MILWAUKIE PLANNING
6101 SE Johnson Creek Blvd
Milwaukie OR 97206
503-786-7630
planning@milwaukieoregon.gov

Application for Land Use Action

Master File #: PD-2020-001

Review type*: ☒ I ☒ II ☑ III ☒ IV ☐ V

CHOOSE APPLICATION TYPE(S):

TFR-2020-002;
WG-2020-001;
PLA-2020-001

Planned Development

Willamette Greenway Review

Land Division: Property Line Adjustment

...

...

APPLICATION ACCEPTED ON AUGUST 3, 2020
FEES PAID ON **AUGUST 4, 2020**
= **APPLICATION DATE**

Use separate application forms for:
- Annexation and/or Boundary Change
- Compensation for Reduction in Property Value (Measure 37)
- Daily Display Sign
- Appeal

RESPONSIBLE PARTIES:

APPLICANT (owner or other eligible applicant—see reverse): [redacted]

Mailing address: [redacted] State/Zip: [redacted]

Phone(s): [redacted] Email: [redacted]

Please do not include my contact information on public notices or on the City website: ☑

APPLICANT'S REPRESENTATIVE (if different than above): Phil Krueger - YGH Architecture

Mailing address: 707 SW Washington St, Suite 1200, Portland State/Zip: Oregon/97205

Phone(s): 503-715-3224 Email: philk@ygh.com

SITE INFORMATION:

Address: 10415 SE Waverley Ct Map & Tax Lot(s): 11E26DC02100,11E26DC02200, 11E26DC02400

Comprehensive Plan Designation: HD Zoning: R-2 Size of property: 10.90 Acres

PROPOSAL (describe briefly):

Multi-family apartment development consisting of 4 residential buildings, a community center with pool, and community room built over 3 phases totaling 100 units (primarily 2 BR units with some 1 BR and 3BR units).

SIGNATURE:

ATTEST: I am the property owner or I am eligible to initiate this application per Milwaukie Municipal Code (MMC) Subsection 19.1001.6.A. If required, I have attached written authorization to submit this application. To the best of my knowledge, the information provided within this application package is complete and accurate.

Submitted by: Philip H Krueger Digitally signed by Philip H Krueger DN: C=US, E=philk@ygh.com, O=YGH Architecture, CN=Philip H Krueger Date: 2020.07.17 14:48:12-07'00' Date: July 17, 2020

IMPORTANT INFORMATION ON REVERSE SIDE

*For multiple applications, this is based on the highest required review type. See MMC Subsection 19.1001.6.B.1.

WHO IS ELIGIBLE TO SUBMIT A LAND USE APPLICATION (excerpted from MMC Subsection 19.1001.6.A):

Type I, II, III, and IV applications may be initiated by the property owner or contract purchaser of the subject property, any person authorized in writing to represent the property owner or contract purchaser, and any agency that has statutory rights of eminent domain for projects they have the authority to construct.

Type V applications may be initiated by any individual.

PREAPPLICATION CONFERENCE:

A preapplication conference may be required or desirable prior to submitting this application. Please discuss with Planning staff.

REVIEW TYPES:

This application will be processed per the assigned review type, as described in the following sections of the Milwaukie Municipal Code:

- Type I: Section 19.1004
- Type II: Section 19.1005
- Type III: Section 19.1006
- Type IV: Section 19.1007
- Type V: Section 19.1008

Note: Natural Resource Review applications **may require a refundable deposit.** Deposits require completion of a Deposit Authorization Form, found at www.milwaukieoregon.gov/building/deposit-authorization-form.

THIS SECTION FOR OFFICE USE ONLY:

FILE TYPE	FILE NUMBER	AMOUNT (after discount, if any)	PERCENT DISCOUNT	DISCOUNT TYPE	DATE STAMP
Master file	PD-2020-001	~~prelim = $1,500~~ $final = $5,000	~~25%~~		
Concurrent application files	TFR-2020-002	$ 750 + 2500	25% (LU fee only) ~~+ review deposit~~	PAID	
	WG-2020-001	$ 1,500			
	PLA-2020-001	$ 150			
		$ $8,150			
Deposit (NR only)				☐ Deposit Authorization Form received	
TOTAL AMOUNT RECEIVED: $			RECEIPT #:		RCD BY:

Associated application file #s (appeals, modifications, previous approvals, etc.):

Neighborhood District Association(s): Historic Milwaukie

Notes:

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Submittal Requirements

For all Land Use Applications
(except Annexations and Development Review)

All land use applications must be accompanied by a signed copy of this form (see reverse for signature block) and the information listed below. The information submitted must be sufficiently detailed and specific to the proposal to allow for adequate review. Failure to submit this information may result in the application being deemed incomplete per the Milwaukie Municipal Code (MMC) and Oregon Revised Statutes.

Contact Milwaukie Planning staff at 503-786-7630 or planning@milwaukieoregon.gov for assistance with Milwaukie's land use application requirements.

1. **All required land use application forms and fees**, including any deposits.

   Applications without the required application forms and fees will not be accepted.

2. **Proof of ownership or eligibility to initiate application** per MMC Subsection 19.1001.6.A.

   Where written authorization is required, applications without written authorization will not be accepted.

3. **Detailed and comprehensive description** of all existing and proposed uses and structures, including a summary of all information contained in any site plans.

   Depending upon the development being proposed, the description may need to include both a written and graphic component such as elevation drawings, 3-D models, photo simulations, etc. Where subjective aspects of the height and mass of the proposed development will be evaluated at a public hearing, temporary onsite "story pole" installations, and photographic representations thereof, may be required at the time of application submittal or prior to the public hearing.

4. **Detailed statement** that demonstrates how the proposal meets the following:

   A. All applicable development standards (listed below):

      1. **Base zone standards** in Chapter 19.300.
      2. **Overlay zone standards** in Chapter 19.400.
      3. **Supplementary development regulations** in Chapter 19.500.
      4. **Off-street parking and loading standards and requirements** in Chapter 19.600.
      5. **Public facility standards and requirements**, including any required street improvements, in Chapter 19.700.

   B. All applicable application-specific approval criteria (check with staff).

   These standards can be found in the MMC, here: www.qcode.us/codes/milwaukie/

5. **Site plan(s), preliminary plat, or final plat** as appropriate.

   See Site Plan, Preliminary Plat, and Final Plat Requirements for guidance.

6. **Copy of valid preapplication conference report**, when a conference was required.

APPLICATION PREPARATION REQUIREMENTS:

- Five hard copies of all application materials are required at the time of submittal. Staff will determine how many additional hard copies are required, if any, once the application has been reviewed for completeness. Provide an electronic version, if available.
- All hard copy application materials larger than 8½ x 11 in. must be folded and be able to fit into a 10- x 13-in. or 12- x 16-in. mailing envelope.
- All hard copy application materials must be collated, including large format plans or graphics.

ADDITIONAL INFORMATION:

- Neighborhood District Associations (NDAs) and their associated Land Use Committees (LUCs) are important parts of Milwaukie's land use process. The City will provide a review copy of your application to the LUC for the subject property. They may contact you or you may wish to contact them. Applicants are strongly encouraged to present their proposal to all applicable NDAs prior to the submittal of a land use application and, where presented, to submit minutes from all such meetings. NDA information: www.milwaukieoregon.gov/citymanager/what-neighborhood-district-association.
- By submitting the application, the applicant agrees that City of Milwaukie employees, and appointed or elected City Officials, have authority to enter the project site for the purpose of inspecting project site conditions and gathering information related specifically to the project site.
- Submittal of a full or partial electronic copy of all application materials is strongly encouraged.

As the authorized applicant I, (print name) Philip Krueger, attest that all required application materials have been submitted in accordance with City of Milwaukie requirements. I understand that any omission of required items or lack of sufficient detail may constitute grounds for a determination that the application is incomplete per MMC Subsection 19.1003.3 and Oregon Revised Statutes 227.178. I understand that review of the application may be delayed if it is deemed incomplete.

Furthermore, I understand that, if the application triggers the City's sign-posting requirements, I will be required to post signs on the site for a specified period of time. I also understand that I will be required to provide the City with an affidavit of posting prior to issuance of any decision on this application.

Applicant Signature: Philip H Krueger Digitally signed by Philip H Krueger DN: C=US, E=philk@ygh.com, O=YGH Architecture, CN=Philip H Krueger Date: 2020.07.28 11:03:04-07'00'

Date: 7/28/2020

Official Use Only

Date Received (date stamp below):

Received by: _____

WAVERLEY WOODS APARTMENT DEVELOPMENT PLAN

10415 SE Waverly Ct. Milwaukie, OR 97222

Planned Development Preliminary Submission
CITY FILE# 20-003PA
July 28, 2020

WALKER VENTURES, LLC.
YGH Architecture

Development Description

The Waverley Woods residential development will be the newest addition to the existing Waverley Greens Apartment communities. The site is located within the Willamette Greenway Zone Overlay and is zoned R-2. The existing site contains a ridge with steep slopes in the middle of the property and is heavily wooded. The site includes three tax lots (11E26DC02100,11E26DC02200 and 11E26DC02400) and has a total area of approximately 10.76 acres. The application includes a lot line adjustment that would revise the three parcels to include Parcel 1 (11E26DC02400) at 2.15 acres for the existing Dunbar Woods apartments, Parcel 2 (11E26DC02100) to be 6.77 acres for this proposed development and parcel 3 (11E26DC02200) to be 1.84 acres for a future development. Without approval as a Planned Development, Parcel 2 would have a minimum density of 78 units and the maximum density of 84 units. This application refers only to development of Parcel 2, and all references to the "site," development," or "property" are to Parcel 2, unless otherwise noted.

Waverley Woods will become a new member of the Waverley Greens residential communities, currently made up of 325 apartments in six diverse apartment communities. Waverley Greens has been a Wyse family-owned business since 1971. Its mission is to provide superior apartments, grounds, services, and amenities to encourage a contented, long-term tenant population. Tenants can take advantage of a community garden, dog walk, sports court, exercise room, and a variety of free classes, ranging from water aerobics and yoga to art and writing classes. Waverley Greens has joined with the Oregon Energy Trust to upgrade units and has installed the largest solar array of any apartment complex in Oregon.

The Planned Development will involve the phased construction of (4) multifamily apartment buildings. The 100 apartments will primarily be spacious 2-bedroom units with (16) 1-bedroom units provided in Buildings A.1 and A.2 along the Ridge. The site is divided into two areas - the Ridge in the middle and the Gardens to the north. The Ridge buildings are built into the slope, allowing four residential levels over parking, which provide dramatic views toward the Willamette River. The Garden buildings have three residential levels over parking, and their lower height relates to the pedestrian scale of the adjacent public street. Access to the development will be from SE Waverly Court, and a traffic impact assessment has been provided which indicates no changes are needed in intersection traffic control based on trip increase from the development. The project will be phased so that Building A.1 (32 units) will be built along the Ridge in phase 1 and Building A.2 (32 units) and the associated community building will occur in phase 2. The two Gardens Buildings B.1 (18 units) and B.2 (18 units) and the community center with pool would be developed in Phase 3.

Secure parking for tenants will be provided below all buildings, with visitor parking adjacent to entries along the internal streets. A total of 108 parking spaces will be provided below the buildings, and there will be 30 parking spaces along the private project roads. The 138 parking spaces provided exceed the minimum parking requirement by 13 spaces. The location of parking below buildings will minimize surface parking and increase amount of landscape and tree area. The below-building parking levels will be open-air but secure for tenant-only access. Bike parking in each building will accommodate 1 bike per unit with 50% to be in secured, covered parking in the parking garage below the units and 50% to be in open bike parking in the front of each building as per section 19.609 and the Multifamily Guidelines and Standards 19.505.3.D.

Trash handling will be accommodated with a trash chute on each floor leading to a large central trash/ recycling room on the parking level. Residents will be responsible for bringing recycling to the trash/recycling room where all waste will be collected by on-site maintenance crew and disposed of off-site.

The development will feature a variety of tenant amenities, including a community center at the Garden level with a kitchen, workout space, and meeting rooms. An outdoor pool and patio with southwest views will be adjacent to the community center. The existing community garden is a popular amenity available to all Waverley Greens residents, which will be relocated in phase 3.

The new community garden area will flank the north and east sides of the Phase 3 community center with southern solar exposure. Residents will be able to access the garden easily via the community center loading area should they need to deliver planting material and tools by vehicle.

An additional community facility will be located at the Ridge, between Buildings A.1 and A.2. The facility will include a library, a warming kitchen, wine cellar, bathrooms, and meeting room opening to an expansive river view terrace. The facility will be constructed as part of phase 2. The development plan includes a series of walking paths connecting project communal areas while also allowing tenants to traverse the varied terrain and enjoy views of the river and forest reserve.

The siting of the buildings, their associated access streets, and the grading and utility routing have been laid out to minimize the removal of significant trees. An arborist, included in the design team, has conducted a tree survey of all trees with 6" diameter or larger and provided input to minimize impact to the existing retained wooded areas. A total of 391 trees were found, many of which are invasive species and trees in poor health with removal recommendations. The project is currently on track to save 135 of the existing trees that are healthy and non-invasive. The project will, over time, remove the extensive invasive ivy and blackberry bushes, providing access to the wooded areas throughout the site. Wood from the removed trees within the project will be repurposed when possible.

The Wyse family is interested in responsible, sustainable development. The project held an Energy Development Plan meeting on April 16, 2020 with the Energy Trust of Oregon (ETO), the City of Milwaukie, local utility companies, and solar, energy, water, and infrastructure specialists to discuss opportunities for an energy development plan. The discussion included solar panel locations, alternative energy solutions, an EUI target, carbon goals, aligning with the City of Milwaukie's sustainability goals and strategies to achieve targets. These discussions are on-going, and the project will benefit from additional sustainability analysis in each phase. The Wyse family has already engaged Biohabitats to examine opportunities for water conservation and for wastewater and stormwater treatment and reuse for their existing buildings as well as the new development. The Wyse family is also committed to owning and operating their apartment buildings as long-term investments, so the design incorporates durable materials such as metal wall panel, fiber cement wall panel, and metal roofs.

On July 13, 2020, the Wyse family and design team attended the Historic Milwaukie Neighborhood District Association monthly meeting to present the project. The neighbors spoke highly of the current Waverley Greens apartment properties and noted the quality landscaping and community amenities. Overall, the community reaction to the presentation was positive with attendees looking forward to walking through the wooded areas and perhaps even being future tenants.

Development Requests for Approval

The project is pursuing a Planned Development review to address four key issues: the 20% density increase allowed for exceptional project design, the 150' maximum building length for multifamily housing, the Willamette Greenway Zone 35' height limit, and the 55' maximum height on a sloped site. The project is requesting a 20% density increase to allow 100 units on Parcel 2. This narrative and associated drawings illustrate the project's "outstanding planned land use and design" and many "exceptional advantages in living conditions" that are required for City Council to approve such density increases over regular zoning. In lieu of adding a fifth residential building, the project proposes that the Ridge buildings A.1 and A.2 extend to 203' in length and exceed the 35' building height limit with the addition of a fourth level. These two buildings are the farthest away and downhill from the public street, so the height and length increases will not have a significant visual impact to the surrounding community. The

addition of this fourth floor increases the efficiency of the development's footprint and will use less materials, save more trees and provide more natural space for public walkways and gardens while maintaining the unit counts and staying consistent with the existing building context. The Two 3-level Garden buildings are 150' in length and relating in scale to Waverley Apartment communities to the north and compliant with City code requirements.

Statement on Development Standards

NOTE: The project is proposing with this application the division of the existing lots into three distinct parcels. Project is divided into three parcels (see A1.0 – Site Plan) Parcel 01 = existing Dunbar Apartment complex. Parcel 02 = new construction. Parcel 03 = future development

1.1 Title 19 Milwaukie Zoning Code

Section 19.300 Base Zones

19.302 Medium and High-Density Residential Zones (R-2)

19.302.1 Purpose:

The medium and high-density residential zones are intended to create and maintain higher density residential neighborhoods that blend a range of housing types with a limited mix of neighborhood-scale commercial, office, and institutional uses.

19.302.4 Development Standards

Table19.302.4 (R-2)

A. Lot Standards
   1. Min. Lot size
      c. All other uses = 5,000 sq.ft.
   2. Min. lot width
      b. All other lots = 50 ft.
   3. Min. lot depth
      b. All other lots = 80 ft.
   4. Min. street frontage requirements
      b. Standard Lot = 35 ft.

B. Development Standards
   1. Min. Yard Requirements for primary structures
      a. Front = 15 ft
      b. Side = 5 ft. (Subsection 19.302.5 A)
      c. Street side yard = 15 ft
      d. Rear yard = 15 ft.

   2. Max. building height for primary structures
      A. 3 stories or 45 ft. whichever is less
      Subsection 19.302.5.E Height Exceptions:

      1 additional story may be permitted in excess of the required maximum standard. For each additional story, an additional 10% of site area beyond the minimum is required to be retained in vegetation.

      Response: Through the addition of a 4th story on the Ridge Buildings, Waverley Woods can preserve in excess of 10% of the vegetation on site area beyond the minimum required. This additional area will provide a recreational amenity for residents and neighbors. (See 19.302.5.H.2 Building Limitations for height calculations)

B. Side Yard height plan limit
   a. Height above ground at min. required side yard depth 25 ft.
   b. Slope of plane 45 degrees

C. Max. lot coverage (% of total lot area) = 45%

Response:

Parcel 01 = 94,032 sq.ft. lot with 25,346sqft building = 26.9% lot coverage

Parcel 02 = 294,350 sq.ft. lot with 64,336 sq. ft building = 21.9% lot coverage

Parcel 03 = no proposed building at this time

D. Min. Vegetation (% of total lot area) = 15%
(+10% (25% site vegetation) to qualify for height increase as per 19.302.5.H.2)

Response: Parcel 02: 294,350 sq.ft. lot. 15% = 44,152 sq.ft. (Proposed: An additional story requested as per 19.302.5.E Height Exceptions**:** 25% of lot would need to have vegetation. 25% of site is 73,587.5 sq.ft. (lot vegetation = 128,912 sq.ft.-maintained forest, open recreation area + 1,960 sq.ft. community garden + 28,278 sq.ft. maintained landscaping = 159,150 sq.ft. vegetated area)

Proposed lot vegetation = 54% of the lot (exceeding 25%)

19.302.5.C Min. Vegetation
At least half of min. required vegetation area must be suitable for outdoor recreation by residence, and not have extreme topography or dense vegetation that precludes access.

Response: Area of steep slope = 25% slope or above = 58,904 sq.ft.

58,904 sq.ft. steep slope / 159,150 sq.ft. of site vegetation = 37% of vegetated area is steep slope. (less than 50% of the min required vegetation)

19.504.4 Minimum Vegetation
No more than 20% of the required vegetation area shall be covered in mulch or bark dust. Mulch or bark dust under the canopy of trees or shrubs is excluded from this limit. Plans for development shall include landscaping plans which shall be reviewed for conformance to this standard.

Response: Project will maintain most of the vegetation as natural native growth with maintenance for invasive species, walking paths, open space, and community gardens. Walking paths may be made with mulch or bark in the forested area under the canopy of trees – which is excluded from this limit.

DENSITY
Table 19.302.4 Density Calculations

C. Other Standards				
1. Density requirements (dwelling units per acre)				**Subsection 19.202.4** Density Calculations
a. Minimum	11.6	11.6	25.0	**Subsection 19.302.5.F** Residential Densities
b. Maximum	14.5	17.4	32.0	**Subsection 19.501.4** Density Exceptions

All three proposed parcels meet the required min and max development requirements. Parcel 1 encompasses the existing Dunbar Woods development (94,032 sq.ft.); Parcel 2 the current proposed development (294,250 sq.ft.) and Parcel 3 proposed future development 80,241 sq.ft. Parcel 2 includes steep slopes over 25%. This area has been subtracted from the developable area as required per (see A1.2 – Unit Density and Lot Coverage)

Minimum Density: (*11.6)

Parcel 1: 94,032 sq ft = 2.15 Acres at 11.6 units/acre = **25 Units**

Parcel 2: 294,250 sq ft = 6.755 Acres at 11.6 units/acre = **78 Units**

Parcel 3: 80,241 sq ft = 1.84 Acres at 11.6 units/acre = **21 Units**

Maximum Density: (*17.4)

Parcel 1: 2.15 Acres at 17.4 units/acre = **37 Units (36 Existing)**

Parcel 2: 19.202.4E Excludes all areas with 25% or greater slope (84,374 sq ft = 1.9 Acres)

6.755 Acres – 1.9 Acres = 4.855 Acres

4.855 Acres at 17.4 units/acre = 84 Units

84 Units/Acre with 20% increase = 100.8 (Proposed 100)

*Proposed density exceeds maximum density – Project is requesting 20% density increase as allowable by 19.311.3 C. and 19.501.4 (see below exceptions)

Parcel 3: 1.84 Acres at 17.4 units/acre = 32 Units (0 Proposed – Future Development)

19.311.3 C. Density Increase and Control

The City Council may permit residential densities which exceed those of the underlying zone, if it determines that the planned development is outstanding in planned land use and design and provides exceptional advantages in living conditions and amenities not found in similar developments constructed under regular zoning. In no case shall such density increase be more than 20% greater than the density range prescribed for the primary land use designation indicated in the Comprehensive Plan.

Subsection 19.501.4 Density Exceptions

In exchange for the dedication of parkland, residential density may be increased (and lot sizes decreased) so that overall parcel density remains the same. (Ord. 2051 § 2, 2012; Ord, 2025 § 2, 2011)

Ord. 2051: To encourage a desirable living environment by allowing flexibility in design, minimizing the impact of new construction on existing development, and assuring that natural open spaces and developed recreational areas are provided whenever feasible: Policy 2: In all Planned Unit Developments, a density bonus up to 20% over the allowable density may be granted in exchange for exceptional design quality or special project amenities.

Response: The focus of the Waverley Woods development is to design a sustainable apartment development that preserves and maintains as much of the wooded landscape and natural habitat as possible. To this end, the project team opted to minimize the development footprint by removing a 5th building along the ridge and requesting a height increase for an additional floor of apartments. This 4th residential floor allows the project to maximize the density desired for the site, while minimizing the environmental impacts. Along with maintained walking paths through the wooded areas, the project is proposing a large community garden in the central courtyard (available to the entire Waverley Greens residents), a pool with kitchen access, exercise room, and meeting spaces for teaching classes and community gatherings. The Waverley Greens owners are passionate about creating a sense of community and enriching the lives of their residents. These new spaces will facilitate an increase in the number and types of educational and community opportunities that can be provided to all their diverse residents. The owners strive to provide community experiences for all walks and stages of life.

The project has already worked with the Energy Trust of Oregon during the Development Planning phase and has consulted with an energy and solar consultant to discuss energy efficiency strategies and propose a preliminary solar design for the development.

BUILDING LENGTH

19.302.5.H.2 Building Limitations

Multifamily buildings shall not have an overall horizontal distance exceeding 150 linear ft. as measured from end wall to end wall.

Response: Project is applying for a Planned Development zoning change to allow the extension of the overall building length of the two ridge buildings by 50 ft so that they will be 200 ft from end wall to end wall instead of 150 ft. This 200 ft allows the building to be broken into two smaller massings of 89 ft through the use of a 23 ft. wide, 24 ft 6-inch deep exterior entry recess (see Image 1). This large entry recess allows the building to read as two distinct masses while limiting the footprint of the development along the ridge to two 200 ft buildings rather than three 150 ft buildings. Reducing the development footprint preserves more natural vegetation and open space while maintaining the required density. The 89 ft lengths are further broken up through the undulation of exterior balconies and interior bump outs. The proposed length of the new ridge buildings is not without precedent in the neighborhood. Waverley Hall and Stuart Hall (Image 2), the original development, both exceed 280 ft in width.

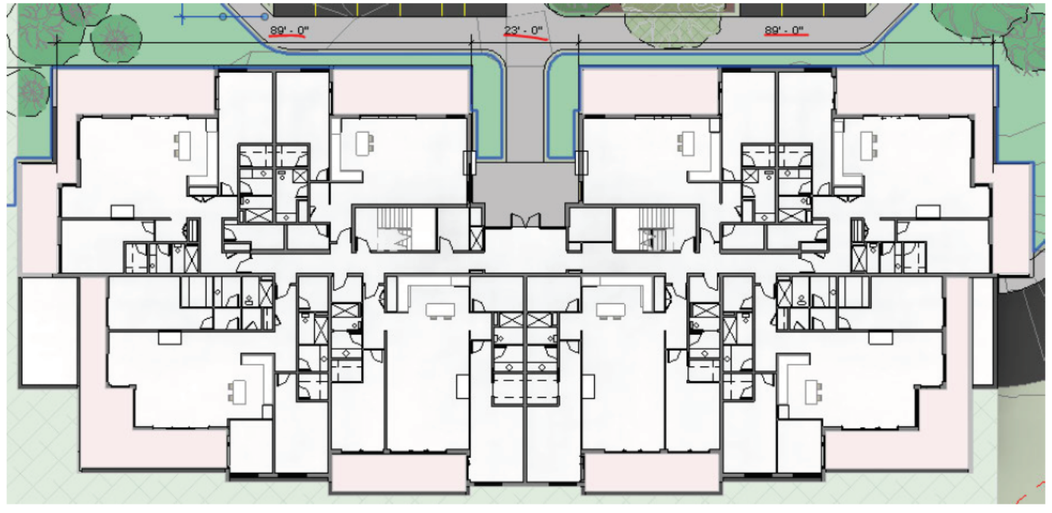


Image 1. Ridge Building A-1 entry level showing overall 203' long plan broken into two masses at street.

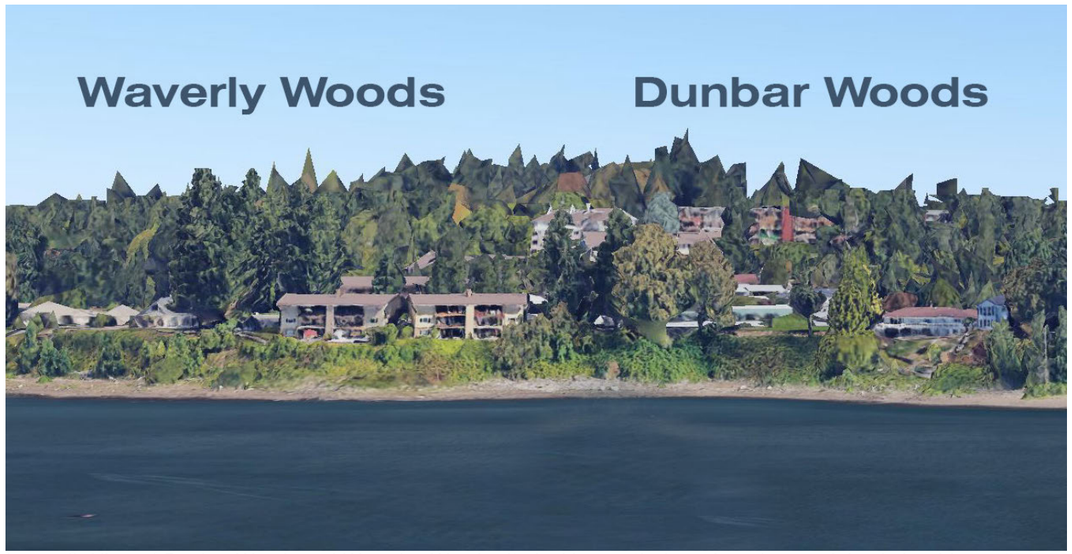


Image 2. View of Dunbar Woods and Waverley Woods site looking north downriver shows minimal visual impact.

With the preservation of tree cover, orientation along the ridge, and the development's seclusion from other private development, our investigations and modeling shows the 50' increase in length will not be perceivable from either the Willamette River or other private residences in the area (see A6.3 – Views From River and A6.1 – Rendered Views). The existing dense tree canopy west of the proposed development extends beyond the proposed building heights, minimizing the visual impact of the additional proposed height from the river (see A2.1 Site Sections).

BUILDING HEIGHT

19.202.2 Vertical Measurements

B. Exterior Height of Primary Structures

The height of a primary structure building is the vertical distance from the base point described in Subsection 19.202.2.B.1, below, to the top of a building described in Subsection 19.202.2.B.2, below.

1.a Base Point Measurement #2. Base point is 10' above lowest grade, when the sidewalk or ground surface within a 5' horizontal distance from the exterior wall of the building, when such sidewalk or ground surface is more than 10' above lowest grade.

Figure 19.202.2.B.1
Base Point Measurement

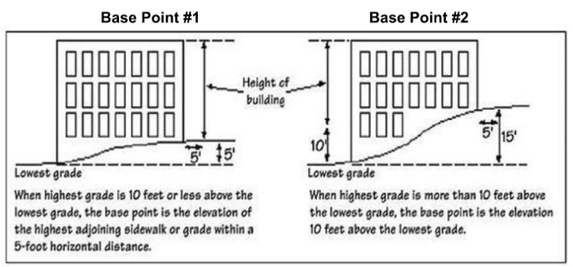
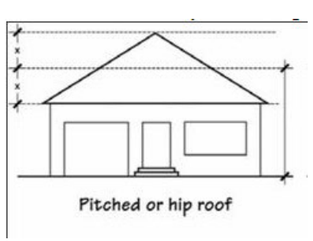


Figure 19.202.2.B.2
Top of Building Measurement



19.302.5.E Height Exceptions

One additional story may be permitted more than the maximum standard if an additional 10% of site area beyond the minimum is retained in vegetation.

Response: Waverley Woods is maintaining 54% the total site as vegetation beyond the 15% min. required (19.302.5.C Min. Vegetation) therefore allowing an extra story beyond the 45' height limit as per this code requirement, making the allowable height of the Ridge Buildings approximately 55' feet.

19.401.3A Willamette Greenway Zone:

35' max height (City of Milwaukie base point is 10' above lowest grade – making total height 45' Max from lowest Grade under Willamette Greenway Zone)

Response: The project would like to determine the height based upon the Milwaukie City code instead of the Willamette Greenway Zone. The Willamette Greenway Zone establishes a boundary 150' inland of the high-water mark of the Willamette River. The Waverly Woods development is well beyond this 150' high water mark and the Waverly Golf Course (not designated within the boundary) lies between the Willamette River and the Waverley Development. The 2018 Milwaukie Comprehensive Plan Update, a Background Report: Willamette Greenway states the "land east of Waverly Golf Course" (our proposed site) was included in the designation without being in this 150' buffer zone or having a clear connection to the river and is subject to review.

The project is requesting Planned Development zoning to increase the allowable height, along the ridge only, to be 65 ft. as measured from Base Point #2 or allow the development to measure height upon Base Point #1 due to the extreme slope of the site skewing the numbers. The height measurement difference between Base Point #1 and Base Point #2 as described in Figure 19.202.2.B.1 varies significantly. The highest grade at its steepest point is 15' above the lowest grade making the height of our building from Base Point #2 62', 18' above the maximum allowable by Milwaukie City code. By contrast, if measurement is taken from Base Point #1, the building is 43' – 8", 1' – 7" below the maximum allowable height by Milwaukie City code (see Image 3 below).

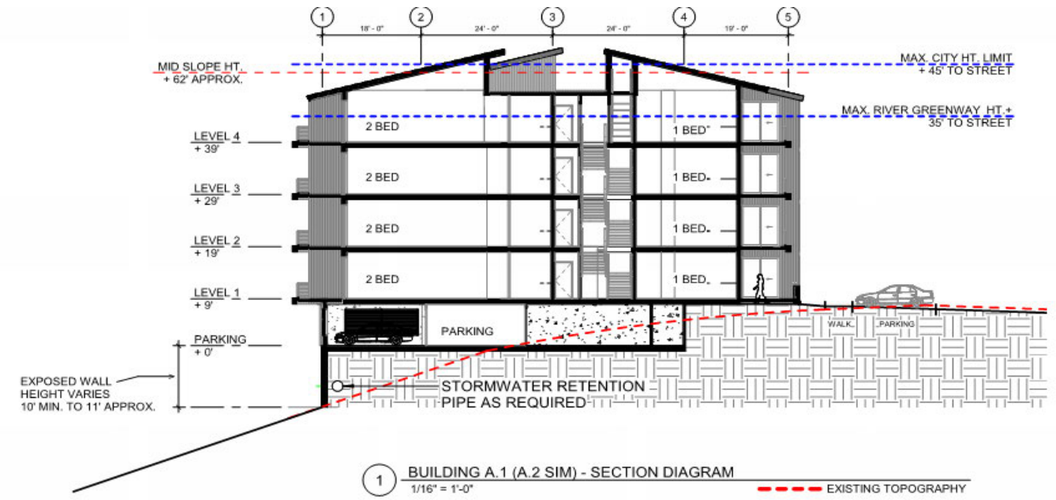


*Image 3. Section of A-1 showing maximum relative building heights between Base Point #1 and Base Point #2

19.311.9 Planned Development

A. Substantial consistency with the proposal approved with Subsection 19.311.6
Response: See below responses to ensure substantial consistency

B. Compliance with Subsections 19.311.1, 19.311.2 and 19.311.3
Response: The project is applying for a Planned Development to comply with the purposes set forth in 19.311.1.

To provide a more desirable environment than is possible through the strict application of Zoning Ordinance requirements; To provide a more efficient, aesthetic, and desirable use of public and private common open space;; and provide an alternative discretionary review process for projects requiring more flexibility than what would be provided through the standard clear and objective development review or land division process.

19.311.1 – Project is providing a more desirable environment than is possible through the strict application of the zoning ordinance requirements. The main objective of the development is to minimally impact the site to retaining as much of the existing tree canopy as possible and maximize vegetated space. Provide recreational opportunities and appreciation for the natural environment while maximizing the density opportunity. To achieve this, the project has proposed three strategies. 1. In lieu of developing a fifth residential building, the project proposes adding an additional story to the two ridge buildings and 2. increase the length of the two ridge buildings to 203'. 3. Taking advantage of the naturally sloping topography, the opportunity to tuck most of the required parking under the building minimizes surface parking, further increasing the vegetated area. Through these proposals, the site is able to retain 54% of the vegetated area while maximizing the density (see A1.5 – Forested Areas and Walkways) The existing dense tree canopy west of the proposed development extends beyond the proposed building heights, minimizing the visual impact of the additional proposed height from the river (see A2.1 Site Sections).

19.311.2 – Project complies with all use requirements laid out in this standard. See 19.401.6 J for compliance with City's Comprehensive Plan. Development proposed is a multi-family apartment complex located within a neighborhood of existing multifamily apartments all owned by the Wyse family. Each having a unique character, but cohesive and harmonious as a neighborhood. Through initial utility research, the capacity of the existing utilities have been assessed as part of the proposed development. The development is designed to serve primarily the residence of the planned development and surrounding community.

19.311.3 Development Standards. The development is on land suitable for the proposed development and is of sufficient size to be planned and developed consistent with this zone. The project recognizes the requirements the City may impose on sewer lines, water lines, roads and street or other service facilities and has done preliminary studies to ensure the sizing is known for the existing infrastructure. The project requests the allowable 20% density increase to assist with the development of the community amenities proposed. Review "Development Description" and "Development Requests for Approval" at the start of this document for additional details. The project provides ample wooded setbacks in its peripheral yards, the smallest of which is 30' in depth (See A1.0 – Site Plan). The project is proposing 54% of the site to be vegetated open space set aside for scenic, landscaping, or open recreational purposes.

C. The proposed amendment is compatible with the surrounding area based on the following factors:
1. Site location and character of the area.
2. Predominant land use pattern and density of the area.
3. Expected changes in the development pattern for the area.
Response: The proposed amendment is compatible with the surrounding area based upon the site location and character of the area. As noted above, the dense, tall forest minimizes the impact of the taller, wider buildings on the ridge from the Willamette River and the breaking up of the length into two distinct masses minimizes the appearance from the street. Regardless, the existing multifamily structures in the neighborhood exceed the lengths proposed in this development with the existing Stuart and Waverley Hall Apartments located to the east of this development both ranging in over 284' in length. The proposed development is consistent with the predominant land use pattern and density of the area as it is surrounded by existing multifamily apartment complexes. There are no expected changes in the development patten for the area. The area is designated med-high density residential and this development is the last undeveloped tract of land in the community. Reading through the May 2020 City of Milwaukie Comprehensive Plan, there are no city plans to change the development pattern for the area.

D. The need is demonstrated for uses allowed by the proposed amendment.
Response: The Wyse family understands the needs of the rental market as they own a large portfolio of apartment communities ranging in affordability. They have found a gap in the availability of the proposed apartment types. Within their community, they have a waiting list for the type of accommodations this project is providing. The City of Milwaukie's Comprehensive Plan recognizes increased housing is a need to be addressed as more people are moving to the Pacific Northwest and there is a housing shortage.

E. The subject property and adjacent properties presently have adequate public transportation facilities, public utilities, and services to support the use(s) allowed by the proposed amendment, or such facilities, utilities, and services are proposed or required as a condition of approval for the proposed amendment
Response: The development has already preformed preliminary investigations into the existing infrastructure including a traffic study to analyze the impacts of increased traffic on the existing city infrastructure. Increased storm water, sewer, domestic and fire water as a result of this 100-unit development have also been reviewed and calculated. Please review the additional submitted documentation for compliance. It is the development team's analysis that the existing public transportation facilities, utilities, and services are adequate to support the proposed development.

F. The proposal is consistent with the functional classification, capacity, and level of service of the transportation system. A transportation impact study may be required subject to the provisions of Chapter 19.700.
Response: A transportation impact study has been included as part of this submission

G. Compliance with all applicable standards in Title 17 Land Division.
Response: Project has reviewed and is complying with all applicable Title 17 Land Division Standards. Project is applying for a property boundary change as part of this Planned Development submission. Proposed boundary changes meet all criteria for approval in section 17.12.030. The boundary change will still allow reasonable development and as calculated in section 19.302.4 Density Calculations, the proposed boundaries do not impact the minimum density requirements for any of the new parcels. Reference this document for demonstrated compliance with Title 19.

H. Compliance with all applicable development standards and requirements
Response: Please review the submitted documents for compliance.

I. The proposal demonstrates that it addresses a public purpose and provides public benefits and/or amenities beyond those permitted in the base zone.
Response: The base zone – R2 allows for residential development. This project is proposing much more than a series of new buildings. It is fulfilling and expanding needed amenities for the existing six communities of Waverley Greens Apartments. It is providing more places for community gathering and celebration. The proposed two new community centers and outdoor amenities provide places for the inhabitants to garden, swim, eat, celebrate, meet, organize, and educate themselves. The existing community already partners with local educators to provide classes to its residents. This proposal will increase the number of spaces and opportunities for these experiences. The project is nestled harmoniously within an existing natural forest. The proposal includes relocating and enlarging the community garden which is an extremely popular amenity and creating walkable paths through the forested area with peak-a-boo views of the Willamette River in an area

which was once unpassable. This development is seeking to maximize density and minimize its footprint to create an urban development within an urban forest. Fulfilling the needs for more housing while providing more natural recreation spaces to improve occupant health and exposure to and appreciation for our natural environment. Through the project's sustainable design, the project further will also reduce its operational footprint. As more directly address in the subsequent sections, through the approval of the additional height allowance and width of the building the project is able to take advantage of the natural topography on the site to tuck parking under the buildings. The parking level pushes the building to exceed the Willamette Greenway Zone height limit, but still within the allowable City of Milwaukie code. Tucking the parking under the building saves the development from surface parking allowing the project space to maintain the forested areas, add additional community spaces, community gardens and other amenities.

19.401 Willamette Greenway Zone WG

19.401.6 Criteria

A. Whether the land to be developed has been committed to an urban use, as defined under the State Willamette River Greenway Plan:
Response: The land for the proposed project has been committed to an urban use as defined under the State Willamette River Greenway Plan. The City of Milwaukie has designated the use of this land as R-2, residential, medium and high-density development.

B. Compatibility with the scenic, natural, historic, economic, and recreational character of the river
Response: The proposed development is consistent with the multi-family character of the surrounding area and in its relationship with the river. As seen in Image 2 and on G0.2, there proposed development is set back from the river with a buffer of an existing golf course and multiple existing multi-family developments closer and more exposed to the river. Maintaining the natural tree canopy and forested nature of the site are important aspects to this development. This includes the addition of recreational walking paths through the forested site.

C. Protection of views both toward and away from the river
Response: As seen in Image 2 above, by maintaining the existing forest and carefully orienting the new development, the views from the river will be minimally impacted. New opportunities for views to the river are being creating by the development through the creation of recreational paths in the existing forest removing invasive species and dead/diseased trees along with curating views from the development itself. Overall, the project will increase the opportunities for visual enjoyment of the river and its surrounding environment while minimally impacting the views from and/or across the river.

D. Landscaping, aesthetic enhancement, open space and vegetation between the activity and river, to the maximum extent practicable
Response: As seen in A1.0 and Image 4 below, the development footprint is located to the north east portion, the farthest corner away from the river, of the site. The south and west of the site are devoted to walking paths and recreational uses for the residents along with maintaining habitat corridors. The development itself has no direct connection to the river as is Waverley Greens Golf course, private residences, and other multi-family developments are between the development and the river.

*Image 4. Surrounding development and proximity to the Willamette River

E. Public access to and along the river, to the greatest possible degree, by appropriate legal means
Response: See Image 4 above, there is no public access from the site to the river from the proposed development or its surrounding area.

F. Emphasis on water-oriented and recreational uses
Response: As seen in image 4 above, there is no direct access to the river from the site. Increased access to views of the river will be created by the development.

G. Maintain or increase views between the Willamette River and downtown
Response: See responses above. In addition, the added height of the development will allow for increased views of the Willamette River and to downtown Milwaukie.

H. Protection of the natural environment according to regulations in Section 19.402
Response: Project is removing invasive species, dead and diseased trees and improving the overall health of the forested area on the site. Development has chosen to reduce its development footprint through the addition of one level on two of the proposed buildings to allow more area for recreation, forest and habitat creation. Project development will adherence to Section 19.402 throughout construction and development.]

I. Advice and recommendations of the Design and Landmark Committee, as appropriate
Response: Project is not located in historic area or downtown Milwaukie. The Design and Landmark Committee was not called upon to review current project. The project did present the development plan to the Historic Milwaukie Neighborhood District Association and received a positive response. No additional advice or recommendations were made on the behalf of the Historic Milwaukie NDA for the project.

J. Conformance to applicable Comprehensive Plan policies
Response: The proposed development is striving to maximize density while minimizing development footprint to increase urban tree canopy, recreational areas, while also providing additional community spaces - key aspects of the Milwaukie Comprehensive Plan. To achieve the density goals, the project is requesting a height increase from the Willamette Greenway Zone restriction of 35'-0" to add an additional story to the project in lieu of developing a third building along the ridge. The steep topography of the site further exacerbates the code definition of height limits as there is roughly 20'-0" of grade change from the front to the back of the building.
According to the May 2020 City of Milwaukie Comprehensive Plan, see image 5 below, the site of this development is proposing to increase the density designation to High Density (currently it is medium density) Increasing the number of residential units to meet future demands is an important consideration in the Comprehensive Plan.

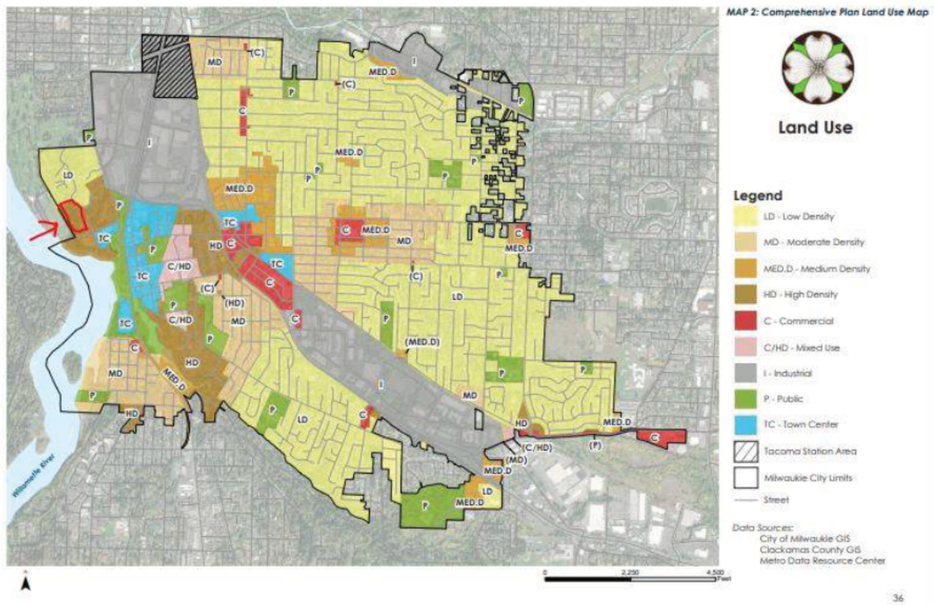


*Image 5. Density Map – City of Milwaukie Comprehensive Plan May 2020 Public Review Draft

Consistent with Goal 3.5, Sustainable Design and Development, The Waverley Woods development is committed to designing sustainably with considerations for energy efficiency and embodied carbon. The project has already held an Energy Trust of Oregon Master Planning session to discuss sustainability strategies along with engaging a solar designer for a preliminary solar study. The project is committed to including solar on the new development. Through the reduction of the development footprint, the project is able to increase the tree canopy, vegetated areas, natural habitat and recreational opportunities, contributing to Goal 3.4 – Healthy Urban Forest.

Goal 1 - Fostering Community, culture and belonging. Waverley Greens provides its existing residence with educational classes to enhance the community. This new development allows the community to grow this amenity through the development of two additional community centers providing recreation and community gathering in the form of a pool, wine cellar, event kitchen, exercise room, and multiple meeting spaces to hold additional educational classes and community events.
Goal 4 – Willamette Greenway. The Greenway Review's intended purpose focuses on areas in close proximity and visible from the river, with a less stringent review process for areas further from the river. In areas where the boundary for the WG overlay zone is further inland than the state regulated 150 feet from the ordinary high-water line minimum or the 100-year flood plane requirement, the city allows for a compatibility review to determine appropriateness and compatibility of a new proposed use addressing use, siting, size, scale, height and site improvements. As demonstrated in Image 5, this site fits within that definition for this alternative review process. As described in response C, the proposed development will limit the view impacts from the river, while increasing the public view access from the site.

K. The request in consistent with applicable plans and programs of the Division of State Lands
Response: Project development is not within the 150 feet of the ordinary high-water line of the Willamette River or within the 100 year flood plain of the Willamette River nor does it contain any types of "waters of the state" therefore, no permit or authorization for development is required from the Division of State Lands.

L. A vegetation buffer plan meeting the conditions of Subsections 19.401.8.A through C.
Response: Project is not located along the Willamette river or within 25 feet upland from the ordinary high-water line therefore does not fit within the vegetation buffer strip limits described within 19.401.8 A through C. The project intends on removing invasive species and maintaining and planting native species where landscaping occurs. Image 2 demonstrates the impact of the removal of trees on the site and the minimal impact the development will have on the of scenic views from the river within the context of the existing site. Sheet A2.1 Site sections shows the placement of the buildings on the site in relation to the tree existing tree canopy. A5.1 Tree Removal Plan and A5.1 Tree Schedule show the existing trees to be removed and the condition of the trees. Trees will be replanted to satisfy the Milwaukie City Urban Forest Management Plan.

19.505.3.D Multifamily Design Guidelines and Standards

1. **Private open space:** 96 sf ground floor, 48 sf upper floors
Response: Each apartment unit has its own private balcony directly accessible from the interior of each dwelling, and separate physically and visually from other apartments. The smallest private outdoor space is 195 sq.ft. (see A3.2 – A3.4 for floor plans)

2. **Public open space:**
Response: Community is important to the Waverley Greens Apartment complex. This new development has focused on creating many additional community spaces and amenities for the residents of the entire complex. These include, but are not limited to the following: large outdoor community gardens, swimming pool, walking trails, kitchen/catering space, wine cellar, permanent picnic tables, and community meeting rooms.

3. **Pedestrian Circulation:**
Response: Project will have continuous connections with adequate lighting and street crossings to site elements as required. Walkways are separated from vehicle parking with physical barriers such as planter strips and raised curbs. Walkways shall be constructed of concrete, with a minimum width 5 ft and 7 ft. where parked vehicles will overhang the walkway. The walkways will be separated from parking areas and internal driveways using curbing, landscaping, or distinctive paving materials.

4. **Vehicle and Bike Parking:**
Response: Waverley Woods A.1, A.2 and B.2 are located on a private internal dead-end drive, not a public right-of-way. As is typical for multifamily developments, including the other apartments in this complex, some parking spaces are outside the building entry along the private drive. A total of 106 vehicle parking spaces for

residents will be located under the buildings and 36 parking spaces will be provided off the private dead-end street for the apartment buildings, community center and other provided amenities. (See A1.3 – Parking Plans and Count)

Covered, secure bike parking with permanently mounted bike racks/hangers will be provided in the parking garage and outdoor bike racks, located no further than 30' from the main entrance of each building to meet the required number of racks required by this this code section.

5. **Building Orientation & Entrances:**
   Response: Waverley Woods A.1, A.2 and B.2 are located on a private internal dead-end drive, not a public right-of-way. Buildings A.1 and A.2 feature street facing primary entrances, which become focal points as the central element of the buildings' U-shape. Users are drawn into the building entry by an entry overhang, walking paths, and landscape elements.

6. **Building Façade Design:**
   Response: The street facing façade is broken into two building masses flanking a recessed entry with outdoor balconies and projecting window bays providing visual interest. A minimum of 25% of the façade is glazing. (See A4.2 – Building A Elevations)

7. **Building Materials:**
   Response: Building materials will be a mix of fiber cement board siding with wood accent siding with metal trim panels. The building is still in the design phase and specific materials and placements have to be investigated.

8. **Landscaping:**
   Response: Landscaping will be provided as per development standards.
   As part of the development, existing trees will be maintained where possible. Diseased and dead trees, as wells as, invasive species, such as English ivy and blackberries, will be removed and replaced by native plants where appropriate. New natural walking paths will be developed through the preserved wooded area for residents. The landscape will be continually maintained by the Waverley Greens maintenance team.

9. **Screening:**
   Response: Screening will be provided as per development standards. Mechanical equipment will be housed inside the buildings with some roof top equipment located on lower roof areas that are blocked from view by adjacent high sloped roofs. Trash and recycling with be collected in trash rooms on the parking levels of each apartment building to avoid waste containers being visible from the outside.

10. **Recycling Areas:**
    Response: Recycling collection will be provided in the trash/recycling room located on the parking level of each building. Residents will be responsible to bring their recycling to that location and maintenance staff will collect and transport the material off site

11. **Sustainability:**
    Response: Sustainability is a key component in the design of these residences. Building orientation and solar access along with passive strategies have been the first step of our design analysis. A preliminary solar study has already been completed, and the owners are committed to installing solar panels on the roofs. Each unit is provided with operable windows and overhangs, and sunscreens will be studied to maximize efficiency as part of the building design. Retaining and re-planting the surrounding tree canopy is a key component to maintaining a cool site that takes advantage of the breezes flowing down the Willamette River and through the tree canopy to provide passive cooling for the units. On-site rainwater collection is being investigated along with applying roofing materials with an SRI of 78 where the roof has a 3/12 pitch or less and an SRI of 29 where the roof pitch is 3/12 or greater.

12. **Privacy Considerations**:
    Response: All privacy design considerations will be met in design.

13. **Safety**:
    Response: All safety design considerations will be met in design.

Parking

19.605 Vehicle Parking Quantity Requirements:

Table 19.605.1
Minimum To Maximum Off-Street Parking Requirements

Use	Minimum Required	Maximum Allowed
2. Multifamily dwellings containing 3 or more dwelling units (includes senior and retirement housing).		
a. Dwelling units with 800 sq ft of floor area or less and all units located in the DMU Zone.	1 space per dwelling unit.	2 spaces per dwelling unit.
b. Dwelling units with more than 800 sq ft of floor area.	1.25 spaces per dwelling unit.	2 spaces per dwelling unit.

Response:

Minimum parking: 100 proposed units x 1.25 = 125 spaces

Maximum parking: 100 proposed units x 2 = 200 spaces

Proposed: 108 covered spaces and 30 on-street spaces = **138 spaces total**

(See A1.3 – Parking Plans and Count)

19.609 Bike Parking

19.609.2.A.3 Multifamily residential development with 4 or more units shall provide 1 space per unit.

19.609.2.B Covered or enclosed bicycle parking. A minimum of 50% of the bicycle spaces shall be covered and/or enclosed.

Response: The Waverley Woods project will provide a minimum of 100 bike parking spaces as specified in the code balanced to each phase development. The minimum required 50 covered parking will be located at the parking entry of each building accessible by auto ramp and sidewalk.

The exit from corridor from the central stair accessing the parking level will also provide a route for bikers to access a locker room with adjacent shower and toilet facilities prior to taking the elevator or stair to their unit above.

19.700 Public Facility Improvements

All land divisions and boundary changes that increase the number of lots shall be subject to the requirements and standards contained in Chapter 19.700 Public Facility Improvements and the Public Works Standards for improvements to streets, sidewalks, bicycle facilities, transit facilities, and public utilities.

19.703.1 Preapplication Conference

Response: The project team held a Pre-application Conference with the City of Milwaukie on May 14, 2020.

19.703.2 Application Submittal

Response: The project team is submitting lot line adjustment with Planned Development application. Transportation Facilities Review has been included in this submission.

19.703.3 Approval Criteria

A. Procedures, Requirements, and Standards
Response: Project will comply with procedures, requirements, and standards of Chapter 19.700 and the Public Works Standards.

B. Transportation Facility Improvements
Response: Review Traffic Impact Analysis included in the submission for compliance.

C. Safety and Functionality Standards

1. Adequate Street Drainage, as determined by the Engineering Director.
Response: See Civil sheet C3.0 for proposed street drainage.

