
Mvmt Flow	381	94	96	613	269	61

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	496	0	1255	472
Stage 1	-	-	-	-	449	-
Stage 2	-	-	-	-	806	-
Critical Hdwy	-	-	4.1	-	6.46	6.2
Critical Hdwy Stg 1	-	-	-	-	5.46	-
Critical Hdwy Stg 2	-	-	-	-	5.46	-
Follow-up Hdwy	-	-	2.2	-	3.554	3.3
Pot Cap-1 Maneuver	-	-	1078	-	~ 186	596
Stage 1	-	-	-	-	635	-
Stage 2	-	-	-	-	433	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1056	-	~ 166	571
Mov Cap-2 Maneuver	-	-	-	-	~ 166	-
Stage 1	-	-	-	-	622	-
Stage 2	-	-	-	-	393	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.2	$ 390.7
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	191	-	-	1056	-
HCM Lane V/C Ratio	1.727	-	-	0.091	-
HCM Control Delay (s)	$ 390.7	-	-	8.8	-
HCM Lane LOS	F	-	-	A	-
HCM 95th %tile Q(veh)	22.8	-	-	0.3	-

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

Intersection	
Intersection Delay, s/veh	29.9
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	121	330	41	43	279	34	102	159	97	32	25	136
Future Vol, veh/h	121	330	41	43	279	34	102	159	97	32	25	136
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	5	2	0	13	2	0	3	2	6	0	5	2
Mvmt Flow	134	367	46	48	310	38	113	177	108	36	28	151
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	40.1	31.5	21.6	16.3
HCM LOS	E	D	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	62%	0%	89%	0%	89%	0%	16%
Vol Right, %	0%	38%	0%	11%	0%	11%	0%	84%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	102	256	121	371	43	313	32	161
LT Vol	102	0	121	0	43	0	32	0
Through Vol	0	159	0	330	0	279	0	25
RT Vol	0	97	0	41	0	34	0	136
Lane Flow Rate	113	284	134	412	48	348	36	179
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.281	0.64	0.316	0.896	0.118	0.78	0.093	0.415
Departure Headway (Hd)	8.917	8.106	8.47	7.821	8.864	8.074	9.401	8.351
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	403	447	425	466	405	449	382	431
Service Time	6.663	5.851	6.214	5.566	6.61	5.82	7.152	6.103
HCM Lane V/C Ratio	0.28	0.635	0.315	0.884	0.119	0.775	0.094	0.415
HCM Control Delay	15.1	24.2	15.1	48.2	12.8	34.1	13.1	16.9
HCM Lane LOS	C	C	C	E	B	D	B	C
HCM 95th-tile Q	1.1	4.4	1.3	9.8	0.4	6.8	0.3	2

Intersection	
Intersection Delay, s/veh	16
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	303	10	246	6	25	26	152	152	3	6	124	112
Future Vol, veh/h	303	10	246	6	25	26	152	152	3	6	124	112
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	8	0	2	6	2	2	1	4	1	0	2	0
Mvmt Flow	322	11	262	6	27	28	162	162	3	6	132	119
Number of Lanes	1	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	2
HCM Control Delay	17.1	10.7	17	13.5
HCM LOS	C	B	C	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	50%	100%	0%	11%	2%
Vol Thru, %	50%	0%	4%	44%	51%
Vol Right, %	1%	0%	96%	46%	46%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	307	303	256	57	242
LT Vol	152	303	0	6	6
Through Vol	152	0	10	25	124
RT Vol	3	0	246	26	112
Lane Flow Rate	327	322	272	61	257
Geometry Grp	2	7	7	5	2
Degree of Util (X)	0.562	0.627	0.429	0.115	0.427
Departure Headway (Hd)	6.191	7.007	5.676	6.809	5.972
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	578	513	629	529	597
Service Time	4.268	4.78	3.448	4.809	4.056
HCM Lane V/C Ratio	0.566	0.628	0.432	0.115	0.43
HCM Control Delay	17	20.9	12.7	10.7	13.5
HCM Lane LOS	C	C	B	B	B
HCM 95th-tile Q	3.5	4.3	2.2	0.4	2.1

Intersection	
Int Delay, s/veh	15.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations														
Traffic Vol, veh/h	32	3	2	0	0	128	5	9	1988	100	3	47	1201	21
Future Vol, veh/h	32	3	2	0	0	128	5	9	1988	100	3	47	1201	21
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	-	None	-	-	-	None
Storage Length	-	-	-	-	-	-	-	260	-	-	-	260	-	255
Veh in Median Storage, #	-	2	-	-	0	-	-	-	0	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-	0	-	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	11	0	0	5	0	13	0	0	4	4	0	0	7	7
Mvmt Flow	33	3	2	0	0	133	5	9	2071	104	3	49	1251	22

Major/Minor	Minor2			Minor1			Major1			Major2				
Conflicting Flow All	2419	3558	626	-	-	1088	1251	1273	0	0	2175	2175	0	0
Stage 1	1355	1355	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	1064	2203	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	7.72	6.5	6.9	-	-	7.16	6.4	4.1	-	-	6.4	4.1	-	-
Critical Hdwy Stg 1	6.72	5.5	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.72	5.5	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.61	4	3.3	-	-	3.43	2.5	2.2	-	-	2.5	2.2	-	-
Pot Cap-1 Maneuver	~ 15	6	432	0	0	194	233	552	-	-	58	248	-	-
Stage 1	145	220	-	0	0	-	-	-	-	-	-	-	-	-
Stage 2	223	83	-	0	0	-	-	-	-	-	-	-	-	-
Platoon blocked, %									-	-			-	-
Mov Cap-1 Maneuver	~ 3	4	432	-	-	194	370	370	-	-	147	147	-	-
Mov Cap-2 Maneuver	~ 14	26	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	139	142	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	67	80	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, $	1232.3	56.6	0.1	1.7
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	370	-	-	15	194	147	-	-
HCM Lane V/C Ratio	0.039	-	-	2.569	0.687	0.354	-	-
HCM Control Delay (s)	15.1	-	-	$ 1232.3	56.6	42.3	-	-
HCM Lane LOS	C	-	-	F	F	E	-	-
HCM 95th %tile Q(veh)	0.1	-	-	5.5	4.2	1.5	-	-

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

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	11	132	2	0	112	3	3	2	2	9	3	13
Future Vol, veh/h	11	132	2	0	112	3	3	2	2	9	3	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	2	-	-	2	-	-	-2	-
Peak Hour Factor	69	69	69	69	69	69	69	69	69	69	69	69
Heavy Vehicles, %	0	2	100	0	6	0	50	50	0	0	0	21
Mvmt Flow	16	191	3	0	162	4	4	3	3	13	4	19

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	166	0	0	194	0	0	401	391	193	392	390	164
Stage 1	-	-	-	-	-	-	225	225	-	164	164	-
Stage 2	-	-	-	-	-	-	176	166	-	228	226	-
Critical Hdwy	4.1	-	-	4.1	-	-	8	7.4	6.4	6.7	6.1	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	7	6.4	-	5.7	5.1	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7	6.4	-	5.7	5.1	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.95	4.45	3.3	3.5	4	3.489
Pot Cap-1 Maneuver	1424	-	-	1391	-	-	462	457	845	596	573	841
Stage 1	-	-	-	-	-	-	664	621	-	858	780	-
Stage 2	-	-	-	-	-	-	712	666	-	799	739	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1424	-	-	1391	-	-	444	451	845	585	566	841
Mov Cap-2 Maneuver	-	-	-	-	-	-	444	451	-	585	566	-
Stage 1	-	-	-	-	-	-	655	613	-	847	780	-
Stage 2	-	-	-	-	-	-	692	666	-	782	729	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0	12.1	10.5
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	516	1424	-	-	1391	-	-	692
HCM Lane V/C Ratio	0.02	0.011	-	-	-	-	-	0.052
HCM Control Delay (s)	12.1	7.6	0	-	0	-	-	10.5
HCM Lane LOS	B	A	A	-	A	-	-	B
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	9.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	3	125	14	2	99	17	17	14	10	8	5	2
Future Vol, veh/h	3	125	14	2	99	17	17	14	10	8	5	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-1	-	-	1	-	-	-2	-	-	0	-
Peak Hour Factor	72	72	72	72	72	72	72	72	72	72	72	72
Heavy Vehicles, %	0	1	0	50	5	17	0	0	11	0	0	33
Mvmt Flow	4	174	19	3	138	24	24	19	14	11	7	3

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	186	112	9	201	106	26	10	0	0	33	0	0
Stage 1	31	31	-	74	74	-	-	-	-	-	-	-
Stage 2	155	81	-	127	32	-	-	-	-	-	-	-
Critical Hdwy	6.9	6.31	6.1	7.8	6.75	6.47	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	5.9	5.31	-	6.8	5.75	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.9	5.31	-	6.8	5.75	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.009	3.3	3.95	4.045	3.453	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	787	785	1079	657	774	1007	1623	-	-	1592	-	-
Stage 1	992	873	-	825	824	-	-	-	-	-	-	-
Stage 2	859	833	-	768	861	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	651	768	1079	524	757	1007	1623	-	-	1592	-	-
Mov Cap-2 Maneuver	651	768	-	524	757	-	-	-	-	-	-	-
Stage 1	977	867	-	813	812	-	-	-	-	-	-	-
Stage 2	686	821	-	599	855	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.1	10.8	3	3.9
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1623	-	-	787	779	1592	-	-
HCM Lane V/C Ratio	0.015	-	-	0.251	0.21	0.007	-	-
HCM Control Delay (s)	7.3	0	-	11.1	10.8	7.3	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1	0.8	0	-	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	168	2	1	62	4	3
Future Vol, veh/h	168	2	1	62	4	3
Conflicting Peds, #/hr	0	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-3	-	-	2	1	-
Peak Hour Factor	68	68	68	68	68	68
Heavy Vehicles, %	1	0	0	8	0	33
Mvmt Flow	247	3	1	91	6	4

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	250	0	342	250
Stage 1	-	-	-	-	249	-
Stage 2	-	-	-	-	93	-
Critical Hdwy	-	-	4.1	-	6.6	6.63
Critical Hdwy Stg 1	-	-	-	-	5.6	-
Critical Hdwy Stg 2	-	-	-	-	5.6	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.597
Pot Cap-1 Maneuver	-	-	1327	-	646	714
Stage 1	-	-	-	-	786	-
Stage 2	-	-	-	-	931	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1327	-	645	713
Mov Cap-2 Maneuver	-	-	-	-	645	-
Stage 1	-	-	-	-	786	-
Stage 2	-	-	-	-	930	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	10.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	672	-	-	1327	-
HCM Lane V/C Ratio	0.015	-	-	0.001	-
HCM Control Delay (s)	10.4	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection	
Int Delay, s/veh	6.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	142	39	20	125	46	35
Future Vol, veh/h	142	39	20	125	46	35
Conflicting Peds, #/hr	1	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, %	2	-	-	-1	0	-
Peak Hour Factor	70	70	70	70	70	70
Heavy Vehicles, %	2	8	17	5	8	5
Mvmt Flow	203	56	29	179	66	50