2. Safe access and clear vision at intersections, as determined by the Engineering Director.
Response: Please see Traffic Impact Analysis included in this submission for safe access and clear vision at intersections.

3. Adequate public utilities, as determined by the Engineering Director.
Response: Feedback from Pre-Application Conference and information provided to the team by the city on the existing public utilities has informed the current design. It is our understanding adequate public utilities are provided to the site. Project team will provide utilities to the site which conform to all local and national codes. See Civil sheet C3.0 for utility information.

4. Access onto a public street with the minimum paved widths as stated in Subsection 19.703.3.C.5 below. **Response:** See responses below

5. Adequate frontage improvements as follows:
Response: See civil sheet C2.0 for Waverley Court Public Improvements. Requirement: Local Street Min paved width of 16' along site's frontage. Nonlocal streets min. paved 20' along site's frontage. For all streets a minimum horizontal right-of-way clearance of 20' along the site's frontage. The proposed development exceeds all of these minimum requirements. The existing SE Waverly Court is 32' in width along the site's frontage. The new Ridge View Drive is 26' in width.

6. Compliance with Level of Service D for all intersections impacted by the development, except those on Oregon Highway 99E that shall be subject to the following:
Response: Review Traffic Impact Analysis included in the submission for compliance.

19.708 Transportation Facility Requirements

19.708.1 General Street Requirements and Standards

Response: Review Traffic Impact Analysis included in the submission for compliance.

19.708.2 Street Design Standards

Response: Please review sheets A1.4 – Fire Access Diagram, A2.3 – Phase 01 Site Plan, and C2.0 – Waverly Court Public Improvements for dimensional plans showing compliance to the Street Design Standards.

19.708.3 Sidewalk Requirements and Standards

Response: Please review sheets A1.4 – Fire Access Diagram, A2.3 – Phase 01 Site Plan, and C2.0 – Waverley Court Public Improvements for dimensional plans showing compliance to the Street Design Standards. Waverley Greens will maintain all sidewalks and landscape strips in accordance with Chapter 12.04

19.708.4 Bicycle Facility Requirements and Standards

Response: Bike parking will be provided in accordance with section 19.609 Bike Parking and the requirements and standards outlined in this section.

19.708.5 Pedestrian/Bicycle Path Requirements

Response: Pedestrian/Bicycle paths as described in this section are not required or provided in this proposed development. If they are incorporated, they will meet the required conditions described in this section. Private pedestrian paths and nature trails will be provided in this project and will adhere to the safety regulations required by the City of Milwaukie.

WAVERLEY GREENS APARTMENT COMMUNITIES

1 WAVERLEY & STUART HALL
- Swimming Pool
- Covered Parking
- Solar Panels

2 DUNDEE
- Swimming Pool
- Covered Parking
- Solar Panels
- Dog Run

3 THE HIGHLANDS
- Swimming Pool
- Covered Parking
- Solar Panels
- Basketball Court

4 BANBURY
- Covered Parking

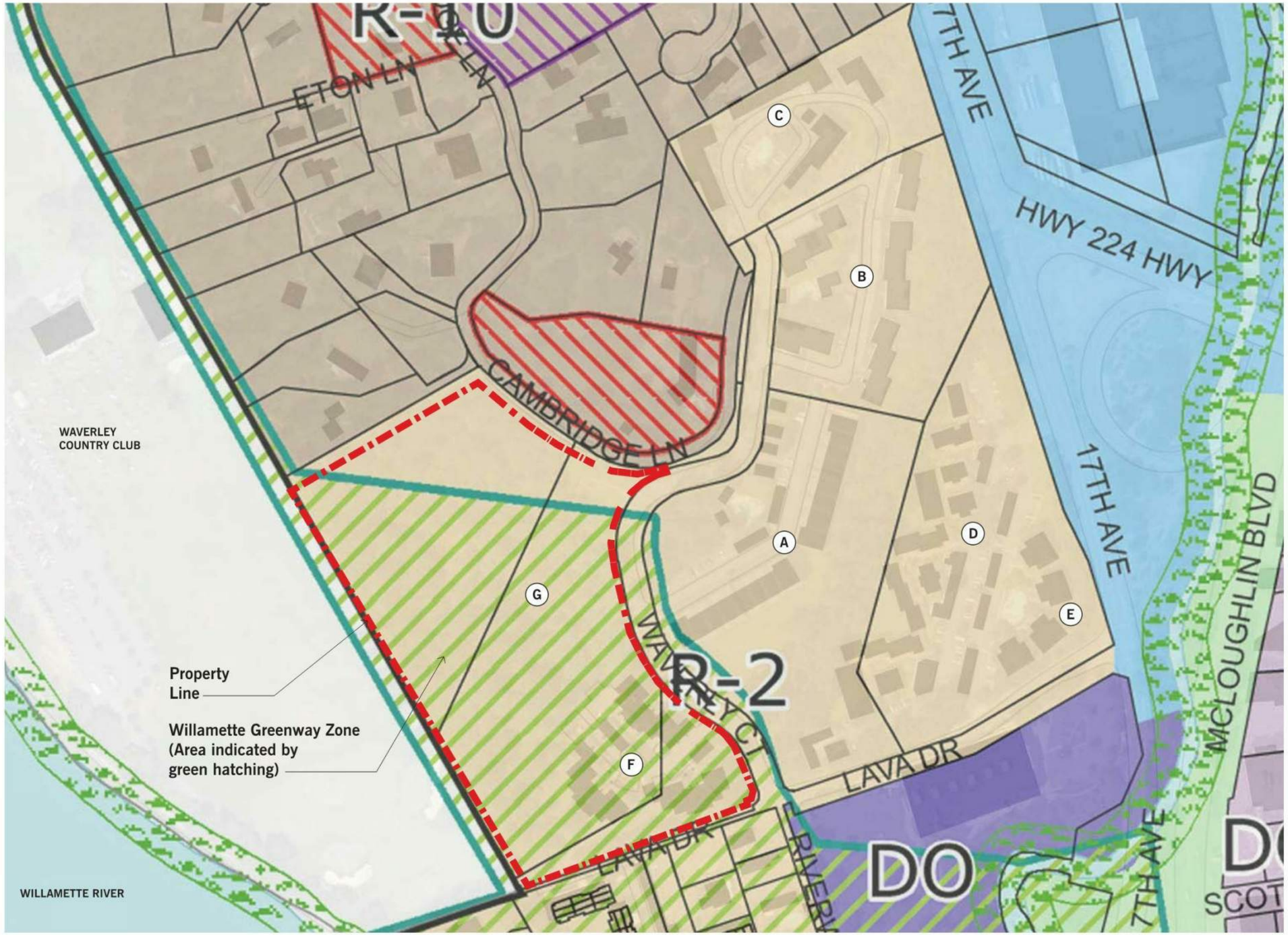
5 STONEHAVEN
- Covered Parking
- Swimming Pool

6 DUNBAR WOODS
- Covered Parking
- Solar Panels

7 WAVERLEY WOODS (PROPOSED)
- Covered Parking
- Solar Panels
- Swimming Pool
- Community Center(s)
- Walking Path
- Community Garden

N
0°


DUNDEE
THE HIGHLANDS
STUART HALL
PROPOSED WAVERLEY WOODS DEVELOPMENT
BANBURY
WAVERLEY HALL
STONEHAVEN
DUNBAR WOODS



Communities

- (A) Waverley & Stuart Hall
- (B) Dundee
- (C) The Highlands
- (D) Banbury
- (E) Stonehaven
- (F) Dunbar Woods
- (G) Waverley Woods **(proposed)**

Industrial
- BI
- M

Residential
- R-1
- R-1-B
- R-2
- R-2.5
- R-3
- R-5
- R-7
- R-7PD
- R-10
- R-10PD
- R-O-C

Commercial
- C-N
- C-L
- C-G
- C-CS

Downtown
- DS
- DC
- DO
- DR
- DOS

- Mixed Use Overlay
- Vegetated Corridor*
- Wetland Buffer*
- Willamette Greenway
- Significant Historic Resource
- Contributing Historic Resource
- Unranked Historic Resource
- City Boundary

N

SE Cambridge Ln.

COMMUNITY GARDEN

WAVERLY HALL

MANAGEMENT OFFICE

SE Waverly Ct.

DUNBAR WOODS

SE Lava Dr.

LEGEND

- ROADWAY
- EXISTING SIDEWALK
- PROPERTY LINE
- GRASS / NATURAL
- LANDSCAPED AREA
- PARKING STALL
- GOOD HEALTH TREE
- POOR HEALTH TREE
- COMMUNITY GARDEN
- CONIFER TREE
- DECIDUOUS TREE
- OFF-SITE TREE *shown for context
- FAIR HEALTH TREE
- DEAD TREE

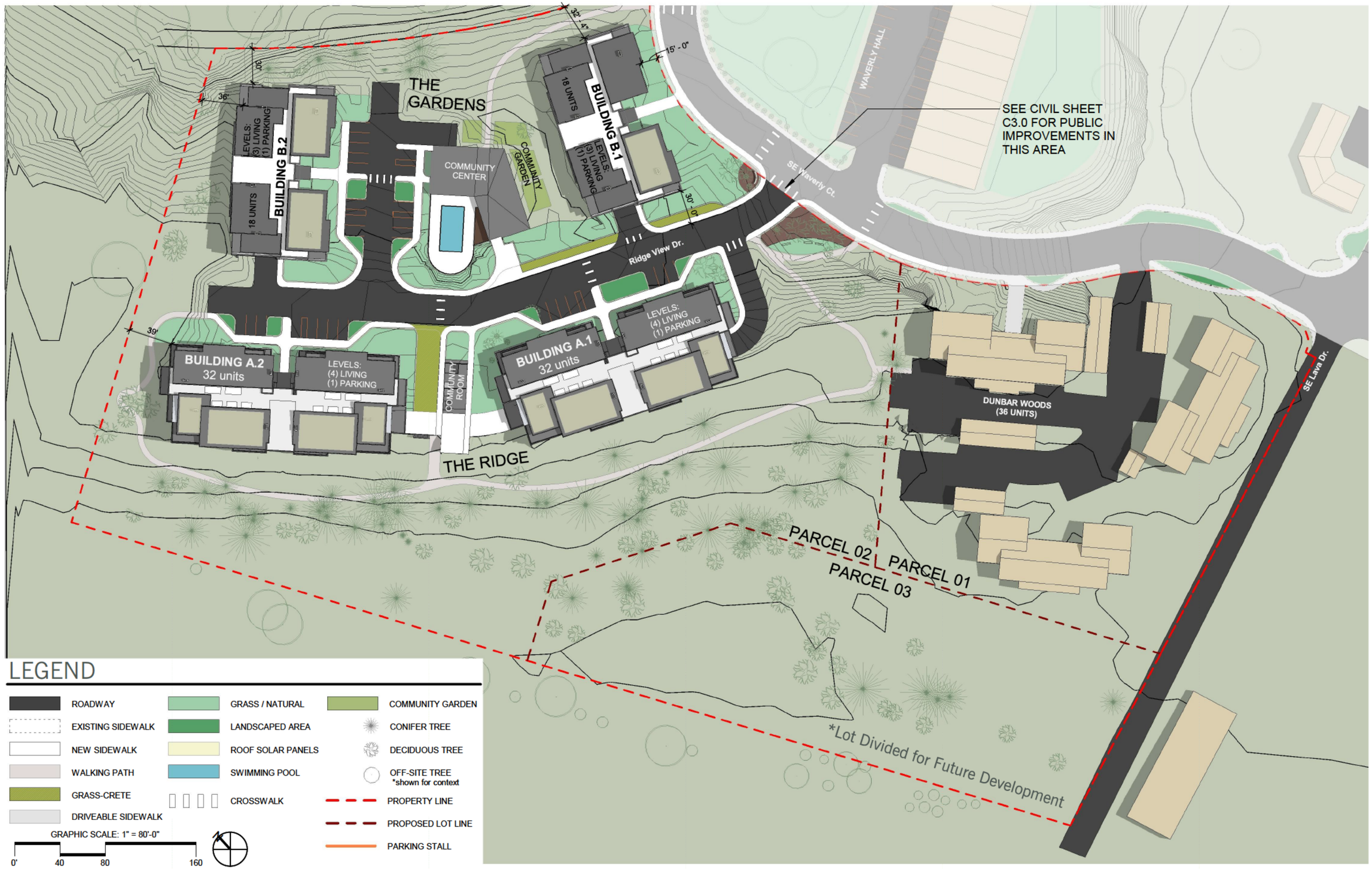
GRAPHIC SCALE: 1" = 80'-0"

0' 40 80 160

N 42°

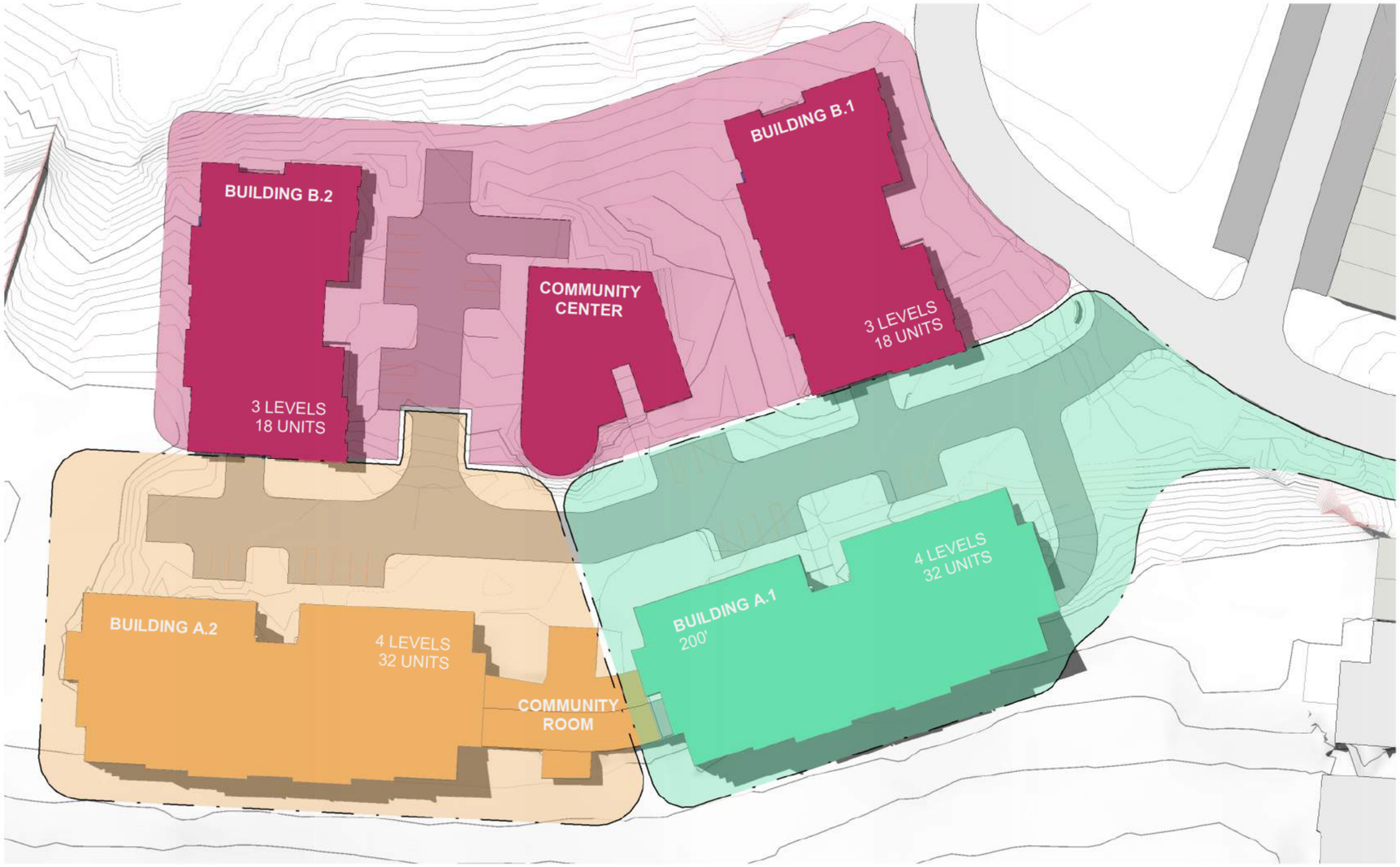
A0.1 - EXISTING SITE PLAN AND TOPOGRAPHY

07/28/2020



A1.0 - SITE PLAN

09/11/2020



PHASE UNIT COUNTS

PHASING OPTION 01:

	1 BR.	2 BR.	3 BR.	TOTAL
PHASE 01	8	24	-	**32**
PHASE 02*	8	24	-	**32**
PHASE 03*	-	36	-	**36**
TOTAL	**16**	**84**	**0**	**100**

* = ADDITION OF COMMUNITY CENTER WITHIN PHASE

BUILDING UNIT COUNTS

BUILDING TYPE A.1 (4 stories)				
	1 BR.	2 BR.	3 BR.	TOTAL
L4	2	6	-	8
L3	2	6	-	8
L2	2	6	-	8
L1	2	6	-	8
	8	24	0	**32**

BUILDING TYPE A.2 (4 stories)				
	1 BR.	2 BR.	3 BR.	TOTAL
L4	2	6	-	8
L3	2	6	-	8
L2	2	6	-	8
L1	2	6	-	8
	8	24	0	**32**

BUILDING TYPE B.1 (3 stories)				
	1 BR.	2 BR.	3 BR.	TOTAL
L3	-	6	-	6
L2	-	6	-	6
L1	-	6	-	6
	0	18	0	**18**

BUILDING TYPE B.2 (3 stories)				
	1 BR.	2 BR.	3 BR.	TOTAL
L3	-	6	-	6
L2	-	6	-	6
L1	-	6	-	6
	0	18	0	**18**

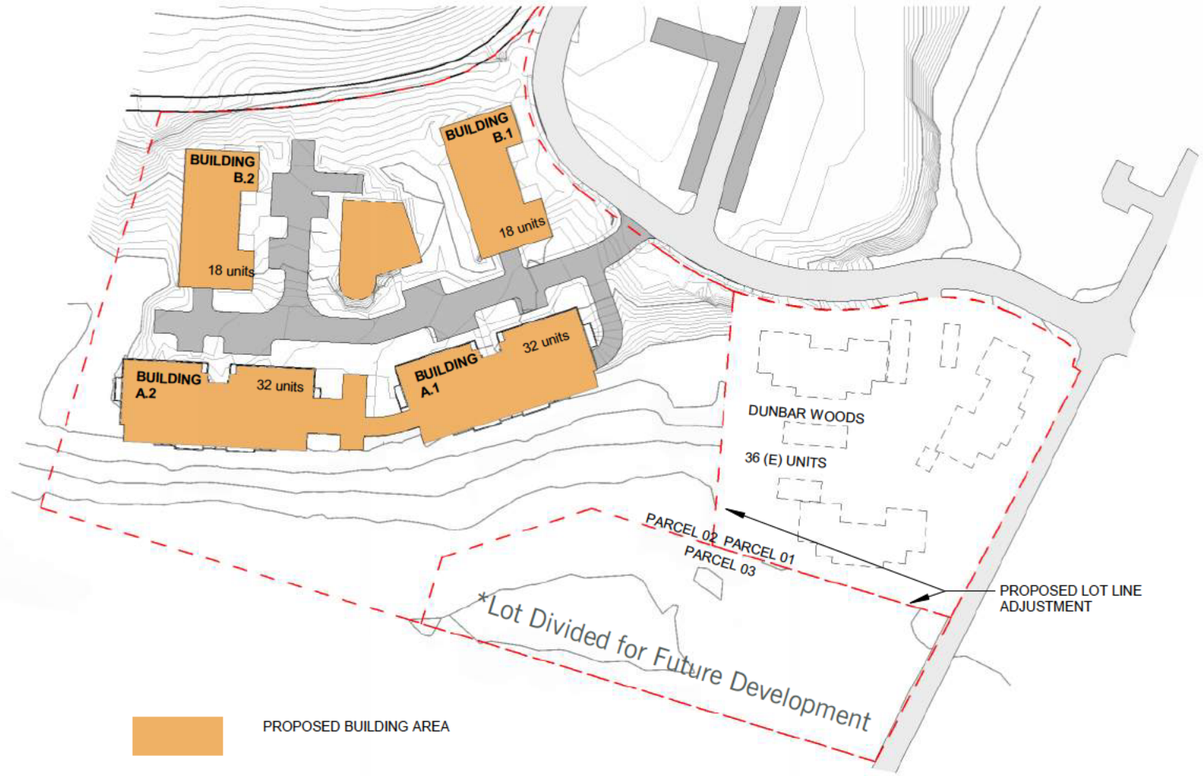
1 PHASING PLAN
NTS

LEGEND

PHASE 01
PHASE 02
PHASE 03
EXISTING ROAD
NEW ROAD
PROPERTY LINE

N
42°

1 UNIT DENSITY CALC
1" = 160'-0"



2 LOT COVERAGE CALC
1" = 160'-0"

	PARCEL AREA	PARCEL UNITS	MINIMUM DENSITY	MAXIMUM DENSITY	(PD) 20% UNIT ADD	STEEP SLOPE AREA	STEEP BUILDING AREA	BUILDING AREA	LOT COVERAGE
PARCEL 01 (E)	94,032 sq. ft.	36 (E)	25	37	-	n/a	-	25,346 sq. ft.	26.9%
PARCEL 02	294,350 sq. ft.	100 (N)	78	84	100	84,374 sq. ft.	13,026 sq. ft.	64,336 sq. ft.	21.9%
PARCEL 03	80,241 sq. ft.	n/a	21	32	n/a	-	-	n/a	n/a
TOTAL	468,623 sq. ft.	136	124	153	-	84,374 sq. ft.	13,026 sq. ft.	89,682 sq. ft.	23.1%

19.302.4 -C.1 - Density Requirements

C. Other Standards				
1. Density requirements (dwelling units per acre)				Subsection 19.202.4 Density Calculations
a. Minimum	11.6	11.6	25.0	Subsection 19.302.5.F Residential Densities
b. Maximum	14.5	17.4	32.0	Subsection 19.501.4 Density Exceptions

19.302.4 -B.4 - Lot Coverage

4. Maximum lot coverage (percent of total lot area)	40%	45%	50%	Section 19.201 "Lot coverage" definition

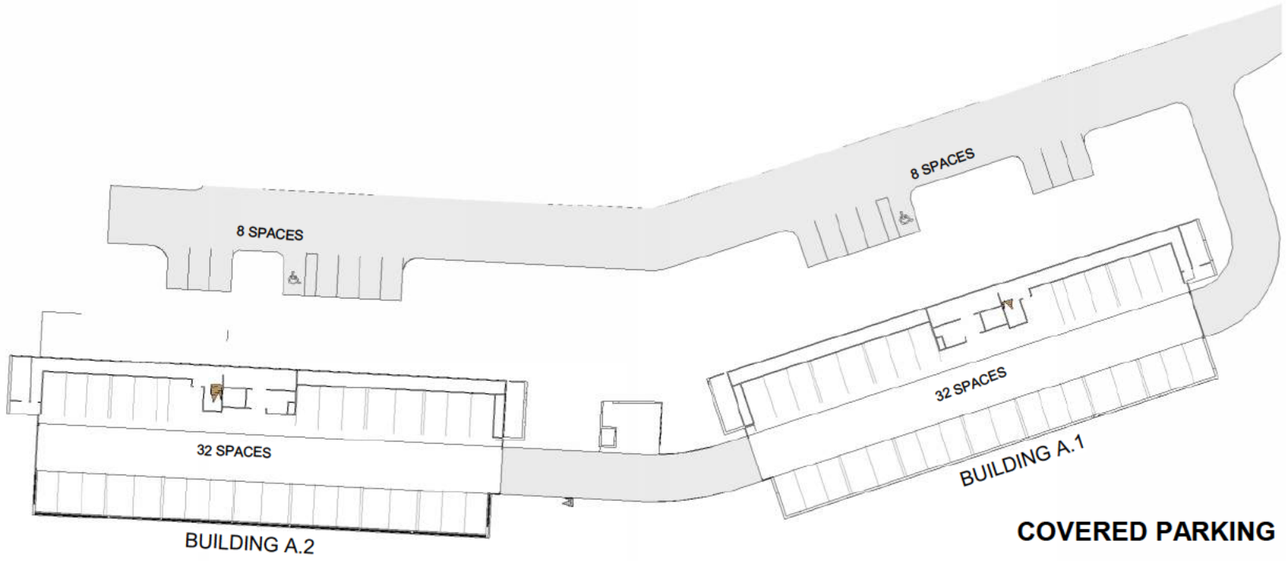
MINIMUM DENSITY CALCULATIONS FOR SITE
(PARCEL AREA / 43,560 sq. ft / AC) (11.6 units/ AC)

MAXIMUM DENSITY CALCULATIONS FOR SITE
(PARCEL AREA - STEEP SLOPE AREA) / (43,560 sq. ft / AC)) (17.6 units/ AC)

PARCEL 01 LOT COVERAGE - 26.9%
PARCEL AREA = 94,032 sq. ft.
BUILDING AREA = 25,346 sq. ft.

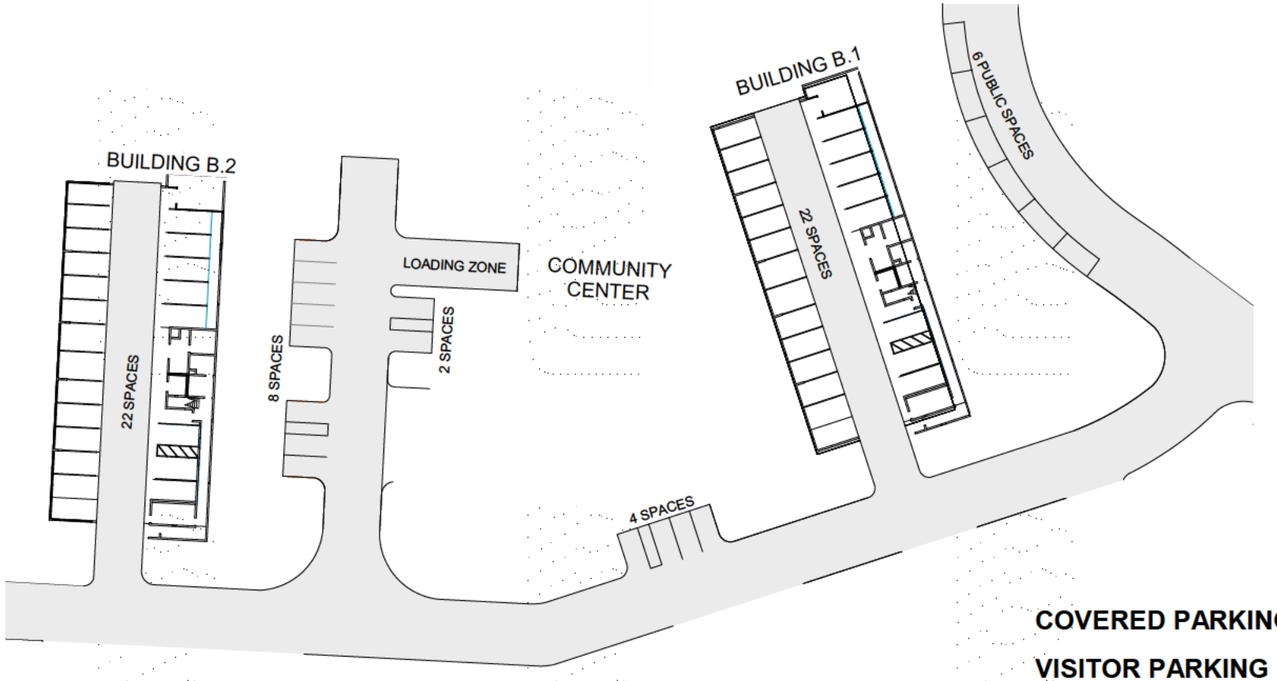
PARCEL 02 LOT COVERAGE -21.9%
PARCEL AREA = 294,350 sq. ft.
BUILDING AREA = 64,336 sq. ft.

TOTAL LOT COVERAGE - 23.1%
PARCEL AREA = 388,382 sq. ft.
BUILDING AREA = 89,682 sq. ft.



1 RIDGE BUILDINGS PARKING
NTS

COVERED PARKING 64 SPACES
VISITOR PARKING 16 SPACES
TOTAL PARKING 80 SPACES



2 GARDEN BUILDINGS PARKING
NTS

COVERED PARKING 44 SPACES
VISITOR PARKING 14 SPACES
TOTAL PARKING 58 SPACES

*EXCLUDES 6 PUBLIC STREET PARKING SPACES

Table 19.605.1
Minimum To Maximum Off-Street Parking Requirements

Use	Minimum Required	Maximum Allowed
A. Residential Uses		
1. Single-family dwellings, including rowhouses and manufactured homes.	1 space per dwelling unit.	No maximum.
2. Multifamily dwellings containing 3 or more dwelling units (includes senior and retirement housing).		
a. Dwelling units with 800 sq ft of floor area or less and all units located in the DMU Zone.	1 space per dwelling unit.	2 spaces per dwelling unit.
b. Dwelling units with more than 800 sq ft of floor area.	1.25 spaces per dwelling unit.	2 spaces per dwelling unit.

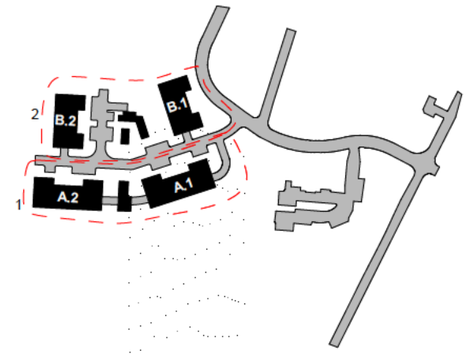
REQUIRED PARKING

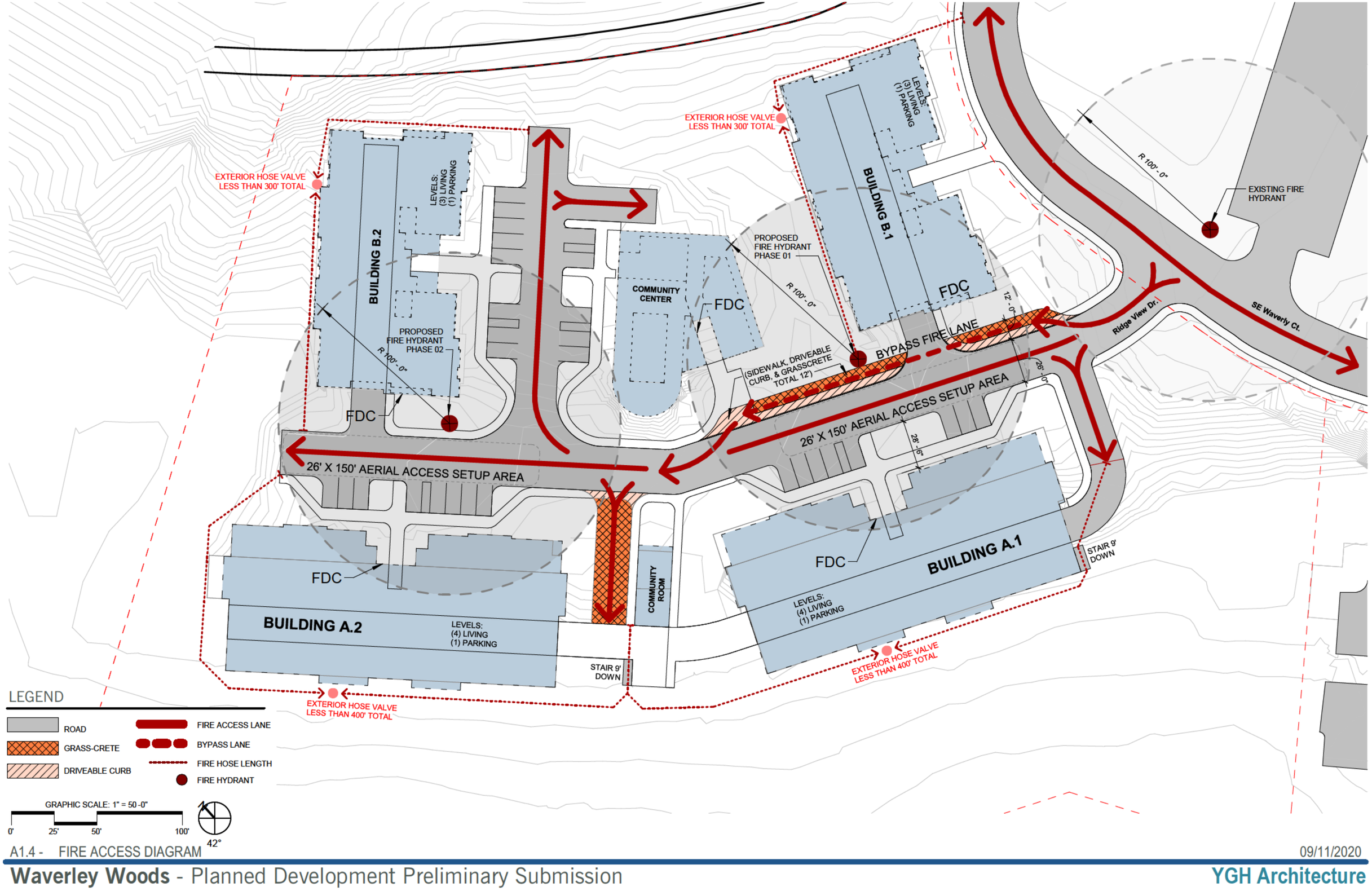
	UNITS	SPACES / UNIT	TOTAL
RIDGE BUILDINGS	64	1.25	80
GARDEN BUILDINGS	36	1.25	45
TOTAL	100	1.25	125

TOTAL PARKING COUNT

	COVERED	STREET	TOTAL
PHASE 01 - BLDG A.1	32	8	40
PHASE 02 - BLDG A.2	32	8	40
PHASE 03 - BLDG B.1 & B.2	44	14	58
SITE TOTAL	**108**	**30**	**138**

NOTE: 138 PROVIDED, 13 ABOVE MINIMUM REQUIRED PARKING COUNT

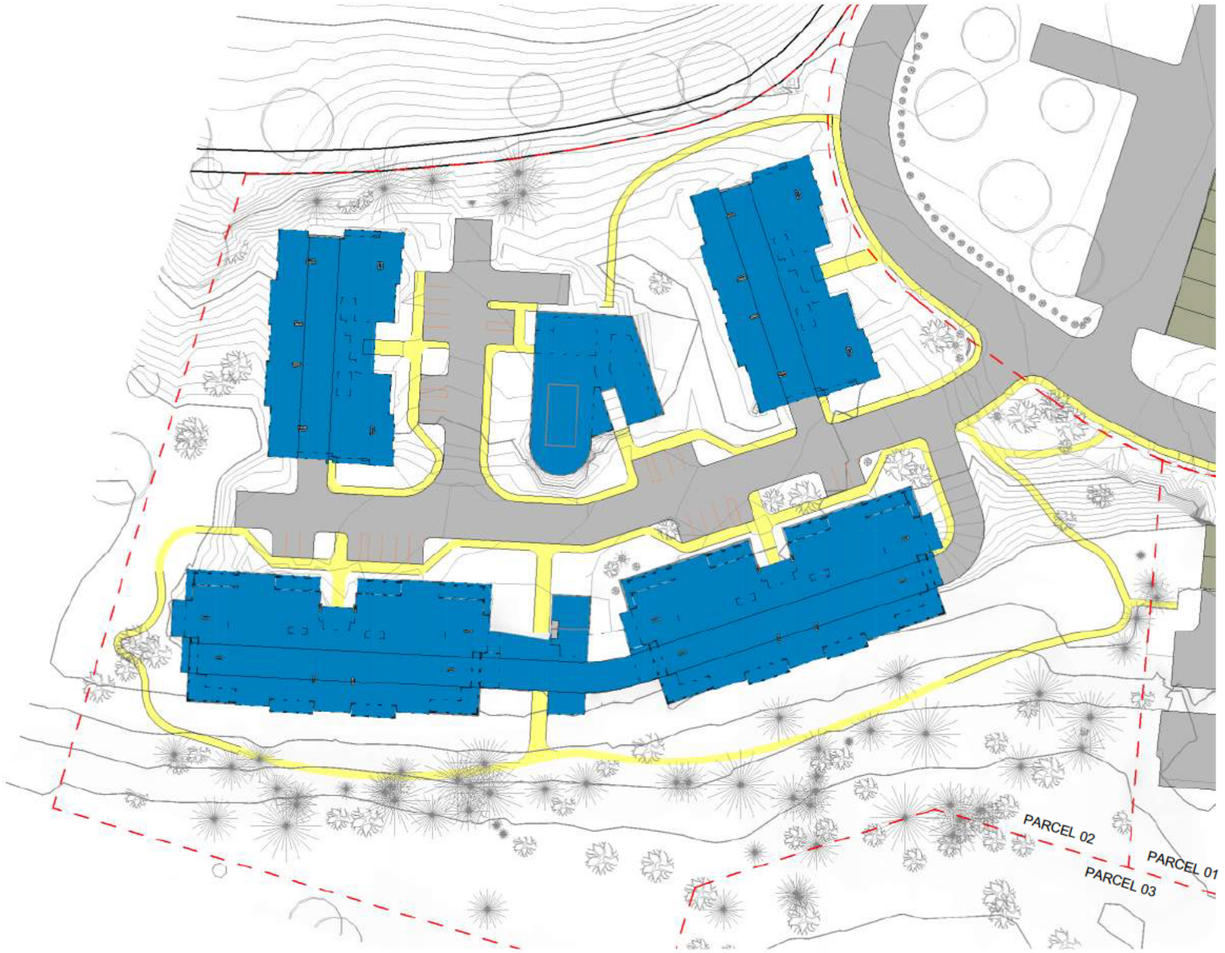




A1.4 - FIRE ACCESS DIAGRAM

09/11/2020

1 PRESERVED VEGETATED AREAS
1" = 100'-0"



2 PEDESTRIAN CIRCULATION
1" = 100'-0"

LEGEND

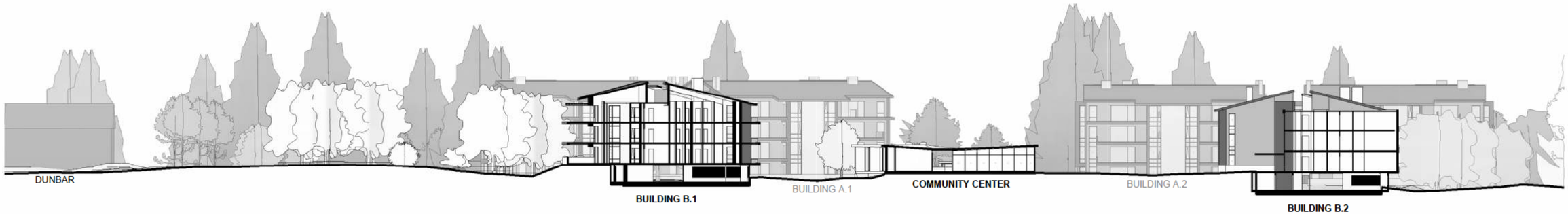
- DEVELOPMENT SITE AREA ~294,350 SQ.FT.
- MAINTAINED FORESTED AREA WITH WALKING PATHS 152,057 SQ. FT.
- GRASS / NATURAL LANDSCAPING
- LANDSCAPED AREA
- PROPERTY LINE
- STEEP AREA MAINTAINED FOREST
- COMMUNITY GARDEN
- EXISTING BUILDINGS
- SW MMING POOL
- PARKING STALL
- CONIFER TREE
- DECIDUOUS TREE
- OFF-SITE TREE *shown for context

N 42°

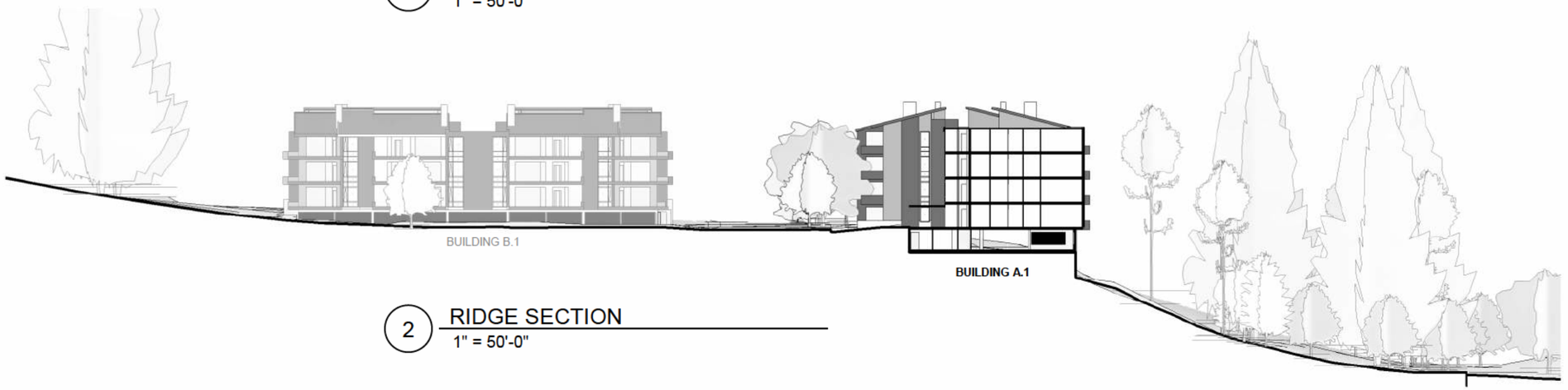
LEGEND

- SIDEWALKS / PATHS
- BUILDING FOOTPRINTS
- EXISTING BUILDINGS
- PARKING STALL
- PROPERTY LINE
- CONIFER TREE
- DECIDUOUS TREE
- OFF-SITE TREE *shown for context

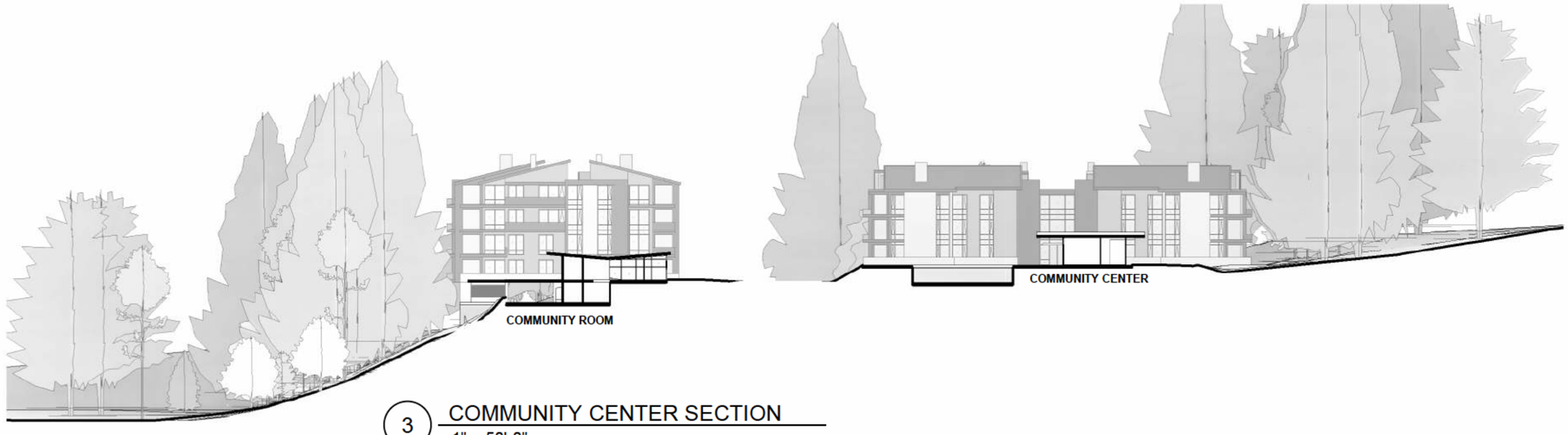
N 42°



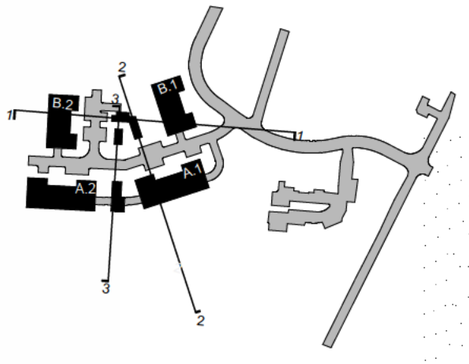
1 GARDEN SECTION
1" = 50'-0"

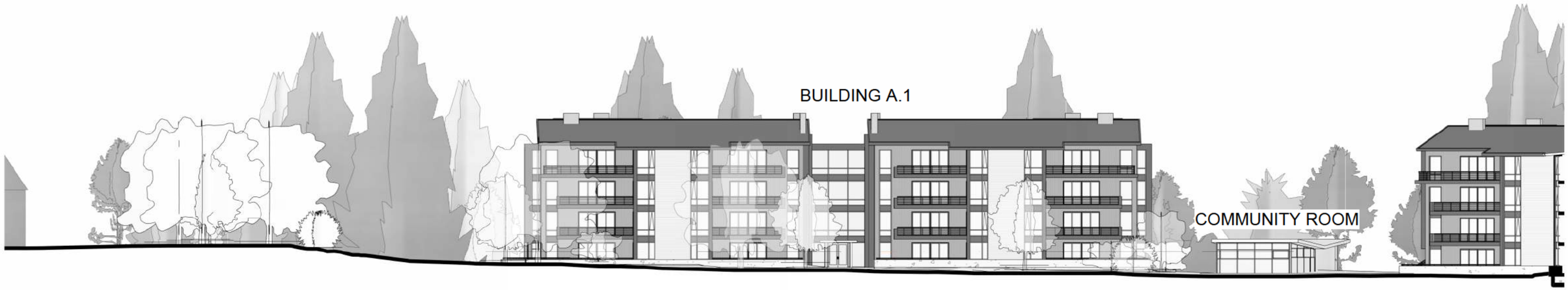


2 RIDGE SECTION
1" = 50'-0"



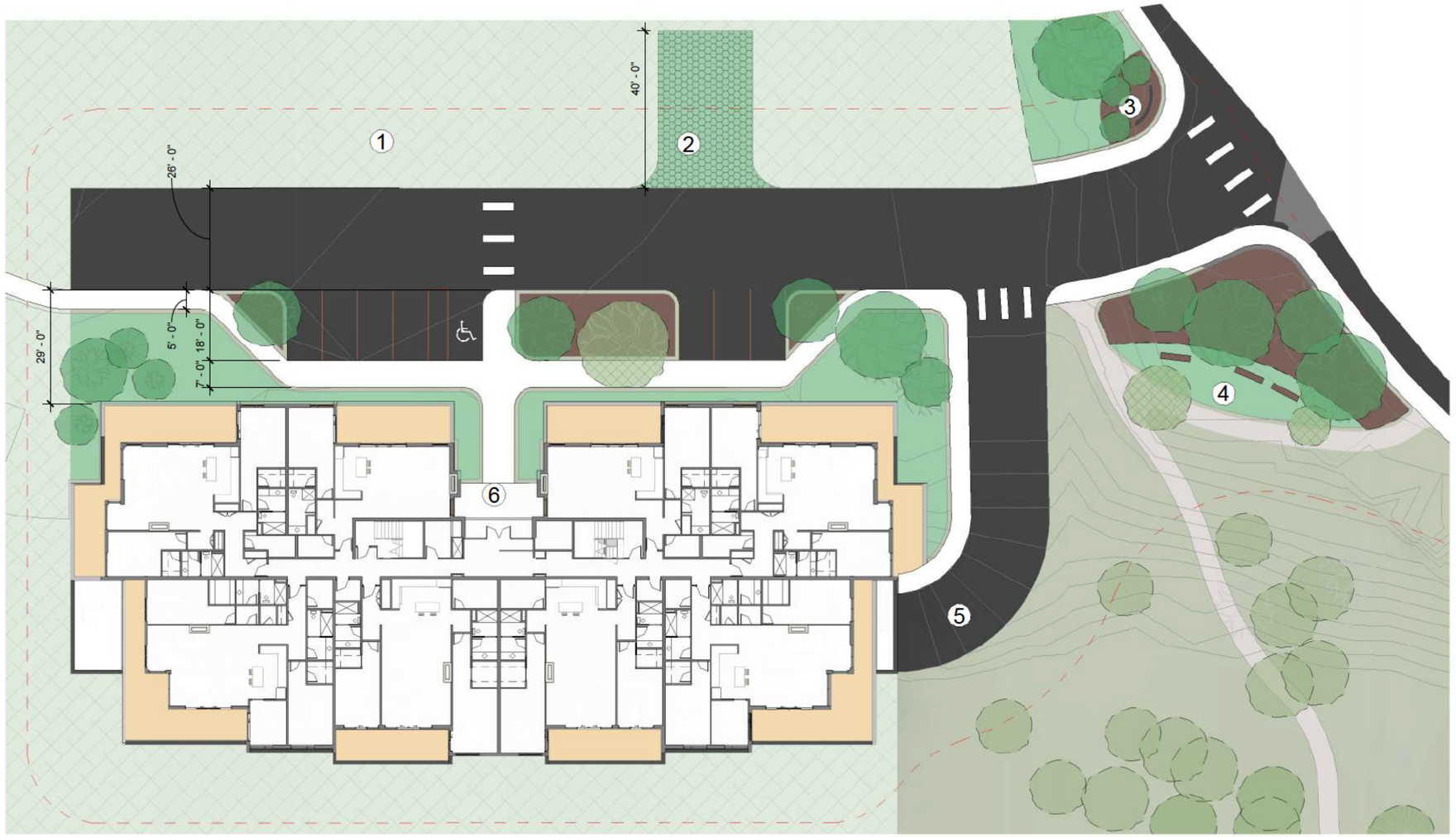
3 COMMUNITY CENTER SECTION
1" = 50'-0"





1 SITE ELVEATION - EAST
1/32" = 1'-0"

2 SITE ELEVATION - WEST
1/32" = 1'-0"



LEGEND

- ROADWAY
- NEW SIDEWALK
- MULCHED LANDSCAPE AREA
- NATURAL GRASSES / LANDSCAPING
- OUTDOOR TERRACE
- PARKING STALL
- CROSSWALK
- PHASE 01 EXTENTS

- CONIFER TREE
- DECIDUOUS TREE
- NEW PHASE 01 TREE
- EXISTING PHASE 01 TREE
- TREE OUTSIDE OF PHASE *subject to limbing / clearing for view corridors

1. CONSTRUCTION LAY DOWN ZONE COVERED WITH GRASS BETWEEN PHASES
2. 40' DEEP GRASSCRETE FIRELANE
3. ENTRY SIGNAGE / LANDSCAPING
4. WALKING PATH LANDSCAPING WITH BENCHES
5. 20' ROADWAY TO UNDERGROUND PARKING
6. BUILDING A.1 ENTRY

PHASE 01 TREE MANAGEMENT

REMOVED TREES

No.	Species	Health
105	Bigleaf Maple	DEAD
106	Bigleaf Maple	POOR
107	Bigleaf Maple	POOR
114	Bigleaf Maple	GOOD
115	Bigleaf Maple	FA R
116	Elm	POOR
117	Oregon Ash	POOR
122	Oregon White Oak	GOOD
123	Bigleaf Maple	DEAD
124	Bigleaf Maple	DEAD
127	Douglas Fir - M	GOOD
128	Douglas Fir - S	FA R
129	Bigleaf Maple	FA R
130	Bigleaf Maple	POOR
131	Oregon White Oak	GOOD
133	Douglas Fir - 20'	POOR
135	Douglas Fir - 20'	GOOD
136	Douglas Fir - S	FA R
137	Douglas Fir - S	GOOD
138	Oregon White Oak	FA R
139	Oregon White Oak	FA R
140	Oregon White Oak	FA R
141	Oregon White Oak	GOOD
214	Bigleaf Maple	GOOD
313	Oregon White Oak	GOOD
325	Oregon Ash	GOOD
326	Hawthorn	POOR
327	Hawthorn	FA R
329	Hawthorn	FA R
330	Hawthorn	FA R
331	Hawthorn	FA R
335	Bigleaf Maple	FA R
336	Hawthorn	FA R
337	Oregon Ash	GOOD
338	Bigleaf Maple	DEAD
339	Bigleaf Maple	POOR
340	Bigleaf Maple	POOR
341	Hawthorn	POOR
342	Bigleaf Maple	POOR
343	Bigleaf Maple	POOR
344	Bigleaf Maple	FA R
345	Bigleaf Maple	FA R
346	Bigleaf Maple	POOR
348	Pacific Dogwood	POOR
351	Bigleaf Maple	POOR
352	Bigleaf Maple	FA R
353	Bigleaf Maple	POOR
354	Bigleaf Maple	POOR
355	Hawthorn	POOR
357	Oregon Ash	POOR
358	Bigleaf Maple	POOR
359	Bigleaf Maple	POOR
360	Bigleaf Maple	POOR
366	Bigleaf Maple	POOR
368	Hawthorn	POOR
369	Bigleaf Maple	POOR
370	Bigleaf Maple	POOR
371	Hawthorn	FAIR
372	Hawthorn	POOR
373	Hawthorn	FAIR
374	Bigleaf Maple	POOR
375	Hawthorn	POOR
377	Hawthorn	FAIR
378	Douglas Fir - 20'	FAIR
379	Bigleaf Maple	DEAD
380	Bigleaf Maple	POOR
381	Douglas Fir - S	FAIR
382	Douglas Fir - 20'	DEAD
383	Douglas Fir - 20'	DEAD
386	Douglas Fir - 20'	POOR