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	329	91	116	0	-	0
Stage 1	91	-	-	-	-	-
Stage 2	238	-	-	-	-	-
Critical Hdwy	6.82	6.48	4.27	-	-	-
Critical Hdwy Stg 1	5.82	-	-	-	-	-
Critical Hdwy Stg 2	5.82	-	-	-	-	-
Follow-up Hdwy	3.518	3.372	2.353	-	-	-
Pot Cap-1 Maneuver	642	945	1384	-	-	-
Stage 1	923	-	-	-	-	-
Stage 2	781	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	627	945	1384	-	-	-
Mov Cap-2 Maneuver	627	-	-	-	-	-
Stage 1	902	-	-	-	-	-
Stage 2	781	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.6	1.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1384	-	676	-	-
HCM Lane V/C Ratio	0.021	-	0.383	-	-
HCM Control Delay (s)	7.7	0	13.6	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	1.8	-	-

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	24	122	50	16	46	67
Future Vol, veh/h	24	122	50	16	46	67
Conflicting Peds, #/hr	2	0	0	2	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	-3	1	-	0	-
Peak Hour Factor	68	68	68	68	68	68
Heavy Vehicles, %	0	1	8	0	0	0
Mvmt Flow	35	179	74	24	68	99

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	100	0	-	0	338	88
Stage 1	-	-	-	-	88	-
Stage 2	-	-	-	-	250	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1505	-	-	-	662	976
Stage 1	-	-	-	-	940	-
Stage 2	-	-	-	-	796	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1502	-	-	-	642	974
Mov Cap-2 Maneuver	-	-	-	-	642	-
Stage 1	-	-	-	-	914	-
Stage 2	-	-	-	-	794	-

Approach	EB	WB	SB
HCM Control Delay, s	1.2	0	10.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1502	-	-	-	805
HCM Lane V/C Ratio	0.023	-	-	-	0.206
HCM Control Delay (s)	7.5	0	-	-	10.6
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.8

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	2	172	54	1	5	5
Future Vol, veh/h	2	172	54	1	5	5
Conflicting Peds, #/hr	2	0	0	2	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	68	68	68	68	68	68
Heavy Vehicles, %	0	2	8	0	0	0
Mvmt Flow	3	253	79	1	7	7

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	82	0	-	0	341	82
Stage 1	-	-	-	-	82	-
Stage 2	-	-	-	-	259	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1528	-	-	-	659	983
Stage 1	-	-	-	-	946	-
Stage 2	-	-	-	-	789	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1525	-	-	-	655	981
Mov Cap-2 Maneuver	-	-	-	-	655	-
Stage 1	-	-	-	-	942	-
Stage 2	-	-	-	-	787	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	9.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1525	-	-	-	786
HCM Lane V/C Ratio	0.002	-	-	-	0.019
HCM Control Delay (s)	7.4	0	-	-	9.7
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

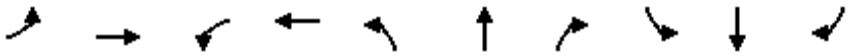
Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations														
Traffic Vol, veh/h	0	0	37	0	0	128	5	9	2020	103	3	47	1201	21
Future Vol, veh/h	0	0	37	0	0	128	5	9	2020	103	3	47	1201	21
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	-	None	-	-	-	None
Storage Length	-	-	0	-	-	-	-	260	-	-	-	260	-	255
Veh in Median Storage, #	-	0	-	-	0	-	-	-	0	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-	0	-	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	0	10	5	0	13	0	0	4	4	0	0	7	7
Mvmt Flow	0	0	39	0	0	133	5	9	2104	107	3	49	1251	22

Major/Minor	Minor2			Minor1			Major1				Major2			
Conflicting Flow All	-	-	626	-	-	1106	1251	1273	0	0	2211	2211	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	7.1	-	-	7.16	6.4	4.1	-	-	6.4	4.1	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.4	-	-	3.43	2.5	2.2	-	-	2.5	2.2	-	-
Pot Cap-1 Maneuver	0	0	408	0	0	188	233	552	-	-	55	241	-	-
Stage 1	0	0	-	0	0	-	-	-	-	-	-	-	-	-
Stage 2	0	0	-	0	0	-	-	-	-	-	-	-	-	-
Platoon blocked, %									-	-			-	-
Mov Cap-1 Maneuver	-	-	408	-	-	188	351	351	-	-	138	138	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.7	60.7	0.1	1.8
HCM LOS	B	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	351	-	-	408	188	138	-	-
HCM Lane V/C Ratio	0.042	-	-	0.094	0.709	0.377	-	-
HCM Control Delay (s)	15.7	-	-	14.7	60.7	46	-	-
HCM Lane LOS	C	-	-	B	F	E	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.3	4.4	1.6	-	-



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	49	556	206	328	294	1176	152	354	1953	49
v/c Ratio	0.86	1.11dr	0.97	0.35	1.52	0.78	0.19	0.79	1.10	0.06
Control Delay	150.3	72.5	116.0	22.5	303.6	39.6	3.3	74.3	86.6	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	150.3	72.5	116.0	22.5	303.6	39.6	3.3	74.3	86.6	0.1
Queue Length 50th (ft)	47	231	197	64	~200	502	0	168	~1097	0
Queue Length 95th (ft)	#130	#340	#364	108	#298	594	35	224	#1233	0
Internal Link Dist (ft)		1143		568		888			476	
Turn Bay Length (ft)	260		185		490		150	460		300
Base Capacity (vph)	57	609	213	960	193	1516	792	479	1783	859
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.91	0.97	0.34	1.52	0.78	0.19	0.74	1.10	0.06