TOTAL: 70

MAINTAINED TREES

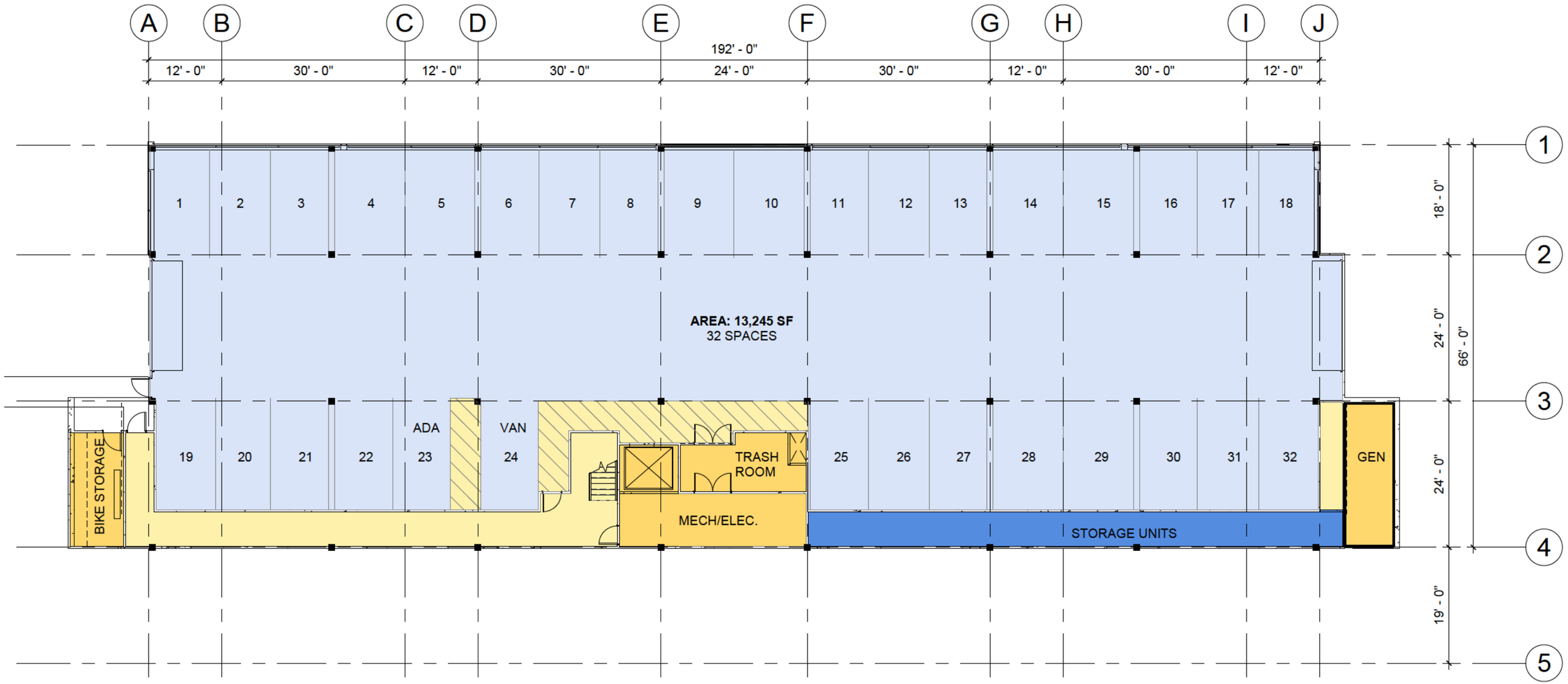
No.	Species	Health
100	Douglas Fir - M	GOOD
104	Douglas Fir - M	GOOD
113	black cottonwood	GOOD
121	Oregon White Oak	GOOD
152	Oregon White Oak	GOOD
349	Bigleaf Maple	FAIR
350	Bigleaf Maple	FAIR
356	Bigleaf Maple	GOOD
361	Douglas Fir - 20'	GOOD

TOTAL: 9

NEW PROPOSED TREES

	Bigleaf Maple	NEW
	Oregon White Oak	NEW
	Bigleaf Maple	NEW
	Oregon White Oak	NEW
	Oregon White Oak	NEW
	Bigleaf Maple	NEW
	Kousa Dogwood	NEW
	Manzanita	NEW
	Bigleaf Maple	NEW
	Oregon White Oak	NEW
	Manzanita	NEW
	Kousa Dogwood	NEW
	Kousa Dogwood	NEW
	American Beech - 20'	NEW
	Kousa Dogwood	NEW
	Manzanita	NEW
	Kousa Dogwood	NEW
	Oregon White Oak	NEW

TOTAL: 18



LEGEND

- STORAGE AREA - **498 SF**
- INTERIOR PARKING AREA - **10,750 SF**
- INTERIOR COMMON AREA - **1,062 SF**
- SERVICE AREA - **878 SF**

TOTAL AREA - **13,188 SF**

N

42°

GRAPHIC SCALE: 1/16" = 1'-0"

0' 8' 16' 32'

A3.1 - BUILDING A.1 PARKING LEVEL

07/28/2020

LEGEND

- EXTERIOR BALCONY AREA - **3,120 SF**
- INTERIOR LIVABLE AREA - **11,618 SF**
- INTERIOR COMMON AREA - **1,048 SF**
- SERVICE AREA - **248 SF**

TOTAL AREA - **15,582 SF**

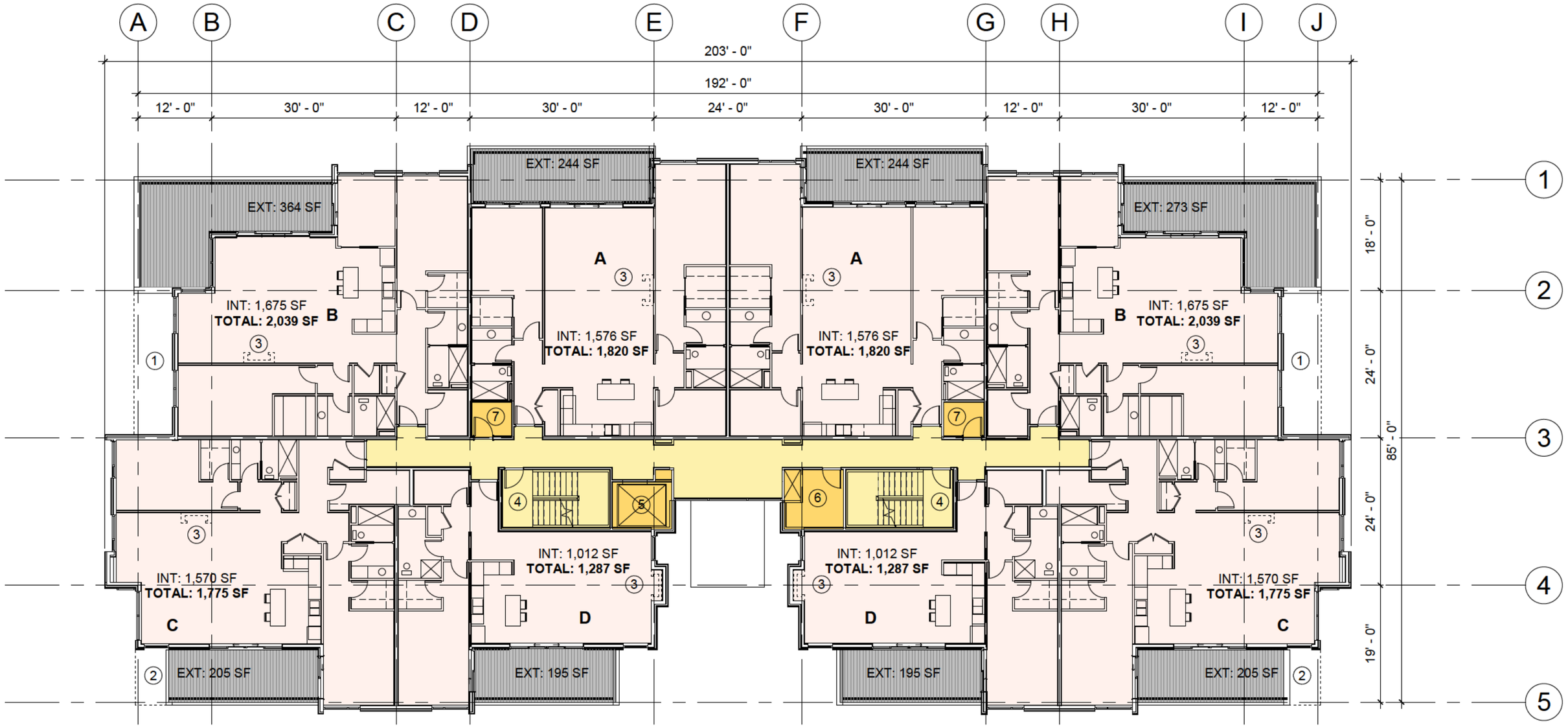
N 42°

GRAPHIC SCALE: 1/16" = 1'-0"

0' 8' 16' 32'

A3.2 - BUILDING A.1 GROUND LEVEL FLOOR PLAN

07/28/2020



LEGEND

- EXTERIOR BALCONY AREA - **2,016 SF**
- INTERIOR LIVABLE AREA - **11,666 SF**
- INTERIOR COMMON AREA - **1,048 SF**
- SERVICE AREA - **248 SF**

TOTAL AREA - **14,978 SF**

GRAPHIC SCALE: 1/16" = 1'-0"

0' 8' 16' 32'

N 42°

NOTES

1. ADDITIONAL TERRACE AT LEVEL 3 AND 4
2. ADDITIONAL TERRACE AT LEVEL 4
3. GAS FIREPLACES AT LEVEL 4
4. EXIT STAIR
5. ELEVATOR TO ALL LEVELS
6. TRASH CHUTE / RECYCLE
7. MEP EQUIPMENT

LEGEND

STANDING SEAM METAL ROOF

SOLAR ARRAY

N

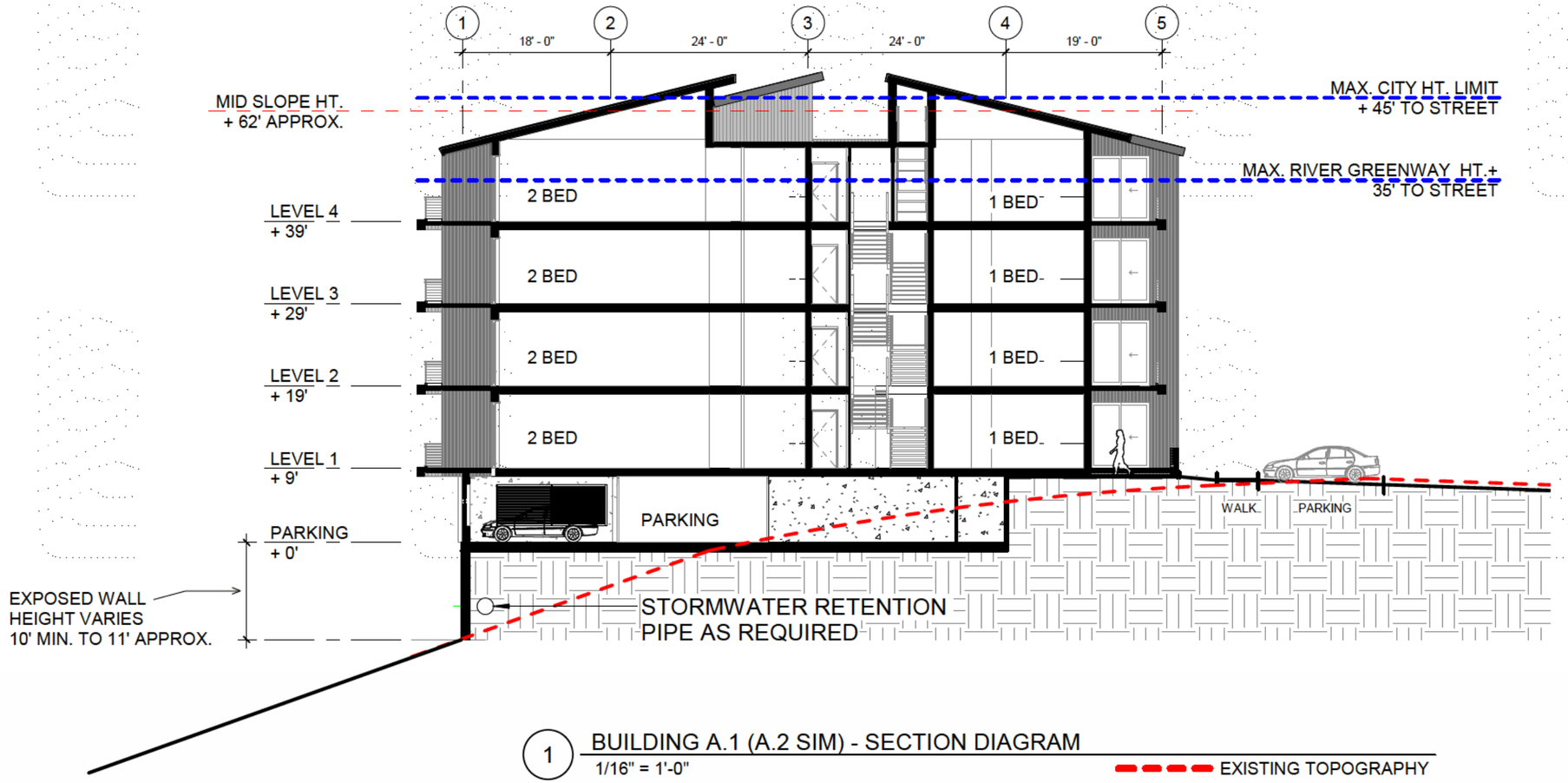
42°

GRAPHIC SCALE: 1/16" = 1'-0"

0' 8' 16' 32'

A3.4 - BUILDING A.1 ROOF LEVEL

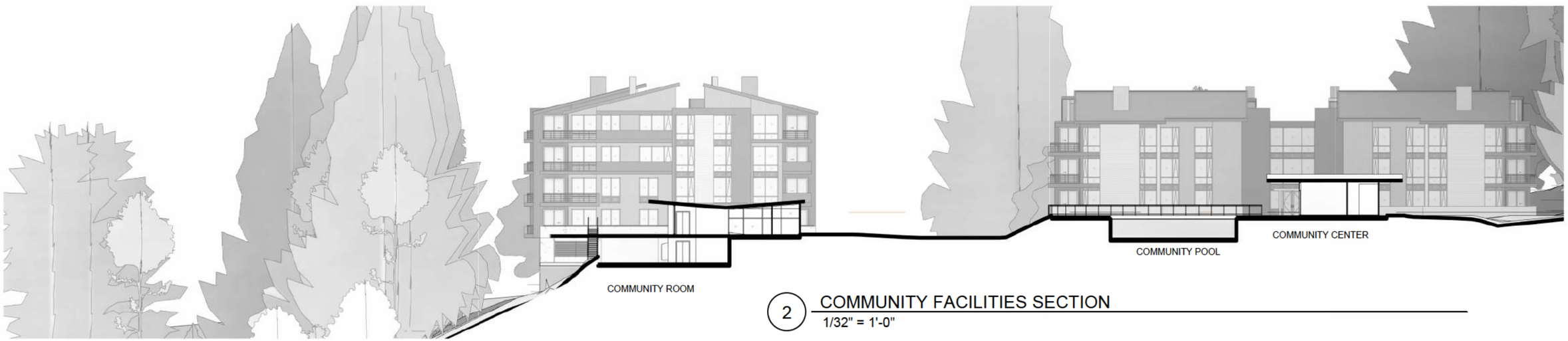
07/28/2020



1 BUILDING A.1 (A.2 SIM) - SECTION DIAGRAM

1/16" = 1'-0"

EXISTING TOPOGRAPHY

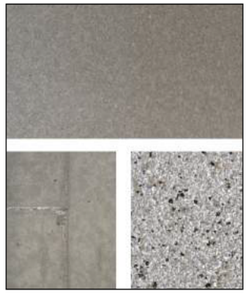


2 COMMUNITY FACILITIES SECTION

1/32" = 1'-0"

1 EAST — **45.6% GLAZING**
1/16" = 1'-0"

PRELIMINARY MATERIALS AND COLORS


SITE AND PRECAST CONCRETE

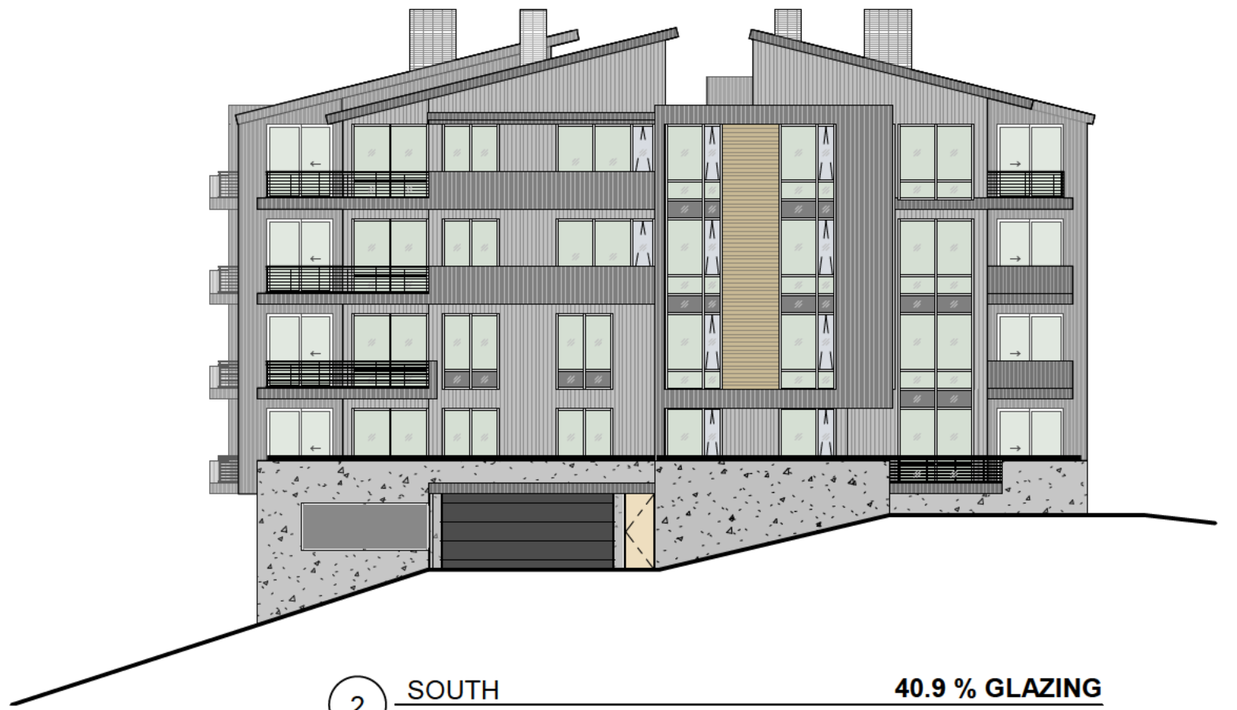

METAL PANELS AND MULLIONS


GLAZING

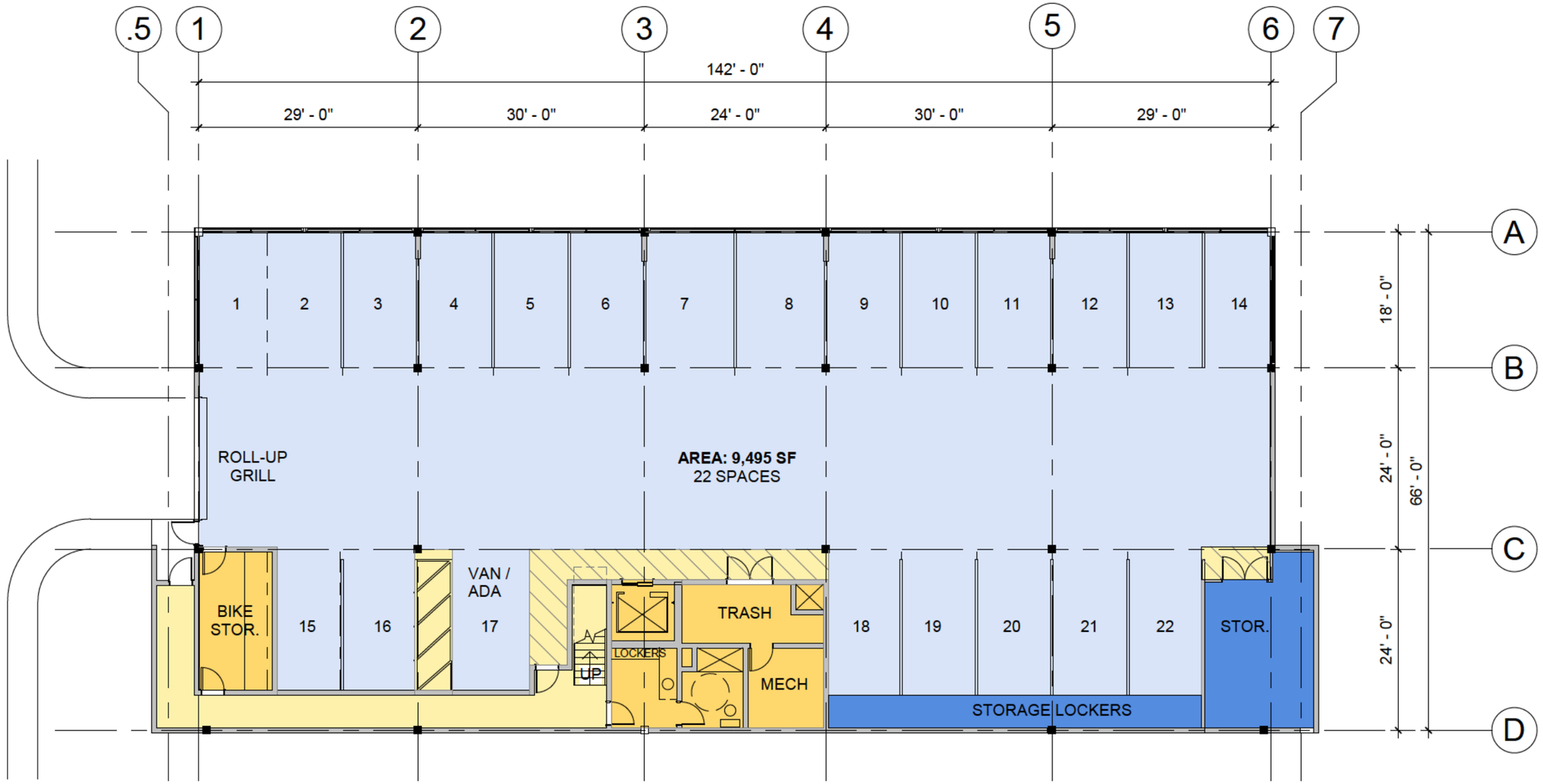

VERTICAL FIBER PANELS


HORIZONTAL TREATED WOOD SIDING


STANDING SEAM METAL ROOF



2 SOUTH — **40.9 % GLAZING**
1/16" = 1'-0"



LEGEND

- STORAGE AREA - **468 SF**
- INTERIOR PARKING AREA - **7,464 SF**
- INTERIOR COMMON AREA - **824 SF**
- SERVICE AREA - **716 SF**

TOTAL AREA - **9,495 SF**

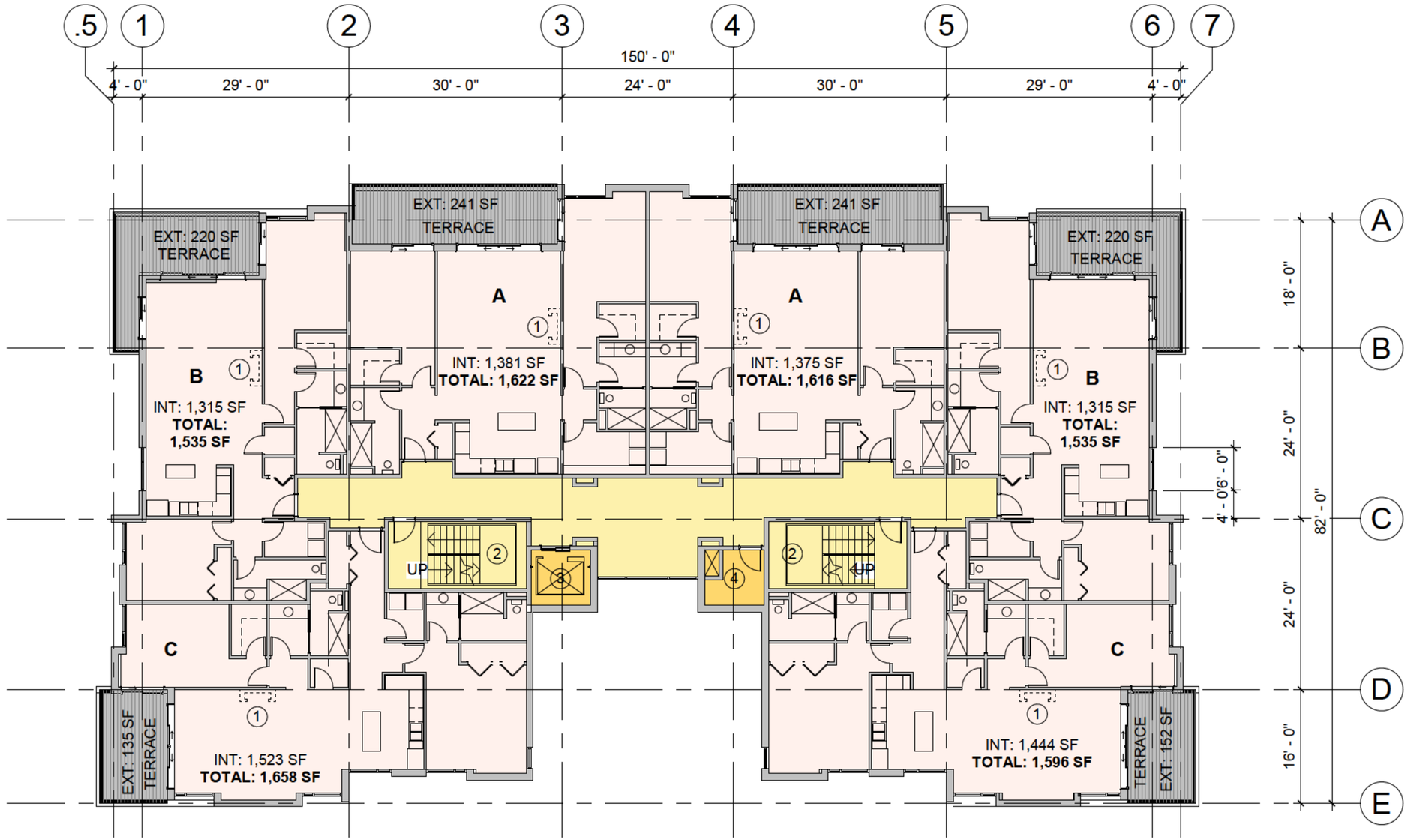
GRAPHIC SCALE: 1/16" = 1'-0"

N 42°

0' 8' 16' 32'

A4.2 - BUILDING B.1 PARKING LEVEL

07/28/2020



LEGEND

- EXTERIOR BALCONY AREA - **1,362 SF**
- INTERIOR LIVABLE AREA - **8,666 SF**
- INTERIOR COMMON AREA - **1,147 SF**
- SERVICE AREA - **127 SF**

TOTAL AREA - **11,302 SF**

NOTES

1. GAS FIREPLACES AT LEVEL 3
2. EXIT STAIR
3. ELEVATOR TO ALL LEVELS
4. TRASH CHUTE / RECYCLE

N 42°

GRAPHIC SCALE: 1/16" = 1'-0"

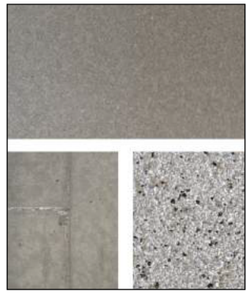
0' 8' 16' 32'

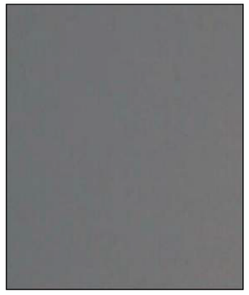
A4.3 - BUILDING B.1 TYPICAL UPPER LEVEL FLOOR PLANS

07/28/2020

1 SOUTH ELEVATION
1/16" = 1'-0"

PRELIMINARY MATERIALS AND COLORS

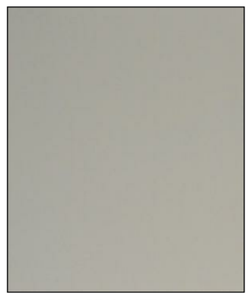

SITE AND PRECAST CONCRETE


METAL PANELS AND MULLIONS

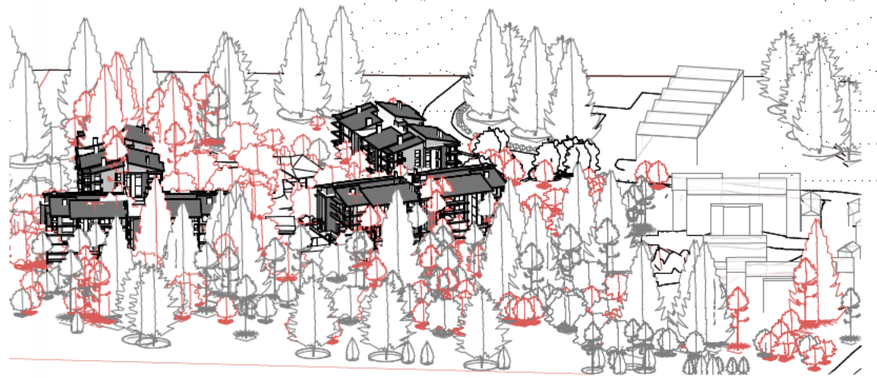

GLAZING


VERTICAL FIBER PANELS


HORIZONTAL TREATED WOOD SIDING


STANDING SEAM METAL ROOF

2 WEST ELEVATION
1/16" = 1'-0"



PARCEL 02
PARCEL 01
PARCEL 03

LEGEND

- DECIDUOUS TREE
- CONIFER TREE
- OFF-SITE TREE *shown for context
- MPACT OF GRADING
- REMOVED TREE
- PROPERTY LINE

GRAPHIC SCALE: 1/16" = 1'-0"

0' 8' 16' 32'

42°

A5.1 - TREE REMOVAL PLAN

07/28/2020

REMOVED TREES

No.	Species	Health
1	Hawthorn	FAIR
3	Hawthorn	GOOD
4	Hawthorn	GOOD
5	Scouler's willow	POOR
6	Scouler's willow	POOR
7	Bigleaf Maple	POOR
8	Bigleaf Maple	POOR
9	Crabapple	POOR
10	Bigleaf Maple	POOR
12	Douglas Fir - S	FAIR
16	Hawthorn	FAIR
24	Elm	FAIR
25	Elm	FAIR
29	Elm	FAIR
33	Bigleaf Maple	POOR
40	Bigleaf Maple	FAIR
41	Bigleaf Maple	GOOD
42	Bigleaf Maple	POOR
44	Bigleaf Maple	POOR
46	Bigleaf Maple	FAIR
49	Bigleaf Maple	POOR
58	Bigleaf Maple	POOR
60	Grand Fir	DEAD
65	Bigleaf Maple	POOR
66	Bigleaf Maple	FAIR
67	Oregon White Oak	FAIR
68	Hawthorn	FAIR
72	Douglas Fir - 20'	DEAD
76	Bigleaf Maple	POOR
78	Bigleaf Maple	POOR
79	Bigleaf Maple	POOR
84	Douglas Fir - S	FAIR
85	Bigleaf Maple	POOR
86	Bigleaf Maple	POOR
88	Bigleaf Maple	POOR
93	Oregon White Oak	FAIR
94	Douglas Fir - S	POOR
97	Bigleaf Maple	POOR
99	Douglas Fir - 20'	POOR
101	Douglas Fir - S	POOR
103	Douglas Fir - M	GOOD
105	Bigleaf Maple	DEAD
106	Bigleaf Maple	POOR
107	Bigleaf Maple	POOR
114	Bigleaf Maple	GOOD
115	Bigleaf Maple	FAIR
116	Elm	POOR
117	Oregon Ash	POOR
118	Bigleaf Maple	GOOD
119	Bigleaf Maple	GOOD
120	Bigleaf Maple	FAIR
122	Oregon White Oak	GOOD
123	Bigleaf Maple	DEAD
124	Bigleaf Maple	DEAD
127	Douglas Fir - M	GOOD
128	Douglas Fir - S	FAIR
129	Bigleaf Maple	FAIR
130	Bigleaf Maple	POOR
131	Oregon White Oak	GOOD
132	Bigleaf Maple	POOR
133	Douglas Fir - 20'	POOR
135	Douglas Fir - 20'	GOOD
136	Douglas Fir - S	FAIR
137	Douglas Fir - S	GOOD
138	Oregon White Oak	FAIR
139	Oregon White Oak	FAIR
140	Oregon White Oak	FAIR
141	Oregon White Oak	GOOD
144	Bigleaf Maple	FAIR
146	Bigleaf Maple	FAIR
151	Oregon White Oak	GOOD
158	Bigleaf Maple	POOR
160	Bigleaf Maple	FA R
164	Oregon White Oak	POOR
165	Oregon White Oak	GOOD
166	Oregon White Oak	GOOD
167	Oregon White Oak	POOR
168	Oregon White Oak	FA R
169	Oregon White Oak	FA R
170	Oregon White Oak	DEAD
171	Oregon White Oak	GOOD
172	White Oak	FA R
173	Oregon White Oak	FA R
174	White Oak	FA R
175	Oregon White Oak	FA R
176	Oregon White Oak	GOOD
177	Oregon White Oak	FA R
178	Oregon White Oak	GOOD
179	White Oak	GOOD
180	Oregon White Oak	FA R
181	Bigleaf Maple	DEAD
182	Douglas Fir - M	FA R
183	White Oak	POOR
184	Hawthorn	FA R
185	Oregon White Oak	FA R
186	Bigleaf Maple	POOR
187	Bigleaf Maple	POOR
188	Hawthorn	POOR
189	White Oak	GOOD
190	Douglas Fir - M	GOOD
191	Douglas Fir - S	GOOD
192	Douglas Fir - L	GOOD
193	Douglas Fir - M	GOOD
194	Scouler's willow	FA R
195	Douglas Fir - M	GOOD
196	Bigleaf Maple	GOOD
197	Douglas Fir - S	GOOD
198	Douglas Fir - L	GOOD
199	Bigleaf Maple	GOOD
200	Douglas Fir - M	GOOD
202	Bigleaf Maple	POOR
204	Douglas Fir - S	FA R
205	Douglas Fir - L	GOOD
206	Douglas Fir - L	GOOD
208	Douglas Fir - M	GOOD
209	Douglas Fir - S	POOR
210	Douglas Fir - M	FA R
212	Sweet Cherry	FA R
213	Bigleaf Maple	DEAD
214	Bigleaf Maple	GOOD
216	Sweet Cherry	GOOD
217	Sweet Cherry	FA R
218	Sweet Cherry	FA R
219	Oregon White Oak	GOOD
220	Douglas Fir - S	DEAD
224	Douglas Fir - M	GOOD
227	Bigleaf Maple	POOR
229	Oregon Ash	GOOD
230	Oregon Ash	GOOD
231	Oregon Ash	GOOD
232	Oregon Ash	GOOD
233	Oregon Ash	FA R
234	Bigleaf Maple	POOR
235	Bigleaf Maple	FA R
236	Bigleaf Maple	FA R
237	Bigleaf Maple	POOR
243	Oregon White Oak	GOOD
244	Oregon White Oak	GOOD
245	Oregon White Oak	GOOD
246	Oregon White Oak	FA R
247	Oregon White Oak	FA R
248	Oregon White Oak	GOOD
251	Oregon White Oak	FA R
252	Oregon White Oak	FA R
253	Oregon White Oak	FAIR
254	Oregon White Oak	GOOD
255	Oregon White Oak	FAIR
257	Oregon White Oak	FAIR
258	Oregon White Oak	POOR
260	Oregon White Oak	FAIR
261	Oregon White Oak	FAIR
262	Bigleaf Maple	DEAD
267	Oregon White Oak	POOR
269	Sweet Cherry	GOOD
271	Bigleaf Maple	POOR
272	Douglas Fir - S	POOR
273	Douglas Fir - S	DEAD
276	Douglas Fir - 20'	DEAD
279	Douglas Fir - S	FAIR
280	Bigleaf Maple	POOR
281	Bigleaf Maple	FAIR
282	Oregon White Oak	POOR
283	Douglas Fir - L	GOOD
284	Bigleaf Maple	FAIR
285	Bigleaf Maple	GOOD
286	Bigleaf Maple	FAIR
287	Bigleaf Maple	POOR
289	Oregon White Oak	DEAD
291	Douglas Fir - 20'	FAIR
292	Douglas Fir - 20'	POOR
296	Douglas Fir - L	POOR
298	Douglas Fir - M	FAIR
300	Bigleaf Maple	POOR
304	Bigleaf Maple	POOR
307	Bigleaf Maple	GOOD
308	Douglas Fir - 20'	POOR
310	Bigleaf Maple	GOOD
311	Douglas Fir - S	FAIR
313	Oregon White Oak	GOOD
314	Hawthorn	POOR
315	Oregon Ash	GOOD
316	Oregon Ash	GOOD
318	Hawthorn	POOR
319	Hawthorn - 25'	GOOD
320	Crabapple	POOR
321	Bigleaf Maple	POOR
322	Bigleaf Maple	FAIR
323	Bigleaf Maple	FAIR
325	Oregon Ash	GOOD
326	Hawthorn	POOR
327	Hawthorn	FAIR
328	Hawthorn	POOR
329	Hawthorn	FAIR
330	Hawthorn	FAIR
331	Hawthorn	FAIR
335	Bigleaf Maple	FAIR
336	Hawthorn	FAIR
337	Oregon Ash	GOOD
338	Bigleaf Maple	DEAD
339	Bigleaf Maple	POOR
340	Bigleaf Maple	POOR
341	Hawthorn	POOR
342	Bigleaf Maple	POOR
343	Bigleaf Maple	POOR
344	Bigleaf Maple	FAIR
345	Bigleaf Maple	FAIR
346	Bigleaf Maple	POOR
348	Pacific Dogwood	POOR
351	Bigleaf Maple	POOR
352	Bigleaf Maple	FAIR
353	Bigleaf Maple	POOR
354	Bigleaf Maple	POOR
355	Hawthorn	POOR
357	Oregon Ash	POOR
358	Bigleaf Maple	POOR
359	Bigleaf Maple	POOR
360	Bigleaf Maple	POOR
366	Bigleaf Maple	POOR
367	Bigleaf Maple	POOR
368	Hawthorn	POOR
369	Bigleaf Maple	POOR
370	Bigleaf Maple	POOR
371	Hawthorn	FAIR
372	Hawthorn	POOR
373	Hawthorn	FAIR
374	Bigleaf Maple	POOR
375	Hawthorn	POOR
377	Hawthorn	FAIR
378	Douglas Fir - 20'	FAIR
379	Bigleaf Maple	DEAD
380	Bigleaf Maple	POOR
381	Douglas Fir - S	FAIR
382	Douglas Fir - 20'	DEAD
383	Douglas Fir - 20'	DEAD
384	Elm	FAIR
385	Douglas Fir - 20'	DEAD
386	Douglas Fir - 20'	POOR
388	Hawthorn	FAIR
390	Douglas Fir - 20'	DEAD
392	Douglas Fir - 20'	DEAD
394	Douglas Fir - 20'	POOR
397	Douglas Fir - S	FAIR
400	Bigleaf Maple	DEAD
403	Elm	GOOD
404	Oregon White Oak	DEAD
405	Oregon White Oak	GOOD
407	Hawthorn	FAIR
407.1	Sweet Cherry	FAIR
408	Hawthorn	FAIR
408.1	Sweet Cherry	FAIR
409	Oregon White Oak	POOR
410	Bigleaf Maple	DEAD
411	Hawthorn	GOOD
412	Bigleaf Maple	POOR
418	Elm	DEAD
420	purple leaf plum	POOR

TOTAL: 256

MAINTAINED TREES

No.	Species	Health
2	Bigleaf Maple	GOOD
11	Bigleaf Maple	GOOD
13	Douglas Fir - M	FAIR
14	Douglas Fir - L	GOOD
15	Douglas Fir - L	FAIR
17	Bigleaf Maple	GOOD
18	Bigleaf Maple	GOOD
19	Bigleaf Maple	GOOD
20	Douglas Fir - L	GOOD
21	Red Oak	GOOD
22	Elm	GOOD
23	Oregon White Oak	GOOD
26	Elm	GOOD
27	Elm	GOOD
28	Oregon White Oak	FAIR
30	Oregon White Oak	GOOD
31	Oregon White Oak	GOOD
32	Bigleaf Maple	GOOD
34	Bigleaf Maple	GOOD
35	Douglas Fir - M	GOOD
36	Douglas Fir - L	GOOD
37	Bigleaf Maple	N/A
38	Douglas Fir - M	GOOD
39	Bigleaf Maple	FAIR
43	Douglas Fir - M	GOOD
45	Bigleaf Maple	FAIR
47	Douglas Fir - L	GOOD
48	Bigleaf Maple	FAIR
50	Oregon White Oak	GOOD
51	Douglas Fir - M	GOOD
52	Douglas Fir - M	GOOD
53	Bigleaf Maple	FAIR
54	Bigleaf Maple	GOOD
55	Douglas Fir - L	GOOD
56	Bigleaf Maple	GOOD
57	Douglas Fir - L	GOOD
59	Douglas Fir - L	GOOD
61	Douglas Fir - S	FAIR
62	Douglas Fir - 20'	GOOD
64	Bigleaf Maple	FAIR
69	Oregon White Oak	GOOD
70	Douglas Fir - S	GOOD
71	Douglas Fir - S	GOOD
73	Grand Fir	GOOD
74	Bigleaf Maple	FAIR
75	Douglas Fir - M	GOOD
77	Bigleaf Maple	GOOD
80	Douglas Fir - S	GOOD
81	Douglas Fir - S	FAIR
82	Grand Fir	GOOD
83	Douglas Fir - M	GOOD
87	Douglas Fir - L	GOOD
89	Douglas Fir - S	GOOD
90	Bigleaf Maple	GOOD
91	Bigleaf Maple	GOOD
92	Oregon White Oak	FAIR
95	Douglas Fir - S	GOOD
96	Douglas Fir - S	GOOD
98	Douglas Fir - S	GOOD
100	Douglas Fir - M	GOOD
102	Bigleaf Maple	FAIR
104	Douglas Fir - M	GOOD
113	black cottonwood	GOOD
121	Oregon White Oak	GOOD
143	Oregon White Oak	GOOD
145	Oregon White Oak	GOOD
147	Douglas Fir - S	GOOD
148	Bigleaf Maple	FAIR
149	Douglas Fir - M	FAIR
150	Bigleaf Maple	GOOD
152	Oregon White Oak	GOOD
153	Bigleaf Maple	GOOD
154	Douglas Fir - S	GOOD
155	Douglas Fir - L	GOOD
156	Douglas Fir - L	GOOD
157	Douglas Fir - L	GOOD
159	Douglas Fir - S	GOOD
161	Douglas Fir - 20'	GOOD
162	Douglas Fir - 20'	GOOD
163	Douglas Fir - M	GOOD
201	Oregon White Oak	GOOD
203	Douglas Fir - M	GOOD
207	Douglas Fir - L	GOOD
211	Douglas Fir - M	GOOD
221	Douglas Fir - L	GOOD
222	Douglas Fir - S	GOOD
223	Douglas Fir - L	GOOD
226	Douglas Fir - 20'	FAIR
228	Bigleaf Maple	GOOD
238	Oregon White Oak	GOOD
239	Oregon White Oak	FAIR
240	Oregon White Oak	FAIR
241	Oregon White Oak	GOOD
249	Oregon White Oak	GOOD
256	Douglas Fir - L	GOOD
259	White Oak	FAIR
263	Douglas Fir - S	GOOD
264	Douglas Fir - S	GOOD
265	Douglas Fir - M	GOOD
266	Douglas Fir - L	GOOD
268	Bigleaf Maple	FAIR
270	Douglas Fir - L	GOOD
274	Douglas Fir - S	GOOD
275	Douglas Fir - S	GOOD
277	Douglas Fir - M	GOOD
278	Douglas Fir - M	GOOD
288	Oregon White Oak	GOOD
290	Grand Fir	GOOD
293	Douglas Fir - S	GOOD
294	Bigleaf Maple	FA R
295	shore pine	GOOD
301	Bigleaf Maple	FA R
302	Bigleaf Maple	FA R
303	Douglas Fir - S	FA R
306	Bigleaf Maple	FA R
309	Douglas Fir - M	GOOD
349	Bigleaf Maple	FA R
350	Bigleaf Maple	FA R
356	Bigleaf Maple	GOOD
361	Douglas Fir - 20'	GOOD
362	shore pine	FA R
363	shore pine	FA R
364	shore pine	FA R
365	shore pine	GOOD
393	Elm	GOOD
395	Bigleaf Maple	FA R
396	Bigleaf Maple	FA R
401	Elm	FA R
402	Elm	FA R
406	Oregon White Oak	FA R
413	Bigleaf Maple	GOOD
414	Bigleaf Maple	GOOD
416	Pacific Dogwood	FA R
417	Elm	GOOD
419	Bigleaf Maple	GOOD

TOTAL: 135

GRAND TOTAL: 391

VIEWS LOOKING EAST ACROSS RIVER TO SITE SHOWING MINIMAL PROJECT VISIBILITY

VIEWS LOOKING NORTH DOWN RIVER TO SITE SHWOING MINIMAL PROJECT VISIBILITY

APPROXIMATE MASTER PLAN EARTHWORK (1:1)
CUT: 5,620 CY FILL: 12,900 CY NET: - 7,280 CY

APPROXIMATE PHASE 1 EARTHWORK (1:1)
CUT: 1,170 CY FILL: 3,780 CY NET: - 2,610 CY

SCALE 1 INCH = 40 FEET
40 0 40 80

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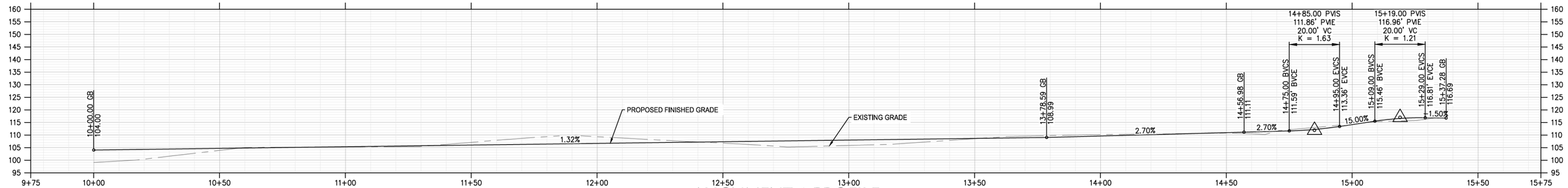
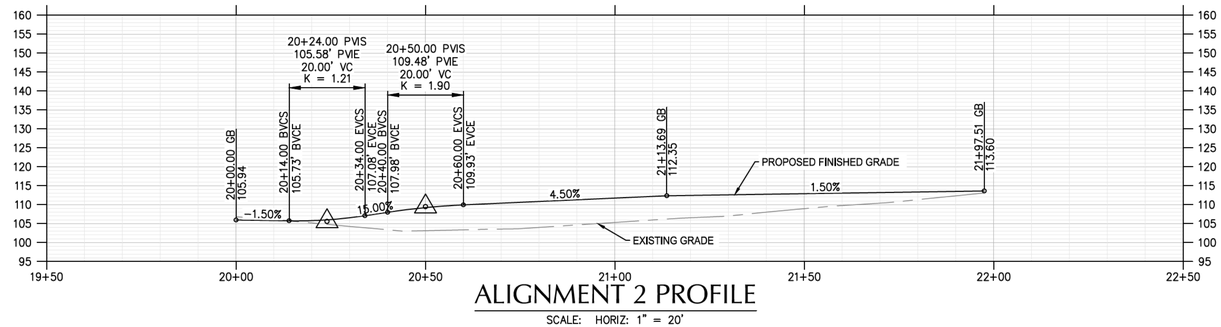


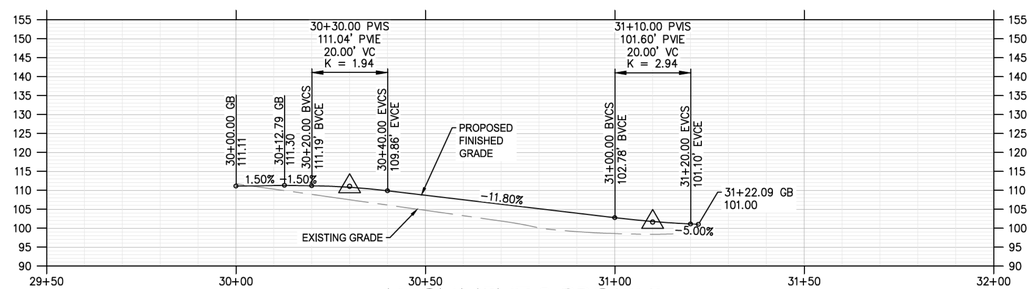
ALIGNMENT 1 PROFILE

SCALE: HORIZ: 1" = 20'
VERT: 1" = 20'



ALIGNMENT 2 PROFILE

SCALE: HORIZ: 1" = 20'
VERT: 1" = 20'



ALIGNMENT 3 PROFILE

SCALE: HORIZ: 1" = 20'
VERT: 1" = 20'

SCALE 1 INCH = 40 FEET
40 0 40 80

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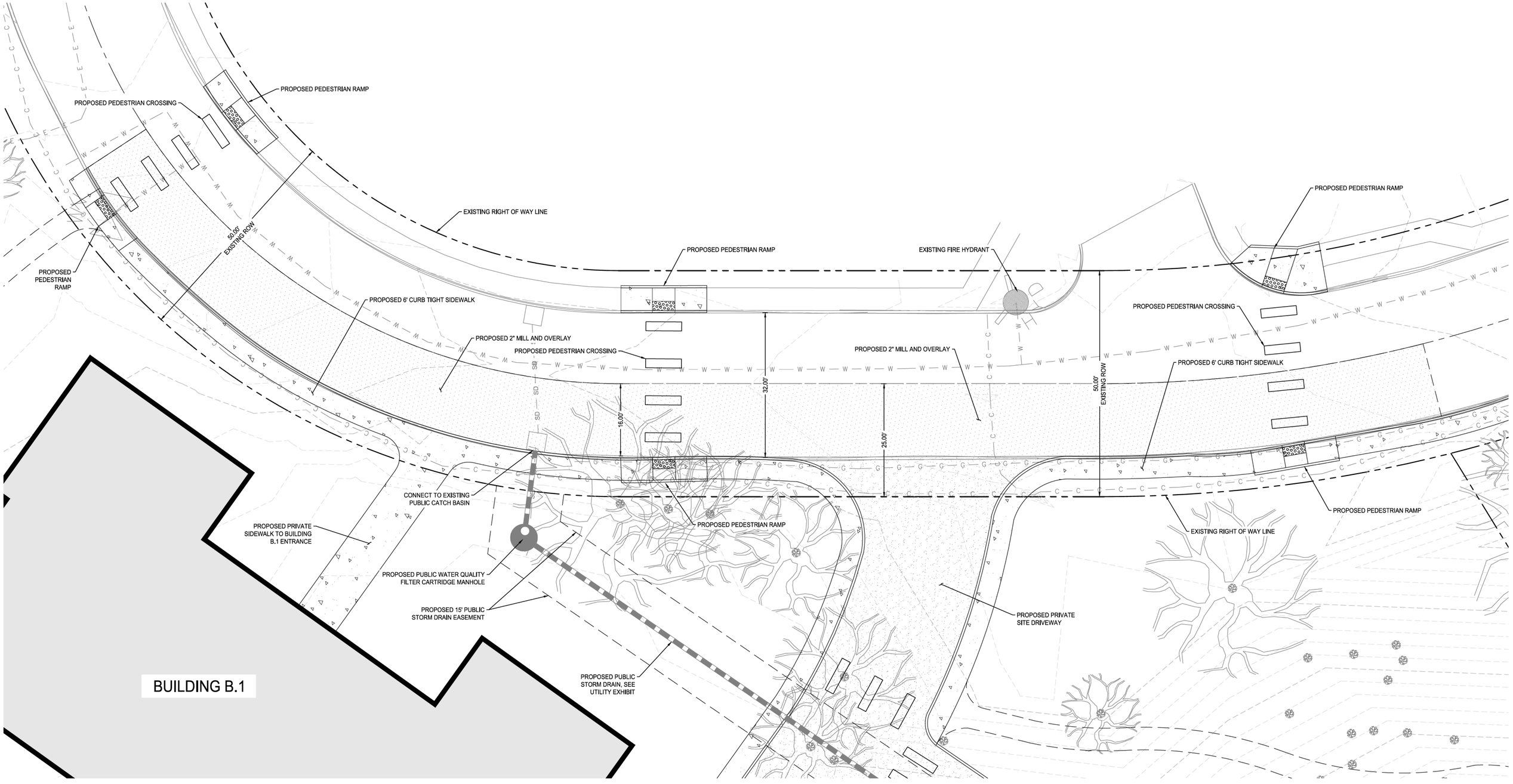

SCALE 1 INCH = 40 FEET

40 0 40 80

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LEGEND

- STORM DRAIN
- SANITARY SEWER
- W — DOMESTIC WATER
- FP — FIRE PROTECTION
- G — NATURAL GAS
- E — ELECTRIC

EXISTING FIRE HYDRANT 100' RADIUS
CONNECT TO EXISTING PUBLIC STREET CATCHBASIN
CONNECT TO EXISTING WATER MAIN FOR DOMESTIC WATER
CONNECT TO EXISTING WATER MAIN FOR FIRE PROTECTION
CONNECT TO EXISTING GAS LINE
CONNECT TO EXISTING ELECTRIC SYSTEM
EXISTING FIRE HYDRANT 100' RADIUS
PROPOSED FIRE HYDRANT 100' RADIUS
SD PUB WQ FILTER CARTRIDGE MH
W METER
W BACKFLOW
BUILDING B.1
PARKING: 108.0
LEVEL 1: 117.0
ELEC STUB-1
FP STUB-1
W STUB-1
NGAS STUB-1
S STUB-1
FP FH-1
FP BACKFLOW
15' PUBLIC STORM DRAIN EASEMENT
SD AD-2
SD AD-1
SD 45° HB
PROPOSED FIRE HYDRANT 100' RADIUS
COMMUNITY BUILDING
FFE: 114.0
TRENCH DRAIN
SD CB-1
SD MH-1
SD STUB-1
SD WYE-1
NGAS STUB-2
FP STUB-2
W STUB-2
ELEC STUB-2
BUILDING B.2
PARKING: 105.0
LEVEL 1: 114.0
SD DI-1
SD WYE-8
S STUB-5
NGAS STUB-5
SD STUB-5
ELEC STUB-5
W STUB-5
FP STUB-5
SD CB-3
SD WYE-7
S STUB-2
SD STUB-2
SD CB-2
SD WYE-4
SD WYE-2
SD WYE-3
TRENCH DRAIN
SD FLOW CONTROL MH
APPROXIMATE LOCATION OF EXISTING 15" STORM DRAIN
PROPOSED 15' PUBLIC STORM DRAIN EASEMENT OVER EXISTING STORM DRAIN SYSTEM
SD PUB-MH-2
SD PUB-MH-1
15' PUBLIC STORM DRAIN EASEMENT
SD STUB-3
FP STUB-3
W STUB-3
NGAS STUB-3
ELEC STUB-3
SD MH-2
BUILDING A.1
PARKING: 101.0
LEVEL 1: 110.0
FP FH-2
TRENCH DRAIN
SD CB-4
SD WYE-5
SD WYE-6
S MH-4
SD MH-3
SD DETENTION VAULT
SD PUB-MH-3
CONNECT TO EXISTING 15" STORM DRAIN STUB
PROPOSED 15' PUBLIC STORM DRAIN EASEMENT OVER EXISTING STORM DRAIN SYSTEM
ELEC STUB-4
FP STUB-4
W STUB-4
NGAS STUB-4
SD STUB-4
S STUB-4
S STUB-3
SD WQ FILTER CARTRIDGE MH
S MH-3
BUILDING A.2
PARKING: 99.0
LEVEL 1: 108.0
S MH-2
EXISTING FIRE HYDRANT 100' RADIUS
S MH-1
CONNECT TO EXISTING 8" SANITARY SEWER

SCALE 1 INCH = 40 FEET
40 0 40 80

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Appendix A

MEMORANDUM

Date:	July 17, 2020	Project #: 24832
To:	Steve Adams, PE – City of Milwaukie Avi Tayar, PE – Oregon Department of Transportation Reah Flisakowski, PE – DKS Associates	
CC:	Phil Krueger, AIA, LEED AP BD+C – Yost Grube Hall Architecture Scott Wyse – Walker Ventures LLC	
From:	Kristine Connolly, PE, Brian Dunn, PE, and Ali Razmpa – Kittelson & Associates, Inc.	
Project:	Waverley Woods Apartments	
Subject:	Transportation Impact Analysis	

Walker Ventures, LLC is proposing a multifamily apartment development located at 10415 SE Waverly Court. The proposed development site is part of the larger Waverley Greens Apartment complex which exists northeast of the site. The current proposal includes development of up to 100 multifamily apartment units with access via a driveway on SE Waverly Court. Future development may include up to 32 additional multifamily apartment units with access via a driveway on SE Lava Drive. The site location and overall site vicinity are shown in **Exhibit 1** and a conceptual site plan is shown in **Attachment A**. This transportation impact analysis report documents the transportation impacts associated with site development. To provide a conservative analysis, this report assumes full build-out of the site (both the current proposed and potential future development). Key findings and recommendations are summarized below.