Intersection Summary

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

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

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	46	171	352	194	154	154	11	265	1105	143	34	299
Future Volume (vph)	46	171	352	194	154	154	11	265	1105	143	34	299
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%				-1%			
Total Lost time (s)	4.5	6.0		4.5	6.0			5.0	6.0	6.0		5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.97	0.95	1.00		0.97
Frpb, ped/bikes	1.00	1.00		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	0.90		1.00	0.93			1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	1.00			0.95	1.00	1.00		0.95
Satd. Flow (prot)	1671	3203		1703	3274			3486	3489	1607		3460
Flt Permitted	0.95	1.00		0.95	1.00			0.95	1.00	1.00		0.95
Satd. Flow (perm)	1671	3203		1703	3274			3486	3489	1607		3460
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	49	182	374	206	164	164	12	282	1176	152	36	318
RTOR Reduction (vph)	0	81	0	0	123	0	0	0	0	86	0	0
Lane Group Flow (vph)	49	475	0	206	205	0	0	294	1176	66	0	354
Confl. Bikes (#/hr)												
Heavy Vehicles (%)	8%	0%	2%	6%	2%	2%	0%	1%	4%	1%	2%	0%
Turn Type	Prot	NA		Prot	NA		Prot	Prot	NA	Perm	Prot	Prot
Protected Phases	7	4		3	8		5	5	2		1	1
Permitted Phases										2		
Actuated Green, G (s)	5.0	23.3		18.1	36.4			8.0	62.8	62.8		18.7
Effective Green, g (s)	5.0	23.3		18.1	36.4			8.0	62.8	62.8		18.7
Actuated g/C Ratio	0.03	0.16		0.13	0.25			0.06	0.43	0.43		0.13
Clearance Time (s)	4.5	6.0		4.5	6.0			5.0	6.0	6.0		5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	5.4	5.4		3.5
Lane Grp Cap (vph)	57	516		213	825			193	1517	698		448
v/s Ratio Prot	0.03	c0.15		c0.12	0.06			c0.08	0.34			0.10
v/s Ratio Perm										0.04		
v/c Ratio	0.86	1.11dr		0.97	0.25			1.52	0.78	0.09		0.79
Uniform Delay, d1	69.4	59.6		62.9	43.1			68.2	34.8	24.0		60.9
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00		1.00
Incremental Delay, d2	69.8	22.0		51.7	0.2			260.1	3.1	0.1		9.4
Delay (s)	139.2	81.7		114.6	43.3			328.3	37.9	24.2		70.4
Level of Service	F	F		F	D			F	D	C		E
Approach Delay (s)		86.3			70.8				89.2			
Approach LOS		F			E				F			

Intersection Summary			
HCM 2000 Control Delay	84.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	144.4	Sum of lost time (s)	21.5
Intersection Capacity Utilization	103.4%	ICU Level of Service	G
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Movement	SBT	SBR
Lane Configurations		
Traffic Volume (vph)	1836	46
Future Volume (vph)	1836	46
Ideal Flow (vphpl)	1900	1900
Grade (%)	2%	
Total Lost time (s)	6.0	6.0
Lane Util. Factor	0.95	1.00
Frpb, ped/bikes	1.00	0.98
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3504	1566
Flt Permitted	1.00	1.00
Satd. Flow (perm)	3504	1566
Peak-hour factor, PHF	0.94	0.94
Adj. Flow (vph)	1953	49
RTOR Reduction (vph)	0	24
Lane Group Flow (vph)	1953	25
Confl. Bikes (#/hr)		1
Heavy Vehicles (%)	2%	0%
Turn Type	NA	Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	73.5	73.5
Effective Green, g (s)	73.5	73.5
Actuated g/C Ratio	0.51	0.51
Clearance Time (s)	6.0	6.0
Vehicle Extension (s)	5.4	5.4
Lane Grp Cap (vph)	1783	797
v/s Ratio Prot	c0.56	
v/s Ratio Perm		0.02
v/c Ratio	1.10	0.03
Uniform Delay, d1	35.5	17.7
Progression Factor	1.00	1.00
Incremental Delay, d2	52.4	0.0
Delay (s)	87.9	17.7
Level of Service	F	B
Approach Delay (s)	83.8	
Approach LOS	F	

Intersection Summary

Intersection	
Int Delay, s/veh	4.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	129	414	28	6	492	79	12	0	1	39	1	71
Future Vol, veh/h	129	414	28	6	492	79	12	0	1	39	1	71
Conflicting Peds, #/hr	0	0	5	5	0	0	0	0	3	3	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	90	-	0	127	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-1	-	-	1	-	-	-2	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	1	1	0	0	3	0	0	0	0	0	0	2
Mvmt Flow	140	450	30	7	535	86	13	0	1	42	1	77

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	621	0	0	485	0	0	1366	1370	458	1341	1357	578
Stage 1	-	-	-	-	-	-	735	735	-	592	592	-
Stage 2	-	-	-	-	-	-	631	635	-	749	765	-
Critical Hdwy	4.11	-	-	4.1	-	-	6.7	6.1	6	7.1	6.5	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	5.7	5.1	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.7	5.1	-	6.1	5.5	-
Follow-up Hdwy	2.209	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.318
Pot Cap-1 Maneuver	965	-	-	1088	-	-	146	172	623	131	150	516
Stage 1	-	-	-	-	-	-	450	465	-	496	497	-
Stage 2	-	-	-	-	-	-	507	510	-	407	415	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	965	-	-	1083	-	-	109	146	618	115	127	516
Mov Cap-2 Maneuver	-	-	-	-	-	-	109	146	-	115	127	-
Stage 1	-	-	-	-	-	-	383	396	-	424	494	-
Stage 2	-	-	-	-	-	-	427	507	-	346	353	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.1	0.1	40.3	37
HCM LOS			E	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	116	965	-	-	1083	-	-	229
HCM Lane V/C Ratio	0.122	0.145	-	-	0.006	-	-	0.527
HCM Control Delay (s)	40.3	9.4	-	-	8.3	-	-	37
HCM Lane LOS	E	A	-	-	A	-	-	E
HCM 95th %tile Q(veh)	0.4	0.5	-	-	0	-	-	2.8

Intersection	
Int Delay, s/veh	6.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	336	118	67	467	109	40
Future Vol, veh/h	336	118	67	467	109	40
Conflicting Peds, #/hr	0	21	21	0	1	23
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	115	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-1	-	-	1	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	1	0	3	2	2	3
Mvmt Flow	369	130	74	513	120	44

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	520	0	1117	478
Stage 1	-	-	-	-	455	-
Stage 2	-	-	-	-	662	-
Critical Hdwy	-	-	4.13	-	6.42	6.23
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.227	-	3.518	3.327
Pot Cap-1 Maneuver	-	-	1041	-	229	585
Stage 1	-	-	-	-	639	-
Stage 2	-	-	-	-	513	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1020	-	208	561
Mov Cap-2 Maneuver	-	-	-	-	208	-
Stage 1	-	-	-	-	626	-
Stage 2	-	-	-	-	475	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.1	43.1
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	250	-	-	1020	-
HCM Lane V/C Ratio	0.655	-	-	0.072	-
HCM Control Delay (s)	43.1	-	-	8.8	-
HCM Lane LOS	E	-	-	A	-
HCM 95th %tile Q(veh)	4.1	-	-	0.2	-

Intersection	
Intersection Delay, s/veh	51.6
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	29	142	144	61	110	56	118	252	47	74	384	69
Future Vol, veh/h	29	142	144	61	110	56	118	252	47	74	384	69
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	0	2	1	3	0	2	0	3	0	2	1	3
Mvmt Flow	33	160	162	69	124	63	133	283	53	83	431	78
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	29.7	17.9	28.5	97.4
HCM LOS	D	C	D	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	84%	0%	50%	0%	66%	0%	85%
Vol Right, %	0%	16%	0%	50%	0%	34%	0%	15%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	118	299	29	286	61	166	74	453
LT Vol	118	0	29	0	61	0	74	0
Through Vol	0	252	0	142	0	110	0	384
RT Vol	0	47	0	144	0	56	0	69
Lane Flow Rate	133	336	33	321	69	187	83	509
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.32	0.759	0.081	0.731	0.179	0.447	0.2	1.132
Departure Headway (Hd)	9.096	8.514	9.458	8.605	9.929	9.104	8.651	8.005
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	398	427	381	424	364	399	414	453
Service Time	6.796	6.214	7.158	6.305	7.629	6.804	6.419	5.773
HCM Lane V/C Ratio	0.334	0.787	0.087	0.757	0.19	0.469	0.2	1.124
HCM Control Delay	16	33.5	13	31.4	14.8	19	13.6	111.1
HCM Lane LOS	C	D	B	D	B	C	B	F
HCM 95th-tile Q	1.4	6.3	0.3	5.8	0.6	2.2	0.7	17.9

Intersection	
Intersection Delay, s/veh	48.3
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	120	15	185	1	23	17	348	154	7	34	161	306
Future Vol, veh/h	120	15	185	1	23	17	348	154	7	34	161	306
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	0	0	5	100	0	0	2	1	0	0	2	2
Mvmt Flow	133	17	206	1	26	19	387	171	8	38	179	340
Number of Lanes	1	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	2
HCM Control Delay	15.3	14.8	73.7	46.4
HCM LOS	C	B	F	E

Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	68%	100%	0%	2%	7%
Vol Thru, %	30%	0%	7%	56%	32%
Vol Right, %	1%	0%	93%	41%	61%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	509	120	200	41	501
LT Vol	348	120	0	1	34
Through Vol	154	0	15	23	161
RT Vol	7	0	185	17	306
Lane Flow Rate	566	133	222	46	557
Geometry Grp	2	7	7	5	2
Degree of Util (X)	1.036	0.306	0.438	0.126	0.928
Departure Headway (Hd)	6.594	8.491	7.304	10.335	6.199
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	554	425	496	349	590
Service Time	4.594	6.191	5.004	8.335	4.199
HCM Lane V/C Ratio	1.022	0.313	0.448	0.132	0.944
HCM Control Delay	73.7	14.9	15.6	14.8	46.4
HCM Lane LOS	F	B	C	B	E
HCM 95th-tile Q	15.8	1.3	2.2	0.4	11.8