SUMMARY OF FINDINGS

- All study intersections are forecast to operate within the applicable review agency volume-to-capacity ratio and level of service standards under existing and site build-out year 2021 conditions during the weekday AM and PM peak hours.
- Historical crash data for the study area intersections indicate no patterns or trends that require mitigation associated with the proposed development.

RECOMMENDATIONS

- Any new landscaping, above ground utilities, and signing should be located and maintained along the site frontage to maximize sight distance.

Exhibit 1. Site Vicinity Map

REPORT SCOPE

This report identifies the transportation-related impacts associated with the proposed development and was prepared in accordance with the City of Milwaukie and Oregon Department of Transportation (ODOT) requirements. Per City and ODOT staff direction, operational analyses were performed at the following study intersections during the weekday AM and PM peak periods (see **Exhibit 1**):

1. SE 17th Avenue – SE Harrison Street/SE McLoughlin Boulevard (OR-99E)
2. SE 17th Avenue/SE Lava Drive
3. SE 17th Avenue/Milwaukie Expressway (OR-224)
4. SE Lava Drive/SE Waverly Court
5. SE Waverly Court/Proposed Site Access
6. SE Lava Drive/Potential Future Site Access

This report evaluates the following transportation issues:

- Existing land use and transportation system conditions within the site vicinity during the weekday AM and PM peak periods;
- Forecast year 2021 background traffic conditions during the weekday AM and PM peak periods, considering other development and transportation improvements planned in the study area;
- Trip generation and distribution estimates for the proposed development;

- Forecast year 2021 total traffic conditions during the weekday AM and PM peak periods with build-out of the site;
- Review of applicable City of Milwaukie requirements, including sight distance and access standards; and
- Findings and recommendations.

Analysis Methodology

All level-of-service (LOS) analyses described in this report were performed in accordance with the procedures stated in the *Highway Capacity Manual, 6th Edition* (HCM – Reference 1) using PTV Vistro 2020 software. To ensure that the analyses were based on a reasonable worst-case scenario, peak 15-minute flow rates were used in the evaluation of all intersection levels of service. For this reason, the analyses reflect conditions that are only likely to occur for 15 minutes out of each average peak hour.

Applicable Operating Standards

Chapter 3 of the *City of Milwaukie Transportation System Plan* (TSP – Reference 2) defines the minimum acceptable measure of effectiveness for intersections during the peak hour as LOS "D" for both signalized and stop-controlled intersections.

The 1999 Oregon Highway Plan and all associated plan updates (OHP – Reference 3) defines ODOT v/c ratio mobility targets based on facility type. Per the OHP, a maximum v/c ratio of 0.99 is the ODOT mobility target for the SE 17th Avenue/OR-224 intersection. At SE 17th Avenue – SE Harrison Street/OR-99E, a maximum v/c ratio of 1.1 is the mobility target for the first highest hour and 0.99 for the second highest hour, due to its location within a Town Center.

Table 1 lists the study intersections, existing traffic control, jurisdictional authority, and the corresponding operating standard.

Table 1. Study Intersection Operating Standards

	Study Intersection	Traffic Control	Jurisdictional Authority	Intersection Operating Standard
1	SE 17th Avenue – SE Harrison Street/OR-99E	Signalized	ODOT	Intersection V/C ≤ 1.10 during the 1st Highest Hour Intersection V/C ≤ 0.99 during the 2nd Highest Hour
2	SE 17th Avenue/SE Lava Drive	Two Way Stop Control	City of Milwaukie	LOS D
3	SE 17th Avenue/OR-224	Signalized	ODOT	Intersection V/C ≤ 0.99 during the 1st and 2nd Highest Hours
4	SE Lava Drive/SE Waverly Court	Two Way Stop Control	City of Milwaukie	LOS D
5	SE Waverly Court/Proposed Site Access	Two Way Stop Control	City of Milwaukie	LOS D
6	SE Lava Drive/Potential Future Site Access	Two Way Stop Control	City of Milwaukie	LOS D

EXISTING CONDITIONS

This section summarizes the existing characteristics of the transportation system and adjacent land uses in the vicinity of the proposed development, including an inventory of the existing multimodal transportation facilities and options, an evaluation of existing intersection operations for motor vehicles at the study intersections, and a summary of recent study intersection crash history.

Site Conditions and Adjacent Land Uses

The proposed development site is located within the City of Milwaukie, northwest of the SE Lava Drive/SE Waverly Court intersection (see **Exhibit 1**). The development site is mostly forested and currently undeveloped. It is bounded by the Waverley Country Club to the northwest, and primarily residential development to the north, east and south.

Transportation Facilities

Table 2 summarizes the attributes of key roadways in the vicinity.

Table 2. Street Characteristics in Site Vicinity

Street	Classification[1]	Motor Vehicle Travel Lanes	Posted Speed (mph)	Sidewalks	Striped Bicycle Lanes	On-Street Parking
OR-224	Regional Route (Milwaukie) Urban Principal Arterial (ODOT)	4-5	50	No	No	No
SE 17th Avenue	Arterial (Milwaukie)	2	35	Partial[2]	Yes[3]	No
OR-99E	Regional Route (Milwaukie) Urban Principal Arterial (ODOT)	4-5	30	Partial[4]	Yes	No
SE Lava Drive	Local Street	2	NP[5]	Partial[6]	No	No
SE Waverly Court	Local Street	2	NP[5]	Partial[7]	No	No

[1]Per *City of Milwaukie Transportation System Plan*, Table 3-4 (Reference 2)
[2]There is a sidewalk on the west side of SE 17th Avenue between SE Lava Drive and OR-99E. North of SE Lava Drive, a multi-use path is provided on the west side of SE 17th Avenue.
[3]There is a striped bicycle lane on the east side and a multi-use path on the west side.
[4]There is a sidewalk on the east side of OR-99E between OR-224 interchange and SE 17th Avenue. North of the OR-224 interchange, pedestrian facilities are provided on SE Main Street which parallels OR-99E.
[5]Not posted.
[6]There are sidewalks on both sides of SE Lava Drive between SE 17th Avenue and SE Waverly Court, but no existing sidewalk west of SE Waverly Court.
[7]There are sidewalks on both sides of SE Waverly Court between SE lava Drive and the site frontage, but no existing sidewalk along the site frontage.

Roadway Cross Section Standards

The City of Milwaukie maintains typical cross-sections for roadways based on functional classification, as detailed in the City's *Transportation System Plan* (Reference 2). Milwaukie Municipal Code (MMC) Section 19.708 requires that all rights-of-way, streets, sidewalks, necessary public improvements, and other public transportation facilities located in the public right-of-way and abutting the development site shall be adequate at the time of development or shall be made adequate in a timely manner.

Per MMC Table 19.708.2, the SE Waverley Court and SE Lava Drive local street cross sections fronting the proposed development site should ultimately include 8-10 foot wide travel lanes, 6-8 foot wide parking, and 5-6 foot sidewalks (depending on the presence of landscape strips).

Transit Facilities

Per TriMet's online schedule, (Reference 4) weekday bus service is provided by TriMet Route 70 (12th/NE33rd Ave) along SE 17th Avenue between downtown Milwaukie and the Sunderland neighborhood (NE Portland) from 7:30 AM to 11:00 PM. Headways change throughout the day and range from approximately 20 to 30 minutes. The stop closest to the site is on SE 17th Avenue at SE Lava Drive, approximately ¼-mile from the site.

Approximately ½-mile from the site in downtown Milwaukie, TriMet Routes 29, 30, 32, 33, 34, 75, 99, and 152 converge, offering connection to various destinations. Additionally, the Milwaukie/Main Street MAX Station (orange line connecting Milwaukie to downtown Portland) stops approximately ¾-mile from the site.

Crash History Analysis

Reported crash history for each study intersection was reviewed in an effort to identify potential intersection safety issues. Reported 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** summarizes the crashes reported at the study intersections. **Attachment B** contains the ODOT crash data. No crashes were reported at SE Lava Drive/SE Waverly Court (Intersection #4).

Table 3. Intersection Crash History (January 1, 2013 through December 31, 2017)

Intersection		Collision Type					Severity			Total Crashes
		Rear End	Turning	Angle	Bike/Ped	Other	PDO[1]	Injury	Fatal	
1	SE 17th Avenue – SE Harrison Street/OR-99E	14	6	4	1	1	10	16	0	26
2	SE 17th Avenue/SE Lava Drive	0	0	0	0	2	1	1	0	2
3	SE 17th Avenue/OR-224	6	1	0	1	1	4	5	0	9

[1]PDO – Property damage only

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. Review of the SPIS list determined that the north leg of OR-99E at SE 17th Avenue – SE Harrison Street is within the top ten percent.

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 5). 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 6). 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. As shown in **Table 4**, the observed crash rate at all intersections is less than the critical crash rates.

Table 4. Intersection Crash Rate Assessment

	Location	Total Crashes	Critical Crash Rate by Intersection	Critical Crash Rate by Volume	Observed Crash Rate at Intersection	Observed Crash Rate>Critical Crash Rate?
1	SE 17th Avenue – SE Harrison Street/OR-99E	26	0.62	0.53	0.36	No
2	SE 17th Avenue/SE Lava Drive	2	0.29	0.40	0.11	No
3	SE 17th Avenue/OR-224	9	0.69	0.45	0.27	No

No safety-based mitigations were identified for implementation in conjunction with the proposed development based on review of the historic crash data alone.

Existing Conditions Operational Analysis

Given the impacted traffic pattens due to the current COVID-19 pandemic and State of Oregon stay at home order, new traffic counts were not collected for this analysis. Rather, historical morning (7:00-9:00 AM) and evening (4:00-6:00 PM) peak hour traffic count data was collected from June of 2014 at study Intersections #1-3. These counts are included in **Attachment C**.

A 2.7% linear annual growth rate was applied to the 2014 traffic counts to estimate year 2020 existing traffic volumes. This rate was calculated based on the average growth of ODOT Transportation Volume Tables (TVT) from 2014 to 2018 near the McLoughlin Blvd (OR-99E)/17th Ave/ Harrison St intersection. This growth rate is reflective of growth throughout a typical day. However, a comparison of more recent

signal detector count data provided by ODOT at Intersections #1 and #3 between 2018 and 2020 indicates a reduction in PM peak hour traffic volumes. To account for this reduction, a zero growth was applied to the PM peak hour traffic volumes for all years *after* year 2018, which is conservative given recent negative growth trend. These calculations are included in **Attachment C.**

Trips from SE 17th Avenue/SE Lava Drive (Intersection #3) were distributed along the SE Lava Drive corridor according to an estimation of trips associated with each existing land use according to trip rates presented in *Trip Generation Manual, 10th Edition* (Reference 7). This analysis was used to estimate existing turning movements at Intersection #4, where historical traffic count data is not available.

Table 5 summarizes the estimated 2020 existing traffic conditions for the weekday AM and PM peak hours.

Table 5. Estimated 2020 Existing Traffic Conditions

Study Intersection		Operating Requirement	Weekday AM Peak Hour		Weekday PM Peak Hour	
			V/C	LOS	V/C	LOS
1	SE 17th Avenue – SE Harrison Street/OR-99E	Intersection V/C ≤ 1.10 during the 1st Highest Hour Intersection V/C ≤ 0.99 during the 2nd Highest Hour	0.68	C	0.94	D
2	SE 17th Avenue/SE Lava Drive	LOS D	0.21 (EBL)	C	0.31 (EBL)	C
3	SE 17th Avenue/OR-224	Intersection V/C ≤ 0.99 during the 1st and 2nd Highest Hours	0.75	C	0.67	B
4	SE Waverly Court/ SE Lava Drive	LOS D	0.04 (SB)	A	0.03 (SB)	A

WB= Westbound, SB = Southbound, EB = Eastbound, NB = Northbound, L = Left, T = Through, R = Right
V/C= Intersection volume-to-capacity ratio (signalized) / Critical lane group volume-to-capacity ratio (unsignalized)
LOS= Intersection level of service (signalized) / Critical lane group level of service (unsignalized)

As shown in **Table 5**, all of the intersections satisfy applicable City and ODOT standards under existing traffic conditions. **Attachment D** includes the 2020 existing traffic operations analysis worksheets. An illustration of existing lane configurations and traffic control devices at the study intersections is also included in **Attachment D**.

TRANSPORTATION IMPACT ANALYSIS

The transportation impact analysis identifies how the study area's transportation system would operate in the year 2021 with and without development of the site. This section of the report includes analysis of 2021 background traffic volumes and operations, an estimate of site-generated trips, and analysis of 2021 total traffic volumes and operations with the proposed development.

2021 Background Operational Analysis

Background traffic volumes include changes in volumes due to added trips from in-process developments in the vicinity of the site as well as general regional growth. Per direction from City of Milwaukie staff, no in-process developments or planned transportation improvements are included in the background traffic analysis for this development. Similar to the methodology for estimating existing traffic volumes, a 2.7% growth rate was applied to 2020 traffic volumes in the AM peak hour to estimate 2021 build-out year background traffic volumes. Zero growth was applied to the 2020 traffic volumes in the PM peak hour.

Table 6 summarizes the 2021 build-out year background traffic conditions for the weekday AM and PM peak hours.

Table 6. Year 2021 Background Traffic Conditions

Study Intersection		Operating Requirement	Weekday AM Peak Hour		Weekday PM Peak Hour	
			V/C	LOS	V/C	LOS
1	SE 17th Avenue – SE Harrison Street/OR-99E	Intersection V/C ≤ 1.10 during the 1st Highest Hour Intersection V/C ≤ 0.99 during the 2nd Highest Hour	0.70	C	0.94	D
2	SE 17th Avenue/SE Lava Drive	LOS D	0.22 (EBL)	C	0.31 (EBL)	C
3	SE 17th Avenue/OR-224	Intersection V/C ≤ 0.99 during the 1st and 2nd Highest Hours	0.76	C	0.67	B
4	SE Waverly Court/ SE Lava Drive	LOS D	0.04 (SB)	A	0.03 (SB)	A

WB= Westbound, SB = Southbound, EB = Eastbound, NB = Northbound, L = Left, T = Through, R = Right
V/C= Intersection volume-to-capacity ratio (signalized) / Critical lane group volume-to-capacity ratio (unsignalized)
LOS= Intersection level of service (signalized) / Critical lane group level of service (unsignalized)

As shown in **Table 6**, all of the intersections are expected to continue to satisfy applicable City and ODOT standards under 2021 build-out year background traffic conditions. **Attachment E** includes the 2021 background traffic operations analysis worksheets.

Trip Generation Estimate

Trips for the proposed development were estimated using trip rates obtained from *Trip Generation Manual, 10th Edition* (Reference 7), as shown in **Table 7**.

Table 7. Trip Generation

Land Use	ITE Code	Size	Total Daily Trips	Weekday AM Peak Hour			Weekday PM Peak Hour		
				Total Trips	In	Out	Total Trips	In	Out
Multifamily Housing (Mid-Rise)	221	132 units	359	45	12	33	58	35	23

Trip Distribution/Assignment

A trip distribution pattern was identified for the site considering existing traffic patterns at the study intersections. Site-generated traffic was assigned to the study intersections based on the estimated distribution pattern. The proposed trip distribution and the site-generated trip assignment at each study intersection for the weekday AM and PM peak hours is included in **Attachment F**.

Year 2021 Total Traffic Conditions

The total traffic conditions analysis forecasts the operation of the study area's transportation system with the inclusion of traffic generated by the proposed site development. Total traffic conditions were determined by adding the estimated site-generated trips to the year 2021 background volumes for the weekday AM and PM peak hours. **Table 8** summarizes the 2021 total traffic conditions and corresponding operational analysis for the weekday AM and PM peak hours.

Table 8. Year 2021 Total Traffic Conditions

Study Intersection		Operating Requirement	Weekday AM Peak Hour		Weekday PM Peak Hour	
			V/C	LOS	V/C	LOS
1	SE 17th Avenue – SE Harrison Street/OR-99E	Intersection V/C ≤ 1.10 during the 1st Highest Hour Intersection V/C ≤ 0.99 during the 2nd Highest Hour	0.70	D	0.95	D
2	SE 17th Avenue/SE Lava Drive	LOS D	0.31 (EBL)	C	0.40 (EBL)	D
3	SE 17th Avenue/OR-224	Intersection V/C ≤ 0.99 during the 1st and 2nd Highest Hours	0.77	C	0.67	B
4	SE Lava Drive/SE Waverly Court	LOS D	0.07 (SB)	A	0.05 (SB)	A
5	SE Waverly Court/Proposed Site Access	LOS D	0.02 (EB)	A	0.02 (EB)	A
6	SE Lava Drive/Potential Future Site Access	LOS D	0.01 (SB)	A	0.01 (SB)	A

WB= Westbound, SB = Southbound, EB = Eastbound, NB = Northbound, L = Left, T = Through, R = Right
V/C= Intersection volume-to-capacity ratio (signalized) / Critical lane group volume-to-capacity ratio (unsignalized)
LOS= Intersection level of service (signalized) / Critical lane group level of service (unsignalized)

As shown in **Table 8**, all of the intersections are expected to continue to satisfy applicable City and ODOT standards under 2021 total traffic conditions. **Attachment F** includes the 2021 total traffic operations analysis worksheets.

Year 2021 Queuing Analysis

95th percentile static queues reported by Vistro at each study intersection were assessed during the weekday AM and PM peak hours under 2021 total traffic conditions. The results are summarized in **Table 9**.

Table 9. Summary of 95th Percentile Queues, 2021 Total Traffic Conditions

Intersection		Movement	Available Queue Storage (feet)	95th Percentile Queue (feet)		Queue Storage Adequate?
				Weekday AM Peak Hour	Weekday PM Peak Hour	
1	SE 17th Avenue – SE Harrison Street/OR-99E	NBL	375	600	375	**No**
		NBTR	Continuous	600	350	Yes
		SBL	375	150	150	Yes
		SBTR	Continuous	300	900	Yes
		EBR	150	100	150	Yes
		EBTL	Continuous	75	250	Yes
		WBL	135	100	225	**No**
		WBLTR	Continuous	150	225	Yes
2	SE 17th Avenue/SE Lava Drive	WBL	150	50	50	Yes
		WBR	65	25	25	Yes
3	SE 17th Avenue/OR-224	NBT	Continuous	550	250	Yes
		NBR	135	75	75	Yes
		SBL	300[1]	225	250	Yes
		SBT	Continuous	150	250	Yes
		WBL	150	150	75	Yes
		WBR	Continuous	325	75	Yes
4	SE Lava Drive/SE Waverly Court	NBLTR	120	0	0	Yes
		SBLTR	140	25	25	Yes
5	SE Waverly Court/Proposed Site Access	EBLTR	75	25	25	Yes
6	SE Lava Drive/Potential Future Site Access	SBLTR	75	25	25	Yes

Where: EB = eastbound, WB = westbound, NB = northbound, SB = southbound, L = left-turn, T= through, R = right-turn
Queues rounded up to the nearest vehicle length, assumed to be 25 feet
[1]Approximately 160 feet of storage is provided, however, the turn lane approach includes a striped center median allowing for approximately 140 feet of additional storage.

As shown in **Table** , all 95th percentile queues during year 2021 total traffic conditions would be accommodated by the available storage, with the exception of the northbound left-turn (AM peak) and westbound left-turn (PM peak) at SE 17th Avenue – SE Harrison Street/OR-99E. However, queues under 2021 total traffic conditions for these two movements are within 10 feet of background traffic conditions. This indicates that less than a single vehicle length is added to the queues with site development. Furthermore, both of these turn lanes extend to the next intersection. Therefore, lengthening is not appropriate as a condition of site development.

Intersection Sight Distance

The sight distance analysis documented herein for the proposed site driveways on SE Waverly Court and SE Lava Drive was conducted per the guidelines provided in the most recent edition of American Association of State Highway Transportation Officials' (AASHTO) A Policy on Geometric Design of Highways and Streets. Specifically, Sections 6 (Stopping Sight Distance, SSD) and 9 (Intersection Sight Distance, ISD) of AASHTO were applied.

Consistent with AASHTO guidelines, ISD measurements were taken in the field from the location of the proposed accesses from a viewpoint 15 feet behind the edge of the traveled way and from a height of 3.5 feet above the ground, looking toward an object that is 3.5 feet above the ground along the travel way. SSD measurements were obtained in the field from the approaching travel way from a viewpoint 3.5 feet above the ground looking toward an object that is 2 feet above the ground.

Based on field observations, sight distance measurements are documented at each of the two site access locations in **Table 10** and supporting photos are included in **Attachment G.**

Table 10: Proposed Site Driveway Observed Sight Distances

Site Driveway	Roadway Speed Limit	AASHTO Requirements			Observed Sight Distance	Satisfies AASHTO Requirements? (ISD/SSD)
		ISD[1]: Right Turn from Stop	ISD: Left turn from Stop	SSD[2]		
Proposed SE Waverly Court Site Access	25 MPH	240 feet	280 feet	155 feet	~200 feet southbound ~200 feet northbound	No/Yes
Potential Future SE Lava Drive Site Access	25 MPH	240 feet	280 feet	155 feet	~130 feet westbound >240 feet eastbound	Yes/Yes[3] Yes/Yes

[1] ISD: Intersection Sight Distance
[2] SSD: Stopping Sight Distance
[3] SE Lava Drive is a dead-end road approximately 130 feet west of the proposed SE Lava Drive access.

SE Waverly Court Access

The proposed site access on SE Waverly Court will provide full turning movements. As summarized in **Table 10**, sight distance was observed at approximately 200 feet in both the northbound and southbound directions. The ISD for traffic looking north and south along SE Waverly Court are limited by landscaping to the north, and the combined effects of horizontal and vertical curvature to the south. Although ISD requirements are not met, sight distance observations exceed the required 155-foot SSD. Photographs taken facing north and south of the proposed access location are shown in **Attachment G**.

According to the AASHTO guidelines, "if the available sight distance for an entering or crossing vehicle is at least equal to the appropriate stopping sight distance for the major road, then drivers have sufficient sight distance to anticipate and avoid collisions."

Any new landscaping, above ground utilities, and signing should be located and maintained along the site frontage to maximize sight distance.

SE Lava Drive Access

The potential future site access on SE Lava Drive will provide full turning movements. As summarized in **Table 10**, sight distance was observed in excess of the required 240 feet to the east for ISD (with the removal of some existing bushes/shrubs). SE Lava Drive ends at a gated private access approximately 130 feet west of the future access. With the removal of some existing bushes/shrubs, drivers approaching SE Lava Drive at the site access are able to see the existing gate. Therefore, the south site access can provide sufficient sight distance. Photographs taken facing east and west of the future access location are shown in **Attachment G**.

Any new landscaping, above ground utilities, and signing should be located and maintained along the site frontage to maximize sight distance.

Analysis of Access Standards

Per Section 12.16.040 of the *City of Milwaukie Municipal Code* (Reference 8) driveway access to the nearest intersecting street face shall be a minimum of 100 feet. Both driveway access locations are at least 100 feet from the nearest intersection of SE Waverley Court and SE Lava Drive.

Safe Routes to School

With site development, sidewalks will be provided along the site frontages on SE Waverly Court (proposed) and SE Lava Drive (future). Additionally, a mid-block pedestrian crossing will be constructed across SE Waverly Court. Sidewalk connection along the north side of SE Lava Drive to existing pedestrian facilities at SE Waverly Court will also be provided upon build-out of the potential future development phase on SE Lava Drive. Pedestrian connections are shown in the site plan in **Attachment A.**

Parking Supply Analysis

The Applicant proposes a total of 193 parking spaces upon full site build-out. A minimum of 165 parking spaces (1.25 spaces per unit for units over 800 square feet) are required, and maximum of 264 (2 spaces per unit) are allowed per City Code Table 19.605.1 (Reference 8).

FINDINGS AND RECOMMENDATIONS

Based on the results of the transportation impact analysis, the proposed development can be constructed while maintaining acceptable operations at the study intersections. The analysis developed the following findings and recommendations.

Findings

- All study intersections are forecast to operate within the applicable review agency volume-to-capacity ratio and delay standards under existing and site build-out year 2021 conditions during the weekday AM and PM peak hours.
- Historical crash data for the study area intersections indicate no patterns or trends that require mitigation associated with the proposed development.

RECOMMENDATIONS

- Any new landscaping, above ground utilities, and signing should be located and maintained along the site frontage to maximize sight distance.

Please contact us if you need any additional information regarding our analyses.

REFERENCES

1. Transportation Research Board. *Highway Capacity Manual 6th Edition*. 2016.
2. *City of Milwaukie Transportation System Plan*. Revised October 2018.
3. Oregon Department of Transportation. *1999 Oregon Highway Plan.* Amended May 2015.
4. TriMet. "Bus Services." Accessed on-line at www.trimet.org. Accessed July 2020.
5. Oregon Department of Transportation Research Section. *SPR 667 Assessment of Statewide Intersection Safety Performance*. June 2011.
6. American Association of State Highway and Transportation Officials. *Highway Safety Manual*. 2010.
7. Institute of Transportation Engineers. *Trip Generation, 10th Edition.* 2017.
8. *City of Milwaukie Municipal Code*. Revised February 2020. Accessed July 2020.

ATTACHMENTS

Attachment A – Site Plan

Attachment B – Crash Data

Attachment C – Traffic Count Data

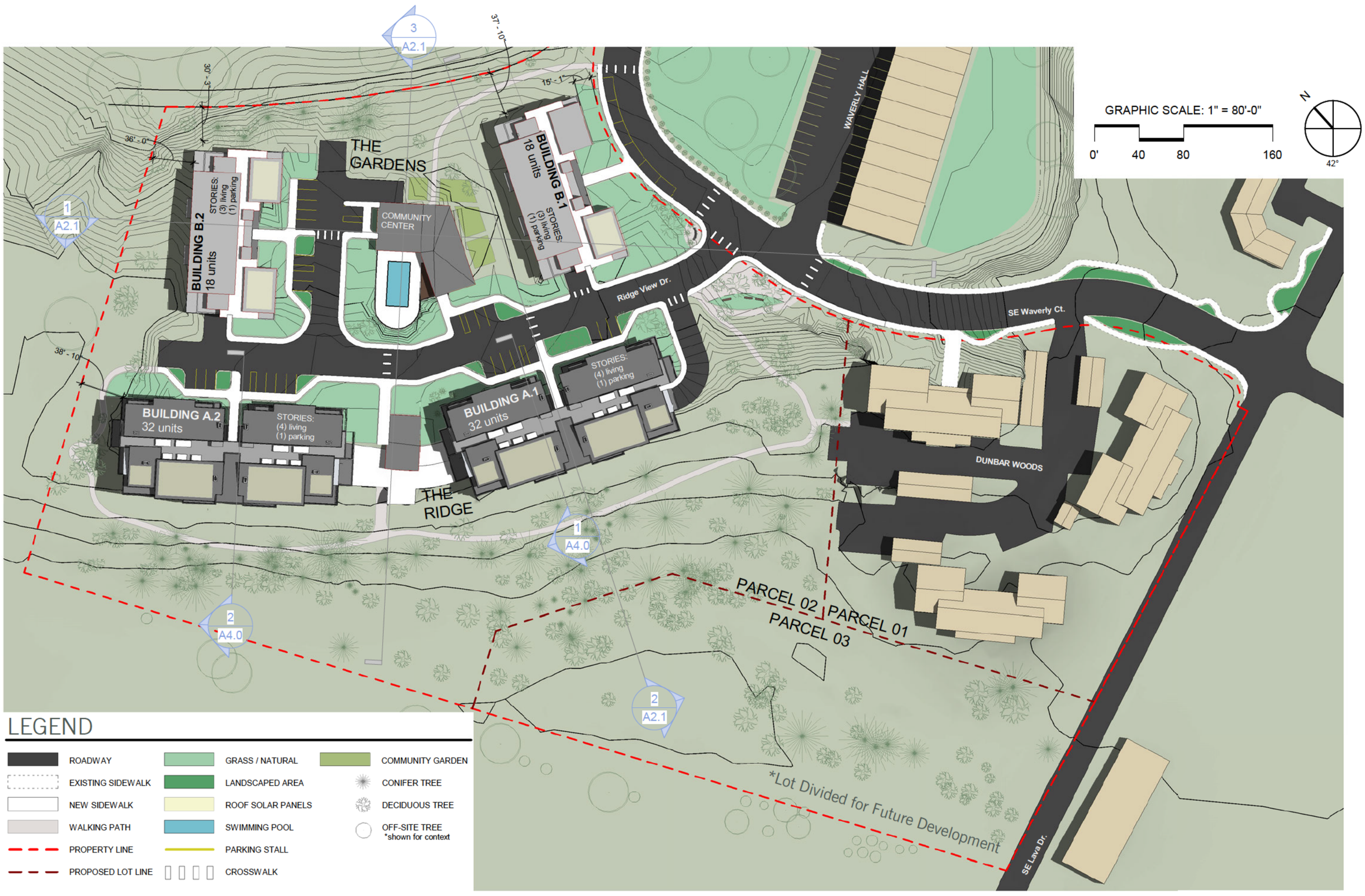
Attachment D – Existing Traffic Level-of-Service Worksheets

Attachment E – 2021 Background Traffic Level-of-Service Worksheets

Attachment F – 2021 Total Traffic Level-of-Service Worksheets

Attachment G – Sight Distance Observations

Attachment A – Site Plan


GRAPHIC SCALE: 1" = 80'-0"
0'
40
80
160
N
42°
THE GARDENS
COMMUNITY CENTER
BUILDING B.2
18 units
STORIES:
(3) living
(1) parking
BUILDING B.1
18 units
STORIES:
(3) living
(1) parking
WAVERLY HALL
Ridge View Dr.
SE Waverly Ct.
BUILDING A.2
32 units
STORIES:
(4) living
(1) parking
BUILDING A.1
32 units
STORIES:
(4) living
(1) parking
THE RIDGE
DUNBAR WOODS
PARCEL 02
PARCEL 01
PARCEL 03
*Lot Divided for Future Development
SE Lava Dr.
37' - 10"
30' - 3"
15' - 1"
36' - 0"
38' - 10"
3
A2.1
1
A2.1
1
A4.0
2
A4.0
2
A2.1
LEGEND
ROADWAY
EXISTING SIDEWALK
NEW SIDEWALK
WALKING PATH
PROPERTY LINE
PROPOSED LOT LINE
GRASS / NATURAL
LANDSCAPED AREA
ROOF SOLAR PANELS
SWIMMING POOL
PARKING STALL
CROSSWALK
COMMUNITY GARDEN
CONIFER TREE
DECIDUOUS TREE
OFF-SITE TREE
*shown for context

Attachment B – Crash Data

OREGON DEPARTMENT OF TRANSPORTATION - POLICY, DATA AND ANALYSIS DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CONTINUOUS SYSTEM CRASH LISTING

171 CLACKAMAS

Intersectional Crashes at OR-224, Clackamas Hwy (#171) & SE 17th Ave
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
00655	N	N	N			02/25/2013	CLACKAMAS	2 12		INTER	3-LEG	N	N	RAIN	S-1STOP	01	NONE 0	STRGHT											07
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							PORTLAND UA	- 0.01	17TH AVE	06	1		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	M	UNK		026	000		07
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No	*45*	*26*	*59.23*	*-122*	*38*	*39.95*		017100100S00	1															OR<25					
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171 CLACKAMAS

Intersectional Crashes at OR-224, Clackamas Hwy (#171) & SE 17th Ave
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SER# / INVEST / UNLOC?	SPED	ALC	DRUGS	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
00109	N	N	N	N	N	01/10/2015	CLACKAMAS	2 12		INTER	3-LEG	N	N	CLD	BIKE													110	04
CITY		N				Sat 4P	MILWAUKIE	MN 0	CLACKAMAS HY	CN		TRF SIGNAL	N	WET	TURN														
							PORTLAND UA	- 0.01	17TH AVE	02	1		N	DAY	INJ			STRGHT	01	BIKE	INJB	45	F		02	020	035		04
No	*45 26*		*59.69*	*-122 38*	*40.20*			017100200	S00 1									S N										
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01712	N	N	N	N	N	05/07/2015	CLACKAMAS	1 12		INTER	3-LEG	N	N	CLR	S-OTHER	01	NONE 0	TURN-L											08
CITY		N				Thu 3P	MILWAUKIE	MN 0	CLACKAMAS HY	CN		L-GRN-SIG	N	DRY	TURN		PRVTE	N E									000	00
							PORTLAND UA	- 0.01	17TH AVE	03	1		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	39	M	OR-Y		005	000		08
No	*45 26*		*59.23*	*-122 38*	*39.95*			017100100	S00 1															OR<25				
																02	NONE 0	TURN-L										
																	PRVTE	N E									000	00
																	PSNGR CAR		01	DRVR	NONE	61	F	OR-Y		000	000	00
																								OR<25				

OREGON DEPARTMENT OF TRANSPORTATION - POLICY, DATA AND ANALYSIS DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
URBAN NON-SYSTEM CRASH LISTING

CITY OF MILWAUKIE, CLACKAMAS COUNTY

Intersectional Crashes at OR-224, Clackamas Hwy (#171) & SE 17th Ave
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
81588	N	N	N			09/21/2015	16	CLACKAMAS HY	INTER	3-LEG	N	N	CLR	S-1STOP	01	NONE 0	STRGHT											29
NO RPT			N			Mon 4P	0	17TH AVE	N		TRF SIGNAL	N	DRY	REAR		PRVTE	N S									000		00
No						*45 26 59.69*		1	06	1		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	34	F	OTH-Y N-RES		026	000		29
															02	NONE 0	STOP											
																PRVTE	N S									011		00
																PSNGR CAR		01	DRVR	INJC	39	M	OR-Y OR<25		000	000		00
																		02	PSNG	INJC	72	F			000	000		00
																		03	PSNG	INJC	49	F			000	000		00

081 PACIFIC HIGHWAY EAST — Intersectional Crashes at OR-99E, Pacific Hwy (#081), McLoughlin Blvd & SE 17th Ave / SE Harrison St
January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	S P E D	E L C	A M J	D R U G	S H L	W O R K	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
04400	N	N	N				11/14/2013	CLACKAMAS	1 14		INTER	CROSS	N		N CLR	S-1STOP	01	NONE 0	STRGHT										07
NONE		N					Thu 4P	MILWAUKIE	MN 0	MCLOUGHLIN BLVD	N		TRF SIGNAL		N DRY	REAR		PRVTE	N S								000	00
								PORTLAND UA	5.72	17TH AVE	06	0			N DAY	INJ		PSNGR CAR		01	DRVR	NONE	29	F	OTH-Y		026	000	07
No							*45 26 43.37 -122 38 33.97*		008100100S00	1															N-RES				
																	02	NONE 0	STOP										
																		PRVTE	N S									011	00
																		PSNGR CAR		01	DRVR	INJC	38	F	OR-Y		000	000	00
																									OR<25				
00440	N	N	N	N	N		02/04/2015	CLACKAMAS	1 14		INTER	CROSS	N		N CLR	S-1STOP	01	NONE 0	STRGHT										35,13
CITY		N					Wed 3P	MILWAUKIE	MN 0	HARRISON ST	N		TRF SIGNAL		N DRY	REAR		PRVTE	N S								000	00
								PORTLAND UA	5.72	MCLOUGHLIN BLVD	06	0			N DAY	PDO		PSNGR CAR		01	DRVR	NONE	43	M	OR-Y		045	000	13
No							*45 26 43.37 -122 38 33.97*		008100100S00	1															OR<25				
																	02	NONE 0	STRGHT										
																		PRVTE	N S									000	00
																		PSNGR CAR		01	DRVR	NONE	41	F	OR-Y		045	000	13
																									OR<25				
05280	N	Y	N				12/10/2015	CLACKAMAS	1 14		INTER	CROSS	N		N RAIN	S-1STOP	01	NONE 0	STRGHT										29,07
CITY		N					Thu 2A	MILWAUKIE	MN 0	HARRISON ST	N		L-GRN-SIG		N WET	REAR		PRVTE	N S								000	00
								PORTLAND UA	5.72	MCLOUGHLIN BLVD	06	0			N DLIT	INJ		PSNGR CAR		01	DRVR	INJC	23	M	OR-Y		043,026	000	29,07
No							*45 26 43.37 -122 38 33.97*		008100100S00	1															OR<25				
																	02	NONE 0	STOP										
																		PRVTE	N S									012	00
																		PSNGR CAR		01	DRVR	NONE	51	M	OR-Y		000	000	00
																									OR<25				
84208	N	N	N				06/25/2016	CLACKAMAS	2 14		INTER	CROSS	N		N CLR	S-1STOP	01	NONE 0	STRGHT										29
NONE		N					Sat 9A	MILWAUKIE	MN 0	HARRISON ST	N		TRF SIGNAL		N DRY	REAR		PRVTE	N S								000	00
								PORTLAND UA	5.72	MCLOUGHLIN BLVD	06	0			N DAY	INJ		PSNGR CAR		01	DRVR	NONE	49	M	OTH-Y		026	000	29
No							*45 26 43.37 -122 38 33.97*		008100200S00	1															N-RES				
																	02	NONE 0	STOP										
																		PRVTE	N S									011	00
																		PSNGR CAR		01	DRVR	INJC	43	M	OR-Y		000	000	00
																									OR<25				
00401	N	N	N	N	N		01/30/2017	CLACKAMAS	1 14		INTER	CROSS	N		N CLD	S-1STOP	01	NONE 0	STRGHT										29
CITY		N					Mon 1P	MILWAUKIE	MN 0	HARRISON ST	N		TRF SIGNAL		N DRY	REAR		PRVTE	N S								000	00
								PORTLAND UA	5.72	MCLOUGHLIN BLVD	06	0			N DAY	INJ		PSNGR CAR		01	DRVR	NONE	39	M	OR-Y		026	000	29
No							*45 26 43.37 -122 38 33.97*		008100100S00	1															OR<25				

081 PACIFIC HIGHWAY EAST — Intersectional Crashes at OR-99E, Pacific Hwy (#081), McLoughlin Blvd & SE 17th Ave / SE Harrison St
January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	SPEED	ALC	DRUGS	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 / OWNER / VEH TYPE	QTY / MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
																02	NONE PRVTE	0 STOP N S									011		00
																	PSNGR CAR		01	DRVR	INJC	63	M	OR-Y OR<25		000	000		00
02997 NONE	N	N	N			07/24/2017 Mon 5P	CLACKAMAS MILWAUKIE	2 14 MN 0	HARRISON ST	INTER N	CROSS	N TRF SIGNAL	N	CLR DRY	S-1STOP REAR	01	NONE UNKN	0 STRGHT N S									000		29 00
							PORTLAND UA	5.72	MCLOUGHLIN BLVD	06	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	38	F	OR-Y UNK		026	000		29
No						*45 26 43.37 -122 38 33.97*		008100200S00	1																				
																02	NONE PRVTE	0 STOP N S									011		00
																	PSNGR CAR		01	DRVR	INJC	47	M	OR-Y OR<25		000	000		00
05142 CITY	N	N	N	N	N	11/06/2016 Sun 9P	CLACKAMAS MILWAUKIE	2 14 MN 0	MCLOUGHLIN BLVD	INTER S	CROSS	N TRF SIGNAL	N	CLD WET	S-OTHER TURN	01	NONE N/A	9 TURN-R W S									000		27,08 00
							PORTLAND UA	5.72	17TH AVE	05	0		N	DLIT	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
No						*45 26 43.37 -122 38 33.97*		008100200S00	1																				
																02	NONE N/A	9 TURN-R W S									000		00
																	PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
03035 NONE	N	N	N			07/26/2017 Wed 3P	CLACKAMAS MILWAUKIE	2 14 MN 0	HARRISON ST	INTER S	CROSS	N TRF SIGNAL	N	CLR DRY	S-OTHER TURN	01	NONE N/A	9 TURN-L E S									000		08,14 00
							PORTLAND UA	5.72	MCLOUGHLIN BLVD	05	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
No						*45 26 43.37 -122 38 33.97*		008100200S00	1																				
																02	NONE N/A	9 TURN-L E S									000		00
																	PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
05466 NONE	N	N	N			12/21/2017 Thu 6P	CLACKAMAS MILWAUKIE	2 14 MN 0	MCLOUGHLIN BLVD	INTER S	CROSS	N TRF SIGNAL	N	CLR DRY	S-STRGHT REAR	01	NONE PRVTE	0 STRGHT N S									000	013	29 00
							PORTLAND UA	5.72	17TH AVE	05	0		N	DARK	INJ		PSNGR CAR		01	DRVR	INJC	33	M	OR-Y OR<25		042	000		29
No						*45 26 43.37 -122 38 33.97*		008100200S00	1																				
																02	NONE PRVTE	0 STRGHT N S									000	013	00
																	PSNGR CAR		01	DRVR	INJC	62	F	OR-Y OR<25		000	000		00

081 PACIFIC HIGHWAY EAST — Intersectional Crashes at OR-99E, Pacific Hwy (#081), McLoughlin Blvd & SE 17th Ave / SE Harrison St
January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	SPED	ALC	DRUG/MJ	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
																03	NONE 0 / PRVTE	STRGHT / N S									022	00
																	PSNGR CAR		01	DRVR	NONE	57	F	OR-Y / OR<25		000	000	00
00831	N	N	N			03/10/2013 Sun 9A	CLACKAMAS / MILWAUKIE / PORTLAND UA	1 MN 5.72	14 / 0 / HARRISON ST / MCLOUGHLIN BLVD	INTER / S / 06	CROSS / TRF SIGNAL / 0	N / N / N	N / N / N	UNK / UNK / DAY	S-1STOP / REAR / PDO	01	NONE 0 / PRVTE	STRGHT / S N										07
NONE			N														PSNGR CAR		01	DRVR	NONE	69	M	OR-Y / OR<25		026	000	07
No	*45*	*26*	*43.37*	*-122*	*38*	*33.97*		008100100	S00 1																		000	00
																02	NONE 0 / PRVTE	STOP / S N									011	00
																	PSNGR CAR		01	DRVR	NONE	00	M	UNK / UNK		000	000	00
01567	N	N	N			05/06/2013 Mon 3P	CLACKAMAS / MILWAUKIE / PORTLAND UA	1 MN 5.72	14 / 0 / MCLOUGHLIN BLVD / 17TH AVE	INTER / S / 06	CROSS / TRF SIGNAL / 0	N / N / N	N / N / N	CLR / DRY / DAY	S-1STOP / REAR / PDO	01	NONE 0 / UNKN / UNKNOWN	STRGHT / S N										07
NONE			N																01	DRVR	NONE	00	U	UNK / UNK		026	000	07
No	*45*	*26*	*43.37*	*-122*	*38*	*33.97*		008100100	S00 1																		000	00
																02	NONE 0 / PRVTE	STOP / S N									011	00
																	PSNGR CAR		01	DRVR	NONE	48	F	OR-Y / OR<25		000	000	00
01679	N	N	N	N	N	04/13/2016 Wed 10A	CLACKAMAS / MILWAUKIE / PORTLAND UA	2 MN 5.72	14 / 0 / HARRISON ST / MCLOUGHLIN BLVD	INTER / S / 06	CROSS / TRF SIGNAL / 0	N / N / N	N / N / N	CLD / DRY / DAY	S-1STOP / REAR / INJ	01	NONE 0 / PRVTE	STRGHT / S N										29
CITY			N														PSNGR CAR		01	DRVR	NONE	64	F	OR-Y / OR<25		026	000	29
No	*45*	*26*	*43.37*	*-122*	*38*	*33.97*		008100200	S00 1																		000	00
																02	NONE 0 / PRVTE	STOP / S N									011	00
																	PSNGR CAR		01	DRVR	NONE	38	M	OR-Y / OR<25		000	000	00
																			02	PSNG	INJC	38	F			000	000	00
05892	N	N	N			11/29/2016 Tue 1P	CLACKAMAS / MILWAUKIE / PORTLAND UA	2 MN 5.72	14 / 0 / HARRISON ST / MCLOUGHLIN BLVD	INTER / S / 06	CROSS / TRF SIGNAL / 0	N / N / N	N / N / N	CLR / DRY / DAY	O-OTHER / BACK / PDO	01	NONE 9 / N/A / TRUCK	BACK / N S										10
NONE			N																01	DRVR	NONE	00	U	UNK / UNK		000	000	00
No	*45*	*26*	*43.37*	*-122*	*38*	*33.97*		008100200	S00 1																		000	00
																02	NONE 9 / N/A	STOP / S N									011	00
																	PSNGR CAR		01	DRVR	NONE	00	U	UNK / UNK		000	000	00

081 PACIFIC HIGHWAY EAST — Intersectional Crashes at OR-99E, Pacific Hwy (#081), McLoughlin Blvd & SE 17th Ave / SE Harrison St
January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	SPED	ALC	DRUG/MJ	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
06184	N	N	N			12/28/2016	CLACKAMAS	2 14		INTER	CROSS	N	N	CLR	S-1STOP	01	NONE 9	STRGHT											29
NONE			N			Wed 10A	MILWAUKIE	MN 0	HARRISON ST	S		TRF SIGNAL	N	DRY	REAR		N/A	S N										000		00
							PORTLAND UA	5.72	MCLOUGHLIN BLVD	06	0		N	DAY	PDO		UNKNOWN		01	DRVR	NONE	00	U	UNK		000	000		00
No	*45*	*26*	*43.37*	*-122*	*38*	*33.97*		008100200S00	1															UNK					
																02	NONE 9	STOP											
																	N/A	S N									011		00
																	PSNGR CAR		01	DRVR	NONE	00	U	UNK		000	000		00
																								UNK					
00273	N	N	N			01/19/2017	CLACKAMAS	2 14		INTER	CROSS	N	N	UNK	S-1STOP	01	NONE 0	STRGHT											29
NONE			N			Thu 9A	MILWAUKIE	MN 0	MCLOUGHLIN BLVD	S		TRF SIGNAL	N	WET	REAR		PRVTE	S N									000		00
							PORTLAND UA	5.72	17TH AVE	06	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	26	F	OR-Y		026	000		29
No	*45*	*26*	*43.37*	*-122*	*38*	*33.97*		008100200S00	1															OR<25					
																02	NONE 0	STOP											
																	PRVTE	S N									011		00
																	PSNGR CAR		01	DRVR	INJC	38	F	OR-Y		000	000		00
																								OR<25					
03789	N	N	N	N	N	09/15/2015	CLACKAMAS	1 14		INTER	CROSS	N	N	CLD	O-1 L-TURN	01	NONE 0	STRGHT											04
CITY			N			Tue 7P	MILWAUKIE	MN 0	HARRISON ST	CN		TRF SIGNAL	N	DRY	TURN		PRVTE	N S									000		00
							PORTLAND UA	5.72	MCLOUGHLIN BLVD	01	0		N	DUSK	INJ		PSNGR CAR		01	DRVR	NONE	30	M	OR-Y		097	000		00
No	*45*	*26*	*43.37*	*-122*	*38*	*33.97*		008100100S00	1															OR<25					
																02	NONE 0	TURN-L											
																	PRVTE	S W									000		00
																	PSNGR CAR		01	DRVR	INJC	22	F	SUSP		097	000		00
																								OR<25					
02128	N	N	N	N	N	06/15/2013	CLACKAMAS	1 14		INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE 0	STRGHT											04
COUNTY			N			Sat 3P	MILWAUKIE	MN 0	HARRISON ST	CN		TRF SIGNAL	N	DRY	ANGL		PRVTE	S N									000		00
							PORTLAND UA	5.72	MCLOUGHLIN BLVD	02	0		N	DAY	INJ		PSNGR CAR		01	DRVR	INJC	67	F	OR-Y		000	000		00
No	*45*	*26*	*43.37*	*-122*	*38*	*33.97*		008100100S00	1															OR<25					
																02	POLCE 0	STRGHT											
																	PUBLC	W E									000		00
																	PSNGR CAR		01	DRVR	NONE	51	M	OR-Y		020	000		04
																								OR<25					
00218	Y	N	N	N	N	01/13/2017	CLACKAMAS	2 14		INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE 0	STRGHT										124	01,04
CITY			N			Fri 6P	MILWAUKIE	MN 0	HARRISON ST	CN		TRF SIGNAL	N	ICE	TURN		PRVTE	S N									000	124	00
							PORTLAND UA	5.72	MCLOUGHLIN BLVD	02	0		N	DLIT	INJ		PSNGR CAR		01	DRVR	INJB	27	F	OR-Y		047,020	000		01,04
No	*45*	*26*	*43.37*	*-122*	*38*	*33.97*		008100200S00	1															OR<25					

081 PACIFIC HIGHWAY EAST — Intersectional Crashes at OR-99E, Pacific Hwy (#081), McLoughlin Blvd & SE 17th Ave / SE Harrison St
January 1, 2013 through December 31, 2017