Intersection	
Int Delay, s/veh	5.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations														
Traffic Vol, veh/h	22	8	13	0	0	76	1	9	1421	62	2	89	2227	51
Future Vol, veh/h	22	8	13	0	0	76	1	9	1421	62	2	89	2227	51
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	-	None	-	-	-	None
Storage Length	-	-	-	-	-	-	-	260	-	-	-	260	-	255
Veh in Median Storage, #	-	2	-	-	0	-	-	-	0	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-	0	-	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	5	0	0	3	0	0	0	0	3	0	0	0	2	0
Mvmt Flow	23	8	14	0	0	79	1	9	1480	65	2	93	2320	53

Major/Minor	Minor2			Minor1			Major1				Major2			
Conflicting Flow All	3270	4075	1160	-	-	773	2320	2373	0	0	1545	1545	0	0
Stage 1	2510	2510	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	760	1565	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	7.6	6.5	6.9	-	-	6.9	6.4	4.1	-	-	6.4	4.1	-	-
Critical Hdwy Stg 1	6.6	5.5	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.6	5.5	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.55	4	3.3	-	-	3.3	2.5	2.2	-	-	2.5	2.2	-	-
Pot Cap-1 Maneuver	~ 3	~ 3	192	0	0	346	47	208	-	-	151	435	-	-
Stage 1	28	58	-	0	0	-	-	-	-	-	-	-	-	-
Stage 2	358	174	-	0	0	-	-	-	-	-	-	-	-	-
Platoon blocked, %									-	-			-	-
Mov Cap-1 Maneuver	~ 2	~ 2	192	-	-	346	152	152	-	-	411	411	-	-
Mov Cap-2 Maneuver	24	34	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	26	45	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	258	163	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 422.2	18.5	0.2	0.6
HCM LOS	F	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	152	-	-	35	346	411	-	-
HCM Lane V/C Ratio	0.069	-	-	1.28	0.229	0.231	-	-
HCM Control Delay (s)	30.5	-	-	$ 422.2	18.5	16.4	-	-
HCM Lane LOS	D	-	-	F	C	C	-	-
HCM 95th %tile Q(veh)	0.2	-	-	4.8	0.9	0.9	-	-

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

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	10	141	1	1	71	2	1	1	2	1	1	1
Future Vol, veh/h	10	141	1	1	71	2	1	1	2	1	1	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	2	-	-	2	-	-	-2	-
Peak Hour Factor	82	82	82	82	82	82	82	82	82	82	82	82
Heavy Vehicles, %	0	0	0	0	3	0	0	0	0	0	0	0
Mvmt Flow	12	172	1	1	87	2	1	1	2	1	1	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	89	0	0	173	0	0	288	288	173	288	287	88
Stage 1	-	-	-	-	-	-	197	197	-	90	90	-
Stage 2	-	-	-	-	-	-	91	91	-	198	197	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.9	6.4	6.7	6.1	6
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.9	-	5.7	5.1	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.9	-	5.7	5.1	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1519	-	-	1416	-	-	647	606	867	690	646	981
Stage 1	-	-	-	-	-	-	792	726	-	932	833	-
Stage 2	-	-	-	-	-	-	912	815	-	826	758	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1519	-	-	1416	-	-	641	600	867	682	640	981
Mov Cap-2 Maneuver	-	-	-	-	-	-	641	600	-	682	640	-
Stage 1	-	-	-	-	-	-	785	719	-	924	832	-
Stage 2	-	-	-	-	-	-	909	814	-	815	751	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0.1	10	9.9
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	723	1519	-	-	1416	-	-	741
HCM Lane V/C Ratio	0.007	0.008	-	-	0.001	-	-	0.005
HCM Control Delay (s)	10	7.4	0	-	7.5	0	-	9.9
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	9.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	10	122	17	13	53	13	12	11	9	2	10	5
Future Vol, veh/h	10	122	17	13	53	13	12	11	9	2	10	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-1	-	-	1	-	-	-2	-	-	0	-
Peak Hour Factor	74	74	74	74	74	74	74	74	74	74	74	74
Heavy Vehicles, %	0	0	0	50	0	0	15	0	11	0	11	0
Mvmt Flow	14	165	23	18	72	18	16	15	12	3	14	7

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	122	83	18	171	80	21	21	0	0	27	0	0
Stage 1	24	24	-	53	53	-	-	-	-	-	-	-
Stage 2	98	59	-	118	27	-	-	-	-	-	-	-
Critical Hdwy	6.9	6.3	6.1	7.8	6.7	6.3	4.25	-	-	4.1	-	-
Critical Hdwy Stg 1	5.9	5.3	-	6.8	5.7	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.9	5.3	-	6.8	5.7	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.95	4	3.3	2.335	-	-	2.2	-	-
Pot Cap-1 Maneuver	863	815	1067	690	810	1062	1514	-	-	1600	-	-
Stage 1	1000	880	-	849	852	-	-	-	-	-	-	-
Stage 2	918	852	-	778	875	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	783	804	1067	563	799	1062	1514	-	-	1600	-	-
Mov Cap-2 Maneuver	783	804	-	563	799	-	-	-	-	-	-	-
Stage 1	989	878	-	840	843	-	-	-	-	-	-	-
Stage 2	817	843	-	617	873	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.8	10.4	2.8	0.9
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1514	-	-	826	777	1600	-	-
HCM Lane V/C Ratio	0.011	-	-	0.244	0.137	0.002	-	-
HCM Control Delay (s)	7.4	0	-	10.8	10.4	7.3	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1	0.5	0	-	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	89	0	5	85	5	5
Future Vol, veh/h	89	0	5	85	5	5
Conflicting Peds, #/hr	0	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-3	-	-	2	1	-
Peak Hour Factor	68	68	68	68	68	68
Heavy Vehicles, %	1	0	0	8	0	33
Mvmt Flow	131	0	7	125	7	7