SER# / INVEST / UNLOC?	SPEED	ALC	DRUGS	SCHL	WORK	DATE / DAY/TIME / *LAT/LONG*	COUNTY / CITY / URBAN AREA	RD# / CMPT/MLG / LRS	FC / MILEPNT	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 / PUBLC	TURN-R / E N									000	00
																		OTH BUS		01	DRVR	INJC	60	M	OR-Y / OR<25		000	000	00
02771	N	N	N	N	N	07/18/2014	CLACKAMAS	1	14		INTER	CROSS	N		N	CLR	ANGL-OTH	01	NONE 0	STRGHT										04
CITY		N				Fri 7P	MILWAUKIE	MN 0		HARRISON ST	CN		TRF SIGNAL		N	DRY	ANGL		PRVTE	N S								000	00
							PORTLAND UA	5.72		MCLOUGHLIN BLVD	03	0			N	DAY	INJ		PSNGR CAR		01	DRVR	INJC	60	F	OR-Y / OR<25		000	000	00
No	*45 26*		*43.37*	*-122*	*38*	*33.97*		008100100		S00	1																		
																	02	NONE 0 / PRVTE	STRGHT / W E									000	00
																		PSNGR CAR		01	DRVR	NONE	21	F	OR-Y / OR<25		021	000	04
02339	N	N	N			05/24/2016	CLACKAMAS	2	14		INTER	CROSS	N		N	CLR	S-OTHER	01	NONE 9	TURN-L										08
NONE		N				Tue 2P	MILWAUKIE	MN 0		HARRISON ST	CN		TRF SIGNAL		N	DRY	TURN		N/A	E S								000	00
							PORTLAND UA	5.72		MCLOUGHLIN BLVD	03	0			N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK / UNK		000	000	00
No	*45 26*		*43.37*	*-122*	*38*	*33.97*		008100200		S00	1																		
																	02	NONE 9 / N/A	TURN-L / E S									000	00
																		PSNGR CAR		01	DRVR	NONE	00	U	UNK / UNK		000	000	00
02289	N	N	N	N	N	06/28/2013	CLACKAMAS	1	14		INTER	CROSS	N		N	CLR	ANGL-OTH	01	NONE 0	STRGHT										16,04
NONE		N				Fri 11A	MILWAUKIE	MN 0		HARRISON ST	CN		TRF SIGNAL		N	DRY	ANGL		PRVTE	W E								000	00
							PORTLAND UA	5.72		MCLOUGHLIN BLVD	04	0			N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	74	M	OR-Y / OR<25		020	025	16,04
No	*45 26*		*43.37*	*-122*	*38*	*33.97*		008100100		S00	1																		
																	02	NONE 0 / PRVTE	STRGHT / S N									000	00
																		PSNGR CAR		01	DRVR	INJC	32	F	OR-Y / OR<25		000	000	00
02013	N	N	N	N	N	05/27/2014	CLACKAMAS	1	14		INTER	CROSS	N		N	CLR	ANGL-OTH	01	NONE 0	STRGHT										04
CITY		N				Tue 6P	MILWAUKIE	MN 0		HARRISON ST	CN		TRF SIGNAL		N	DRY	ANGL		PRVTE	W E								000	00
							PORTLAND UA	5.72		MCLOUGHLIN BLVD	04	0			N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	00	U	UNK / UNK		020	000	04
No	*45 26*		*43.37*	*-122*	*38*	*33.97*		008100100		S00	1																		
																	02	NONE 0 / PRVTE	STRGHT / S N									000	00
																		PSNGR CAR		01	DRVR	INJC	44	F	OR-Y / OR<25		000	000	00
																				02	PSNG	INJC	09	F			000	000	00

081 PACIFIC HIGHWAY EAST — Intersectional Crashes at OR-99E, Pacific Hwy (#081), McLoughlin Blvd & SE 17th Ave / SE Harrison St

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

                                                                                                                           03 NONE    0  STOP
                                                                                                                              PRVTE      E  W                                                          011             00

                                                                                                                              PSNGR CAR             01 DRVR  INJC    42 F  OR-Y        000          000             00
                                                                                                                                                                           OR<25

00490  N N N N N 02/06/2017  CLACKAMAS          2    14                           INTER     CROSS   N             N CLD   O-1 L-TURN 01 NONE   0  STRGHT                                                         013        02,08,04
CITY      N       Mon     1P MILWAUKIE          MN    0   HARRISON ST             CN                TRF SIGNAL    N WET   TURN          PRVTE      S  N                                                          000             00

                             PORTLAND UA          5.72    MCLOUGHLIN BLVD         04          0                   N DAY   INJ           PSNGR CAR             01 DRVR  NONE    28 M  OR-Y        000          000             00
No      45 26  43.37 -122 38  33.97             008100200S00               1                                                                                                  OR<25

                                                                                                                           02 NONE    0  TURN-L
                                                                                                                              PRVTE      N  E                                                          000  013        00

                                                                                                                              PSNGR CAR             01 DRVR  NONE    30 M  SUSP        028,004,020  000             02,08,04
                                                                                                                                                                           OR<25

                                                                                                                           03 NONE    0  STOP
                                                                                                                              PRVTE      E  W                                                          022             00

                                                                                                                              PSNGR CAR             01 DRVR  INJB    45 M  OR-Y        000          000             00
                                                                                                                                                                           OR<25
```

CITY OF MILWAUKIE, CLACKAMAS COUNTY

Intersectional Crashes at OR-99E, Pacific Hwy (#081), McLoughlin Blvd & SE 17th Ave / SE Harrison St

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
02108	N	N	N			05/10/2016	16	HARRISON ST	INTER	CROSS	N	N	CLR	S-1STOP	01	NONE 9	STRGHT										006	29
NONE			N			Tue 1P	0	MCLOUGHLIN BLVD	E		TRF SIGNAL	N	DRY	REAR		N/A	E W									000		00
No	*45 26 43.37*		*-122 38 33.97*				1		06	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
															02	NONE 9	STOP											
																N/A	E W									011		00
																PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
02029	N	N	N			06/09/2013	17	MCLOUGHLIN BLVD	INTER	CROSS	N	N	CLR	S-1STOP	01	NONE 0	STRGHT											07
NONE			N			Sun 1P	0	17TH AVE	W		TRF SIGNAL	N	DRY	REAR		PRVTE	W E									000		00
No	*45 26 43.37*		*-122 38 33.97*				1		06	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	M	OR-Y UNK		026	000		07
															02	NONE 0	STOP											
																PRVTE	W E									011		00
																PSNGR CAR		01	DRVR	NONE	55	F	OR-Y OR<25		000	000		00
01805	N	N	N	N	N	04/20/2016	16	MCLOUGHLIN BLVD	INTER	CROSS	N	N	RAIN	BIKE	01	NONE 0	STRGHT											27
CITY			N			Wed 6P	0	17TH AVE	W		TRF SIGNAL	N	WET	ANGL		PRVTE	W E									000		00
No	*45 26 43.37*		*-122 38 33.97*				1		06	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	36	F	OR-Y OR<25		016,027	038		27
																	STRGHT	01	BIKE	INJB	54	M		01	000	035		00
																	S N											

OREGON DEPARTMENT OF TRANSPORTATION - POLICY, DATA AND ANALYSIS DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
URBAN NON-SYSTEM CRASH LISTING

CITY OF MILWAUKIE, CLACKAMAS COUNTY

Intersectional Crashes at SE 17th Ave & SE Lava Dr
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
03993	Y	Y	N	N	N	10/09/2014	17	LAVA DR	INTER	3-LEG	N	Y	CLR	FIX OBJ	01	NONE 0	STRGHT										116,058	30,27
CITY			N			Thu 9P	0	17TH AVE	S		STOP SIGN	N	DRY	FIX		PRVTE	N S									000	058	00
No	*45 26 50.85*					*-122 38 36.30*		1	05	0		N	DLIT	PDO		PSNGR CAR		01	DRVR	NONE	34	M	OR-Y OR<25		050,016	038	116	30,27
06111	N	N	N	N	N	12/27/2016	16	LAVA DR	INTER	3-LEG	N	Y	CLD	FIX OBJ	01	NONE 0	STRGHT										044	10
CITY			N			Tue 6P	0	17TH AVE	NW		STOP SIGN	N	WET	FIX		PRVTE	SE NW									000	044	00
No	*45 26 50.98*					*-122 38 36.35*		1	05	0		N	DLIT	INJ		PSNGR CAR		01	DRVR	INJC	50	F	OR-Y OR<25		080	000		10

Attachment C – Traffic Count Data

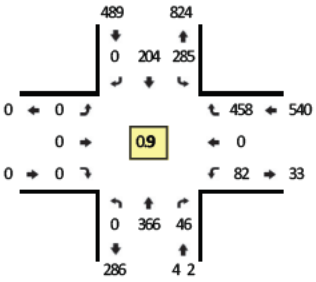
ype of peak hour be ng reported: ntersect on Peak

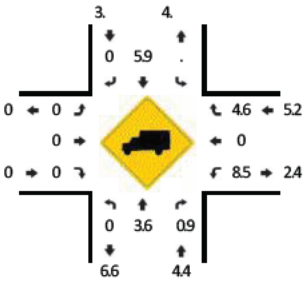
Method for determ n ng peak hour: ota Enter ng Vo ume

LOCATION: SE 17th Ave -- Milwaukie Expy
CITY/STATE: Milwaukie, OR

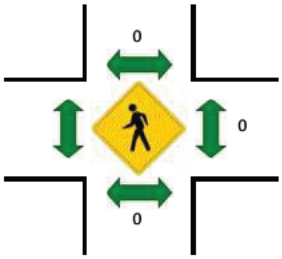
QC JOB #: 15240501
DATE: Tue, Jun 3 2014

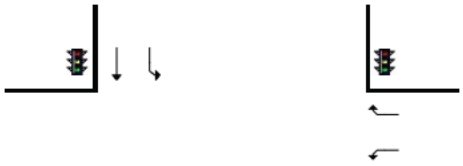
Peak-Hour: **7:25** AM -- **8:25** AM
Peak 15-Min: **7:40** AM -- **7:55** AM

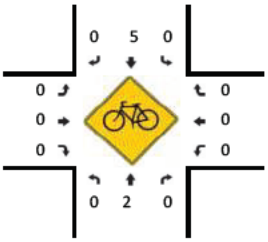


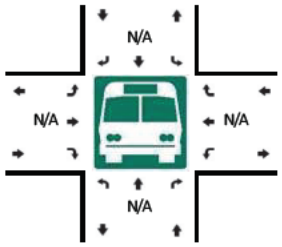


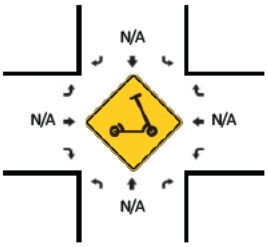
Quality Counts
DATA THAT DRIVES COMMUNITIES











5 M n Count Per od Beg nn ng At	SE 17th Ave (Northbound)				SE 17th Ave (Southbound)				M wauk e Expy (Eastbound)				M wauk e Expy (Westbound)				ota	Hour y ota s
	Left	hru	R ght	U	Left	hru	R ght	U	Left	hru	R ght	U	Left	hru	R ght	U		
7:00 AM	0	24	0	0	25	15	0	0	0	0	0	0	3	0	35	0	102	
7:05 AM	0	17	1	0	12	11	0	0	0	0	0	0	7	0	27	0	75	
7:10 AM	0	13	1	0	20	15	0	0	0	0	0	0	13	0	42	0	104	
7:15 AM	0	29	2	0	16	15	0	0	0	0	0	0	2	0	56	0	120	
7:20 AM	0	32	2	0	15	12	0	0	0	0	0	0	5	0	29	0	95	
7:25 AM	0	36	3	0	37	9	0	0	0	0	0	0	12	0	47	0	144	
7:30 AM	0	31	7	0	20	13	0	0	0	0	0	0	11	0	40	0	122	
7:35 AM	0	36	6	0	22	14	0	0	0	0	0	0	8	0	27	0	113	
7:40 AM	0	26	4	0	27	19	0	0	0	0	0	0	5	0	41	0	122	
7:45 AM	0	31	6	0	29	18	0	0	0	0	0	0	12	0	57	0	153	
7:50 AM	0	33	1	0	18	20	0	0	0	0	0	0	8	0	40	0	120	
7:55 AM	0	24	2	0	24	20	0	0	0	0	0	0	3	0	48	0	121	1391
8:00 AM	0	30	2	0	28	14	0	0	0	0	0	0	5	0	35	0	114	1403
8:05 AM	0	25	3	0	28	16	0	0	0	0	0	0	4	0	27	0	103	1431
8:10 AM	0	33	4	0	22	21	0	0	0	0	0	0	4	0	25	0	109	1436
8:15 AM	0	36	6	0	19	24	0	0	0	0	0	0	3	0	26	0	114	1430
8:20 AM	0	25	2	0	11	16	0	0	0	0	0	0	7	0	45	0	106	1441
8:25 AM	0	24	4	0	23	18	0	0	0	0	0	0	2	0	20	0	91	1388
8:30 AM	0	13	3	0	16	13	0	0	0	0	0	0	8	0	32	0	85	1351
8:35 AM	0	23	3	0	13	18	0	0	0	0	0	0	4	0	29	0	90	1328
8:40 AM	0	19	10	0	17	14	0	0	0	0	0	0	6	0	28	0	94	1300
8:45 AM	0	23	3	0	17	14	0	0	0	0	0	0	7	0	34	0	98	1245
8:50 AM	0	20	2	0	23	16	0	0	0	0	0	0	4	0	26	0	91	1216
8:55 AM	0	28	2	0	20	15	0	0	0	0	0	0	3	0	18	0	86	1181

Peak 15 M n F owrates	Northbound				Southbound				Eastbound				Westbound				ota
	Left	hru	R ght	U	Left	hru	R ght	U	Left	hru	R ght	U	Left	hru	R ght	U	
A Veh c es	0	360	44	0	296	228	0	0	0	0	0	0	100	0	552	0	1580
Heavy Trucks	0	16	4		4	8	0		0	0	0		4	0	24		60
Buses																	
Pedestr ans		0				0				4				0			4
B cyc es	0	20	0		0	8	0		0	0	0		0	0	0		28
Scooters																	

Comments:

Report generated on 6/4/2020 3:20 PM

SOURCE: Qua ty Counts, LLC (http://www qua tycounts net) 1 877 580 2212

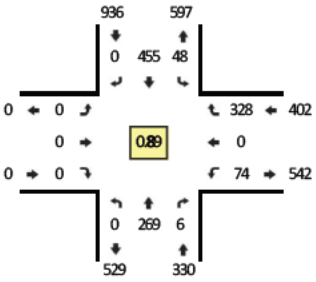
ype of peak hour be ng reported: ntersect on Peak

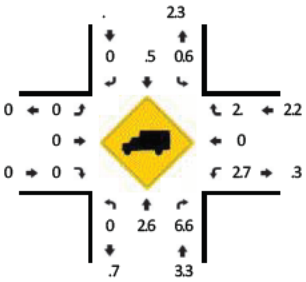
Method for determ n ng peak hour: ota Enter ng Vo ume

LOCATION: SE 17th Ave -- Milwaukie Expy
CITY/STATE: Milwaukie, OR

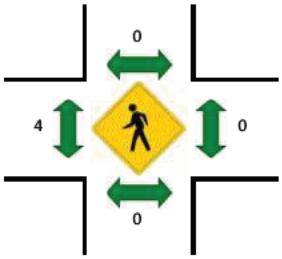
QC JOB #: 15240502
DATE: Tue, Jun 3 2014

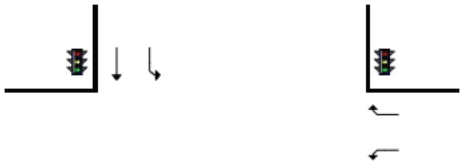
Peak-Hour: 4:55 PM -- 5:55 PM
Peak 15-Min: 5:20 PM -- 5:35 PM

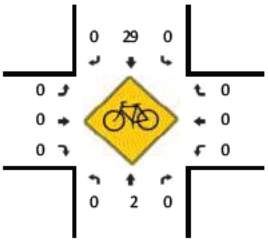


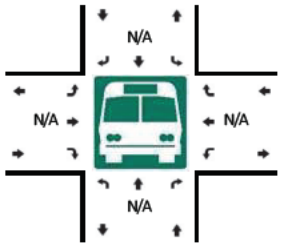


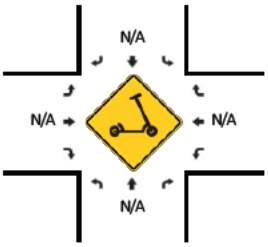
Quality Counts
DATA THAT DRIVES COMMUNITIES











5 M n Count Per od Beg nn ng At	SE 17th Ave (Northbound)				SE 17th Ave (Southbound)				M wauk e Expy (Eastbound)				M wauk e Expy (Westbound)				ota	Hour y ota s
	Left	hru	R ght	U	Left	hru	R ght	U	Left	hru	R ght	U	Left	hru	R ght	U		
4:00 PM	0	19	5	0	25	31	0	0	0	0	0	0	6	0	27	0	113	
4:05 PM	0	15	7	0	36	31	0	0	0	0	0	0	2	0	18	0	109	
4:10 PM	0	34	6	0	46	35	0	0	0	0	0	0	5	0	20	0	146	
4:15 PM	0	14	6	0	26	28	0	0	0	0	0	0	6	0	33	0	113	
4:20 PM	0	21	7	0	38	43	0	0	0	0	0	0	4	0	20	0	133	
4:25 PM	0	15	3	0	51	38	0	0	0	0	0	0	11	0	25	0	143	
4:30 PM	0	28	7	0	32	52	0	0	0	0	0	0	8	0	18	0	145	
4:35 PM	0	22	17	0	44	38	0	0	0	0	0	0	2	0	26	0	149	
4:40 PM	0	20	4	0	31	35	0	0	0	0	0	0	9	0	18	0	117	
4:45 PM	0	23	4	0	29	37	0	0	0	0	0	0	8	0	26	0	127	
4:50 PM	0	21	10	0	28	31	0	0	0	0	0	0	6	0	24	0	120	
4:55 PM	0	23	4	0	41	42	0	0	0	0	0	0	1	0	24	0	135	1550
5:00 PM	0	19	5	0	41	40	0	0	0	0	0	0	6	0	33	0	144	1581
5:05 PM	0	25	4	0	42	40	0	0	0	0	0	0	5	0	23	0	139	1611
5:10 PM	0	10	6	0	45	31	0	0	0	0	0	0	5	0	18	0	115	1580
5:15 PM	0	19	6	0	40	43	0	0	0	0	0	0	8	0	28	0	144	1611
5:20 PM	0	20	5	0	33	45	0	0	0	0	0	0	7	0	34	0	144	1622
5:25 PM	0	20	3	0	45	31	0	0	0	0	0	0	14	0	24	0	137	1616
5:30 PM	0	40	9	0	46	60	0	0	0	0	0	0	9	0	21	0	185	1656
5:35 PM	0	24	6	0	28	24	0	0	0	0	0	0	9	0	33	0	124	1631
5:40 PM	0	26	6	0	38	36	0	0	0	0	0	0	1	0	31	0	138	1652
5:45 PM	0	19	3	0	47	29	0	0	0	0	0	0	4	0	24	0	126	1651
5:50 PM	0	24	4	0	35	34	0	0	0	0	0	0	5	0	35	0	137	1668
5:55 PM	0	18	7	0	30	35	0	0	0	0	0	0	5	0	26	0	121	1654

Peak 15 M n F owrates	Northbound				Southbound				Eastbound				Westbound				ota
	Left	hru	R ght	U	Left	hru	R ght	U	Left	hru	R ght	U	Left	hru	R ght	U	
A Veh c es	0	320	68	0	496	544	0	0	0	0	0	0	120	0	316	0	1864
Heavy Trucks	0	16	4		4	8	0		0	0	0		0	0	12		44
Buses																	
Pedestr ans		0				0				4				0			4
B cyc es	0	0	0		0	32	0		0	0	0		0	0	0		32
Scooters																	

Comments:

Report generated on 6/4/2020 3:20 PM

SOURCE: Qua ty Counts, LLC (http://www qua tycounts net) 1 877 580 2212

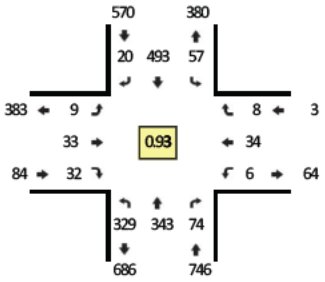
ype of peak hour be ng reported: ntersect on Peak

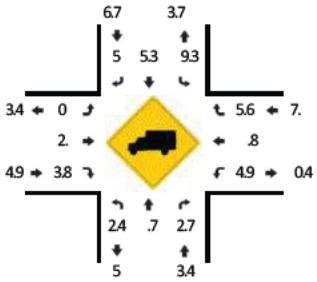
Method for determ n ng peak hour: ota Enter ng Vo ume

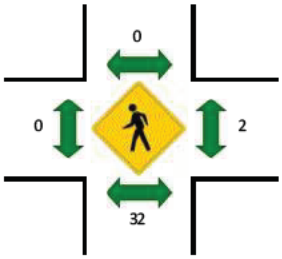
LOCATION: Hwy 99E -- SE Harrison St/17th St
CITY/STATE: Milwaukie, OR

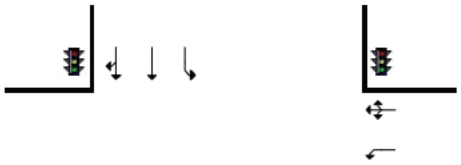
QC JOB #: 15240503
DATE: Tue, Jun 3 2014

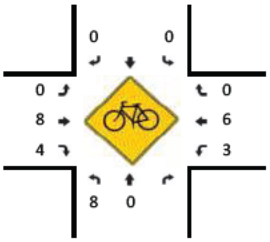
Peak-Hour: 7:05 AM -- 8:05 AM
Peak 15-Min: 7:10 AM -- 7:25 AM

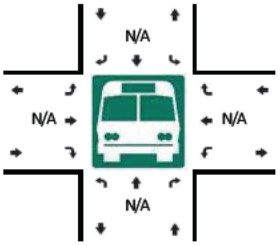


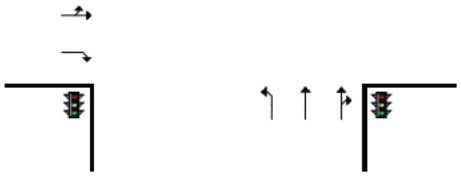


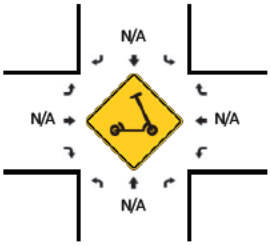












5 M n Count Per od Beg nn ng At	Hwy 99E (Northbound)				Hwy 99E (Southbound)				SE Harr son St/17th St (Eastbound)				SE Harr son St/17th St (Westbound)				ota	Hour y ota s
	Left	hru	R ght	U	Left	hru	R ght	U	Left	hru	R ght	U	Left	hru	R ght	U		
7:00 AM	22	102	4	0	2	29	1	0	2	2	8	0	6	1	2	0	181	
7:05 AM	18	118	2	0	3	42	1	0	1	1	10	0	2	2	2	0	202	
7:10 AM	21	123	9	0	4	30	3	0	4	2	13	0	9	0	2	0	220	
7:15 AM	23	139	4	0	4	36	1	0	0	3	10	0	9	0	0	0	229	
7:20 AM	40	135	6	0	6	45	4	0	0	3	8	0	5	2	2	0	256	
7:25 AM	19	127	5	0	3	33	1	0	1	3	5	0	6	2	2	0	207	
7:30 AM	36	116	5	0	3	30	0	0	2	5	6	0	5	7	2	0	217	
7:35 AM	23	108	8	0	4	60	1	0	0	5	13	0	0	3	1	0	226	
7:40 AM	29	88	9	0	5	44	2	0	2	2	12	0	8	3	1	0	205	
7:45 AM	31	87	6	0	9	56	2	0	1	6	15	0	3	3	2	0	221	
7:50 AM	42	132	7	0	2	35	1	0	1	0	13	0	7	6	3	0	249	
7:55 AM	15	86	6	0	8	55	3	0	4	0	11	0	4	1	1	0	194	2607
8:00 AM	32	84	7	0	6	27	1	0	3	3	16	0	3	5	0	0	187	2613
8:05 AM	14	91	4	0	8	54	0	0	0	0	10	0	4	2	2	0	189	2600
8:10 AM	42	88	9	0	11	27	1	0	2	6	15	0	7	7	1	0	216	2596
8:15 AM	24	104	9	0	7	42	1	0	0	9	17	0	7	3	4	0	227	2594
8:20 AM	26	81	7	0	9	46	0	1	1	11	20	0	10	10	2	0	224	2562
8:25 AM	14	94	3	0	14	55	2	0	0	6	7	0	5	3	1	0	204	2559
8:30 AM	19	85	6	0	5	18	3	0	2	11	10	0	9	8	3	0	179	2521
8:35 AM	10	93	11	0	8	42	4	0	0	1	14	0	4	4	1	0	192	2487
8:40 AM	24	86	4	0	7	27	1	0	2	7	12	1	7	3	1	0	182	2464
8:45 AM	17	83	4	0	9	66	2	0	3	4	12	0	8	6	1	0	215	2458
8:50 AM	24	71	4	0	2	32	2	0	0	7	18	0	8	7	5	0	180	2389
8:55 AM	19	58	6	0	9	42	2	0	0	3	12	0	6	1	2	0	160	2355

Peak 15 M n F owrates	Northbound				Southbound				Eastbound				Westbound				ota
	Left	hru	R ght	U	Left	hru	R ght	U	Left	hru	R ght	U	Left	hru	R ght	U	
A Veh c es	336	1588	76	0	56	444	32	0	16	32	124	0	92	8	16	0	2820
Heavy Trucks	8	32	0		12	28	4		0	4	0		4	4	4		100
Buses																	
Pedestr ans		12				0				0				0			12
B cyc es	12	0	0		0	4	0		0	4	12		4	4	0		40
Scooters																	

Comments:

Report generated on 6/4/2020 3:20 PM

SOURCE: Qua ty Counts, LLC (http://www qua tycounts net) 1 877 580 2212

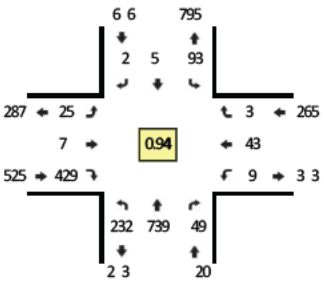
ype of peak hour be ng reported: ntersect on Peak

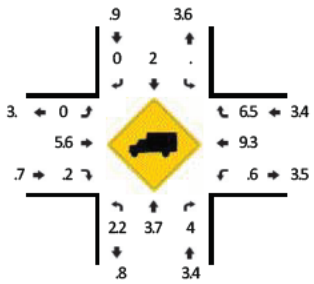
Method for determ n ng peak hour: ota Enter ng Vo ume

LOCATION: Hwy 99E -- SE Harrison St/17th St
CITY/STATE: Milwaukie, OR

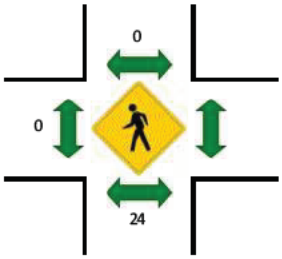
QC JOB #: 15240504
DATE: Tue, Jun 3 2014

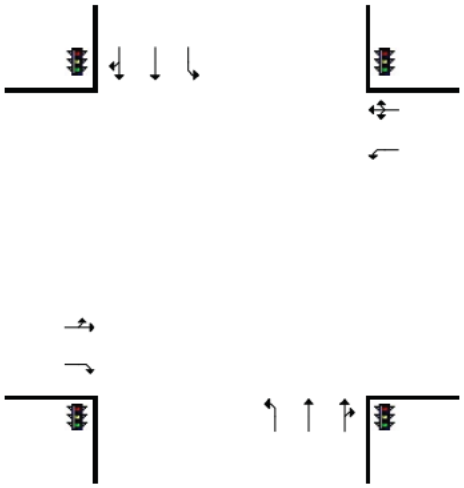
Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 5:15 PM -- 5:30 PM

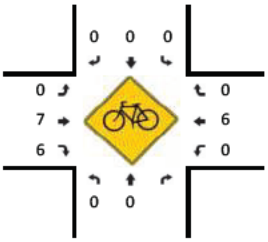


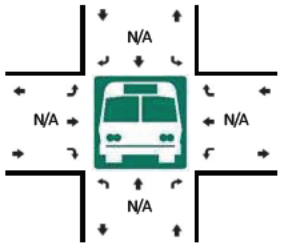


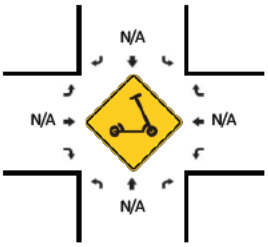
Quality Counts
DATA THAT DRIVES COMMUNITIES











5 M n Count Per od Beg nn ng At	Hwy 99E (Northbound)				Hwy 99E (Southbound)				SE Harr son St/17th St (Eastbound)				SE Harr son St/17th St (Westbound)				ota	Hour y ota s
	Left	hru	R ght	U	Left	hru	R ght	U	Left	hru	R ght	U	Left	hru	R ght	U		
4:00 PM	10	32	4	0	6	96	0	0	1	4	32	0	13	0	3	0	201	
4:05 PM	23	56	10	0	7	119	0	0	2	3	29	0	14	2	2	0	267	
4:10 PM	17	54	4	0	13	91	2	1	2	8	33	0	24	5	4	0	258	
4:15 PM	17	67	14	0	9	127	2	1	2	4	23	0	14	4	1	0	285	
4:20 PM	15	49	6	0	8	118	1	0	3	8	37	0	17	7	3	0	272	
4:25 PM	24	64	8	0	10	133	1	0	1	4	42	0	10	3	3	0	303	
4:30 PM	12	37	3	0	4	122	0	0	1	8	30	0	24	5	1	0	247	
4:35 PM	21	70	14	0	4	119	2	0	5	7	46	0	13	2	5	0	308	
4:40 PM	18	41	10	0	9	112	0	0	2	9	40	0	20	4	5	0	270	
4:45 PM	22	81	12	0	9	159	1	0	0	5	28	0	16	9	1	0	343	
4:50 PM	10	47	7	0	12	114	0	0	4	4	24	0	20	6	2	0	250	
4:55 PM	24	57	15	0	5	122	1	0	3	6	40	0	13	0	3	0	289	3293
5:00 PM	14	65	8	0	10	127	2	0	0	4	37	0	19	4	1	0	291	3383
5:05 PM	16	62	18	0	4	111	2	0	1	4	45	0	11	1	0	0	275	3391
5:10 PM	19	57	13	0	11	122	0	0	4	2	33	0	12	2	2	0	277	3410
5:15 PM	28	82	12	0	8	128	0	0	1	5	37	0	19	2	3	0	325	3450
5:20 PM	15	64	10	0	8	127	1	0	2	12	34	0	23	5	7	0	308	3486
5:25 PM	30	58	14	0	3	146	0	0	2	5	30	0	10	2	1	0	301	3484
5:30 PM	15	55	16	0	10	124	3	0	1	8	35	0	15	6	1	0	289	3526
5:35 PM	21	67	5	0	9	106	0	0	8	4	43	0	21	5	2	1	292	3510
5:40 PM	14	53	13	0	5	112	1	0	3	6	36	0	14	5	1	0	263	3503
5:45 PM	22	69	13	0	6	116	0	0	3	2	35	0	7	4	2	0	279	3439
5:50 PM	15	43	13	0	12	126	1	0	4	4	30	0	18	4	4	0	274	3463
5:55 PM	23	57	13	0	6	140	1	0	0	2	29	0	11	2	2	0	286	3460

Peak 15 M n F owrates	Northbound				Southbound				Eastbound				Westbound				ota
	Left	hru	R ght	U	Left	hru	R ght	U	Left	hru	R ght	U	Left	hru	R ght	U	
A Veh c es	292	816	144	0	76	1604	4	0	20	88	404	0	208	36	44	0	3736
Heavy Trucks	4	24	0		0	32	0		0	4	0		0	4	0		68
Buses																	
Pedestr ans		4				0				0				0			4
B cyc es	0	0	4		0	0	0		0	0	12		0	8	0		24
Scooters																	

Comments:

Report generated on 6/4/2020 3:20 PM

SOURCE: Qua ty Counts, LLC (http://www qua tycounts net) 1 877 580 2212

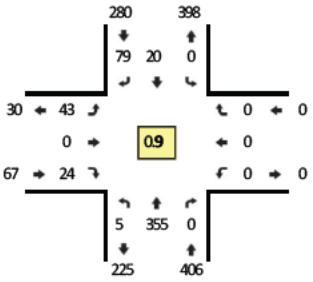
ype of peak hour be ng reported: ntersect on Peak

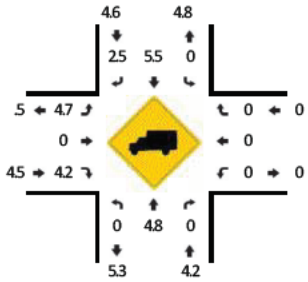
Method for determ n ng peak hour: ota Enter ng Vo ume

LOCATION: SE 17th Ave -- SE Lava Dr
CITY/STATE: Milwaukie, OR

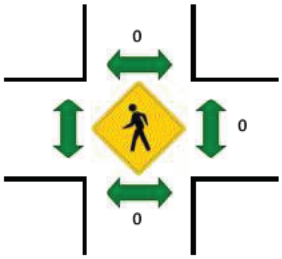
QC JOB #: 15240505
DATE: Tue, Jun 3 2014

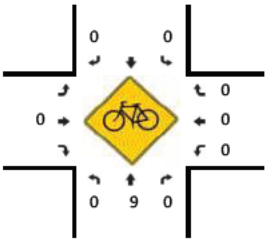
Peak-Hour: **7:30** AM -- **8:30** AM
Peak 15-Min: **7:45** AM -- **8:00** AM

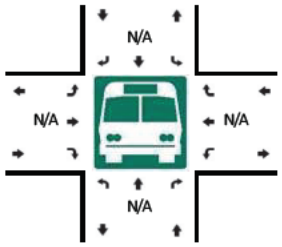


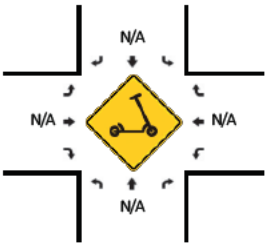


Quality Counts
DATA THAT DRIVES COMMUNITIES









5 M n Count Per od Beg nn ng At	SE 17th Ave (Northbound)				SE 17th Ave (Southbound)				SE Lava Dr (Eastbound)				SE Lava Dr (Westbound)				ota	Hour y ota s
	Left	hru	R ght	U	Left	hru	R ght	U	Left	hru	R ght	U	Left	hru	R ght	U		
7:00 AM	3	22	0	0	0	15	3	0	1	0	1	0	0	0	0	0	45	
7:05 AM	3	18	0	0	0	7	9	0	0	0	3	0	0	0	0	0	40	
7:10 AM	6	17	0	0	0	16	8	0	0	0	2	0	0	0	0	0	49	
7:15 AM	1	24	0	0	0	14	8	0	4	0	0	0	0	0	0	0	51	
7:20 AM	7	33	0	0	0	9	8	0	6	0	1	0	0	0	0	0	64	
7:25 AM	4	24	0	0	0	9	12	0	6	0	2	0	0	0	0	0	57	
7:30 AM	4	35	0	0	0	9	10	0	6	0	2	0	0	0	0	0	66	
7:35 AM	2	29	0	0	0	14	12	0	6	0	3	0	0	0	0	0	66	
7:40 AM	5	30	0	0	0	14	6	0	3	0	2	0	0	0	0	0	60	
7:45 AM	5	28	0	0	0	15	6	0	1	0	2	0	0	0	0	0	57	
7:50 AM	7	30	0	0	0	18	8	0	5	0	2	0	0	0	0	0	70	
7:55 AM	7	38	0	0	0	15	16	0	1	0	4	0	0	0	0	0	81	706
8:00 AM	5	18	0	0	0	15	7	0	2	0	2	0	0	0	0	0	49	710
8:05 AM	2	35	0	0	0	15	7	0	3	0	1	0	0	0	0	0	63	733
8:10 AM	0	18	0	0	0	16	1	0	3	0	0	0	0	0	0	0	38	722
8:15 AM	6	40	0	0	0	24	4	0	5	0	2	0	0	0	0	0	81	752
8:20 AM	4	25	0	0	0	23	1	0	6	0	3	0	0	0	0	0	62	750
8:25 AM	4	29	0	0	0	23	1	0	2	0	1	0	0	0	0	0	60	753
8:30 AM	1	19	0	0	0	17	3	0	3	0	5	0	0	0	0	0	48	735
8:35 AM	8	22	0	0	0	11	7	0	2	0	1	0	0	0	0	0	51	720
8:40 AM	5	16	0	0	0	21	3	0	2	0	3	0	0	0	0	0	50	710
8:45 AM	4	22	0	0	0	20	4	0	5	0	2	0	0	0	0	0	57	710
8:50 AM	5	24	0	0	0	12	2	0	3	0	4	0	0	0	0	0	50	690
8:55 AM	4	24	0	0	0	18	5	0	1	0	3	0	0	0	0	0	55	664

Peak 15 M n F owrates	Northbound				Southbound				Eastbound				Westbound				ota
	Left	hru	R ght	U	Left	hru	R ght	U	Left	hru	R ght	U	Left	hru	R ght	U	
A Veh c es	76	384	0	0	0	192	120	0	28	0	32	0	0	0	0	0	832
Heavy Trucks	0	12	0		0	4	4		0	0	4		0	0	0		24
Buses																	
Pedestr ans		0				0				0				0			0
B cyc es	0	24	0		0	16	0		4	0	0		0	0	0		44
Scooters																	

Comments:

Report generated on 6/4/2020 3:20 PM

SOURCE: Qua ty Counts, LLC (http://www qua tycounts net) 1 877 580 2212

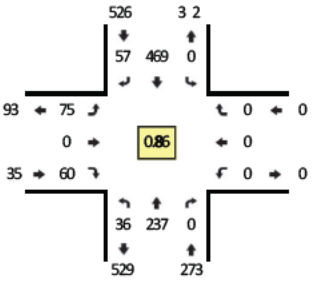
ype of peak hour be ng reported: ntersect on Peak

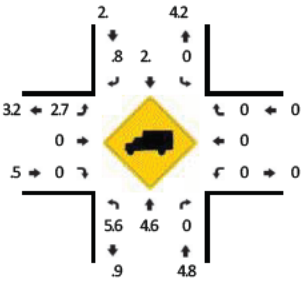
Method for determ n ng peak hour: ota Enter ng Vo ume

LOCATION: SE 17th Ave -- SE Lava Dr
CITY/STATE: Milwaukie, OR

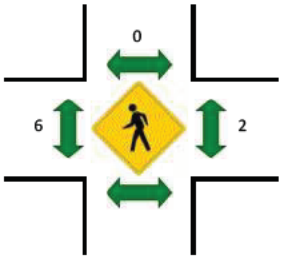
QC JOB #: 15240506
DATE: Tue, Jun 3 2014

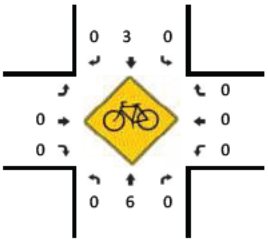
Peak-Hour: 4:20 PM -- 5:20 PM
Peak 15-Min: 4:30 PM -- 4:45 PM

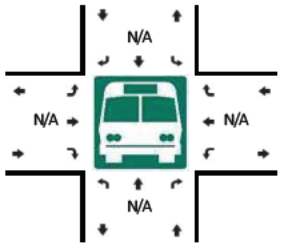


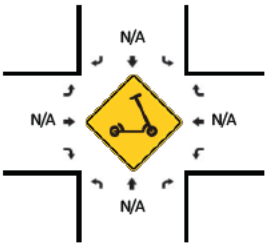


Quality Counts
DATA THAT DRIVES COMMUNITIES









5 M n Count Per od Beg nn ng At	SE 17th Ave (Northbound)				SE 17th Ave (Southbound)				SE Lava Dr (Eastbound)				SE Lava Dr (Westbound)				ota	Hour y ota s
	Left	hru	R ght	U	Left	hru	R ght	U	Left	hru	R ght	U	Left	hru	R ght	U		
4:00 PM	1	18	0	0	0	32	4	0	6	0	5	0	0	0	0	0	66	
4:05 PM	0	16	0	0	0	32	4	0	5	0	5	0	0	0	0	0	62	
4:10 PM	2	30	0	0	0	33	3	0	11	0	4	0	0	0	0	0	83	
4:15 PM	3	13	0	0	0	27	5	0	7	0	3	0	0	0	0	0	58	
4:20 PM	3	25	0	0	0	48	2	0	2	0	4	0	0	0	0	0	84	
4:25 PM	4	15	0	0	0	41	9	0	3	0	2	0	0	0	0	0	74	
4:30 PM	3	23	0	0	0	51	4	0	13	0	8	0	0	0	0	0	102	
4:35 PM	1	16	0	0	0	34	4	0	19	0	10	0	0	0	0	0	84	
4:40 PM	0	30	0	0	0	40	6	0	2	0	8	0	0	0	0	0	86	
4:45 PM	7	16	0	0	0	39	7	0	1	0	3	0	0	0	0	0	73	
4:50 PM	3	21	0	0	0	29	3	0	11	0	6	0	0	0	0	0	73	
4:55 PM	0	17	0	0	0	36	3	0	7	0	6	0	0	0	0	0	69	914
5:00 PM	7	21	0	0	0	40	3	0	3	0	2	0	0	0	0	0	76	924
5:05 PM	2	11	0	0	0	40	4	0	8	0	3	0	0	0	0	0	68	930
5:10 PM	2	24	0	0	0	36	5	0	3	0	3	0	0	0	0	0	73	920
5:15 PM	4	18	0	0	0	35	7	0	3	0	5	0	0	0	0	0	72	934
5:20 PM	3	22	0	0	0	42	3	0	3	0	4	0	0	0	0	0	77	927
5:25 PM	1	20	0	0	0	35	5	0	4	0	3	0	0	0	0	0	68	921
5:30 PM	4	29	0	0	0	44	5	0	7	0	8	0	0	0	0	0	97	916
5:35 PM	2	19	0	0	0	37	6	0	15	0	14	0	0	0	0	0	93	925
5:40 PM	2	21	0	0	0	35	4	0	10	0	5	0	0	0	0	0	77	916
5:45 PM	3	14	0	0	0	36	3	0	6	0	5	0	0	0	0	0	67	910
5:50 PM	1	26	0	0	0	31	4	0	4	0	3	0	0	0	0	0	69	906
5:55 PM	1	19	0	0	0	33	4	0	6	0	1	0	0	0	0	0	64	901

Peak 15 M n F owrates	Northbound				Southbound				Eastbound				Westbound				ota
	Left	hru	R ght	U	Left	hru	R ght	U	Left	hru	R ght	U	Left	hru	R ght	U	
A Veh c es	16	276	0	0	0	500	56	0	136	0	104	0	0	0	0	0	1088
Heavy Trucks	4	8	0		0	12	4		4	0	0		0	0	0		32
Buses																	
Pedestr ans		0				0				8				0			8
B cyc es	0	4	0		0	28	0		4	0	0		0	0	0		36
Scooters																	

Comments:

Report generated on 6/4/2020 3:20 PM

SOURCE: Qua ty Counts, LLC (http://www qua tycounts net) 1 877 580 2212

Transportation Volume Tables					
TVT	0.25 mile north of Clackamas Highway (OR224)				
Year	2014	2015	2016	2017	2018
AADT	38300	41200	33000	33300	33400
GR	1	1.08	0.80	1.01	1.00
TVT	0.05 mile north of Harrison Street				
AADT	26200	28200	33700	34000	34200
GR	1	1.08	1.20	1.01	1.01
TVT	0.02 mile south of Jefferson Street				
AADT	26900	29000	30600	30800	31000
GR	1	1.08	1.06	1.01	1.01
AVERAGE GROWTH RATE			**2.7%**		

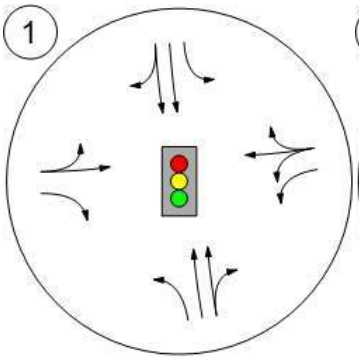
Detector Counts	OR 99E@17th St/Harrison St		Annual Growth Rate	OR 224@17th St		Annual Growth Rate
	Total Entering Volumes (TEV)			Total Entering Volumes (TEV)		
Date	Mar-18	Mar-19		Mar-19	Feb-20	
PM Peak Hour	3485	3348	**-3.9%**	1617	1492	**-7.7%**

Turning Movement Counts	OR 99E@17th St/Harrison St		Annual Growth Rate	OR 224@17th St		Annual Growth Rate
	TSP data	Historical data		TSP data	Historical data	
Date	11/29/2006	6/3/2014		11/29/2006	6/3/2014	
PM Peak Hour	3852	2598	**-4.1%**	2080	1656	**-2.5%**

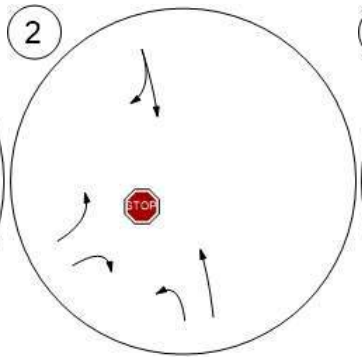
Attachment D – Existing Traffic Level-of-Service Worksheets

Lane Configuration and Traffic Control

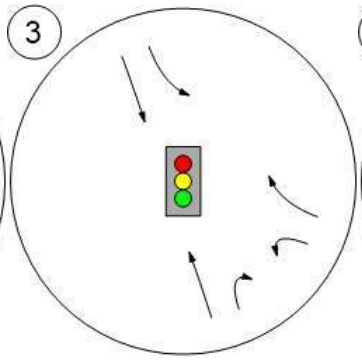
OR 99W / Harrison St / 17th



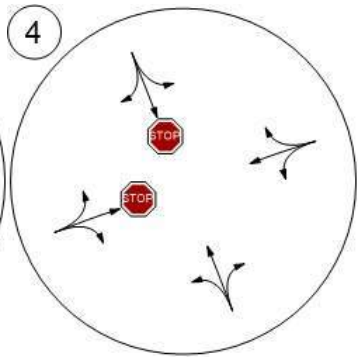
Lava Dr / 17th Ave



OR 224 / 17th Ave

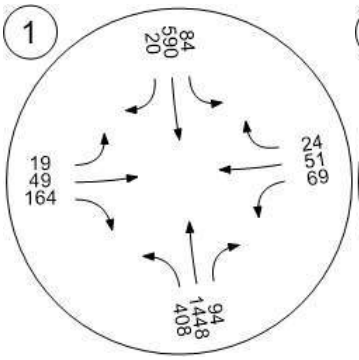


Waverly Ct / Lava Dr

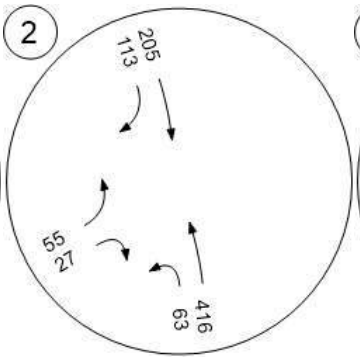


Traffic Volume

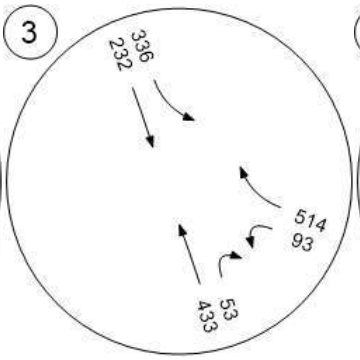
OR 99W / Harrison St / 17th



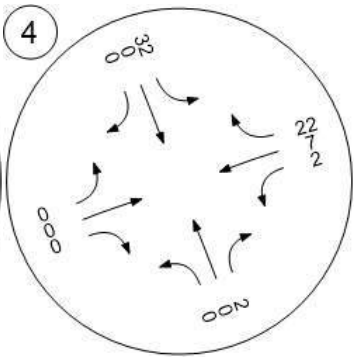
Lava Dr / 17th Ave



OR 224 / 17th Ave

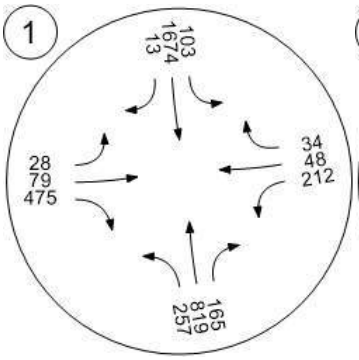


Waverly Ct / Lava Dr

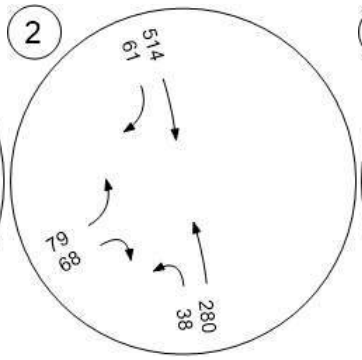


Traffic Volume

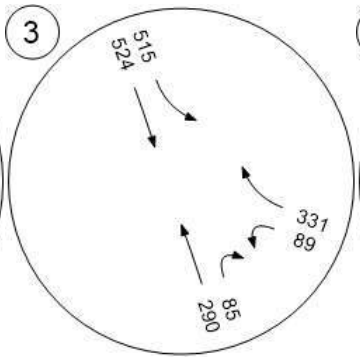
OR 99W / Harrison St / 17th



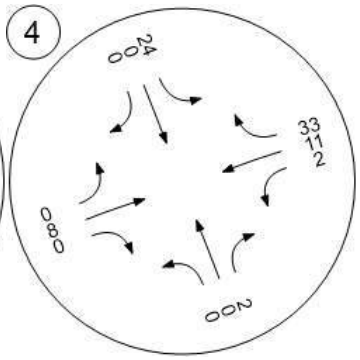
Lava Dr / 17th Ave



OR 224 / 17th Ave



Waverly Ct / Lava Dr



Intersection Level Of Service Report
Intersection 1: OR 99W / Harrison St / 17th St

Control Type:	Signalized	Delay (sec / veh):	33.1
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.678

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	1	1	0	0
Entry Pocket Length [ft]	370.00	100.00	100.00	375.00	100.00	100.00	100.00	100.00	150.00	135.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	408	1448	94	84	590	20	19	49	164	69	51	24
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	4.00	4.00	5.00	11.00	7.00	2.00	6.00	10.00	4.00	7.00	11.00	5.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	82	0	0	0
Total Hourly Volume [veh/h]	408	1448	94	84	590	20	19	49	82	69	51	24
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	104	369	24	21	151	5	5	13	21	18	13	6
Total Analysis Volume [veh/h]	416	1478	96	86	602	20	19	50	84	70	52	24
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	15			0			15			0		
v_di, Inbound Pedestrian Volume crossing m	15			0			15			0		
v_co, Outbound Pedestrian Volume crossing	1			0			0			1		
v_ci, Inbound Pedestrian Volume crossing mi	1			0			0			1		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	10			0			13			8		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	120
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	93.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Split	Split	Overlap	Split	Split	Split
Signal Group	1	6	0	5	2	0	0	8	8	0	4	0
Auxiliary Signal Groups									1,8			
Lead / Lag	Lag	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	4	10	0	6	10	0	0	6	6	0	6	0
Maximum Green [s]	30	30	0	30	30	0	0	30	30	0	30	0
Amber [s]	3.5	3.5	0.0	3.5	3.5	0.0	0.0	3.5	3.5	0.0	4.0	0.0
All red [s]	0.5	0.5	0.0	0.5	0.5	0.0	0.0	0.5	0.5	0.0	0.5	0.0
Split [s]	34	56	0	20	42	0	0	26	26	0	18	0
Vehicle Extension [s]	2.3	6.1	0.0	2.3	6.1	0.0	0.0	2.3	2.3	0.0	2.3	0.0
Walk [s]	0	7	0	0	11	0	0	8	8	0	5	0
Pedestrian Clearance [s]	0	17	0	0	18	0	0	21	21	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
l1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	2.0	0.0	2.0	0.0
l2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	2.0	0.0	2.5	0.0
Minimum Recall	No	Yes		No	Yes			No	No		No	
Maximum Recall	No	No		No	No			No	No		No	
Pedestrian Recall	No	No		No	No			No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C	R	L	C
C, Cycle Length [s]	120	120	120	120	120	120	120	120	120	120
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.50	4.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	0.00	2.50	2.50
g_i, Effective Green Time [s]	30	71	71	8	49	49	16	63	9	9
g / C, Green / Cycle	0.25	0.60	0.60	0.06	0.41	0.41	0.13	0.52	0.07	0.07
(v / s)_i Volume / Saturation Flow Rate	0.24	0.43	0.44	0.05	0.17	0.17	0.04	0.05	0.04	0.06
s, saturation flow rate [veh/h]	1752	1840	1794	1652	1795	1775	1726	1549	1360	1559
c, Capacity [veh/h]	438	1096	1069	107	737	729	223	811	141	148
d1, Uniform Delay [s]	44.28	17.14	17.48	55.36	25.24	25.25	47.40	14.45	55.41	54.71
k, delay calibration	0.40	0.50	0.50	0.07	0.50	0.50	0.07	0.07	0.07	0.07
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	28.08	4.05	4.53	8.23	1.79	1.81	0.48	0.03	1.13	2.42
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.95	0.72	0.74	0.80	0.42	0.42	0.31	0.10	0.40	0.60
d, Delay for Lane Group [s/veh]	72.36	21.19	22.01	63.60	27.03	27.06	47.87	14.48	56.54	57.13
Lane Group LOS	E	C	C	E	C	C	D	B	E	E
Critical Lane Group	No	No	Yes	Yes	No	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	15.48	15.80	16.20	2.81	6.71	6.65	1.91	1.16	1.73	2.75
50th-Percentile Queue Length [ft/ln]	387.08	395.06	404.97	70.31	167.86	166.24	47.72	29.09	43.29	68.78
95th-Percentile Queue Length [veh/ln]	21.94	22.32	22.80	5.06	10.96	10.88	3.44	2.09	3.12	4.95
95th-Percentile Queue Length [ft/ln]	548.41	558.04	569.98	126.55	274.10	271.97	85.89	52.36	77.91	123.80

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	72.36	21.57	22.01	63.60	27.04	27.06	47.87	47.87	14.48	56.54	57.13	57.13
Movement LOS	E	C	C	E	C	C	D	D	B	E	E	E
d_A, Approach Delay [s/veh]	32.21			31.48			29.54			56.90		
Approach LOS	C			C			C			E		
d_I, Intersection Delay [s/veh]	33.11											
Intersection LOS	C											
Intersection V/C	0.678											

Other Modes

g_Walk,mi, Effective Walk Time [s]	12.0	9.0	15.0	11.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswa k Circulation Area [ft²/ped]	194.31	0.00	0.00	2383.30
d_p, Pedestrian Delay [s]	48.60	51.34	45.94	49.50
l_p,int, Pedestrian LOS Score for Intersection	2.983	2.750	2.303	2.077
Crosswalk LOS	C	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	867	633	367	225
d_b, Bicycle Delay [s]	19.36	28.02	40.28	47.45
l_b,int, Bicycle LOS Score for Intersection	3.201	2.144	1.947	1.801
Bicycle LOS	C	B	A	A

Sequence

Ring 1	1	2	4	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 2: Lava Dr / 17th Ave

Control Type:	Two-way stop	Delay (sec / veh):	20.9
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.212

Intersection Setup

Name						
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	1
Entry Pocket Length [ft]	50.00	100.00	100.00	100.00	100.00	65.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	63	416	205	113	55	27
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	5.00	5.00	3.00	6.00	4.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	63	416	205	113	55	27
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	18	116	57	31	15	8
Total Analysis Volume [veh/h]	70	462	228	126	61	30
Pedestrian Volume [ped/h]	0		1		2	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.00	0.00	0.00	0.21	0.04
d_M, Delay for Movement [s/veh]	8.15	0.00	0.00	0.00	20.88	10.07
Movement LOS	A	A	A	A	C	B
95th-Percentile Queue Length [veh/ln]	0.18	0.00	0.00	0.00	0.79	0.13
95th-Percentile Queue Length [ft/ln]	4.59	0.00	0.00	0.00	19.68	3.16
d_A, Approach Delay [s/veh]	1.07		0.00		17.32	
Approach LOS	A		A		C	
d_I, Intersection Delay [s/veh]	2.20					
Intersection LOS	C					

Intersection Level Of Service Report
Intersection 3: OR 224 / 17th Ave

Control Type:	Signalized	Delay (sec / veh):	24.2
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.751

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	1	0	1	0
Entry Pocket Length [ft]	100.00	100.00	160.00	100.00	130.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		No	

Volumes

Name						
Base Volume Input [veh/h]	433	53	336	232	93	514
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	4.00	11.00	1.00	6.00	5.00	5.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	433	53	336	232	93	514
Peak Hour Factor	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	116	14	90	62	25	138
Total Analysis Volume [veh/h]	466	57	361	249	100	553
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	22		18		0	

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Free Running
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	14.00

Phasing & Timing

Control Type	Permissive	Permissive	ProtPerm	Permissive	Permissive	Overlap
Signal Group	6	0	5	2	4	4
Auxiliary Signal Groups						4,5
Lead / Lag	-	-	Lead	-	Lead	-
Minimum Green [s]	5	0	5	5	5	5
Maximum Green [s]	40	0	50	40	20	20
Amber [s]	4.0	0.0	3.5	4.0	4.0	4.0
All red [s]	0.5	0.0	0.5	0.5	0.5	0.5
Split [s]	0	0	0	0	0	0
Vehicle Extension [s]	3.0	0.0	3.0	3.0	3.0	3.0
Walk [s]	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk						
I1, Start-Up Lost Time [s]	2.0	0.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	2.5	0.0	2.0	2.5	2.5	2.5
Minimum Recall	Yes		No	Yes	No	No
Maximum Recall	No		No	No	No	No
Pedestrian Recall	No		No	No	No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	3
Pedestrian Walk [s]	7
Pedestrian Clearance [s]	17

Lane Group Calculations

Lane Group	C	R	L	C	L	R
C, Cycle Length [s]	104	104	104	104	104	104
L, Total Lost Time per Cycle [s]	4.50	4.50	4.50	4.50	4.50	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.50	2.50	0.00	2.50	2.50	0.00
g_i, Effective Green Time [s]	29	29	58	58	20	67
g / C, Green / Cycle	0.28	0.28	0.56	0.56	0.19	0.64
(v / s)_i Volume / Saturation Flow Rate	0.25	0.04	0.27	0.14	0.06	0.36
s, saturation flow rate [veh/h]	1840	1402	1321	1810	1738	1551
c, Capacity [veh/h]	508	387	621	1012	333	996
d1, Uniform Delay [s]	36.59	28.42	12.70	11.76	36.14	10.36
k, delay calibration	0.20	0.11	0.24	0.11	0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	12.06	0.17	1.92	0.13	0.50	2.23
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.92	0.15	0.58	0.25	0.30	0.55
d, Delay for Lane Group [s/veh]	48.66	28.60	14.62	11.89	36.64	12.59
Lane Group LOS	D	C	B	B	D	B
Critical Lane Group	Yes	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	12.98	1.09	4.80	2.89	2.22	7.03
50th-Percentile Queue Length [ft/ln]	324.48	27.25	120.06	72.29	55.54	175.75
95th-Percentile Queue Length [veh/ln]	18.89	1.96	8.40	5.21	4.00	11.38
95th-Percentile Queue Length [ft/ln]	472.19	49.05	209.91	130.13	99.97	284.46

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	48.66	28.60	14.62	11.89	36.64	12.59
Movement LOS	D	C	B	B	D	B
d_A, Approach Delay [s/veh]	46.47		13.51		16.27	
Approach LOS	D		B		B	
d_I, Intersection Delay [s/veh]	24.17					
Intersection LOS	C					
Intersection V/C	0.751					

Other Modes

g_Walk,mi, Effective Walk Time [s]	11.0	11.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswa k Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	34.67	34.67	0.00
l_p,int, Pedestrian LOS Score for Intersection	2.223	2.469	0.000
Crosswalk LOS	B	B	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	889	889	444
d_b, Bicycle Delay [s]	14.04	14.02	27.22
l_b,int, Bicycle LOS Score for Intersection	2.423	2.566	1.560
Bicycle LOS	B	B	A

Sequence

Ring 1	2	-	4	3	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 4: Waverly Ct / Lava Dr

Control Type:	Two-way stop	Delay (sec / veh):	8.8
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.036

Intersection Setup

Name											
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	0	2	32	0	0	0	0	0	2	7	22
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	2	32	0	0	0	0	0	2	7	22
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	1	9	0	0	0	0	0	1	2	6
Total Analysis Volume [veh/h]	0	0	2	36	0	0	0	0	0	2	8	24
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Stop	Stop	Free
Flared Lane		No	No	
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance		No	No	
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	7.24	7.26	0.00	8.76	9.25	8.53	8.69	9.10	8.38	0.00	0.00	0.00
Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.11	0.11	0.11	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	2.82	2.82	2.82	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.00			8.76			8.72			0.00		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	4.38											
Intersection LOS	A											

Intersection Level Of Service Report
Intersection 1: OR 99W / Harrison St / 17th St

Control Type:	Signalized	Delay (sec / veh):	42.1
Analysis Method:	HCM 6th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.935

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	1	1	0	0
Entry Pocket Length [ft]	370.00	100.00	100.00	375.00	100.00	100.00	100.00	100.00	150.00	135.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	257	819	165	103	1674	13	28	79	475	212	48	34
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	4.00	4.00	1.00	2.00	2.00	0.00	6.00	1.00	2.00	9.00	6.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	8	0	0	0	0	0	238	0	0	22
Total Hourly Volume [veh/h]	257	819	157	103	1674	13	28	79	237	212	48	12
Peak Hour Factor	0.9900	0.9900	0.9900	0.9900	0.9900	0.9900	0.9900	0.9900	0.9900	0.9900	0.9900	0.9900
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	65	207	40	26	423	3	7	20	60	54	12	3
Total Analysis Volume [veh/h]	260	827	159	104	1691	13	28	80	239	214	48	12
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	12			0			12			0		
v_di, Inbound Pedestrian Volume crossing m	12			0			12			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			1		
v_ci, Inbound Pedestrian Volume crossing mi	1			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	1			0			13			6		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	120
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	60.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Split	Split	Overlap	Split	Split	Split
Signal Group	1	6	0	5	2	0	0	8	8	0	4	0
Auxiliary Signal Groups									1,8			
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	4	10	0	6	10	0	0	6	6	0	6	0
Maximum Green [s]	30	63	0	16	49	0	0	11	11	0	14	0
Amber [s]	3.5	3.5	0.0	3.5	3.5	0.0	0.0	3.5	3.5	0.0	4.0	0.0
All red [s]	0.5	0.5	0.0	0.5	0.5	0.0	0.0	0.5	0.5	0.0	0.5	0.0
Split [s]	23	60	0	19	56	0	0	26	26	0	15	0
Vehicle Extension [s]	2.3	6.1	0.0	2.3	6.1	0.0	0.0	2.3	2.3	0.0	2.3	0.0
Walk [s]	0	7	0	0	11	0	0	8	8	0	5	0
Pedestrian Clearance [s]	0	17	0	0	18	0	0	21	21	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	2.0	0.0	2.5	0.0
Minimum Recall	No	Yes		No	Yes			No	No		No	
Maximum Recall	No	No		No	No			No	No		No	
Pedestrian Recall	No	No		No	No			No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C	R	L	C
C, Cycle Length [s]	120	120	120	120	120	120	120	120	120	120
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.50	4.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	0.00	2.50	2.50
g_i, Effective Green Time [s]	19	69	69	9	58	58	16	39	11	11
g / C, Green / Cycle	0.16	0.57	0.57	0.07	0.48	0.48	0.13	0.32	0.09	0.09
(v / s)_i Volume / Saturation Flow Rate	0.15	0.27	0.28	0.06	0.46	0.46	0.06	0.15	0.08	0.08
s, saturation flow rate [veh/h]	1781	1840	1724	1795	1870	1865	1787	1571	1781	1692
c, Capacity [veh/h]	284	1050	984	130	904	902	235	508	157	149
d1, Uniform Delay [s]	49.63	15.26	15.33	54.78	29.40	29.45	48.19	32.20	54.19	54.19
k, delay calibration	0.11	0.50	0.50	0.07	0.50	0.50	0.07	0.13	0.13	0.13
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	11.29	1.58	1.73	6.72	18.85	19.16	0.86	0.80	18.70	19.27
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.92	0.48	0.49	0.80	0.94	0.94	0.46	0.47	0.90	0.90
d, Delay for Lane Group [s/veh]	60.92	16.84	17.06	61.50	48.24	48.61	49.05	33.00	72.89	73.46
Lane Group LOS	E	B	B	E	D	D	D	C	E	E
Critical Lane Group	Yes	No	No	No	No	Yes	No	Yes	Yes	No
50th-Percentile Queue Length [veh/ln]	8.55	8.43	8.07	3.34	27.14	27.23	3.05	5.63	5.02	4.78
50th-Percentile Queue Length [ft/ln]	213.72	210.73	201.72	83.48	678.62	680.80	76.30	140.83	125.39	119.56
95th-Percentile Queue Length [veh/ln]	13.34	13.19	12.73	6.01	35.69	35.79	5.49	9.53	8.69	8.37
95th-Percentile Queue Length [ft/ln]	333.59	329.76	318.19	150.26	892.23	894.76	137.33	238.14	217.22	209.22

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	60.92	16.93	17.06	61.50	48.42	48.61	49.05	49.05	33.00	73.09	73.46	73.46
Movement LOS	E	B	B	E	D	D	D	D	C	E	E	E
d_A, Approach Delay [s/veh]	26.12			49.18			38.00			73.17		
Approach LOS	C			D			D			E		
d_I, Intersection Delay [s/veh]	42.09											
Intersection LOS	D											
Intersection V/C	0.935											

Other Modes

g_Walk,mi, Effective Walk Time [s]	12.0	9.0	15.0	11.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswa k Circulation Area [ft²/ped]	196.35	0.00	0.00	3272.59
d_p, Pedestrian Delay [s]	48.60	51.34	45.94	49.50
l_p,int, Pedestrian LOS Score for Intersection	3.033	2.841	2.584	2.196
Crosswalk LOS	C	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	933	867	367	175
d_b, Bicycle Delay [s]	17.08	19.27	40.28	50.11
l_b,int, Bicycle LOS Score for Intersection	2.594	3.051	2.525	2.048
Bicycle LOS	B	C	B	B

Sequence

Ring 1	1	2	4	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 2: Lava Dr / 17th Ave

Control Type:	Two-way stop	Delay (sec / veh):	24.3
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.312

Intersection Setup

Name						
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	1
Entry Pocket Length [ft]	50.00	100.00	100.00	100.00	100.00	65.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	38	280	514	61	79	68
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	4.00	2.00	2.00	1.00	0.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	38	280	514	61	79	68
Peak Hour Factor	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	10	74	137	16	21	18
Total Analysis Volume [veh/h]	40	298	547	65	84	72
Pedestrian Volume [ped/h]	1		1		8	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.00	0.01	0.00	0.31	0.14
d_M, Delay for Movement [s/veh]	8.90	0.00	0.00	0.00	24.32	13.26
Movement LOS	A	A	A	A	C	B
95th-Percentile Queue Length [veh/ln]	0.13	0.00	0.00	0.00	1.29	0.49
95th-Percentile Queue Length [ft/ln]	3.25	0.00	0.00	0.00	32.21	12.28
d_A, Approach Delay [s/veh]	1.05		0.00		19.21	
Approach LOS	A		A		C	
d_I, Intersection Delay [s/veh]	3.03					
Intersection LOS	C					

Intersection Level Of Service Report
Intersection 3: OR 224 / 17th Ave

Control Type:	Signalized	Delay (sec / veh):	16.0
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.665

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	1	0	1	0
Entry Pocket Length [ft]	100.00	100.00	160.00	100.00	130.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		No	

Volumes

Name						
Base Volume Input [veh/h]	290	85	515	524	89	331
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	5.00	1.00	2.00	2.00	1.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	290	85	515	524	89	331
Peak Hour Factor	0.9900	0.9900	0.9900	0.9900	0.9900	0.9900
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	73	21	130	132	22	84
Total Analysis Volume [veh/h]	293	86	520	529	90	334
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	6		31		0	

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Free Running
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Permissive	Permissive	ProtPerm	Permissive	Permissive	Overlap
Signal Group	6	0	5	2	4	4
Auxiliary Signal Groups						4,5
Lead / Lag	-	-	Lead	-	Lead	-
Minimum Green [s]	5	0	5	5	5	5
Maximum Green [s]	40	0	50	40	20	20
Amber [s]	4.0	0.0	3.5	4.0	4.0	4.0
All red [s]	0.5	0.0	0.5	0.5	0.5	0.5
Split [s]	0	0	0	0	0	0
Vehicle Extension [s]	3.0	0.0	3.0	3.0	3.0	3.0
Walk [s]	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk						
I1, Start-Up Lost Time [s]	2.0	0.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	2.5	0.0	2.0	2.5	2.5	2.5
Minimum Recall	Yes		No	Yes	No	No
Maximum Recall	No		No	No	No	No
Pedestrian Recall	No		No	No	No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	3
Pedestrian Walk [s]	7
Pedestrian Clearance [s]	17

Lane Group Calculations

Lane Group	C	R	L	C	L	R
C, Cycle Length [s]	71	71	71	71	71	71
L, Total Lost Time per Cycle [s]	4.50	4.50	4.50	4.50	4.50	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.50	2.50	0.00	2.50	2.50	0.00
g_i, Effective Green Time [s]	14	14	36	36	9	49
g / C, Green / Cycle	0.19	0.19	0.51	0.51	0.12	0.69
(v / s)_i Volume / Saturation Flow Rate	0.16	0.06	0.35	0.28	0.05	0.21
s, saturation flow rate [veh/h]	1855	1502	1477	1870	1781	1602
c, Capacity [veh/h]	358	290	747	956	222	1102
d1, Uniform Delay [s]	27.61	24.61	12.00	11.89	28.82	4.39
k, delay calibration	0.11	0.11	0.18	0.11	0.11	0.23
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	4.63	0.56	1.96	0.50	1.19	0.33
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.82	0.30	0.70	0.55	0.41	0.30
d, Delay for Lane Group [s/veh]	32.24	25.18	13.97	12.39	30.01	4.73
Lane Group LOS	C	C	B	B	C	A
Critical Lane Group	Yes	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	5.02	1.24	5.38	5.15	1.44	1.49
50th-Percentile Queue Length [ft/ln]	125.45	30.95	134.59	128.72	36.08	37.28
95th-Percentile Queue Length [veh/ln]	8.69	2.23	9.19	8.87	2.60	2.68
95th-Percentile Queue Length [ft/ln]	217.29	55.71	229.72	221.76	64.95	67.10

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	32.24	25.18	13.97	12.39	30.01	4.73
Movement LOS	C	C	B	B	C	A
d_A, Approach Delay [s/veh]	30.64		13.17		10.09	
Approach LOS	C		B		B	
d_I, Intersection Delay [s/veh]	16.04					
Intersection LOS	B					
Intersection V/C	0.665					

Other Modes

g_Walk,mi, Effective Walk Time [s]	11.0	11.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswa k Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	34.67	34.67	0.00
I_p,int, Pedestrian LOS Score for Intersection	2.264	2.484	0.000
Crosswalk LOS	B	B	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	889	889	444
d_b, Bicycle Delay [s]	13.93	14.11	27.22
I_b,int, Bicycle LOS Score for Intersection	2.185	3.290	1.560
Bicycle LOS	B	C	A

Sequence

Ring 1	2	-	4	3	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 4: Waverly Ct / Lava Dr

Control Type:	Two-way stop	Delay (sec / veh):	9.2
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.010

Intersection Setup

Name											
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	0	2	24	0	0	0	8	0	2	11	33
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	2	24	0	0	0	8	0	2	11	33
Peak Hour Factor	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	1	6	0	0	0	2	0	1	3	9
Total Analysis Volume [veh/h]	0	0	2	26	0	0	0	9	0	2	12	35
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Stop	Stop	Free
Flared Lane		No	No	
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance		No	No	
Number of Storage Spaces in Median	0	0	0	0

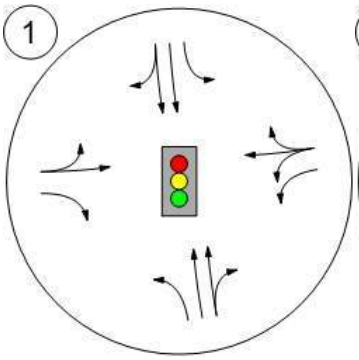
Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	7.26	7.29	0.00	8.83	9.31	8.53	8.81	9.18	8.45	0.00	0.00	0.00
Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.08	0.08	0.08	0.03	0.03	0.03	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	2.07	2.07	2.07	0.78	0.78	0.78	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.00			8.83			9.18			0.00		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	3.63											
Intersection LOS	A											

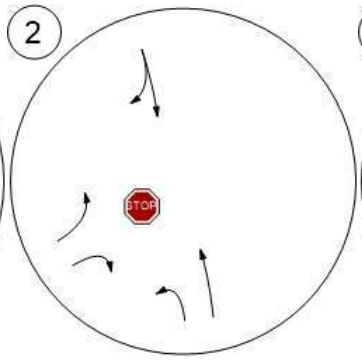
Attachment E – 2021 Background Traffic Level-of-Service Worksheets

Lane Configuration and Traffic Control

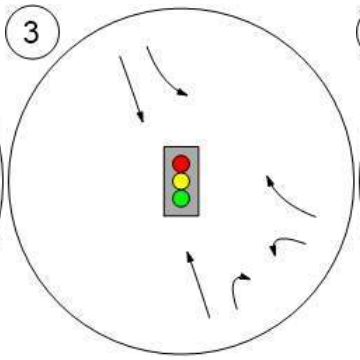
OR 99W / Harrison St / 17th



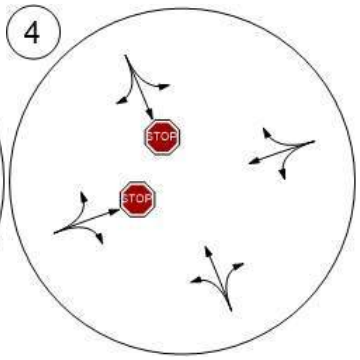
Lava Dr / 17th Ave



OR 224 / 17th Ave

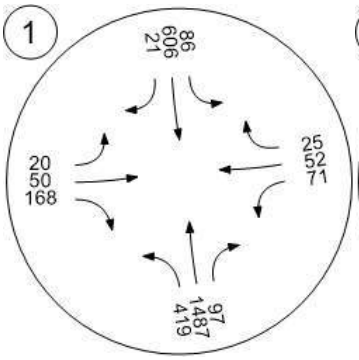


Waverly Ct / Lava Dr

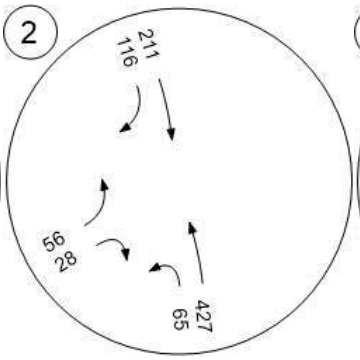


Traffic Volume

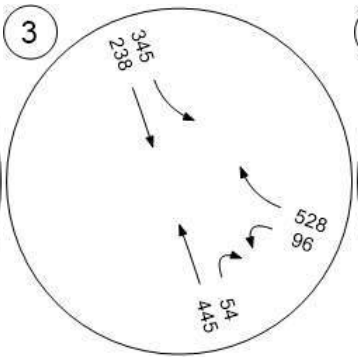
OR 99W / Harrison St / 17th



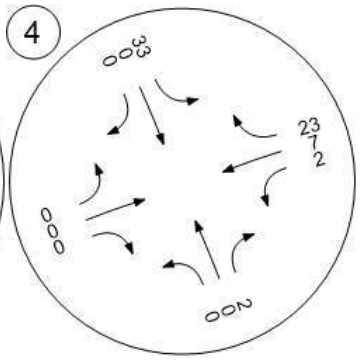
Lava Dr / 17th Ave



OR 224 / 17th Ave

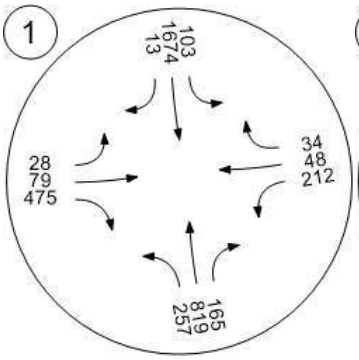


Waverly Ct / Lava Dr

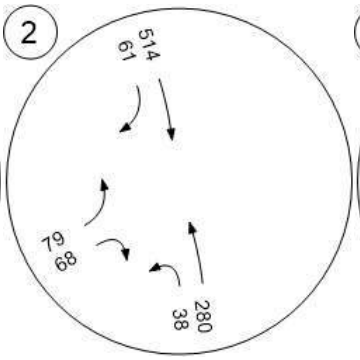


Traffic Volume

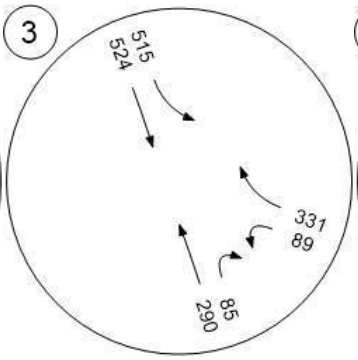
OR 99W / Harrison St / 17th



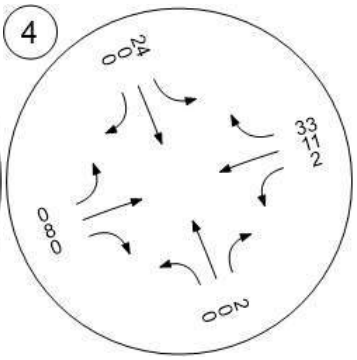
Lava Dr / 17th Ave



OR 224 / 17th Ave



Waverly Ct / Lava Dr



Intersection Level Of Service Report
Intersection 1: OR 99W / Harrison St / 17th St

Control Type:	Signalized	Delay (sec / veh):	37.1
Analysis Method:	HCM 6th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.719

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	1	1	0	0
Entry Pocket Length [ft]	370.00	100.00	100.00	375.00	100.00	100.00	100.00	100.00	150.00	135.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	408	1448	94	84	590	20	19	49	164	69	51	24
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	4.00	4.00	5.00	11.00	7.00	2.00	6.00	10.00	4.00	7.00	11.00	5.00
Growth Factor	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	84	0	0	0
Total Hourly Volume [veh/h]	419	1487	97	86	606	21	20	50	84	71	52	25
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	1.0000	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	110	391	26	23	159	5	5	13	22	19	14	7
Total Analysis Volume [veh/h]	441	1565	102	91	638	21	21	53	88	75	55	26
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	15			0			15			0		
v_di, Inbound Pedestrian Volume crossing m	15			0			15			0		
v_co, Outbound Pedestrian Volume crossing	1			0			0			1		
v_ci, Inbound Pedestrian Volume crossing mi	1			0			0			1		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	10			0			13			8		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	120
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	93.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Split	Split	Overlap	Split	Split	Split
Signal Group	1	6	0	5	2	0	0	8	8	0	4	0
Auxiliary Signal Groups									1,8			
Lead / Lag	Lag	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	4	10	0	6	10	0	0	6	6	0	6	0
Maximum Green [s]	30	30	0	30	30	0	0	30	30	0	30	0
Amber [s]	3.5	3.5	0.0	3.5	3.5	0.0	0.0	3.5	3.5	0.0	4.0	0.0
All red [s]	0.5	0.5	0.0	0.5	0.5	0.0	0.0	0.5	0.5	0.0	0.5	0.0
Split [s]	34	56	0	20	42	0	0	26	26	0	18	0
Vehicle Extension [s]	2.3	6.1	0.0	2.3	6.1	0.0	0.0	2.3	2.3	0.0	2.3	0.0
Walk [s]	0	7	0	0	11	0	0	8	8	0	5	0
Pedestrian Clearance [s]	0	17	0	0	18	0	0	21	21	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	2.0	0.0	2.5	0.0
Minimum Recall	No	Yes		No	Yes			No	No		No	
Maximum Recall	No	No		No	No			No	No		No	
Pedestrian Recall	No	No		No	No			No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C	R	L	C
C, Cycle Length [s]	120	120	120	120	120	120	120	120	120	120
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.50	4.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	0.00	2.50	2.50
g_i, Effective Green Time [s]	30	70	70	8	49	49	16	63	9	9
g / C, Green / Cycle	0.25	0.59	0.59	0.07	0.41	0.41	0.13	0.53	0.08	0.08
(v / s)_i Volume / Saturation Flow Rate	0.25	0.45	0.46	0.06	0.18	0.18	0.04	0.06	0.04	0.06
s, saturation flow rate [veh/h]	1752	1840	1794	1652	1795	1775	1725	1549	1360	1580
c, Capacity [veh/h]	438	1078	1051	113	726	718	226	820	150	156
d1, Uniform Delay [s]	45.03	18.82	19.23	55.11	26.09	26.10	47.36	14.13	54.76	54.39
k, delay calibration	0.45	0.50	0.50	0.07	0.50	0.50	0.07	0.07	0.07	0.07
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	42.67	5.40	6.16	7.83	2.06	2.09	0.51	0.03	1.06	2.36
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	1.01	0.77	0.79	0.80	0.46	0.46	0.33	0.11	0.40	0.61