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	131	0	270	132
Stage 1	-	-	-	-	131	-
Stage 2	-	-	-	-	139	-
Critical Hdwy	-	-	4.1	-	6.6	6.63
Critical Hdwy Stg 1	-	-	-	-	5.6	-
Critical Hdwy Stg 2	-	-	-	-	5.6	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.597
Pot Cap-1 Maneuver	-	-	1467	-	713	838
Stage 1	-	-	-	-	894	-
Stage 2	-	-	-	-	886	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1467	-	709	837
Mov Cap-2 Maneuver	-	-	-	-	709	-
Stage 1	-	-	-	-	894	-
Stage 2	-	-	-	-	882	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	9.8
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	768	-	-	1467	-
HCM Lane V/C Ratio	0.019	-	-	0.005	-
HCM Control Delay (s)	9.8	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	63	26	14	102	103	73
Future Vol, veh/h	63	26	14	102	103	73
Conflicting Peds, #/hr	1	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, %	2	-	-	-1	0	-
Peak Hour Factor	78	78	78	78	78	78
Heavy Vehicles, %	3	7	0	5	1	0
Mvmt Flow	81	33	18	131	132	94

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	347	179	226	0	-	0
Stage 1	179	-	-	-	-	-
Stage 2	168	-	-	-	-	-
Critical Hdwy	6.83	6.47	4.1	-	-	-
Critical Hdwy Stg 1	5.83	-	-	-	-	-
Critical Hdwy Stg 2	5.83	-	-	-	-	-
Follow-up Hdwy	3.527	3.363	2.2	-	-	-
Pot Cap-1 Maneuver	623	843	1354	-	-	-
Stage 1	833	-	-	-	-	-
Stage 2	843	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	614	843	1354	-	-	-
Mov Cap-2 Maneuver	614	-	-	-	-	-
Stage 1	821	-	-	-	-	-
Stage 2	843	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.5	0.9	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1354	-	667	-	-
HCM Lane V/C Ratio	0.013	-	0.171	-	-
HCM Control Delay (s)	7.7	0	11.5	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.6	-	-

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	74	60	43	47	30	42
Future Vol, veh/h	74	60	43	47	30	42
Conflicting Peds, #/hr	2	0	0	2	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	-3	1	-	0	-
Peak Hour Factor	68	68	68	68	68	68
Heavy Vehicles, %	0	1	8	0	0	0
Mvmt Flow	109	88	63	69	44	62

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	134	0	-	0	407	100
Stage 1	-	-	-	-	100	-
Stage 2	-	-	-	-	307	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1463	-	-	-	604	961
Stage 1	-	-	-	-	929	-
Stage 2	-	-	-	-	751	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1460	-	-	-	554	959
Mov Cap-2 Maneuver	-	-	-	-	554	-
Stage 1	-	-	-	-	854	-
Stage 2	-	-	-	-	749	-

Approach	EB	WB	SB
HCM Control Delay, s	4.2	0	10.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1460	-	-	-	735
HCM Lane V/C Ratio	0.075	-	-	-	0.144
HCM Control Delay (s)	7.7	0	-	-	10.7
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.5

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	86	85	5	4	2
Future Vol, veh/h	5	86	85	5	4	2
Conflicting Peds, #/hr	2	0	0	2	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	69	69	69	69	69	69
Heavy Vehicles, %	0	2	0	0	0	0
Mvmt Flow	7	125	123	7	6	3

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	132	0	-	0	268	129
Stage 1	-	-	-	-	129	-
Stage 2	-	-	-	-	139	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1466	-	-	-	726	926
Stage 1	-	-	-	-	902	-
Stage 2	-	-	-	-	893	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1463	-	-	-	719	924
Mov Cap-2 Maneuver	-	-	-	-	719	-
Stage 1	-	-	-	-	896	-
Stage 2	-	-	-	-	891	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	9.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1463	-	-	-	776
HCM Lane V/C Ratio	0.005	-	-	-	0.011
HCM Control Delay (s)	7.5	0	-	-	9.7
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations														
Traffic Vol, veh/h	0	0	43	0	0	76	1	9	1443	66	2	89	2227	51
Future Vol, veh/h	0	0	43	0	0	76	1	9	1443	66	2	89	2227	51
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	-	None	-	-	-	None
Storage Length	-	-	0	-	-	-	-	260	-	-	-	260	-	255
Veh in Median Storage, #	-	0	-	-	0	-	-	-	0	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-	0	-	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	0	3	3	0	0	0	0	3	0	0	0	2	0
Mvmt Flow	0	0	45	0	0	79	1	9	1503	69	2	93	2320	53

Major/Minor	Minor2			Minor1			Major1				Major2			
Conflicting Flow All	-	-	1160	-	-	786	2320	2373	0	0	1572	1572	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.96	-	-	6.9	6.4	4.1	-	-	6.4	4.1	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.33	-	-	3.3	2.5	2.2	-	-	2.5	2.2	-	-
Pot Cap-1 Maneuver	0	0	187	0	0	339	47	208	-	-	145	425	-	-
Stage 1	0	0	-	0	0	-	-	-	-	-	-	-	-	-
Stage 2	0	0	-	0	0	-	-	-	-	-	-	-	-	-
Platoon blocked, %									-	-			-	-
Mov Cap-1 Maneuver	-	-	187	-	-	339	141	141	-	-	400	400	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	30.2	18.8	0.2	0.6
HCM LOS	D	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	141	-	-	187	339	400	-	-
HCM Lane V/C Ratio	0.074	-	-	0.24	0.234	0.237	-	-
HCM Control Delay (s)	32.6	-	-	30.2	18.8	16.8	-	-
HCM Lane LOS	D	-	-	D	C	C	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.9	0.9	0.9	-	-