d, Delay for Lane Group [s/veh]	87.71	24.22	25.39	62.94	28.15	28.18	47.87	14.16	55.82	56.75
Lane Group LOS	F	C	C	E	C	C	D	B	E	E
Critical Lane Group	No	No	Yes	Yes	No	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	18.10	18.22	18.76	2.96	7.30	7.23	2.05	1.21	1.83	2.94
50th-Percentile Queue Length [ft/ln]	452.61	455.51	469.02	74.01	182.55	180.75	51.23	30.14	45.83	73.46
95th-Percentile Queue Length [veh/ln]	25.19	25.22	25.86	5.33	11.73	11.64	3.69	2.17	3.30	5.29
95th-Percentile Queue Length [ft/ln]	629.82	630.52	646.61	133.22	293.34	291.00	92.22	54.25	82.50	132.23

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	87.71	24.77	25.39	62.94	28.17	28.18	47.87	47.87	14.16	55.82	56.75	56.75
Movement LOS	F	C	C	E	C	C	D	D	B	E	E	E
d_A, Approach Delay [s/veh]	37.96			32.39			29.56			56.39		
Approach LOS	D			C			C			E		
d_I, Intersection Delay [s/veh]	37.12											
Intersection LOS	D											
Intersection V/C	0.719											

Other Modes

g_Walk,mi, Effective Walk Time [s]	12.0	9.0	15.0	11.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswa k Circulation Area [ft²/ped]	188.94	0.00	0.00	2312.16
d_p, Pedestrian Delay [s]	48.60	51.34	45.94	49.50
l_p,int, Pedestrian LOS Score for Intersection	3.024	2.776	2.318	2.085
Crosswalk LOS	C	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	867	633	367	225
d_b, Bicycle Delay [s]	19.36	28.02	40.28	47.45
l_b,int, Bicycle LOS Score for Intersection	3.299	2.178	1.966	1.817
Bicycle LOS	C	B	A	A

Sequence

Ring 1	1	2	4	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 2: Lava Dr / 17th Ave

Control Type:	Two-way stop	Delay (sec / veh):	21.7
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.223

Intersection Setup

Name						
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	1
Entry Pocket Length [ft]	50.00	100.00	100.00	100.00	100.00	65.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	63	416	205	113	55	27
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	5.00	5.00	3.00	6.00	4.00
Growth Factor	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	65	427	211	116	56	28
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	18	119	59	32	16	8
Total Analysis Volume [veh/h]	72	474	234	129	62	31
Pedestrian Volume [ped/h]	0		1		2	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.00	0.00	0.00	0.22	0.04
d_M, Delay for Movement [s/veh]	8.18	0.00	0.00	0.00	21.67	10.13
Movement LOS	A	A	A	A	C	B
95th-Percentile Queue Length [veh/ln]	0.19	0.00	0.00	0.00	0.84	0.13
95th-Percentile Queue Length [ft/ln]	4.77	0.00	0.00	0.00	20.93	3.31
d_A, Approach Delay [s/veh]	1.08		0.00		17.82	
Approach LOS	A		A		C	
d_I, Intersection Delay [s/veh]	2.24					
Intersection LOS	C					

Intersection Level Of Service Report
Intersection 3: OR 224 / 17th Ave

Control Type:	Signalized	Delay (sec / veh):	26.1
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.772

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	1	0	1	0
Entry Pocket Length [ft]	100.00	100.00	160.00	100.00	130.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		No	

Volumes

Name						
Base Volume Input [veh/h]	433	53	336	232	93	514
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	4.00	11.00	1.00	6.00	5.00	5.00
Growth Factor	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	445	54	345	238	96	528
Peak Hour Factor	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	122	15	95	65	26	145
Total Analysis Volume [veh/h]	489	59	379	262	105	580
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	22		18		0	

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Free Running
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	14.00

Phasing & Timing

Control Type	Permissive	Permissive	ProtPerm	Permissive	Permissive	Overlap
Signal Group	6	0	5	2	4	4
Auxiliary Signal Groups						4,5
Lead / Lag	-	-	Lead	-	Lead	-
Minimum Green [s]	5	0	5	5	5	5
Maximum Green [s]	40	0	50	40	20	20
Amber [s]	4.0	0.0	3.5	4.0	4.0	4.0
All red [s]	0.5	0.0	0.5	0.5	0.5	0.5
Split [s]	0	0	0	0	0	0
Vehicle Extension [s]	3.0	0.0	3.0	3.0	3.0	3.0
Walk [s]	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk						
I1, Start-Up Lost Time [s]	2.0	0.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	2.5	0.0	2.0	2.5	2.5	2.5
Minimum Recall	Yes		No	Yes	No	No
Maximum Recall	No		No	No	No	No
Pedestrian Recall	No		No	No	No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	3
Pedestrian Walk [s]	7
Pedestrian Clearance [s]	17

Lane Group Calculations

Lane Group	C	R	L	C	L	R
C, Cycle Length [s]	111	111	111	111	111	111
L, Total Lost Time per Cycle [s]	4.50	4.50	4.50	4.50	4.50	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.50	2.50	0.00	2.50	2.50	0.00
g_i, Effective Green Time [s]	32	32	65	65	20	70
g / C, Green / Cycle	0.29	0.29	0.58	0.58	0.18	0.64
(v / s)_i Volume / Saturation Flow Rate	0.27	0.04	0.29	0.14	0.06	0.37
s, saturation flow rate [veh/h]	1840	1403	1317	1810	1738	1551
c, Capacity [veh/h]	527	402	641	1058	314	988
d1, Uniform Delay [s]	38.38	29.36	12.11	11.17	39.56	11.67
k, delay calibration	0.26	0.11	0.30	0.11	0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	15.37	0.17	2.44	0.12	0.62	2.56
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.93	0.15	0.59	0.25	0.33	0.59
d, Delay for Lane Group [s/veh]	53.75	29.52	14.55	11.29	40.18	14.23
Lane Group LOS	D	C	B	B	D	B
Critical Lane Group	Yes	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	14.93	1.19	5.19	3.07	2.55	8.37
50th-Percentile Queue Length [ft/ln]	373.36	29.73	129.68	76.66	63.63	209.28
95th-Percentile Queue Length [veh/ln]	21.27	2.14	8.92	5.52	4.58	13.12
95th-Percentile Queue Length [ft/ln]	531.80	53.51	223.06	137.99	114.54	327.91

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	53.75	29.52	14.55	11.29	40.18	14.23
Movement LOS	D	C	B	B	D	B
d_A, Approach Delay [s/veh]	51.14		13.22		18.21	
Approach LOS	D		B		B	
d_I, Intersection Delay [s/veh]	26.13					
Intersection LOS	C					
Intersection V/C	0.772					

Other Modes

g_Walk,mi, Effective Walk Time [s]	11.0	11.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswa k Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	34.67	34.67	0.00
I_p,int, Pedestrian LOS Score for Intersection	2.237	2.495	0.000
Crosswalk LOS	B	B	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	889	889	444
d_b, Bicycle Delay [s]	14.04	14.02	27.22
I_b,int, Bicycle LOS Score for Intersection	2.464	2.617	1.560
Bicycle LOS	B	B	A

Sequence

Ring 1	2	-	4	3	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 4: Waverly Ct / Lava Dr

Control Type:	Two-way stop	Delay (sec / veh):	8.8
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.037

Intersection Setup

Name											
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	0	2	32	0	0	0	0	0	2	7	22
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	2	33	0	0	0	0	0	2	7	23
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	1	9	0	0	0	0	0	1	2	6
Total Analysis Volume [veh/h]	0	0	2	37	0	0	0	0	0	2	8	26
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Stop	Stop	Free
Flared Lane		No	No	
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance		No	No	
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	7.24	7.27	0.00	8.77	9.26	8.53	8.70	9.11	8.38	0.00	0.00	0.00
Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.12	0.12	0.12	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	2.91	2.91	2.91	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.00			8.77			8.73			0.00		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	4.33											
Intersection LOS	A											

Intersection Level Of Service Report
Intersection 1: OR 99W / Harrison St / 17th St

Control Type:	Signalized	Delay (sec / veh):	41.6
Analysis Method:	HCM 6th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.935

Intersection Setup

Name											
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	1	1	0	0
Entry Pocket Length [ft]	370.00	100.00	100.00	375.00	100.00	100.00	100.00	100.00	150.00	135.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	257	819	165	103	1674	13	28	79	475	212	48	34
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	4.00	4.00	1.00	2.00	2.00	0.00	6.00	1.00	2.00	9.00	6.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	9	0	0	1	0	0	238	0	0	21
Total Hourly Volume [veh/h]	257	819	156	103	1674	12	28	79	237	212	48	13
Peak Hour Factor	0.9900	0.9900	0.9900	0.9900	0.9900	0.9900	0.9900	0.9900	0.9900	0.9900	0.9900	0.9900
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	65	207	39	26	423	3	7	20	60	54	12	3
Total Analysis Volume [veh/h]	260	827	158	104	1691	12	28	80	239	214	48	13
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	12			0			12			0		
v_di, Inbound Pedestrian Volume crossing m	12			0			12			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			1		
v_ci, Inbound Pedestrian Volume crossing mi	1			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	1			0			13			6		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	120
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	60.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Split	Split	Overlap	Split	Split	Split
Signal Group	1	6	0	5	2	0	0	8	8	0	4	0
Auxiliary Signal Groups									1,8			
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	4	10	0	6	10	0	0	6	6	0	6	0
Maximum Green [s]	30	30	0	30	30	0	0	30	30	0	30	0
Amber [s]	3.5	3.5	0.0	3.5	3.5	0.0	0.0	3.5	3.5	0.0	4.0	0.0
All red [s]	0.5	0.5	0.0	0.5	0.5	0.0	0.0	0.5	0.5	0.0	0.5	0.0
Split [s]	23	60	0	19	56	0	0	26	26	0	15	0
Vehicle Extension [s]	2.3	6.1	0.0	2.3	6.1	0.0	0.0	2.3	2.3	0.0	2.3	0.0
Walk [s]	0	7	0	0	11	0	0	8	8	0	5	0
Pedestrian Clearance [s]	0	17	0	0	18	0	0	21	21	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	2.0	0.0	2.5	0.0
Minimum Recall	No	Yes		No	Yes			No	No		No	
Maximum Recall	No	No		No	No			No	No		No	
Pedestrian Recall	No	No		No	No			No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C	R	L	C
C, Cycle Length [s]	120	120	120	120	120	120	120	120	120	120
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.50	4.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	0.00	2.50	2.50
g_i, Effective Green Time [s]	19	68	68	9	58	58	16	39	11	11
g / C, Green / Cycle	0.16	0.57	0.57	0.07	0.48	0.48	0.13	0.32	0.09	0.09
(v / s)_i Volume / Saturation Flow Rate	0.15	0.27	0.28	0.06	0.46	0.46	0.06	0.15	0.08	0.08
s, saturation flow rate [veh/h]	1781	1840	1725	1795	1870	1865	1787	1571	1781	1690
c, Capacity [veh/h]	283	1047	982	131	904	902	235	508	158	150
d1, Uniform Delay [s]	49.76	15.38	15.45	54.78	29.45	29.49	48.19	32.27	54.18	54.17
k, delay calibration	0.11	0.50	0.50	0.07	0.50	0.50	0.07	0.13	0.07	0.07
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	11.74	1.59	1.74	6.46	18.87	19.16	0.85	0.80	10.41	10.81
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.92	0.48	0.49	0.79	0.94	0.94	0.46	0.47	0.89	0.89
d, Delay for Lane Group [s/veh]	61.50	16.97	17.19	61.23	48.31	48.65	49.04	33.07	64.58	64.98
Lane Group LOS	E	B	B	E	D	D	D	C	E	E
Critical Lane Group	Yes	No	No	No	No	Yes	No	Yes	Yes	No
50th-Percentile Queue Length [veh/ln]	8.59	8.44	8.08	3.33	27.14	27.23	3.05	5.64	4.68	4.45
50th-Percentile Queue Length [ft/ln]	214.70	211.05	202.07	83.30	678.62	680.63	76.31	140.95	116.94	111.27
95th-Percentile Queue Length [veh/ln]	13.39	13.21	12.75	6.00	35.69	35.78	5.49	9.53	8.22	7.91
95th-Percentile Queue Length [ft/ln]	334.85	330.17	318.63	149.94	892.23	894.55	137.35	238.30	205.61	197.77

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	61.50	17.05	17.19	61.23	48.48	48.65	49.04	49.04	33.07	64.72	64.98	64.98
Movement LOS	E	B	B	E	D	D	D	D	C	E	E	E
d_A, Approach Delay [s/veh]	26.35			49.22			38.04			64.78		
Approach LOS	C			D			D			E		
d_I, Intersection Delay [s/veh]	41.58											
Intersection LOS	D											
Intersection V/C	0.935											

Other Modes

g_Walk,mi, Effective Walk Time [s]	12.0	9.0	15.0	11.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswa k Circulation Area [ft²/ped]	196.35	0.00	0.00	3296.31
d_p, Pedestrian Delay [s]	48.60	51.34	45.94	49.50
l_p,int, Pedestrian LOS Score for Intersection	3.035	2.842	2.584	2.194
Crosswalk LOS	C	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	933	867	367	175
d_b, Bicycle Delay [s]	17.08	19.27	40.28	50.11
l_b,int, Bicycle LOS Score for Intersection	2.594	3.051	2.525	2.048
Bicycle LOS	B	C	B	B

Sequence

Ring 1	1	2	4	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 2: Lava Dr / 17th Ave

Control Type:	Two-way stop	Delay (sec / veh):	24.3
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.312

Intersection Setup

Name						
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	1
Entry Pocket Length [ft]	50.00	100.00	100.00	100.00	100.00	65.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	38	280	514	61	79	68
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	4.00	2.00	2.00	1.00	0.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	38	280	514	61	79	68
Peak Hour Factor	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	10	74	137	16	21	18
Total Analysis Volume [veh/h]	40	298	547	65	84	72
Pedestrian Volume [ped/h]	1		1		8	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.00	0.01	0.00	0.31	0.14
d_M, Delay for Movement [s/veh]	8.90	0.00	0.00	0.00	24.32	13.26
Movement LOS	A	A	A	A	C	B
95th-Percentile Queue Length [veh/ln]	0.13	0.00	0.00	0.00	1.29	0.49
95th-Percentile Queue Length [ft/ln]	3.25	0.00	0.00	0.00	32.21	12.28
d_A, Approach Delay [s/veh]	1.05		0.00		19.21	
Approach LOS	A		A		C	
d_I, Intersection Delay [s/veh]	3.03					
Intersection LOS	C					

Intersection Level Of Service Report
Intersection 3: OR 224 / 17th Ave

Control Type:	Signalized	Delay (sec / veh):	16.0
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.665

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	1	0	1	0
Entry Pocket Length [ft]	100.00	100.00	160.00	100.00	130.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		No	

Volumes

Name						
Base Volume Input [veh/h]	290	85	515	524	89	331
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	5.00	1.00	2.00	2.00	1.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	290	85	515	524	89	331
Peak Hour Factor	0.9900	0.9900	0.9900	0.9900	0.9900	0.9900
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	73	21	130	132	22	84
Total Analysis Volume [veh/h]	293	86	520	529	90	334
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	6		31		0	

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Free Running
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Permissive	Permissive	ProtPerm	Permissive	Permissive	Overlap
Signal Group	6	0	5	2	4	4
Auxiliary Signal Groups						4,5
Lead / Lag	-	-	Lead	-	Lead	-
Minimum Green [s]	5	0	5	5	5	5
Maximum Green [s]	40	0	50	40	20	20
Amber [s]	4.0	0.0	3.5	4.0	4.0	4.0
All red [s]	0.5	0.0	0.5	0.5	0.5	0.5
Split [s]	0	0	0	0	0	0
Vehicle Extension [s]	3.0	0.0	3.0	3.0	3.0	3.0
Walk [s]	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk						
I1, Start-Up Lost Time [s]	2.0	0.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	2.5	0.0	2.0	2.5	2.5	2.5
Minimum Recall	Yes		No	Yes	No	No
Maximum Recall	No		No	No	No	No
Pedestrian Recall	No		No	No	No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	3
Pedestrian Walk [s]	7
Pedestrian Clearance [s]	17

Lane Group Calculations

Lane Group	C	R	L	C	L	R
C, Cycle Length [s]	71	71	71	71	71	71
L, Total Lost Time per Cycle [s]	4.50	4.50	4.50	4.50	4.50	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.50	2.50	0.00	2.50	2.50	0.00
g_i, Effective Green Time [s]	14	14	36	36	9	49
g / C, Green / Cycle	0.19	0.19	0.51	0.51	0.12	0.69
(v / s)_i Volume / Saturation Flow Rate	0.16	0.06	0.35	0.28	0.05	0.21
s, saturation flow rate [veh/h]	1855	1502	1477	1870	1781	1602
c, Capacity [veh/h]	358	290	747	956	222	1102
d1, Uniform Delay [s]	27.61	24.61	12.00	11.89	28.82	4.39
k, delay calibration	0.11	0.11	0.18	0.11	0.11	0.23
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	4.63	0.56	1.96	0.50	1.19	0.33
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.82	0.30	0.70	0.55	0.41	0.30
d, Delay for Lane Group [s/veh]	32.24	25.18	13.97	12.39	30.01	4.73
Lane Group LOS	C	C	B	B	C	A
Critical Lane Group	Yes	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	5.02	1.24	5.38	5.15	1.44	1.49
50th-Percentile Queue Length [ft/ln]	125.45	30.95	134.59	128.72	36.08	37.28
95th-Percentile Queue Length [veh/ln]	8.69	2.23	9.19	8.87	2.60	2.68
95th-Percentile Queue Length [ft/ln]	217.29	55.71	229.72	221.76	64.95	67.10

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	32.24	25.18	13.97	12.39	30.01	4.73
Movement LOS	C	C	B	B	C	A
d_A, Approach Delay [s/veh]	30.64		13.17		10.09	
Approach LOS	C		B		B	
d_I, Intersection Delay [s/veh]	16.04					
Intersection LOS	B					
Intersection V/C	0.665					

Other Modes

g_Walk,mi, Effective Walk Time [s]	11.0	11.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswa k Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	34.67	34.67	0.00
I_p,int, Pedestrian LOS Score for Intersection	2.264	2.484	0.000
Crosswalk LOS	B	B	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	889	889	444
d_b, Bicycle Delay [s]	13.93	14.11	27.22
I_b,int, Bicycle LOS Score for Intersection	2.185	3.290	1.560
Bicycle LOS	B	C	A

Sequence

Ring 1	2	-	4	3	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 4: Waverly Ct / Lava Dr

Control Type:	Two-way stop	Delay (sec / veh):	9.2
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.010

Intersection Setup

Name											
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	0	2	24	0	0	0	8	0	2	11	33
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	2	24	0	0	0	8	0	2	11	33
Peak Hour Factor	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	1	6	0	0	0	2	0	1	3	9
Total Analysis Volume [veh/h]	0	0	2	26	0	0	0	9	0	2	12	35
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

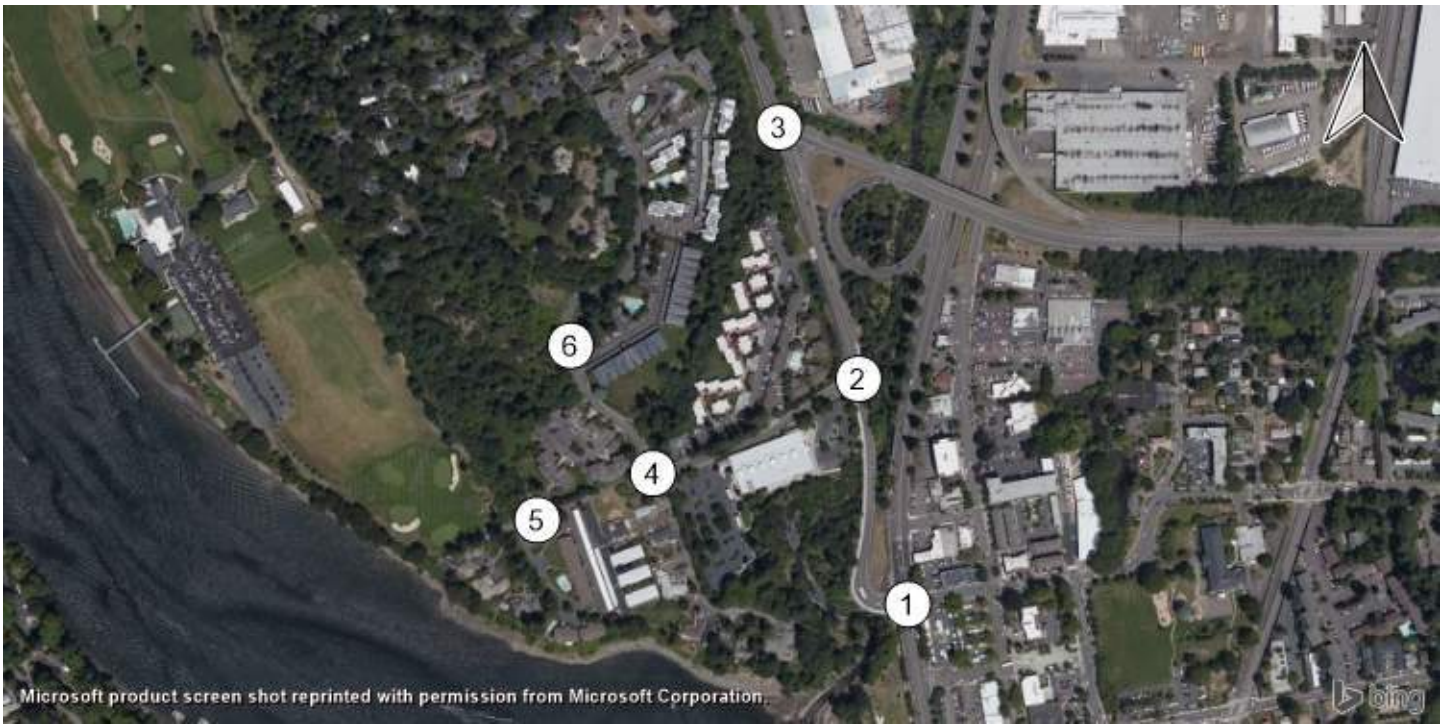
Priority Scheme	Free	Stop	Stop	Free
Flared Lane		No	No	
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance		No	No	
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	7.26	7.29	0.00	8.83	9.31	8.53	8.81	9.18	8.45	0.00	0.00	0.00
Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.08	0.08	0.08	0.03	0.03	0.03	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	2.07	2.07	2.07	0.78	0.78	0.78	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.00			8.83			9.18			0.00		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	3.63											
Intersection LOS	A											

Attachment F – 2021 Total Traffic Level-of-Service Worksheets

Lane Configuration and Traffic Control



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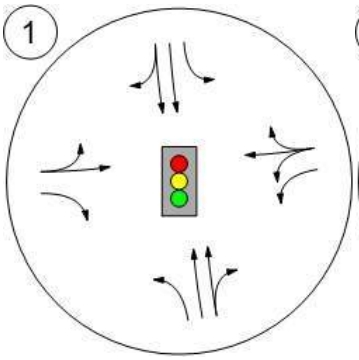
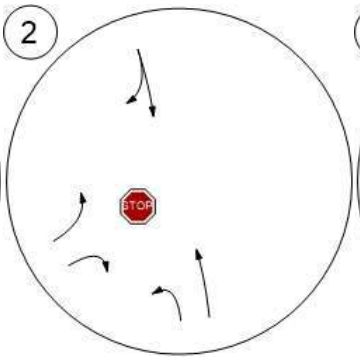


Lava Dr / 17th Ave



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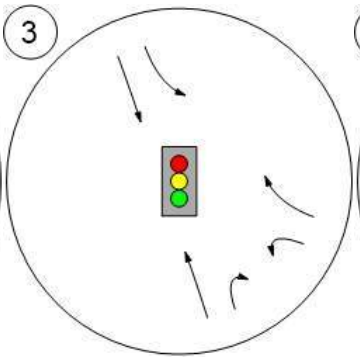
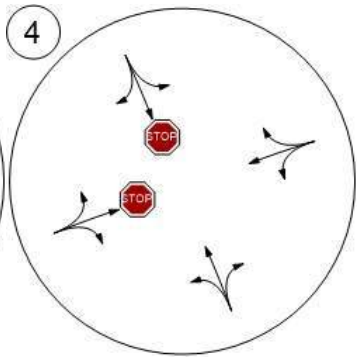


Waverly Ct / Lava Dr



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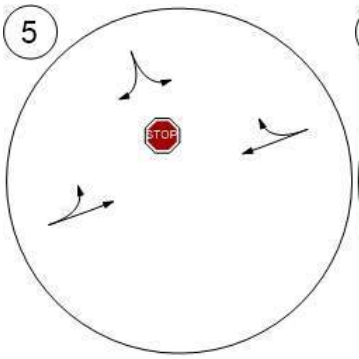

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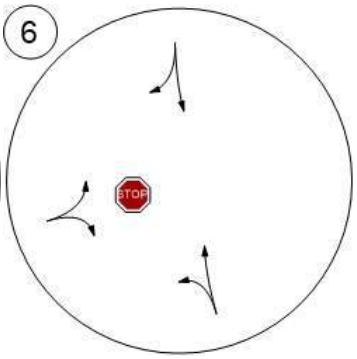

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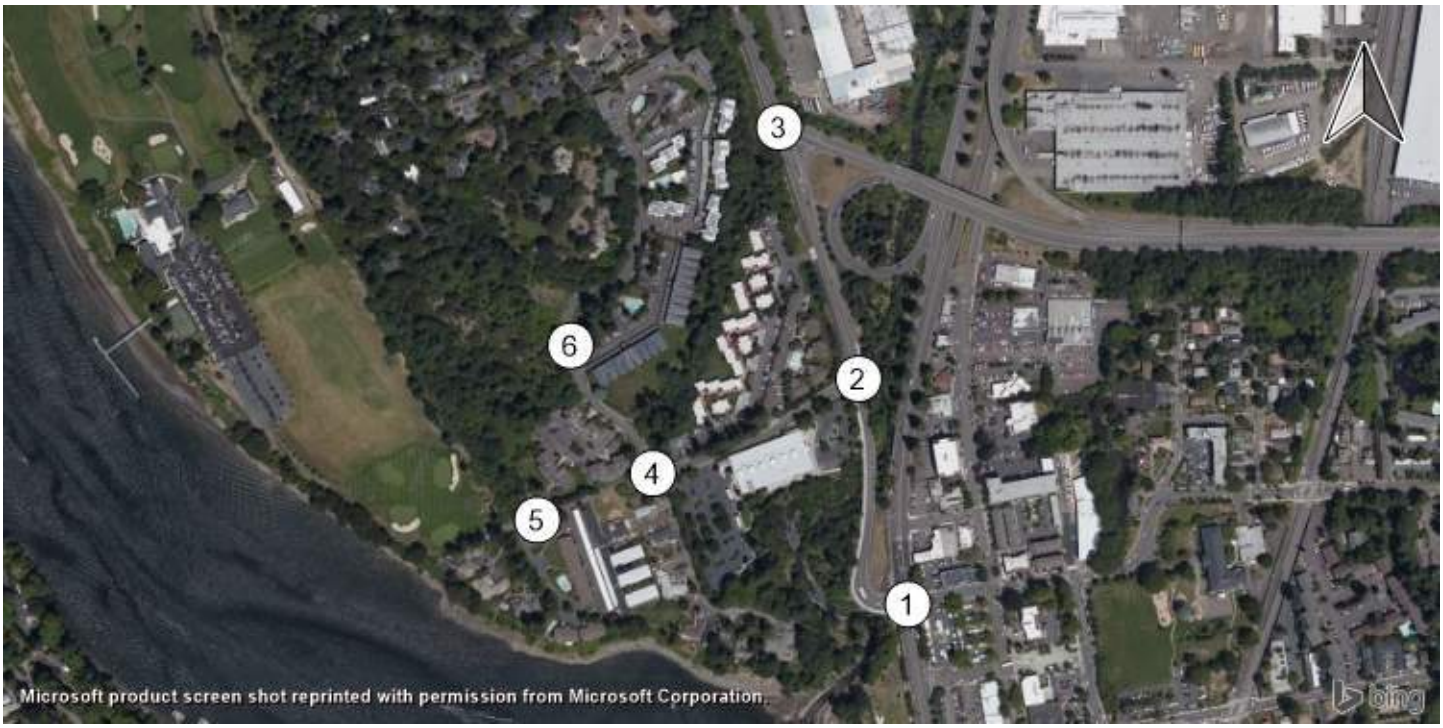
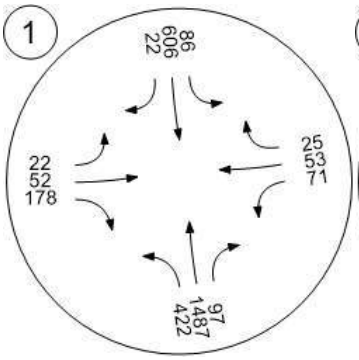


OR 99W / Harrison St / 17th



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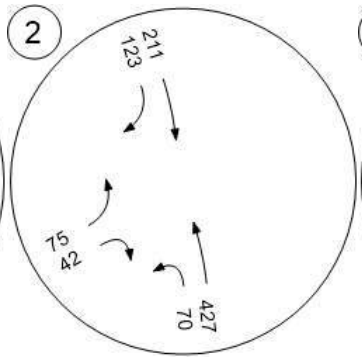

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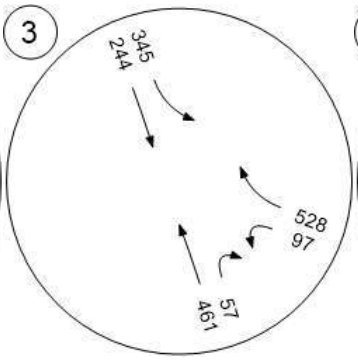

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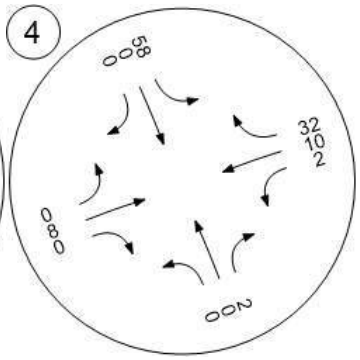

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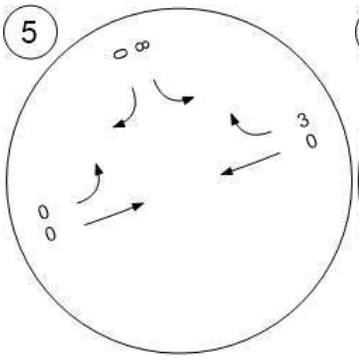

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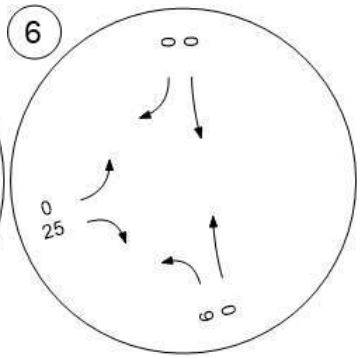

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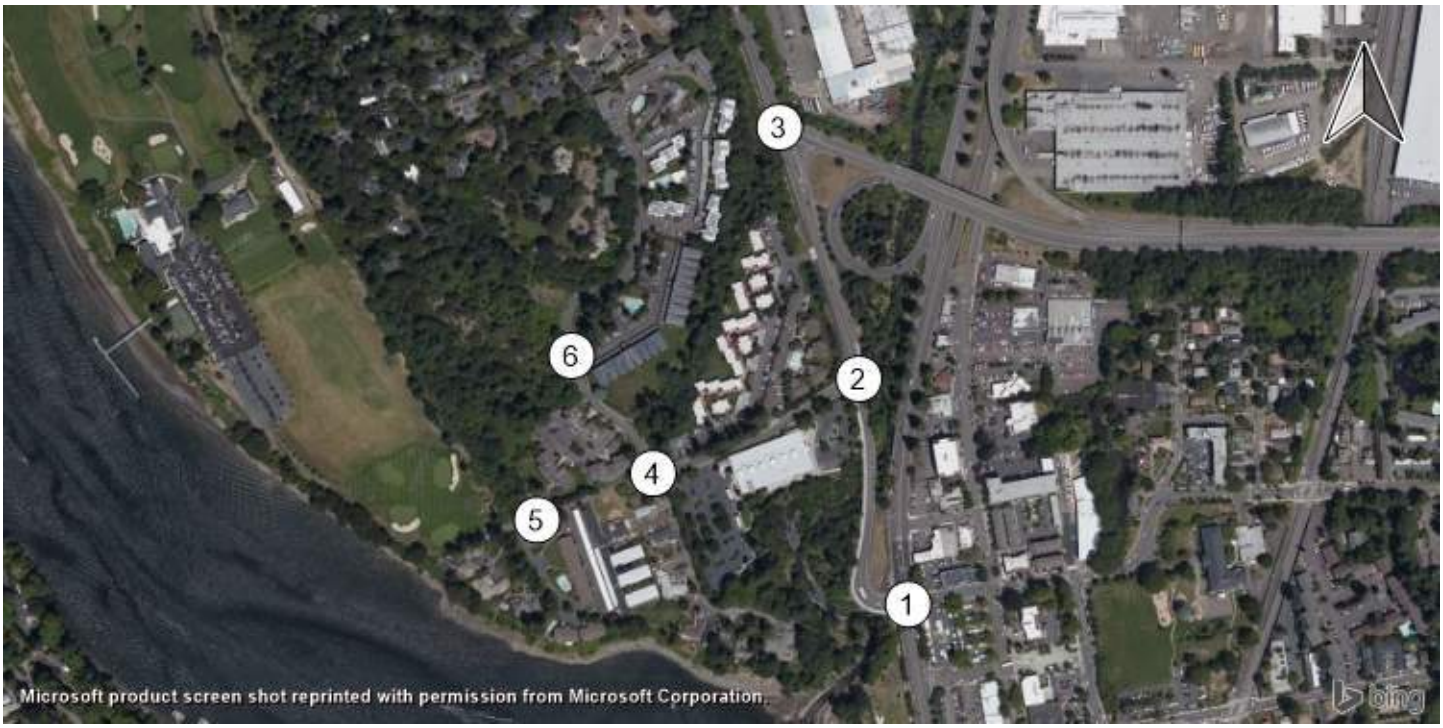

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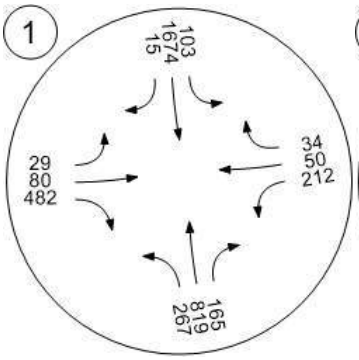

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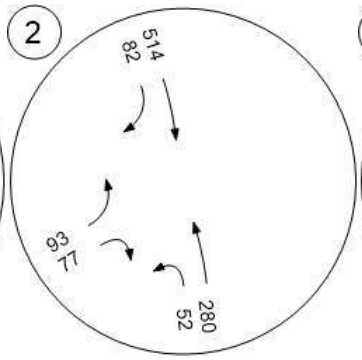

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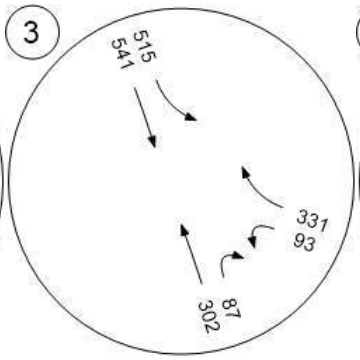

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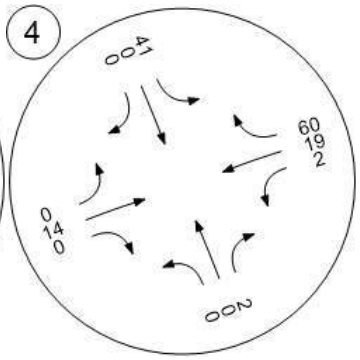
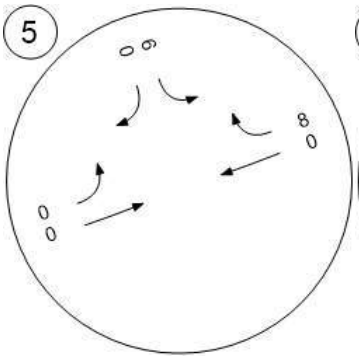
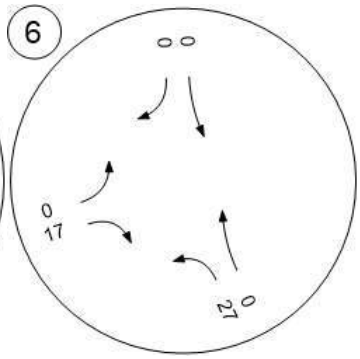


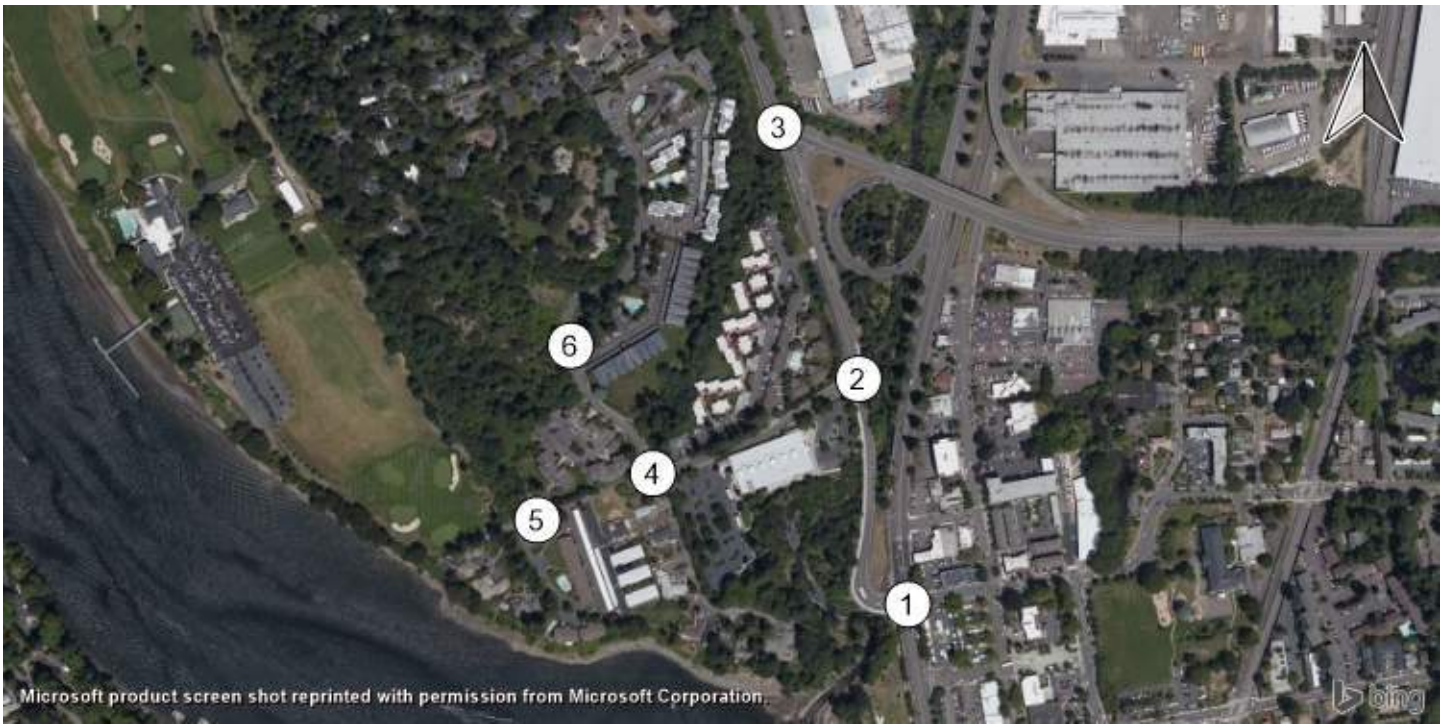
Lava Dr / Site Access Sou



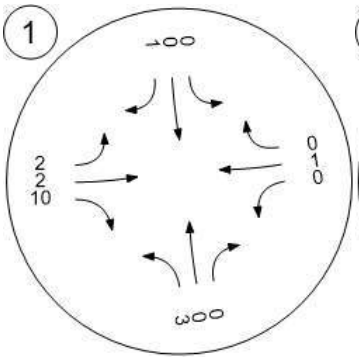
Waverly Ct / Site Access Nort



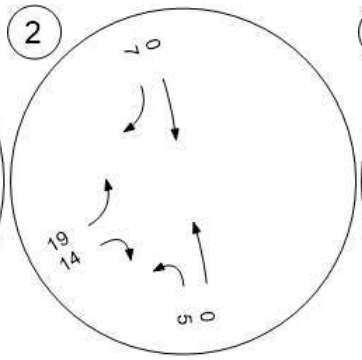
Traffic Volume - Net New Site Trips



OR 99W / Harrison St / 17th



Lava Dr / 17th Ave



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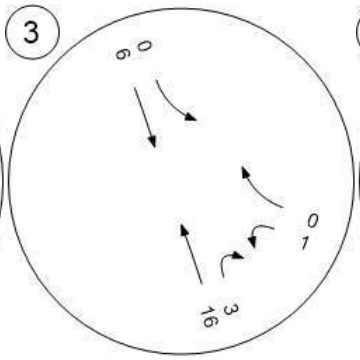
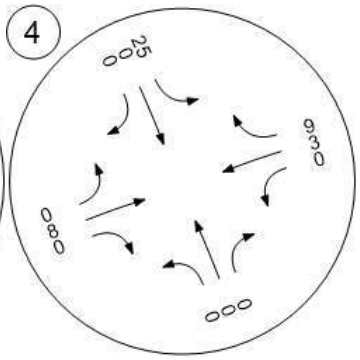


Waverly Ct / Lava Dr



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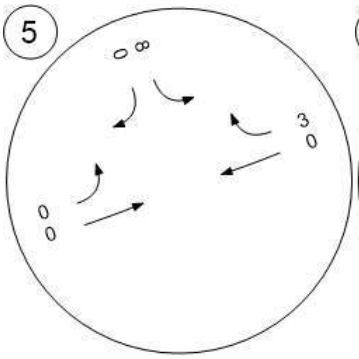
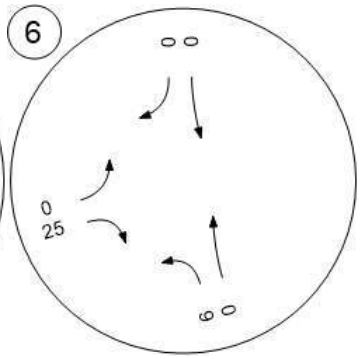
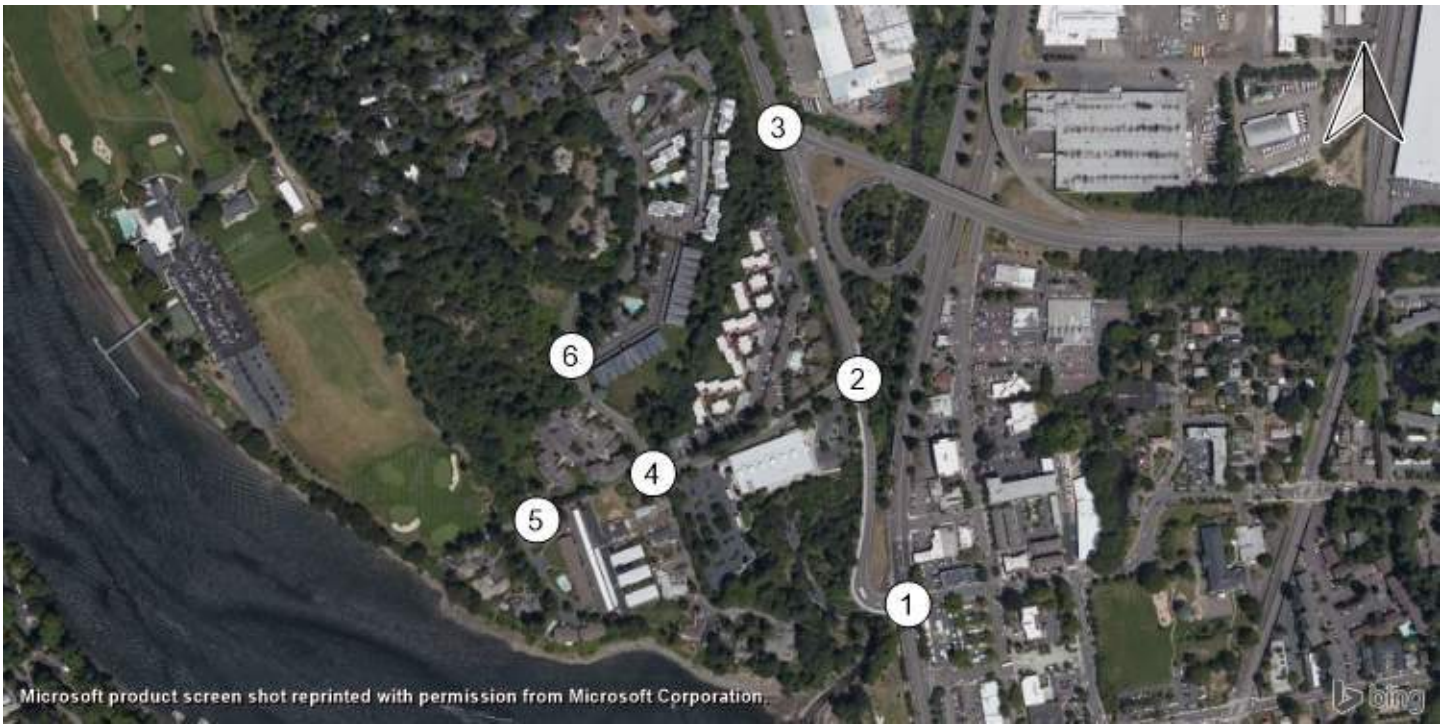


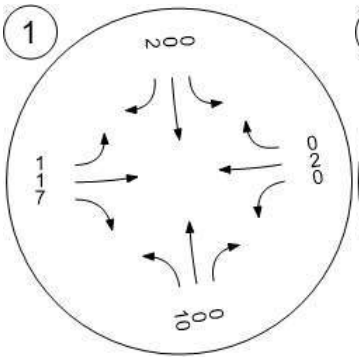
Waverly Ct / Site Access Nort



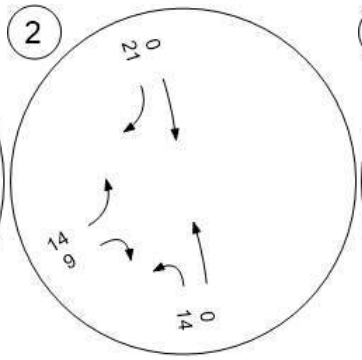
Traffic Volume - Net New Site Trips



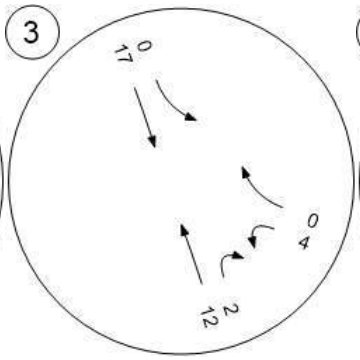
OR 99W / Harrison St / 17th



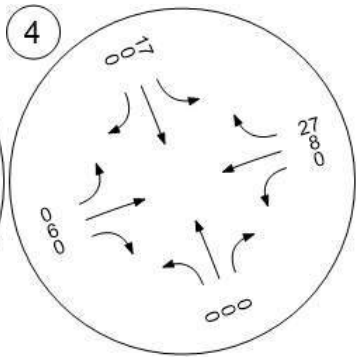
Lava Dr / 17th Ave



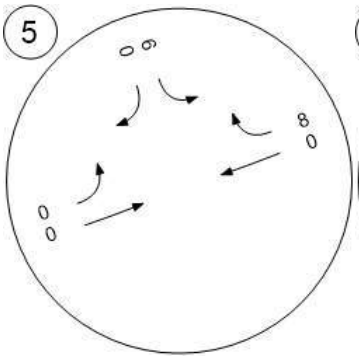
OR 224 / 17th Ave



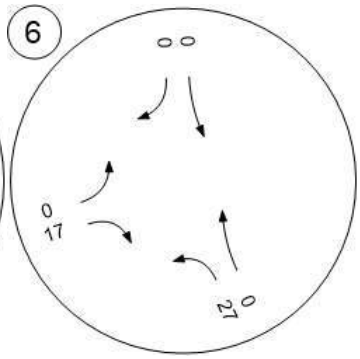
Waverly Ct / Lava Dr



Waverly Ct / Site Access Sou



Waverly Ct / Site Access Nort



Intersection Level Of Service Report
Intersection 1: OR 99W / Harrison St / 17th St

Control Type:	Signalized	Delay (sec / veh):	37.6
Analysis Method:	HCM 6th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.723

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	1	1	0	0
Entry Pocket Length [ft]	370.00	100.00	100.00	375.00	100.00	100.00	100.00	100.00	150.00	135.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	408	1448	94	84	590	20	19	49	164	69	51	24
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	4.00	4.00	5.00	11.00	7.00	2.00	6.00	10.00	4.00	7.00	11.00	5.00
Growth Factor	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	3	0	0	0	0	1	2	2	10	0	1	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	89	0	0	0
Total Hourly Volume [veh/h]	422	1487	97	86	606	22	22	52	89	71	53	25
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	1.0000	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	111	391	26	23	159	6	6	14	23	19	14	7
Total Analysis Volume [veh/h]	444	1565	102	91	638	22	23	55	94	75	56	26
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	15			0			15			0		
v_di, Inbound Pedestrian Volume crossing m	15			0			15			0		
v_co, Outbound Pedestrian Volume crossing	1			0			0			1		
v_ci, Inbound Pedestrian Volume crossing mi	1			0			0			1		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	10			0			13			8		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	120
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	93.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Split	Split	Overlap	Split	Split	Split
Signal Group	1	6	0	5	2	0	0	8	8	0	4	0
Auxiliary Signal Groups									1,8			
Lead / Lag	Lag	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	4	10	0	6	10	0	0	6	6	0	6	0
Maximum Green [s]	30	30	0	30	30	0	0	30	30	0	30	0
Amber [s]	3.5	3.5	0.0	3.5	3.5	0.0	0.0	3.5	3.5	0.0	4.0	0.0
All red [s]	0.5	0.5	0.0	0.5	0.5	0.0	0.0	0.5	0.5	0.0	0.5	0.0
Split [s]	34	56	0	20	42	0	0	26	26	0	18	0
Vehicle Extension [s]	2.3	6.1	0.0	2.3	6.1	0.0	0.0	2.3	2.3	0.0	2.3	0.0
Walk [s]	0	7	0	0	11	0	0	8	8	0	5	0
Pedestrian Clearance [s]	0	17	0	0	18	0	0	21	21	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	2.0	0.0	2.5	0.0
Minimum Recall	No	Yes		No	Yes			No	No		No	
Maximum Recall	No	No		No	No			No	No		No	
Pedestrian Recall	No	No		No	No			No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C	R	L	C
C, Cycle Length [s]	120	120	120	120	120	120	120	120	120	120
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.50	4.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	0.00	2.50	2.50
g_i, Effective Green Time [s]	30	70	70	8	48	48	16	64	9	9
g / C, Green / Cycle	0.25	0.58	0.58	0.07	0.40	0.40	0.13	0.53	0.08	0.08
(v / s)_i Volume / Saturation Flow Rate	0.25	0.45	0.46	0.06	0.18	0.18	0.05	0.06	0.04	0.06
s, saturation flow rate [veh/h]	1752	1840	1794	1652	1795	1774	1724	1549	1360	1575
c, Capacity [veh/h]	438	1075	1048	113	723	715	228	823	151	157
d1, Uniform Delay [s]	45.03	18.99	19.40	55.11	26.27	26.27	47.32	14.07	54.70	54.38
k, delay calibration	0.46	0.50	0.50	0.07	0.50	0.50	0.07	0.07	0.07	0.07
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	44.70	5.49	6.26	7.83	2.09	2.12	0.54	0.04	1.05	2.41
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	1.01	0.78	0.80	0.80	0.46	0.46	0.34	0.11	0.40	0.62
d, Delay for Lane Group [s/veh]	89.73	24.48	25.67	62.94	28.36	28.39	47.86	14.11	55.74	56.79
Lane Group LOS	F	C	C	E	C	C	D	B	E	E
Critical Lane Group	No	No	Yes	Yes	No	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	18.35	18.35	18.90	2.96	7.35	7.27	2.16	1.29	1.83	2.97
50th-Percentile Queue Length [ft/ln]	458.76	458.71	472.38	74.01	183.75	181.87	54.05	32.15	45.76	74.29
95th-Percentile Queue Length [veh/ln]	25.59	25.37	26.02	5.33	11.80	11.70	3.89	2.31	3.29	5.35
95th-Percentile Queue Length [ft/ln]	639.82	634.33	650.60	133.22	294.91	292.45	97.28	57.87	82.37	133.72

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	89.73	25.04	25.67	62.94	28.38	28.39	47.86	47.86	14.11	55.74	56.79	56.79
Movement LOS	F	C	C	E	C	C	D	D	B	E	E	E
d_A, Approach Delay [s/veh]	38.67			32.57			29.42			56.39		
Approach LOS	D			C			C			E		
d_I, Intersection Delay [s/veh]	37.61											
Intersection LOS	D											
Intersection V/C	0.723											

Other Modes

g_Walk,mi, Effective Walk Time [s]	12.0	9.0	15.0	11.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswa k Circulation Area [ft²/ped]	185.80	0.00	0.00	2312.16
d_p, Pedestrian Delay [s]	48.60	51.34	45.94	49.50
l_p,int, Pedestrian LOS Score for Intersection	3.027	2.776	2.332	2.086
Crosswalk LOS	C	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	867	633	367	225
d_b, Bicycle Delay [s]	19.36	28.02	40.28	47.45
l_b,int, Bicycle LOS Score for Intersection	3.301	2.179	1.990	1.819
Bicycle LOS	C	B	A	A

Sequence

Ring 1	1	2	4	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 2: Lava Dr / 17th Ave

Control Type:	Two-way stop	Delay (sec / veh):	24.2
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.308

Intersection Setup

Name						
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	1
Entry Pocket Length [ft]	50.00	100.00	100.00	100.00	100.00	65.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	63	416	205	113	55	27
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	5.00	5.00	3.00	6.00	4.00
Growth Factor	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	5	0	0	7	19	14
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	70	427	211	123	75	42
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	19	119	59	34	21	12
Total Analysis Volume [veh/h]	78	474	234	137	83	47
Pedestrian Volume [ped/h]	0		1		2	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.00	0.00	0.00	0.31	0.06
d_M, Delay for Movement [s/veh]	8.22	0.00	0.00	0.00	24.16	10.28
Movement LOS	A	A	A	A	C	B
95th-Percentile Queue Length [veh/ln]	0.21	0.00	0.00	0.00	1.26	0.21
95th-Percentile Queue Length [ft/ln]	5.23	0.00	0.00	0.00	31.61	5.15
d_A, Approach Delay [s/veh]	1.16		0.00		19.14	
Approach LOS	A		A		C	
d_I, Intersection Delay [s/veh]	2.97					
Intersection LOS	C					

Intersection Level Of Service Report
Intersection 3: OR 224 / 17th Ave

Control Type:	Signalized	Delay (sec / veh):	27.3
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.778

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	1	0	1	0
Entry Pocket Length [ft]	100.00	100.00	160.00	100.00	130.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		No	

Volumes

Name						
Base Volume Input [veh/h]	433	53	336	232	93	514
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	4.00	11.00	1.00	6.00	5.00	5.00
Growth Factor	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	16	3	0	6	1	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	461	57	345	244	97	528
Peak Hour Factor	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	127	16	95	67	27	145
Total Analysis Volume [veh/h]	507	63	379	268	107	580
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	22		18		0	

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Free Running
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	14.00

Phasing & Timing

Control Type	Permissive	Permissive	ProtPerm	Permissive	Permissive	Overlap
Signal Group	6	0	5	2	4	4
Auxiliary Signal Groups						4,5
Lead / Lag	-	-	Lead	-	Lead	-
Minimum Green [s]	5	0	5	5	5	5
Maximum Green [s]	40	0	50	40	20	20
Amber [s]	4.0	0.0	3.5	4.0	4.0	4.0
All red [s]	0.5	0.0	0.5	0.5	0.5	0.5
Split [s]	0	0	0	0	0	0
Vehicle Extension [s]	3.0	0.0	3.0	3.0	3.0	3.0
Walk [s]	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk						
I1, Start-Up Lost Time [s]	2.0	0.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	2.5	0.0	2.0	2.5	2.5	2.5
Minimum Recall	Yes		No	Yes	No	No
Maximum Recall	No		No	No	No	No
Pedestrian Recall	No		No	No	No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	3
Pedestrian Walk [s]	7
Pedestrian Clearance [s]	17

Lane Group Calculations

Lane Group	C	R	L	C	L	R
C, Cycle Length [s]	113	113	113	113	113	113
L, Total Lost Time per Cycle [s]	4.50	4.50	4.50	4.50	4.50	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.50	2.50	0.00	2.50	2.50	0.00
g_i, Effective Green Time [s]	33	33	67	67	20	71
g / C, Green / Cycle	0.30	0.30	0.59	0.59	0.18	0.63
(v / s)_i Volume / Saturation Flow Rate	0.28	0.04	0.29	0.15	0.06	0.37
s, saturation flow rate [veh/h]	1840	1404	1305	1810	1738	1551
c, Capacity [veh/h]	543	415	640	1077	306	977
d1, Uniform Delay [s]	38.94	29.47	11.81	10.94	41.07	12.41
k, delay calibration	0.29	0.11	0.32	0.11	0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	17.31	0.17	2.61	0.12	0.68	2.65
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.93	0.15	0.59	0.25	0.35	0.59
d, Delay for Lane Group [s/veh]	56.25	29.64	14.42	11.06	41.75	15.07
Lane Group LOS	E	C	B	B	D	B
Critical Lane Group	Yes	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	16.14	1.29	5.22	3.15	2.69	8.85
50th-Percentile Queue Length [ft/ln]	403.57	32.30	130.44	78.70	67.23	221.23
95th-Percentile Queue Length [veh/ln]	22.73	2.33	8.96	5.67	4.84	13.73
95th-Percentile Queue Length [ft/ln]	568.29	58.13	224.09	141.67	121.02	343.19

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	56.25	29.64	14.42	11.06	41.75	15.07
Movement LOS	E	C	B	B	D	B
d_A, Approach Delay [s/veh]	53.31		13.03		19.22	
Approach LOS	D		B		B	
d_I, Intersection Delay [s/veh]	27.32					
Intersection LOS	C					
Intersection V/C	0.778					

Other Modes

g_Walk,mi, Effective Walk Time [s]	11.0	11.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswa k Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	34.67	34.67	0.00
l_p,int, Pedestrian LOS Score for Intersection	2.247	2.503	0.000
Crosswalk LOS	B	B	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	889	889	444
d_b, Bicycle Delay [s]	14.04	14.02	27.22
l_b,int, Bicycle LOS Score for Intersection	2.500	2.627	1.560
Bicycle LOS	B	B	A

Sequence

Ring 1	2	-	4	3	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 4: Waverly Ct / Lava Dr

Control Type:	Two-way stop	Delay (sec / veh):	9.2
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.010

Intersection Setup

Name											
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	0	2	32	0	0	0	0	0	2	7	22
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270	1.0270
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	25	0	0	0	8	0	0	3	9
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	2	58	0	0	0	8	0	2	10	32
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	1	16	0	0	0	2	0	1	3	9
Total Analysis Volume [veh/h]	0	0	2	64	0	0	0	9	0	2	11	36
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Stop	Stop	Free
Flared Lane		No	No	
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance		No	No	
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	7.26	7.29	0.00	8.99	9.47	8.69	8.81	9.18	8.45	0.00	0.00	0.00
Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.21	0.21	0.21	0.03	0.03	0.03	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	5.31	5.31	5.31	0.78	0.78	0.78	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.00			8.99			9.18			0.00		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	5.31											
Intersection LOS	A											

Intersection Level Of Service Report
Intersection 36: Waverly Ct / Site Access North

Control Type:	Two-way stop	Delay (sec / veh):	8.4
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.023

Intersection Setup

Name						
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	0	0	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	9	0	0	0	0	25
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	9	0	0	0	0	25
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	0	0	0	0	6
Total Analysis Volume [veh/h]	9	0	0	0	0	25
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.00	0.00	0.02
d_M, Delay for Movement [s/veh]	7.23	0.00	0.00	0.00	8.70	8.40
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.02	0.02	0.00	0.00	0.07	0.07
95th-Percentile Queue Length [ft/ln]	0.42	0.42	0.00	0.00	1.77	1.77
d_A, Approach Delay [s/veh]	7.23		0.00		8.40	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	8.09					
Intersection LOS	A					

Intersection Level Of Service Report
Intersection 37: Waverly Ct / SIte Access South

Control Type:	Two-way stop	Delay (sec / veh):	8.6
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.008

Intersection Setup

Name						
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	0	0	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	8	0	0	0	0	3
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	8	0	0	0	0	3
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	0	0	0	0	1
Total Analysis Volume [veh/h]	8	0	0	0	0	3
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	8.55	8.35	7.22	0.00	0.00	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.02	0.02	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.59	0.59	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	8.55		3.61		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	6.22					
Intersection LOS	A					

Intersection Level Of Service Report
Intersection 1: OR 99W / Harrison St / 17th St

Control Type:	Signalized	Delay (sec / veh):	42.5
Analysis Method:	HCM 6th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.945

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	1	1	0	0
Entry Pocket Length [ft]	370.00	100.00	100.00	375.00	100.00	100.00	100.00	100.00	150.00	135.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	257	819	165	103	1674	13	28	79	475	212	48	34
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	4.00	4.00	1.00	2.00	2.00	0.00	6.00	1.00	2.00	9.00	6.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	10	0	0	0	0	2	1	1	7	0	2	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	9	0	0	1	0	0	241	0	0	21
Total Hourly Volume [veh/h]	267	819	156	103	1674	14	29	80	241	212	50	13
Peak Hour Factor	0.9900	0.9900	0.9900	0.9900	0.9900	0.9900	0.9900	0.9900	0.9900	0.9900	0.9900	0.9900
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	67	207	39	26	423	4	7	20	61	54	13	3
Total Analysis Volume [veh/h]	270	827	158	104	1691	14	29	81	243	214	51	13
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	12			0			12			0		
v_di, Inbound Pedestrian Volume crossing m	12			0			12			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			1		
v_ci, Inbound Pedestrian Volume crossing mi	1			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	1			0			13			6		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	120
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	60.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Split	Split	Overlap	Split	Split	Split
Signal Group	1	6	0	5	2	0	0	8	8	0	4	0
Auxiliary Signal Groups									1,8			
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	4	10	0	6	10	0	0	6	6	0	6	0
Maximum Green [s]	30	30	0	30	30	0	0	30	30	0	30	0
Amber [s]	3.5	3.5	0.0	3.5	3.5	0.0	0.0	3.5	3.5	0.0	4.0	0.0
All red [s]	0.5	0.5	0.0	0.5	0.5	0.0	0.0	0.5	0.5	0.0	0.5	0.0
Split [s]	23	60	0	19	56	0	0	26	26	0	15	0
Vehicle Extension [s]	2.3	6.1	0.0	2.3	6.1	0.0	0.0	2.3	2.3	0.0	2.3	0.0
Walk [s]	0	7	0	0	11	0	0	8	8	0	5	0
Pedestrian Clearance [s]	0	17	0	0	18	0	0	21	21	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	2.0	0.0	2.5	0.0
Minimum Recall	No	Yes		No	Yes			No	No		No	
Maximum Recall	No	No		No	No			No	No		No	
Pedestrian Recall	No	No		No	No			No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C	R	L	C
C, Cycle Length [s]	120	120	120	120	120	120	120	120	120	120
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.50	4.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	0.00	2.50	2.50
g_i, Effective Green Time [s]	19	68	68	9	58	58	16	39	11	11
g / C, Green / Cycle	0.16	0.57	0.57	0.07	0.48	0.48	0.13	0.32	0.09	0.09
(v / s)_i Volume / Saturation Flow Rate	0.15	0.27	0.28	0.06	0.46	0.46	0.06	0.15	0.08	0.08
s, saturation flow rate [veh/h]	1781	1840	1725	1795	1870	1865	1786	1571	1781	1692
c, Capacity [veh/h]	283	1046	980	131	902	900	237	509	158	150
d1, Uniform Delay [s]	50.09	15.43	15.50	54.78	29.56	29.62	48.17	32.29	54.23	54.22
k, delay calibration	0.13	0.50	0.50	0.07	0.50	0.50	0.07	0.14	0.07	0.07
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	17.88	1.60	1.75	6.46	19.27	19.62	0.87	0.88	11.18	11.57
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.95	0.48	0.49	0.79	0.95	0.95	0.46	0.48	0.90	0.90
d, Delay for Lane Group [s/veh]	67.97	17.03	17.25	61.23	48.84	49.24	49.03	33.16	65.41	65.80
Lane Group LOS	E	B	B	E	D	D	D	C	E	E
Critical Lane Group	Yes	No	No	No	No	Yes	No	Yes	Yes	No
50th-Percentile Queue Length [veh/ln]	9.42	8.46	8.10	3.33	27.33	27.43	3.11	5.75	4.76	4.53
50th-Percentile Queue Length [ft/ln]	235.46	211.46	202.56	83.30	683.23	685.64	77.75	143.76	118.99	113.31
95th-Percentile Queue Length [veh/ln]	14.45	13.23	12.77	6.00	35.90	36.01	5.60	9.68	8.34	8.02
95th-Percentile Queue Length [ft/ln]	361.29	330.71	319.27	149.94	897.57	900.36	139.95	242.08	208.43	200.59

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	67.97	17.11	17.25	61.23	49.04	49.24	49.03	49.03	33.16	65.54	65.80	65.80
Movement LOS	E	B	B	E	D	D	D	D	C	E	E	E
d_A, Approach Delay [s/veh]	28.07			49.74			38.11			65.60		
Approach LOS	C			D			D			E		
d_I, Intersection Delay [s/veh]	42.46											
Intersection LOS	D											
Intersection V/C	0.945											

Other Modes

g_Walk,mi, Effective Walk Time [s]	12.0	9.0	15.0	11.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswa k Circulation Area [ft²/ped]	193.74	0.00	0.00	3296.31
d_p, Pedestrian Delay [s]	48.60	51.34	45.94	49.50
l_p,int, Pedestrian LOS Score for Intersection	3.038	2.843	2.596	2.195
Crosswalk LOS	C	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	933	867	367	175
d_b, Bicycle Delay [s]	17.08	19.27	40.28	50.11
l_b,int, Bicycle LOS Score for Intersection	2.602	3.053	2.540	2.053
Bicycle LOS	B	C	B	B

Sequence

Ring 1	1	2	4	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 2: Lava Dr / 17th Ave

Control Type:	Two-way stop	Delay (sec / veh):	28.5
Analysis Method:	HCM 6th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.396

Intersection Setup

Name						
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	1
Entry Pocket Length [ft]	50.00	100.00	100.00	100.00	100.00	65.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	38	280	514	61	79	68
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	4.00	2.00	2.00	1.00	0.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	14	0	0	21	14	9
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	52	280	514	82	93	77
Peak Hour Factor	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	14	74	137	22	25	20
Total Analysis Volume [veh/h]	55	298	547	87	99	82
Pedestrian Volume [ped/h]	1		1		8	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.00	0.01	0.00	0.40	0.16
d_M, Delay for Movement [s/veh]	9.04	0.00	0.00	0.00	28.51	13.59
Movement LOS	A	A	A	A	D	B
95th-Percentile Queue Length [veh/ln]	0.19	0.00	0.00	0.00	1.79	0.58
95th-Percentile Queue Length [ft/ln]	4.63	0.00	0.00	0.00	44.87	14.53
d_A, Approach Delay [s/veh]	1.41		0.00		21.75	
Approach LOS	A		A		C	
d_I, Intersection Delay [s/veh]	3.80					
Intersection LOS	D					

Intersection Level Of Service Report
Intersection 3: OR 224 / 17th Ave

Control Type:	Signalized	Delay (sec / veh):	16.3
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.669

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	1	0	1	0
Entry Pocket Length [ft]	100.00	100.00	160.00	100.00	130.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		No	

Volumes

Name						
Base Volume Input [veh/h]	290	85	515	524	89	331
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	5.00	1.00	2.00	2.00	1.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	12	2	0	17	4	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	302	87	515	541	93	331
Peak Hour Factor	0.9900	0.9900	0.9900	0.9900	0.9900	0.9900
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	76	22	130	137	23	84
Total Analysis Volume [veh/h]	305	88	520	546	94	334
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	6		31		0	

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Free Running
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Permissive	Permissive	ProtPerm	Permissive	Permissive	Overlap
Signal Group	6	0	5	2	4	4
Auxiliary Signal Groups						4,5
Lead / Lag	-	-	Lead	-	Lead	-
Minimum Green [s]	5	0	5	5	5	5
Maximum Green [s]	40	0	50	40	20	20
Amber [s]	4.0	0.0	3.5	4.0	4.0	4.0
All red [s]	0.5	0.0	0.5	0.5	0.5	0.5
Split [s]	0	0	0	0	0	0
Vehicle Extension [s]	3.0	0.0	3.0	3.0	3.0	3.0
Walk [s]	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk						
I1, Start-Up Lost Time [s]	2.0	0.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	2.5	0.0	2.0	2.5	2.5	2.5
Minimum Recall	Yes		No	Yes	No	No
Maximum Recall	No		No	No	No	No
Pedestrian Recall	No		No	No	No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	3
Pedestrian Walk [s]	7
Pedestrian Clearance [s]	17

Lane Group Calculations

Lane Group	C	R	L	C	L	R
C, Cycle Length [s]	72	72	72	72	72	72
L, Total Lost Time per Cycle [s]	4.50	4.50	4.50	4.50	4.50	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.50	2.50	0.00	2.50	2.50	0.00
g_i, Effective Green Time [s]	14	14	37	37	9	49
g / C, Green / Cycle	0.20	0.20	0.51	0.51	0.13	0.68
(v / s)_i Volume / Saturation Flow Rate	0.16	0.06	0.35	0.29	0.05	0.21
s, saturation flow rate [veh/h]	1855	1503	1465	1870	1781	1602
c, Capacity [veh/h]	370	300	739	963	223	1094
d1, Uniform Delay [s]	27.72	24.56	11.98	12.02	29.17	4.58
k, delay calibration	0.11	0.11	0.19	0.11	0.11	0.24
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	4.68	0.54	2.15	0.53	1.26	0.35
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.83	0.29	0.70	0.57	0.42	0.31
d, Delay for Lane Group [s/veh]	32.40	25.10	14.13	12.55	30.43	4.93
Lane Group LOS	C	C	B	B	C	A
Critical Lane Group	Yes	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	5.29	1.27	5.45	5.42	1.53	1.57
50th-Percentile Queue Length [ft/ln]	132.15	31.82	136.32	135.51	38.28	39.18
95th-Percentile Queue Length [veh/ln]	9.06	2.29	9.28	9.24	2.76	2.82
95th-Percentile Queue Length [ft/ln]	226.41	57.28	232.05	230.97	68.90	70.52

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	32.40	25.10	14.13	12.55	30.43	4.93
Movement LOS	C	C	B	B	C	A
d_A, Approach Delay [s/veh]	30.77		13.32		10.53	
Approach LOS	C		B		B	
d_I, Intersection Delay [s/veh]	16.32					
Intersection LOS	B					
Intersection V/C	0.669					

Other Modes

g_Walk,mi, Effective Walk Time [s]	11.0	11.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswa k Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	34.67	34.67	0.00
l_p,int, Pedestrian LOS Score for Intersection	2.275	2.494	0.000
Crosswalk LOS	B	B	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	889	889	444
d_b, Bicycle Delay [s]	13.93	14.11	27.22
l_b,int, Bicycle LOS Score for Intersection	2.208	3.319	1.560
Bicycle LOS	B	C	A

Sequence

Ring 1	2	-	4	3	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 4: Waverly Ct / Lava Dr

Control Type:	Two-way stop	Delay (sec / veh):	9.3
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.018

Intersection Setup

Name											
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	0	2	24	0	0	0	8	0	2	11	33
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	17	0	0	0	6	0	0	8	27
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	2	41	0	0	0	14	0	2	19	60
Peak Hour Factor	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	1	11	0	0	0	4	0	1	5	16
Total Analysis Volume [veh/h]	0	0	2	44	0	0	0	15	0	2	20	64
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Stop	Stop	Free
Flared Lane		No	No	
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance		No	No	
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	7.30	7.36	0.00	9.08	9.56	8.72	9.06	9.31	8.57	0.00	0.00	0.00
Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.15	0.15	0.15	0.05	0.05	0.05	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	3.74	3.74	3.74	1.35	1.35	1.35	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.00			9.08			9.31			0.00		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	3.67											
Intersection LOS	A											

Intersection Level Of Service Report
Intersection 34: Waverly Ct / Site Access North

Control Type:	Two-way stop	Delay (sec / veh):	8.4
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.016

Intersection Setup

Name						
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	0	0	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	27	0	0	0	0	17
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	27	0	0	0	0	17
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	0	0	0	0	4
Total Analysis Volume [veh/h]	27	0	0	0	0	17