Appendix G Turn Lane Assessment

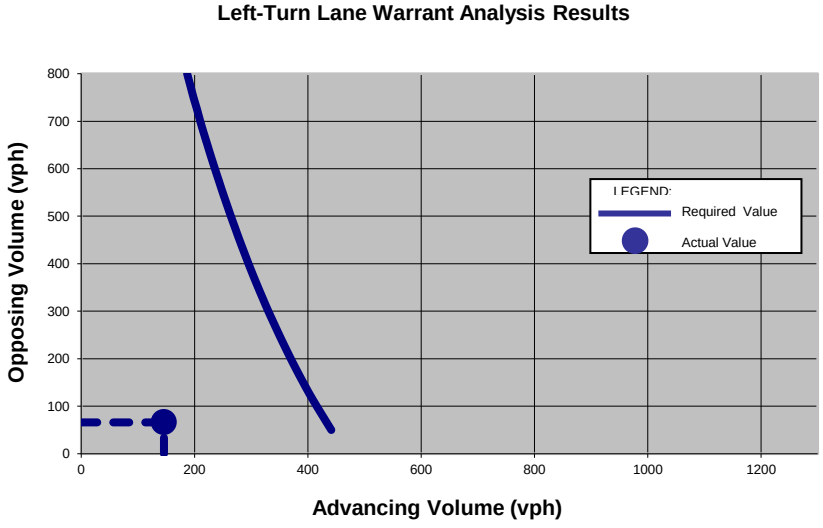
Left-Turn Lane Warrant Analysis

KITTELSON & ASSOCIATES, INC.
851 SW 6th Avenue, Suite 700
Portland, Oregon 97204
(503) 228-5230
Fax: (503) 273-8169

Project #:	24316
Project Name:	The Reserve at Cedar Creek
Analyst:	CLB
Intersection:	Brookman & Site Access A
Scenario:	2024 Total Traffic, Weekday AM Peak Hour
Date:	2/11/2020
File:	H:\24\24316 - Oulette Subdivision\turn lane warrants\[24316_TheReserve_LTWarrant_Brookman&SiteAccessA_AM 2 1

Input Data:

Advancing Volume (vph) =	146	
Left-turning Vehicles (vph) =	24	
Opposing Volume (vph) =	66	
Speed (mph) =	35	
Number of Approach Lanes =	1	(not applicable for two lanes)
% Left-Turning Vehicles	16%	
Critical Gap (sec) =	5	
Maneuver Time (sec) =	3	
Exit Time (sec) =	1.9	
Utilization Factor =	0.02	



* Based on *Volume Warrants for Left-Turn Storage Lanes at Unsignalized Grade Intersections* (D. Harmelink)

Left-Turn Lane Warrant Analysis

KITTELSON & ASSOCIATES, INC.
851 SW 6th Avenue, Suite 700
Portland, Oregon 97204
(503) 228-5230
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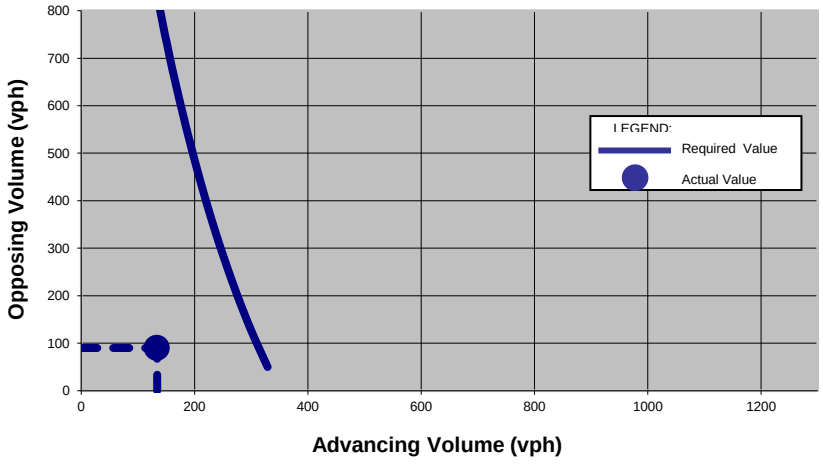
Project #:	24316
Project Name:	The Reserve at Cedar Creek
Analyst:	CLB
Intersection:	Brookman & Site Access A
Scenario:	2024 Total Traffic, Weekday PM Peak Hour
Date:	2/11/2020
File:	H:\24\24316 - Oulette Subdivision\turn lane warrants\[24316_TheReserve_LTWarrant_Brookman&SiteAccessA_PM 2 1

Input Data:

Advancing Volume (vph) =	134	
Left-turning Vehicles (vph) =	74	
Opposing Volume (vph) =	90	
Speed (mph) =	35	
Number of Approach Lanes =	1	(not applicable for two lanes)
% Left-Turning Vehicles	55%	
Critical Gap (sec) =	5	
Maneuver Time (sec) =	3	
Exit Time (sec) =	1.9	
Utilization Factor =	0.02	

Left-Turn Lane Warrant Analysis Results



* Based on *Volume Warrants for Left-Turn Storage Lanes at Unsignalized Grade Intersections* (D. Harmelink)