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.00	0.00	0.00	0.00	0.02
d_M, Delay for Movement [s/veh]	7.26	0.00	0.00	0.00	8.89	8.37
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.05	0.05	0.00	0.00	0.05	0.05
95th-Percentile Queue Length [ft/ln]	1.27	1.27	0.00	0.00	1.19	1.19
d_A, Approach Delay [s/veh]	7.26		0.00		8.37	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	7.69					
Intersection LOS	A					

Intersection Level Of Service Report
Intersection 35: Waverly Ct / Site Access South

Control Type:	Two-way stop	Delay (sec / veh):	8.6
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.006

Intersection Setup

Name						
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	0	0	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	6	0	0	0	0	8
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	6	0	0	0	0	8
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	0	0	0	0	2
Total Analysis Volume [veh/h]	6	0	0	0	0	8
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	8.56	8.36	7.23	0.00	0.00	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.02	0.02	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.44	0.44	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	8.56		3.62		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	3.67					
Intersection LOS	A					

Attachment G – Sight Distance Observations

Figure 3: Photo from Waverly Drive Site Access (facing north)

Figure 3: Photo from Waverly Drive Site Access (facing north)

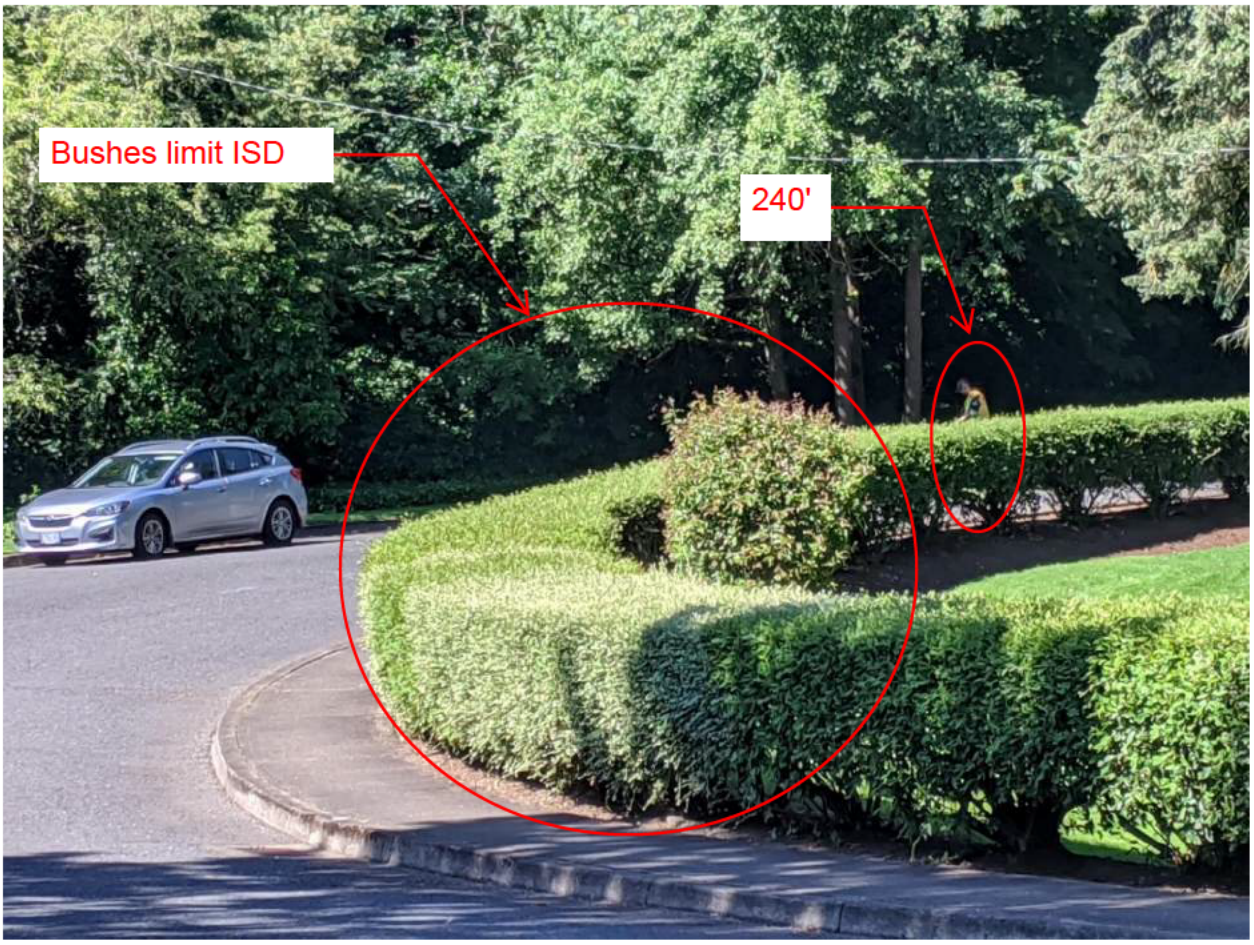


Figure 3: Photo from Waverly Drive Site Access (facing north) - Zoomed

Figure 3: Photo from Waverly Drive Site Access (facing south)

Figure 1: Photo from Lava Drive Site Access (facing east)

Figure 2: Photo from Lava Drive Site Access Pulled Forward (facing east)

Figure 2: Photo from Lava Drive Site Access (facing west)

Figure 4: Photo from Lava Drive Site Access Pulled Forward (facing west)

Figure 3: Photo from Waverly Court from stop bar (facing east)

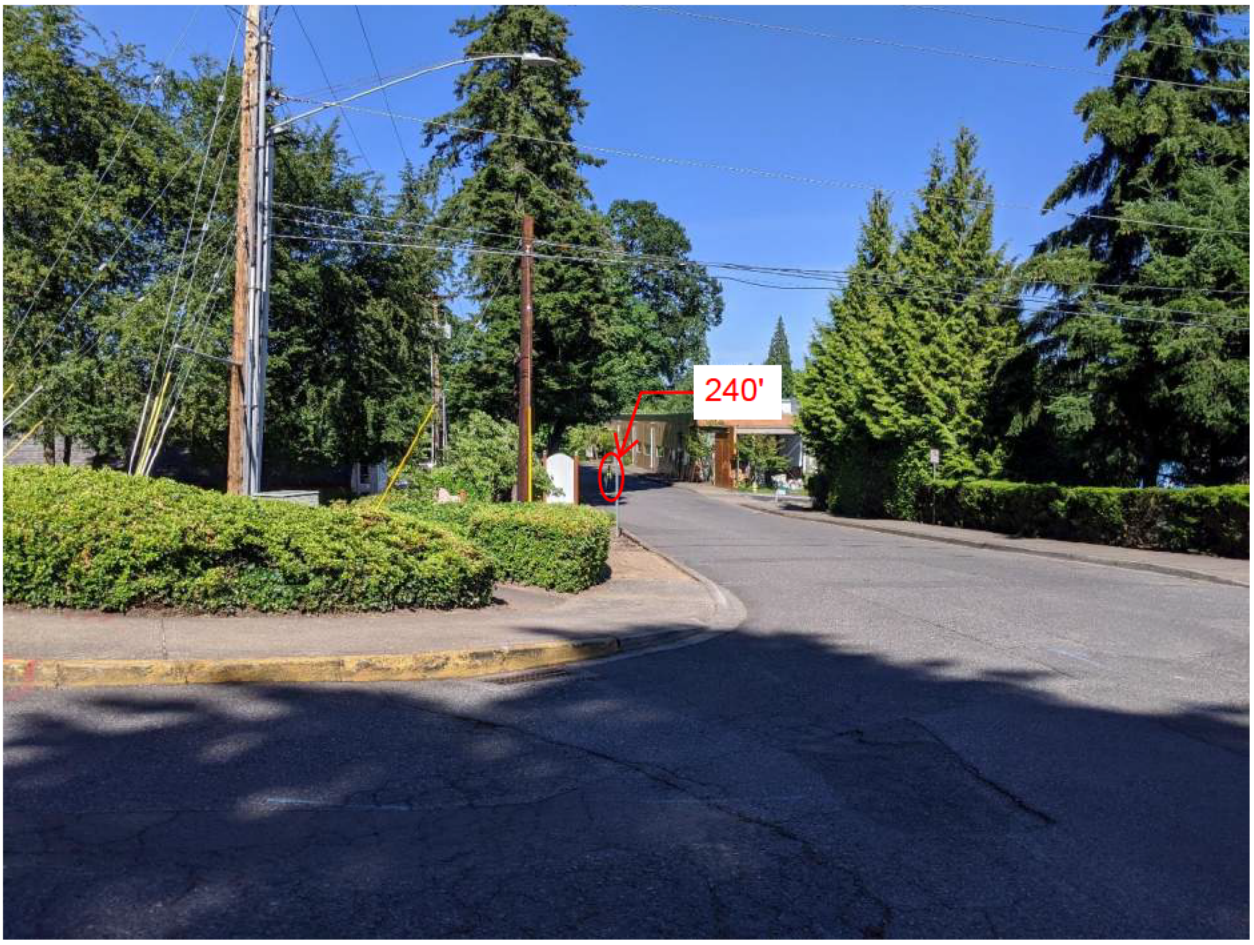


Figure 3: Photo from Waverly Court Pulled Forward (facing east)

Figure 3: Photo from Waverly Court from stop bar (facing west)

Figure 3: Photo from Waverly Court Pulled Forward (facing west)

Appendix B

TERAGAN & ASSOCIATES, INC.
ARBORICULTURAL CONSULTANTS

MEMORANDUM

DATE: July 18, 2020

TO: Phil Krueger (Yost Grube Hall Architecture)

FROM: Todd Prager, RCA #597, ISA Board Certified Master Arborist

RE: Tree Removal and Protection Recommendations for Waverly Woods

Summary

This memorandum provides updated tree removal and protection recommendations for the Waverly Woods multifamily development.

Background

Yost Grube Hall Architecture is designing the Waverly Woods multifamily development near SE Waverly Court and SE Lava Drive in Milwaukie, Oregon. A map of the existing trees is provided in Attachment 1. The updated site and grading plan with the existing trees to be removed and retained is provided in Attachment 2. The updated utility plan with existing trees to be removed and retained is provided in Attachment 3.

The assignment requested of our firm for this project was as follows:

1. Provide an assessment of the existing trees;
2. Provide updated recommendations for tree removal and retention based on the updated plans for site improvements; and
3. Provide updated protection recommendations for the trees to be retained.

This memorandum has been updated from my April 20, 2020 report based on the update site and construction plans.

Tree Assessment

In April of 2020, I completed my assessment of the existing trees. The complete inventory data is provided in the tree inventory spreadsheet in Attachment 4. The data collected for each tree includes the tree number, species (common and scientific names), trunk diameter (DBH), crown radius, tree health condition, tree structural condition, pertinent comments, and treatment (remove or retain). The tree numbers

in the tree inventory in Attachment 4 correspond to the tree numbers on the existing conditions map in Attachment 1 and updated site/grading plan in Attachment 2.

Proposed Tree Removal

A typical minimum root protection zone allows encroachments no closer than a radius from a tree of .5 feet per inch of DBH as long as no more than 25 percent of the root protection zone area (estimated at one foot radius per inch of DBH) is impacted. Figure 1 illustrates this concept. 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, the specific construction impacts, and other factors.

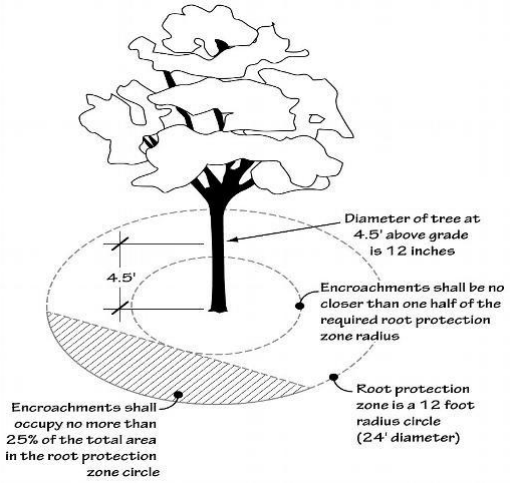


Figure 1: Typical minimum protection zone

The project requires the removal of trees for construction of the new buildings, parking, accessways, and associated grading. Trees outside of the construction footprint that are dead, dying, or in poor to very poor health and/or structural condition are also proposed for removal. In addition, trees generally considered invasive including English hawthorn (*Crataegus monogyna*) and sweet cherry (*Prunus avium*) are proposed for removal. Four trees are proposed for removal to create view corridors.

Based on the updated site/grading plan in Attachment 2, 79 non-nuisance trees in good to fair health and/or structural condition are proposed for removal due to construction impacts. An additional 37 trees that are considered invasive species (English hawthorn and sweet cherry) are proposed for removal. One hundred thirty-six (136) trees that are dead, dying, or in poor to very poor health and/or structural condition are also proposed removal. Four trees (trees 84, 103, 311, and 397) are proposed for removal to open up views to the west of the site. The remaining 135 trees at the site will be retained, with priority given to larger diameter Douglas-firs (*Pseudotsuga menziesii*) and Oregon white oaks (*Quercus garryana*). Note that tree 121, a 32-inch DBH Oregon white oak, will attempt to be retained to the east of building A.1, but may need to be removed if the project arborist determines preservation is not feasible during construction.

Protection recommendations for the 135 trees to be retained are provided in the next section of this report.

Tree Protection Recommendations

The following recommendations apply to the trees to be retained:

- **Protection Fencing**: Establish tree protection fencing in the locations shown in Attachment 2. The intent of the tree protection fencing is to protect the minimum root protection zones detailed in Figure 1 where possible. In some cases the tree protection fencing will need to be modified for the construction of improvements under the onsite supervision of the project arborist. Fencing

may need to be temporarily opened or installed after the trees within the fenced protection zones are removed.

- **Tree Removal**: The selected tree service should coordinate with the project arborist to determine the methods that will be used to protect the trees to be retained during tree removal. The following options will be considered:
    - Directional Felling: If there is a clear path to fell the trees away from the trees to be retained without contacting theirs crowns, the trees may be free-felled away from the retained trees.
    - Piece Removal: If the trees cannot be directionally felled, they will need to be climbed, with branches and trunk sections cut off individually in pieces from the top down. If necessary, the pieces will be secured with ropes so they do not contact the crowns of the retained trees.
    - Crane Removal: The use of a crane may be needed in some cases to remove certain trees where access is limited.

  No heavy equipment is permitted within the fenced tree protection zones during tree removal operations.
- **Stump Removal**: The stumps of the trees to be removed from within the fenced tree protection zones shall be retained or carefully surface ground.
- **Utility Construction**: The proposed sanitary and storm lines at the west and south ends of the site are outside the minimum root protection zones detailed in Figure 1. However, since they are within the fenced tree protection zones, they shall be excavated under project arborist supervision.
- **Tree 121**: The project team will attempt to retain tree 121 as follows:
    - Building Foundation: The project arborist shall be onsite to oversee the excavation for the foundation of building A.1 to ensure the proper preservation and/or pruning of woody structural roots.
    - Prevention of Soil Compaction: Place a layer of geotextile fabric on the ground overlaid with 6-inches of wood chips with steel plates on top in the approximate location shown in Attachment 2 to prevent soil compaction during work on the side of building A.1.
    - Paving: The proposed sidewalk and parking lot paving within the fenced tree protection zone needs to be constructed using a modified pavement profile under arborist supervision as shown in Figure 2.

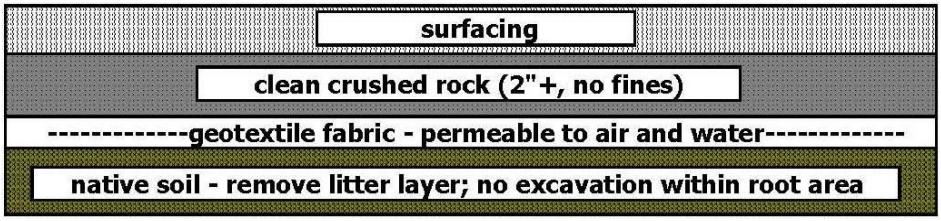


Figure 2. Sample profile for area within fenced tree protection zone. Depth of rock is dependent on grading.

Methods to minimize the depth of the modified pavement profile such as the use of concrete, reinforced pavement should be implemented. Also, methods to improve air and water exchange through the pavement such as the use of permeable paving materials or 4-inch diameter aeration holes at 10 feet on center should be used. Curbs

constructed adjacent to the tree may need to be roll curbs or extruded curbs to minimize excavation where there are structural roots. Sidewalks should be meandered away from tree trunk as needed to avoid root impacts.

  - Utility Construction: The proposed electrical, storm, and gas lines shown within the fenced tree protection zone shall be bored at a depth of five feet or greater underneath the tree protection zone, or rerouted in coordination with the project arborist to avoid the tree.

- **Protect Crowns of Trees**: The crowns of the trees may extend beyond the tree protection fencing. Care will need to be taken to not contact or otherwise damage the crowns of the trees during construction activities.
- **Pruning**: Some of the trees may need to be clearance and/or reduction pruning to allow for construction. Any pruning shall be completed by a qualified, certified arborist in a manner that is consistent with ANSI A300 pruning standards. The pruning shall be the minimum necessary to achieve the required clearance.
- **Sediment Fencing**: Sediment fencing shall be installed outside the fenced protection zones of the trees to be retained to minimize root disturbances. If erosion control is required inside the fenced protection zones, straw wattles shall be used on the soil surface.

Attachment 5 includes additional recommendations to adequately protect the trees during construction.

Conclusion

Seventy-nine (79) non-nuisance trees in good to fair health and/or structural condition are proposed for removal due to construction impacts. An additional 37 trees that are nuisance species (English hawthorn or sweet cherry) are proposed for removal. One hundred thirty-six (136) trees that are dead, dying, or in poor or very poor health and/or structural condition are also proposed removal. Four trees (trees 84, 103, 311, and 397) are proposed for removal to open up views to the west. The remaining 135 trees at the site will be retained, with priority given to larger diameter Douglas-firs and Oregon white oaks. Tree 121, a 32-inch DBH Oregon white oak, will attempt to be retained to the east of building A.1, but may need to be removed if the project arborist determines preservation is not feasible during construction. The trees to be retained will be adequately protected by adhering to the recommendations in this report.

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

Attachment 1:	Existing Conditions Survey with Tree Locations
Attachment 2:	Updated Site/Grading Plan with Trees and Tree Protection
Attachment 3:	Updated Utility Plan with Trees and Tree Protection
Attachment 4:	Tree Inventory
Attachment 5:	Additional Tree Protection Recommendations
Attachment 6:	Assumptions and Limiting Conditions

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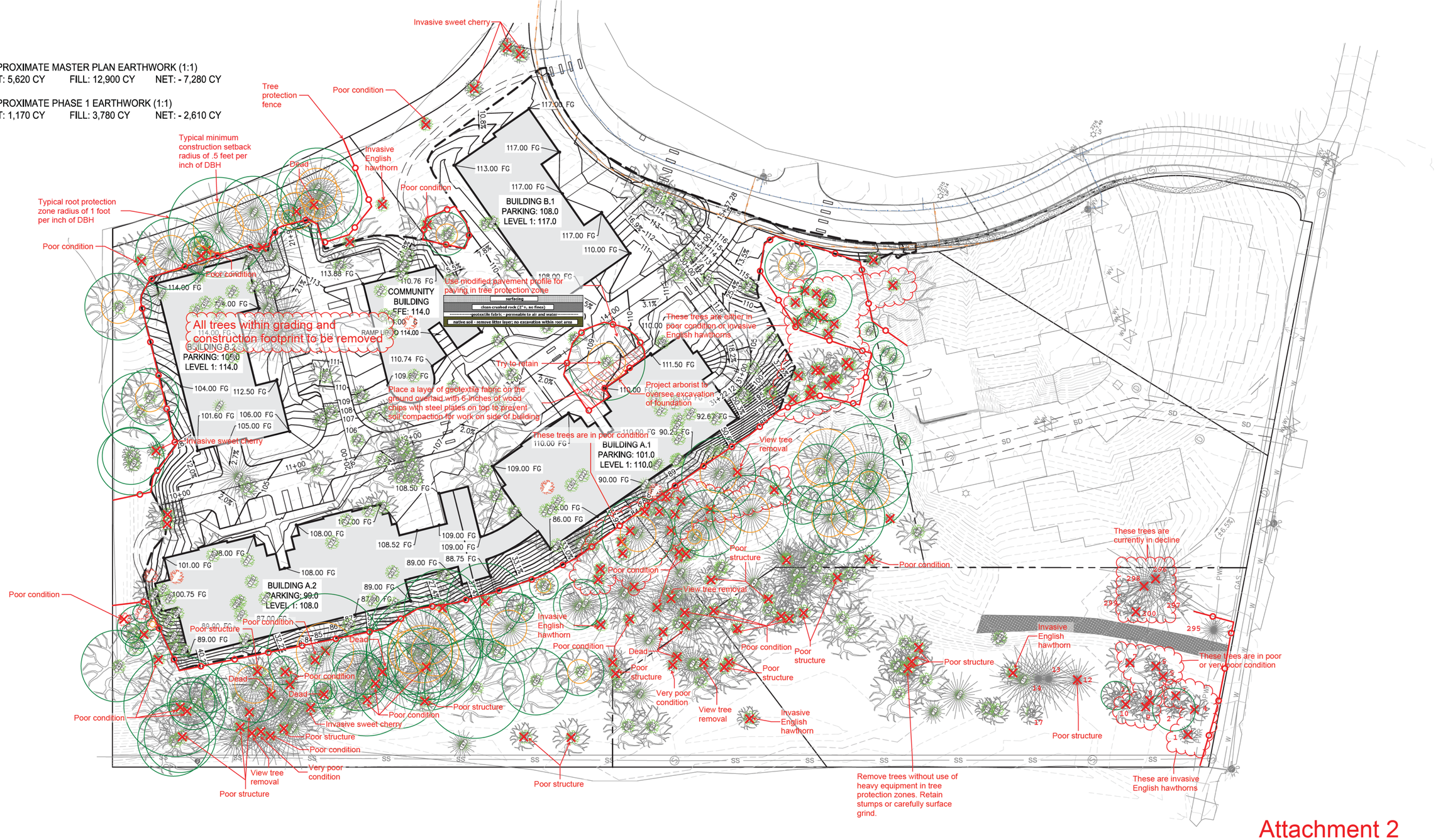
A tachment

APPROXIMATE MASTER PLAN EARTHWORK (1:1)
CUT: 5,620 CY FILL: 12,900 CY NET: - 7,280 CY

APPROXIMATE PHASE 1 EARTHWORK (1:1)
CUT: 1,170 CY FILL: 3,780 CY NET: - 2,610 CY



Attachment 2

GRADING

DATE: 7/16/2020

SCALE 1 INCH = 40 FEET
40 0 40 80

111 SW Fifth Ave., Suite 2500
Portland, OR 97204
O: 503.542.3860
F: 503.224.4681
www.kpff.com

LEGEND

- STORM DRAIN
- SANITARY SEWER
- W — DOMESTIC WATER
- FP — FIRE PROTECTION
- G — NATURAL GAS
- E — ELECTRIC

Tree protection fence

Typical minimum construction setback radius of .5 feet per inch of DBH

Typical root protection zone radius of 1 foot per inch of DBH

Poor condition

Invasive sweet cherry

All trees within grading and construction footprint to be removed

Project arborist to oversee excavation for storm in tree protection zone

Poor condition

Project arborist to oversee excavation for sewer in tree protection zone

Attachment 3

UTILITIES

DATE: 7/16/2020

SCALE 1 INCH = 40 FEET
40 0 40 80

kpff
111 SW Fifth Ave., Suite 2500
Portland, OR 97204
O: 503.542.3860
F: 503.224.4681
www.kpff.com

Attachment 4

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Condition[3]	Structure	Comments	Treatment
1	English hawthorn	*Crataegus monogyna*	18	15	fair	fair	multiple leaders, previous stem failures	remove
2	bigleaf maple	*Acer macrophyllum*	18	20	good	fair	codominant at 3' with included bark	retain
3	English hawthorn	*Crataegus monogyna*	12	15	good	fair	multiple leaders with included bark	remove
4	English hawthorn	*Crataegus monogyna*	14	12	good	fair	multiple leaders	remove
5	Scouler's willow	*Salix scouleriana*	10,8	15	poor	poor	codominant at ground level, significant dieback	remove
6	Scouler's willow	*Salix scouleriana*	10	5	very poor	very poor	extensive dieback	remove
7	bigleaf maple	*Acer macrophyllum*	22	20	poor	poor	significant top dieback and decay	remove
8	bigleaf maple	*Acer macrophyllum*	18	18	poor	poor	extensive ivy, codominant at 1'	remove
9	crabapple	*Malus sp.*	10	15	poor	poor	codominant at 1', smothered by ivy	remove
10	bigleaf maple	*Acer macrophyllum*	16,6	15	poor	poor	multiple leaders at ground level, significant ivy, branch dieback	remove
11	bigleaf maple	*Acer macrophyllum*	12	15	good	fair	one sided	retain
12	Douglas-fir	*Pseudotsuga menziesii*	18	15	fair	poor	extensive ivy, 33% live crown ratio	remove
13	Douglas-fir	*Pseudotsuga menziesii*	27	15	fair	fair	thin crown, small branch dieback	retain
14	Douglas-fir	*Pseudotsuga menziesii*	34	20	good	fair	moderately one sided	retain
15	Douglas-fir	*Pseudotsuga menziesii*	34	25	fair	fair	one sided, minor branch dieback	retain
16	English hawthorn	*Crataegus monogyna*	10	15	fair	fair	extensive ivy	remove
17	bigleaf maple	*Acer macrophyllum*	6	15	good	fair	extensive ivy on trunk	retain
18	bigleaf maple	*Acer macrophyllum*	12	12	good	fair	extensive ivy on trunk	retain
19	bigleaf maple	*Acer macrophyllum*	10	10	good	fair	extensive ivy on trunk	retain
20	Douglas-fir	*Pseudotsuga menziesii*	36	20	good	good	extensive ivy on trunk	retain
21	red oak	*Quercus rubra*	12	12	good	fair	extensive ivy on trunk	retain
22	elm	*Ulmus sp.*	26	15	good	fair	codominant at 3' with included bark	retain
23	Oregon white oak	*Quercus garryana*	24	25	good	fair	one sided, extensive ivy on trunk	retain

Attachment 4

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Condition[3]	Structure	Comments	Treatment
24	elm	*Ulmus sp.*	15,13	10	fair	poor	25% live crown ratio, extensive ivy on trunk	remove
25	elm	*Ulmus sp.*	13	10	fair	poor	one sided, extensive ivy on trunk, suppressed	remove
26	elm	*Ulmus sp.*	15	20	good	fair	one sided, extensive ivy on trunk	retain
27	elm	*Ulmus sp.*	18	20	good	fair	one sided, extensive ivy on trunk	retain
28	Oregon white oak	*Quercus garryana*	23	17	fair	fair	moderately suppressed, significant branch dieback	retain
29	elm	*Ulmus sp.*	12	15	fair	poor	overtopped by adjacent trees, one sided, suppressed	remove
30	Oregon white oak	*Quercus garryana*	24	32	good	fair	one sided, extensive ivy along trunk	retain
31	Oregon white oak	*Quercus garryana*	32	35	good	fair	extensive ivy along trunk	retain
32	bigleaf maple	*Acer macrophyllum*	18	20	good	fair	one sided	retain
33	bigleaf maple	*Acer macrophyllum*	32	20	fair	poor	codominant at 1', smothered by ivy, one sided	remove
34	bigleaf maple	*Acer macrophyllum*	30	30	good	fair	one sided	retain
35	Douglas-fir	*Pseudotsuga menziesii*	20	20	good	fair	one sided, overtopped by adjacent trees	retain
36	Douglas-fir	*Pseudotsuga menziesii*	30	25	good	fair	one sided, significant ivy along trunk	retain
37	n/a	n/a	n/a	n/a	n/a	n/a	not located	n/a
38	Douglas-fir	*Pseudotsuga menziesii*	30	25	good	fair	one sided, extensive ivy along trunk	retain
39	bigleaf maple	*Acer macrophyllum*	14	15	fair	fair	one sided, overtopped by adjacent trees, extensive ivy	retain
40	bigleaf maple	*Acer macrophyllum*	12	15	fair	poor	one sided, significant decay seam at lower trunk	remove
41	bigleaf maple	*Acer macrophyllum*	14	14	poor	poor	lost top at 20' with significant decay	remove
42	bigleaf maple	*Acer macrophyllum*	14	15	poor	poor	lost top at 25'	remove

Attachment 4

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Condition[3]	Structure	Comments	Treatment
43	Douglas-fir	*Pseudotsuga menziesii*	28	25	good	fair	moderately one sided	retain
44	bigleaf maple	*Acer macrophyllum*	14	15	poor	poor	smothered by ivy	remove
45	bigleaf maple	*Acer macrophyllum*	28	20	fair	fair	one sided, significant decay pocket in upper codominant stem, significant ivy along trunk	retain
46	bigleaf maple	*Acer macrophyllum*	18	18	fair	poor	suppressed, lost top, smothered by ivy	remove
47	Douglas-fir	*Pseudotsuga menziesii*	28	30	good	fair	multiple leaders in upper crown	retain
48	bigleaf maple	*Acer macrophyllum*	12	10	fair	fair	one sided, lost top, extensive ivy in crown	retain
49	bigleaf maple	*Acer macrophyllum*	12	10	poor	poor	dead top, significant ivy	remove
50	Oregon white oak	*Quercus garryana*	30	30	good	fair	one sided	retain
51	Douglas-fir	*Pseudotsuga menziesii*	30	20	good	fair	35% live crown ratio	retain
52	Douglas-fir	*Pseudotsuga menziesii*	32	25	good	fair	moderately one sided	retain
53	bigleaf maple	*Acer macrophyllum*	20	25	fair	fair	dead leader, extensive ivy	retain
54	bigleaf maple	*Acer macrophyllum*	18	20	good	fair	one sided	retain
55	Douglas-fir	*Pseudotsuga menziesii*	36	25	good	good		retain
56	bigleaf maple	*Acer macrophyllum*	24	20	good	fair	one sided, extensive ivy along trunk	retain
57	Douglas-fir	*Pseudotsuga menziesii*	48	30	good	good		retain
58	bigleaf maple	*Acer macrophyllum*	14	15	poor	poor	significant dieback	remove
59	Douglas-fir	*Pseudotsuga menziesii*	32	20	good	good		retain
60	grand fir	*Abies grandis*	36	0	very poor	very poor	dead	remove
61	Douglas-fir	*Pseudotsuga menziesii*	28	20	good	fair	one sided, extensive ivy along trunk	retain
62	Douglas-fir	*Pseudotsuga menziesii*	12	10	good	fair	one sided	retain
63	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 396	n/a
64	bigleaf maple	*Acer macrophyllum*	20	20	fair	fair	extensive ivy along trunk, moderately one sided	retain
65	bigleaf maple	*Acer macrophyllum*	18	18	poor	poor	extensive sloughing bark at lower trunk	remove

Attachment 4

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Condition[3]	Structure	Comments	Treatment
66	bigleaf maple	*Acer macrophyllum*	30	30	fair	poor	codominant at 4' with included bark and *Ganoderma sp.* conk, one sided, leans west	remove
67	Oregon white oak	*Quercus garryana*	26	30	fair	poor	codominant at 1', 8" stem dead, 20" stem with significant decay and extreme lean west	remove
68	English hawthorn	*Crataegus monogyna*	10	10	good	fair	multiple leaders	remove
69	Oregon white oak	*Quercus garryana*	26	35	good	fair	one sided, extensive ivy	retain
70	Douglas-fir	*Pseudotsuga menziesii*	18	20	good	fair	one sided	retain
71	Douglas-fir	*Pseudotsuga menziesii*	23	25	good	fair	one sided	retain
72	Douglas-fir	*Pseudotsuga menziesii*	12	0	very poor	very poor	dead	remove
73	grand fir	*Abies grandis*	22	13	good	good		retain
74	bigleaf maple	*Acer macrophyllum*	18,13	22	fair	fair	one sided, previous stem failure at 3', codominant at 3'	retain
75	Douglas-fir	*Pseudotsuga menziesii*	29	22	good	fair	moderately one sided	retain
76	bigleaf maple	*Acer macrophyllum*	18	20	poor	poor	suppressed, extensive epicormic growth at lower trunk	remove
77	bigleaf maple	*Acer macrophyllum*	17	15	good	fair	one sided, marginal trunk taper, 35% live crown ratio, extensive ivy along trunk	retain
78	bigleaf maple	*Acer macrophyllum*	18	20	poor	poor	one sided, extensive decay at lower trunk	remove
79	bigleaf maple	*Acer macrophyllum*	12	20	fair	poor	one sided, moderately suppressed, poor trunk taper	remove
80	Douglas-fir	*Pseudotsuga menziesii*	24	15	good	fair	one sided, extensive ivy along trunk	retain
81	Douglas-fir	*Pseudotsuga menziesii*	18	16	fair	fair	moderately suppressed, marginal trunk taper	retain
82	grand fir	*Abies grandis*	18	10	good	fair	moderately one sided	retain
83	Douglas-fir	*Pseudotsuga menziesii*	28	25	good	fair	25% live crown ratio, extensive ivy on trunk	retain

Attachment 4

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Condition[3]	Structure	Comments	Treatment
84	Douglas-fir	*Pseudotsuga menziesii*	12	15	fair	fair	one sided, significant lean, marginal trunk taper	remove
85	bigleaf maple	*Acer macrophyllum*	16	15	poor	poor	smothered by ivy	remove
86	bigleaf maple	*Acer macrophyllum*	20	20	poor	poor	moderately suppressed, dead codominant stem and epicormic growth at lower trunk	remove
87	Douglas-fir	*Pseudotsuga menziesii*	48	25	good	fair	multiple leaders at top of crown	retain
88	bigleaf maple	*Acer macrophyllum*	16	16	poor	poor	multiple leaders at ground level, two dead leaders, decay seam at remaining leader at lower trunk	remove
89	Douglas-fir	*Pseudotsuga menziesii*	16	18	good	fair	moderately one sided, extensive ivy along trunk	retain
90	bigleaf maple	*Acer macrophyllum*	20	25	good	fair	moderately one sided, extensive ivy along trunk and in crown	retain
91	bigleaf maple	*Acer macrophyllum*	20	25	good	fair	multiple upright leaders	retain
92	Oregon white oak	*Quercus garryana*	24	15	fair	fair	one sided, extensive ivy in crown	retain
93	Oregon white oak	*Quercus garryana*	28	20	fair	poor	moderately suppressed	remove
94	Douglas-fir	*Pseudotsuga menziesii*	14	15	poor	poor	suppressed, overtopped by adjacent trees, lost top at 20'	remove
95	Douglas-fir	*Pseudotsuga menziesii*	20	15	good	fair	one sided	retain
96	Douglas-fir	*Pseudotsuga menziesii*	20	20	good	fair	one sided	retain
97	bigleaf maple	*Acer macrophyllum*	18	18	poor	poor	codominant at ground level, large codominant stem failure	remove
98	Douglas-fir	*Pseudotsuga menziesii*	14	15	good	fair	marginal trunk taper	retain
99	Douglas-fir	*Pseudotsuga menziesii*	9	3	poor	poor	suppressed	remove
100	Douglas-fir	*Pseudotsuga menziesii*	30	25	good	fair	moderately one sided	retain
101	Douglas-fir	*Pseudotsuga menziesii*	14	8	poor	poor	suppressed, 15% live crown ratio	remove
102	bigleaf maple	*Acer macrophyllum*	16	20	fair	fair	codominant at 2', extensive ivy	retain
103	Douglas-fir	*Pseudotsuga menziesii*	22	22	good	fair	one sided, overtopped by adjacent trees	remove

Attachment 4

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Condition[3]	Structure	Comments	Treatment
104	Douglas-fir	*Pseudotsuga menziesii*	31	27	good	good		retain
105	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 379	n/a
106	bigleaf maple	*Acer macrophyllum*	12	12	poor	poor	smothered by ivy	remove
107	bigleaf maple	*Acer macrophyllum*	20,18, 18	25	poor	poor	smothered by ivy	remove
108	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 373	n/a
109	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 370	n/a
110	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 367	n/a
111	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 366	n/a
112	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 369	n/a
113	black cottonwood	*Populus trichocarpa*	22	27	good	fair	upright competing leaders	retain
114	bigleaf maple	*Acer macrophyllum*	10	8	good	fair	multiple leaders	remove
115	bigleaf maple	*Acer macrophyllum*	26	17	poor	poor	multiple leaders at lower trunk, smothered by ivy	remove
116	deciduous	deciduous	15	0	very poor	very poor	dead, smothered by ivy	remove
117	deciduous	deciduous	15	0	very poor	very poor	dead, smothered by ivy	remove
118	bigleaf maple	*Acer macrophyllum*	15,13	20	good	fair	codominant at 2' with included bark, significant ivy growth in crown	remove
119	bigleaf maple	*Acer macrophyllum*	15	20	good	fair	moderately one sided	remove
120	bigleaf maple	*Acer macrophyllum*	17	15	fair	fair	dead, failed codominant stem at lower trunk	remove
121	Oregon white oak	*Quercus garryana*	32	34	good	good		try to retain
122	Oregon white oak	*Quercus garryana*	36	20	good	fair	codominant at 5' with upright stems, extensive ivy along trunk	remove
123	bigleaf maple	*Acer macrophyllum*	8	0	very poor	very poor	dead	remove
124	bigleaf maple	*Acer macrophyllum*	7	15	very poor	very poor	smothered by ivy	remove
125	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 381	n/a
126	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 380	n/a

Attachment 4

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Condition[3]	Structure	Comments	Treatment
127	Douglas-fir	*Pseudotsuga menziesii*	29	23	good	fair	moderately one sided, significant ivy growth	remove
128	Douglas-fir	*Pseudotsuga menziesii*	19	17	fair	poor	25% live crown ratio	remove
129	bigleaf maple	*Acer macrophyllum*	22,18, 18,13	15	fair	fair	multiple leaders at ground level, epicormic growth at lower trunk	remove
130	bigleaf maple	*Acer macrophyllum*	20	10	poor	poor	suppressed, smothered by ivy	remove
131	bigleaf maple	*Acer macrophyllum*	14,11	10	very poor	very poor	suppressed, extensive dieback	remove
132	bigleaf maple	*Acer macrophyllum*	15,11	25	poor	poor	codominant at ground level, 50% dead	remove
133	Douglas-fir	*Pseudotsuga menziesii*	7	8	poor	poor	overtopped by adjacent trees, suppressed	remove
134	bigleaf maple	*Acer macrophyllum*	10	20	fair	fair	overtopped by adjacent trees, epicormic growth at lower trunk, top failed previously, added to site map in approximate location by arborist	remove
135	Douglas-fir	*Pseudotsuga menziesii*	10	10	good	fair	one sided, extensive ivy along trunk	remove
136	Douglas-fir	*Pseudotsuga menziesii*	13	8	fair	poor	extensive ivy, 25% live crown ratio	remove
137	Douglas-fir	*Pseudotsuga menziesii*	18	20	good	fair	extensive ivy along trunk	remove
138	Oregon white oak	*Quercus garryana*	16	20	fair	fair	one sided, extensive ivy along trunk	remove
139	Oregon white oak	*Quercus garryana*	20,20, 18	25	fair	fair	multiple leaders at 2' with included bark, decay pocket at point of stem divergence	remove
140	Oregon white oak	*Quercus garryana*	22	20	fair	fair	extensive ivy along trunk, 40% live crown ratio	remove
141	Oregon white oak	*Quercus garryana*	28	32	good	good		remove
142	n/a	n/a	n/a	n/a	n/a	n/a	not located, same tree as 313?	n/a

Attachment 4

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Condition[3]	Structure	Comments	Treatment
143	Oregon white oak	*Quercus garryana*	20	20	good	fair	extensive ivy in crown	retain
144	bigleaf maple	*Acer macrophyllum*	16,10	25	fair	poor	codominant at ground level, smothered by ivy	remove
145	Oregon white oak	*Quercus garryana*	28	30	good	fair	extensive ivy in crown	retain
146	bigleaf maple	*Acer macrophyllum*	16	15	fair	poor	smothered by ivy	remove
147	Douglas-fir	*Pseudotsuga menziesii*	12	10	good	good		retain
148	bigleaf maple	*Acer macrophyllum*	30,30	40	fair	fair	codominant at ground level, extensive ivy in crown	retain
149	Douglas-fir	*Pseudotsuga menziesii*	30	30	good	good		retain
150	bigleaf maple	*Acer macrophyllum*	12	10	fair	fair	multiple leaders, one sided, extensive ivy in crown	retain
151	Oregon white oak	*Quercus garryana*	24	30	good	fair	extensive ivy in crown	remove
152	Oregon white oak	*Quercus garryana*	12	15	good	fair	extensive ivy along trunk	retain
153	bigleaf maple	*Acer macrophyllum*	8	8	good	fair	33% live crown ratio, one sided	retain
154	Douglas-fir	*Pseudotsuga menziesii*	12	15	good	fair	moderately one sided, extensive ivy along trunk	retain
155	Douglas-fir	*Pseudotsuga menziesii*	48	30	good	fair	one sided	retain
156	Douglas-fir	*Pseudotsuga menziesii*	40	25	good	fair	one sided	retain
157	Douglas-fir	*Pseudotsuga menziesii*	48	20	good	fair	one sided	retain
158	bigleaf maple	*Acer macrophyllum*	20,18, 18	30	poor	poor	overtopped by adjacent trees, overextended leaders, branch dieback	remove
159	Douglas-fir	*Pseudotsuga menziesii*	24	15	good	fair	one sided, 40% live crown ratio	retain
160	bigleaf maple	*Acer macrophyllum*	10	10	fair	poor	33% live crown ratio, extensive ivy in crown	remove
161	Douglas-fir	*Pseudotsuga menziesii*	8	10	good	fair	overtopped by adjacent trees, extensive ivy on trunk	retain

Attachment 4

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Condition[3]	Structure	Comments	Treatment
162	Douglas-fir	*Pseudotsuga menziesii*	8	10	good	fair	overtopped by adjacent trees, extensive ivy on trunk	retain
163	Douglas-fir	*Pseudotsuga menziesii*	36	20	good	fair	one sided, extensive ivy along trunk	retain
164	Oregon white oak	*Quercus garryana*	10	15	poor	poor	overtopped by adjacent trees, one sided, suppressed	remove
165	Oregon white oak	*Quercus garryana*	16	16	good	fair	one sided	remove
166	Oregon white oak	*Quercus garryana*	12	17	fair	fair	one sided, moderately suppressed	remove
167	Oregon white oak	*Quercus garryana*	10	12	poor	poor	extensive dieback	remove
168	Oregon white oak	*Quercus garryana*	9	11	fair	poor	one sided, significant decay at root crown	remove
169	Oregon white oak	*Quercus garryana*	12	12	fair	fair	one sided, extensive ivy at lower crown	remove
170	Oregon white oak	*Quercus garryana*	12	0	very poor	very poor	dead, fallen over	remove
171	Oregon white oak	*Quercus garryana*	20	20	good	fair	moderately one sided	remove
172	Oregon white oak	*Quercus garryana*	28	30	fair	fair	multiple leaders at 6' with included bark, extensive ivy	remove
173	Oregon white oak	*Quercus garryana*	18	25	fair	fair	extensive ivy at lower crown, branches with high aspect ratios	remove
174	Oregon white oak	*Quercus garryana*	24	20	fair	fair	codominant at 2', one sided, extensive ivy at lower crown	remove
175	Oregon white oak	*Quercus garryana*	12	8	fair	fair	one sided, extensive ivy at lower crown	remove
176	Oregon white oak	*Quercus garryana*	14,12, 10,8	35	good	fair	previously fallen over, multiple upright leaders along trunk, extensive ivy along lower trunk and crown	remove

Attachment 4

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Condition[3]	Structure	Comments	Treatment
177	Oregon white oak	*Quercus garryana*	12	10	fair	fair	one sided, stunted growth, extensive ivy in crown	remove
178	Oregon white oak	*Quercus garryana*	20	18	good	fair	extensive ivy at lower crown	remove
179	Oregon white oak	*Quercus garryana*	12	15	good	fair	one sided, extensive ivy at lower crown	remove
180	Oregon white oak	*Quercus garryana*	18,18, 12	20	fair	fair	multiple leaders at ground level with included bark	remove
181	bigleaf maple	*Acer macrophyllum*	10	10	very poor	very poor	smothered by ivy, extensive dieback	remove
182	Douglas-fir	*Pseudotsuga menziesii*	26	20	fair	fair	thinning crown	remove
183	Oregon white oak	*Quercus garryana*	8	10	fair	poor	smothered by ivy	remove
184	English hawthorn	*Crataegus monogyna*	7	6	fair	poor	smothered by ivy	remove
185	Oregon white oak	*Quercus garryana*	14	15	good	fair	significant ivy at lower crown	remove
186	bigleaf maple	*Acer macrophyllum*	10	8	poor	poor	codominant stem dead, smothered by ivy	remove
187	bigleaf maple	*Acer macrophyllum*	12	12	fair	poor	extensive ivy, 33% live crown ratio	remove
188	English hawthorn	*Crataegus monogyna*	10	5	poor	poor	extensive ivy	remove
189	Oregon white oak	*Quercus garryana*	25	25	good	fair	codominant at 7' with included bark	remove
190	Douglas-fir	*Pseudotsuga menziesii*	30	30	good	fair	one sided, significant ivy growth	remove
191	Douglas-fir	*Pseudotsuga menziesii*	22	22	good	fair	one sided, overtopped by adjacent trees	remove
192	Douglas-fir	*Pseudotsuga menziesii*	34	34	good	fair	moderately one sided	remove
193	Douglas-fir	*Pseudotsuga menziesii*	28	25	good	good		remove
194	Scouler's willow	*Salix scouleriana*	10	13	fair	fair	large scar at lower trunk, one sided	remove
195	Douglas-fir	*Pseudotsuga menziesii*	26	26	good	fair	one sided	remove
196	bigleaf maple	*Acer macrophyllum*	8	15	good	fair	marginal trunk taper	remove

Attachment 4

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Condition[3]	Structure	Comments	Treatment
197	Douglas-fir	*Pseudotsuga menziesii*	32	20	good	fair	codominant at top of crown, significant ivy growth at lower crown	remove
198	Douglas-fir	*Pseudotsuga menziesii*	40	30	good	good		remove
199	bigleaf maple	*Acer macrophyllum*	11	16	good	fair	overtopped by adjacent trees	remove
200	Douglas-fir	*Pseudotsuga menziesii*	33	26	good	fair	moderately one sided, extensive ivy	remove
201	Oregon white oak	*Quercus garryana*	28	20	good	fair	one sided, extensive ivy, codominant at 2'	retain
202	bigleaf maple	*Acer macrophyllum*	20	15	poor	poor	overtopped by adjacent trees, smothered by ivy	remove
203	Douglas-fir	*Pseudotsuga menziesii*	30	20	good	good		retain
204	Douglas-fir	*Pseudotsuga menziesii*	16	14	fair	fair	one sided, extensive ivy	remove
205	Douglas-fir	*Pseudotsuga menziesii*	31	27	good	fair	one sided	remove
206	Douglas-fir	*Pseudotsuga menziesii*	34	27	good	fair	one sided	remove
207	Douglas-fir	*Pseudotsuga menziesii*	42	23	good	good	50% live crown ratio	retain
208	Douglas-fir	*Pseudotsuga menziesii*	32	20	good	fair	moderately one sided, extensive ivy	remove
209	Douglas-fir	*Pseudotsuga menziesii*	24	15	poor	poor	smothered by ivy	remove
210	Douglas-fir	*Pseudotsuga menziesii*	28	20	fair	fair	one sided, extensive ivy	remove
211	Douglas-fir	*Pseudotsuga menziesii*	30	20	good	good	50% live crown ratio	retain
212	sweet cherry	*Prunus avium*	8,7	20	fair	poor	overtopped by adjacent trees, 7" stem is dead	remove
213	bigleaf maple	*Acer macrophyllum*	45	34	very poor	very poor	extensive decay behind lean into street	remove
214	bigleaf maple	*Acer macrophyllum*	11	24	good	good		remove
215	English hawthorn	*Crataegus monogyna*	5,5,3	10	poor	poor	smothered by ivy, multiple leaders at ground level	remove
216	sweet cherry	*Prunus avium*	12	14	good	fair	one sided, codominant at 3'	remove
217	sweet cherry	*Prunus avium*	5,5	14	fair	fair	one sided, dead stem at base of trunk	remove

Attachment 4

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Condition[3]	Structure	Comments	Treatment
218	sweet cherry	*Prunus avium*	7	9	fair	fair	one sided, moderately suppressed	remove
219	Oregon white oak	*Quercus garryana*	40	30	good	fair	codominant at 4'	remove
220	Douglas-fir	*Pseudotsuga menziesii*	16	0	very poor	very poor	dead, 20' snag	remove
221	Douglas-fir	*Pseudotsuga menziesii*	34	25	good	fair	one sided	retain
222	Douglas-fir	*Pseudotsuga menziesii*	18	16	good	fair	one sided	retain
223	Douglas-fir	*Pseudotsuga menziesii*	34	25	good	fair	one sided	retain
224	Douglas-fir	*Pseudotsuga menziesii*	31	20	good	fair	crown extensive suppressed by adjacent trees	remove
225	n/a	n/a	n/a	n/a	n/a	n/a	not located	n/a
226	Douglas-fir	*Pseudotsuga menziesii*	11	11	fair	fair	moderately suppressed, overtopped by adjacent trees	retain
227	bigleaf maple	*Acer macrophyllum*	18	15	poor	very poor	one sided, partially uprooted, significant lean, decay at root crown	remove
228	bigleaf maple	*Acer macrophyllum*	18	20	good	fair	moderately one sided	retain
229	Oregon ash	*Fraxinus latifolia*	10	15	good	good		remove
230	Oregon ash	*Fraxinus latifolia*	8,6	12	good	fair	codominant at 2' with included bark	remove
231	Oregon ash	*Fraxinus latifolia*	9	9	good	good		remove
232	Oregon ash	*Fraxinus latifolia*	18	25	good	fair	extensive ivy	remove
233	Oregon ash	*Fraxinus latifolia*	10	10	fair	fair	extensive ivy	remove
234	bigleaf maple	*Acer macrophyllum*	16	16	poor	poor	top dieback and decay, poor trunk taper	remove
235	bigleaf maple	*Acer macrophyllum*	9	11	fair	fair	overtopped by adjacent trees, significant ivy growth	remove
236	bigleaf maple	*Acer macrophyllum*	9	11	fair	poor	moderately suppressed, poor trunk taper	remove
237	bigleaf maple	*Acer macrophyllum*	10	10	poor	poor	smothered by ivy	remove
238	Oregon white oak	*Quercus garryana*	24	20	good	fair	one sided, extensive ivy at lower trunk	retain

Attachment 4

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Condition[3]	Structure	Comments	Treatment
239	Oregon white oak	*Quercus garryana*	32	25	fair	fair	one sided, codominant at 3', 12" codominant stem smothered by ivy with significant decay	retain
240	Oregon white oak	*Quercus garryana*	24	20	fair	fair	codominant at 6', upright crown with overextended leaders	retain
241	Oregon white oak	*Quercus garryana*	28	25	good	fair	one sided	retain
243	Oregon white oak	*Quercus garryana*	16	20	good	fair	one sided, extensive ivy in crown	remove
244	Oregon white oak	*Quercus garryana*	18	20	good	fair	extensive ivy at lower trunk	remove
245	Oregon white oak	*Quercus garryana*	20	25	good	fair	moderately one sided, extensive ivy at lower crown	remove
246	Oregon white oak	*Quercus garryana*	24	25	fair	fair	overtopped by adjacent trees, one sided, codominant at 1', 10" codominant stem failed at 10'	remove
247	Oregon white oak	*Quercus garryana*	14	10	fair	fair	one sided, leans west	remove
248	Oregon white oak	*Quercus garryana*	18	20	good	fair	one sided	remove
249	Oregon white oak	*Quercus garryana*	30	30	good	fair	moderately one sided	retain
251	Oregon white oak	*Quercus garryana*	10	10	fair	poor	extensive ivy at lower crown, 25% live crown ratio	remove
252	Oregon white oak	*Quercus garryana*	18	15	fair	poor	smothered by ivy	remove
253	Oregon white oak	*Quercus garryana*	12,12, 12,12, 10	20	fair	fair	multiple leaders at ground level, extensive ivy in lower crown	remove
254	Oregon white oak	*Quercus garryana*	20	20	good	fair	multiple upright leaders, extensive ivy along trunk	remove

Attachment 4

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Condition[3]	Structure	Comments	Treatment
255	Oregon white oak	*Quercus garryana*	14	20	fair	poor	bent upper trunk with multiple upright leaders along stem	remove
256	Douglas-fir	*Pseudotsuga menziesii*	36	25	fair	fair	codominant at 4' with included bark, one sided, extensive ivy, branch dieback	retain
257	Oregon white oak	*Quercus garryana*	18	15	fair	poor	33% live crown ratio, extensive ivy at lower trunk	remove
258	Oregon white oak	*Quercus garryana*	12	10	poor	poor	suppressed	remove
259	Oregon white oak	*Quercus garryana*	18	18	fair	fair	35% live crown ratio, decay pocket at 15'	retain
260	Oregon white oak	*Quercus garryana*	12	15	fair	fair	moderately one sided, 35% live crown ratio	remove
261	Oregon white oak	*Quercus garryana*	16,14, 10,10, 10	30	good	fair	multiple leaders at ground level, extensive ivy in crown	remove
262	bigleaf maple	*Acer macrophyllum*	16	0	very poor	very poor	dead, smothered by ivy	remove
263	Douglas-fir	*Pseudotsuga menziesii*	28	18	good	fair	40% live crown ratio, extensive ivy at lower trunk	retain
264	Douglas-fir	*Pseudotsuga menziesii*	20	10	good	fair	one sided, extensive ivy along trunk	retain
265	Douglas-fir	*Pseudotsuga menziesii*	24	20	good	fair	one sided, extensive ivy along trunk	retain
266	Douglas-fir	*Pseudotsuga menziesii*	44	25	good	fair	one sided	retain
267	Oregon white oak	*Quercus garryana*	12	10	poor	poor	suppressed, extreme lean, extensive ivy	remove
268	bigleaf maple	*Acer macrophyllum*	24	20	fair	fair	one sided	retain
269	sweet cherry	*Prunus avium*	8	10	good	fair	one sided, extensive ivy	remove
270	Douglas-fir	*Pseudotsuga menziesii*	36	25	good	fair	one sided, extensive ivy at lower trunk	retain

Attachment 4

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Condition[3]	Structure	Comments	Treatment
271	bigleaf maple	*Acer macrophyllum*	30,24	20	fair	poor	one sided, 24" stem topped for overhead high voltage, crown smothered by ivy	remove
272	Douglas-fir	*Pseudotsuga menziesii*	26	20	poor	poor	clusters of *Porodaedalea pini* at lower trunk, one sided, extensive ivy along trunk	remove
273	Douglas-fir	*Pseudotsuga menziesii*	20	15	very poor	very poor	*Phaeolus schweinitzii* conk adjacent to trunk, lower trunk smothered by ivy, 25% live crown ratio	remove
274	Douglas-fir	*Pseudotsuga menziesii*	16	15	good	fair	extensive ivy along trunk	retain
275	Douglas-fir	*Pseudotsuga menziesii*	20	20	good	fair	one sided, extensive ivy along trunk	retain
276	Douglas-fir	*Pseudotsuga menziesii*	10	0	very poor	very poor	dead, smothered by ivy	remove
277	Douglas-fir	*Pseudotsuga menziesii*	32	30	good	fair	lower trunk smothered by ivy, 40% live crown ratio	retain
278	Douglas-fir	*Pseudotsuga menziesii*	28	25	good	fair	lower trunk smothered by ivy, 40% live crown ratio	retain
279	Douglas-fir	*Pseudotsuga menziesii*	20	15	fair	poor	lower trunk smothered by ivy, 33% live crown ratio	remove
280	bigleaf maple	*Acer macrophyllum*	12	5	poor	poor	smothered by ivy	remove
281	bigleaf maple	*Acer macrophyllum*	12	20	fair	poor	smothered by ivy	remove
282	Oregon white oak	*Quercus garryana*	10	10	poor	poor	suppressed, smothered by ivy	remove
283	Douglas-fir	*Pseudotsuga menziesii*	48	25	good	fair	extensive ivy along trunk	remove
284	bigleaf maple	*Acer macrophyllum*	18,16, 16,10	25	fair	fair	multiple leaders at ground level, extensive ivy along trunk	remove
285	bigleaf maple	*Acer macrophyllum*	24	20	good	fair	35% live crown ratio, extensive ivy in crown	remove
286	bigleaf maple	*Acer macrophyllum*	12	12	fair	poor	crown smothered by ivy	remove
287	bigleaf maple	*Acer macrophyllum*	12	20	poor	poor	smothered by ivy	remove

Attachment 4

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Condition[3]	Structure	Comments	Treatment
288	Oregon white oak	*Quercus garryana*	12	12	good	fair	one sided, extensive ivy in crown	retain
289	Oregon white oak	*Quercus garryana*	9	0	very poor	very poor	dead	remove
290	grand fir	*Abies grandis*	8	10	good	fair	one sided, overtopped by adjacent trees	retain
291	Douglas-fir	*Pseudotsuga menziesii*	10	10	fair	fair	suppressed	remove
292	Douglas-fir	*Pseudotsuga menziesii*	12	5	poor	poor	smothered by ivy	remove
293	Douglas-fir	*Pseudotsuga menziesii*	24	15	good	fair	one sided, extensive ivy at lower trunk	retain
294	bigleaf maple	*Acer macrophyllum*	7	10	fair	fair	extensive ivy	retain
295	Austrian pine	*Pinus nigra*	13	10	good	good		retain
296	Douglas-fir	*Pseudotsuga menziesii*	41	14	poor	poor	dead top	remove
297	n/a	n/a	n/a	n/a	n/a	n/a	not present	n/a
298	Douglas-fir	*Pseudotsuga menziesii*	30	17	fair	fair	moderately thin crown	remove
299	n/a	n/a	n/a	n/a	n/a	n/a	not located	n/a
300	bigleaf maple	*Acer macrophyllum*	9	12	poor	very poor	one sided, significant decay at lower trunk	remove
301	bigleaf maple	*Acer macrophyllum*	16	15	fair	fair	one sided, extensive ivy in crown	retain
302	bigleaf maple	*Acer macrophyllum*	20	25	fair	fair	one sided, extensive ivy in crown	retain
303	Douglas-fir	*Pseudotsuga menziesii*	20	20	fair	fair	extensive ivy in crown	retain
304	bigleaf maple	*Acer macrophyllum*	36,24	40	poor	poor	extensive heartrot, codominant at ground level, 24" stem smothered by ivy	remove
305	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 304	n/a
306	bigleaf maple	*Acer macrophyllum*	30	25	fair	fair	one sided, extensive ivy in lower crown	retain
307	bigleaf maple	*Acer macrophyllum*	30	25	fair	poor	multiple leaders at 5', 18" leader topped at 8' for overhead high voltage line	remove
308	Douglas-fir	*Pseudotsuga menziesii*	10	10	poor	poor	suppressed	remove

Attachment 4

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Condition[3]	Structure	Comments	Treatment
309	Douglas-fir	*Pseudotsuga menziesii*	26	15	good	fair	one sided, previously failed at 10' with new leader	retain
310	bigleaf maple	*Acer macrophyllum*	20	15	fair	poor	one sided, extensive ivy, lower trunk smothered by ivy	remove
311	Douglas-fir	*Pseudotsuga menziesii*	28	15	fair	fair		remove
312	n/a	n/a	n/a	n/a	n/a	n/a	not located, same tree as 313?	n/a
313	Oregon white oak	*Quercus garryana*	30	25	good	fair	codominant at 5' with upright stems	remove
314	English hawthorn	*Crataegus monogyna*	6	6	poor	poor	smothered by ivy	remove
315	Oregon ash	*Fraxinus latifolia*	8	9	good	fair	marginal trunk taper	remove
316	Oregon ash	*Fraxinus latifolia*	11	8	good	fair	extensive ivy at lower trunk	remove
318	English hawthorn	*Crataegus monogyna*	10	10	poor	poor	overtopped by adjacent trees, smothered by ivy, not tagged	remove
319	English hawthorn	*Crataegus monogyna*	9	12	good	fair	moderately one sided	remove
320	crabapple	*Malus sp.*	10	13	poor	poor	lost top, large canker along lower trunk	remove
321	bigleaf maple	*Acer macrophyllum*	6	4	fair	poor	smothered by ivy	remove
322	bigleaf maple	*Acer macrophyllum*	6	5	fair	poor	smothered by ivy	remove
323	bigleaf maple	*Acer macrophyllum*	8	5	fair	poor	smothered by ivy	remove
325	Oregon ash	*Fraxinus latifolia*	6	6	good	good		remove
326	English hawthorn	*Crataegus monogyna*	6	9	poor	poor	smothered by ivy	remove
327	English hawthorn	*Crataegus monogyna*	6	7	fair	fair	extensive ivy	remove
328	English hawthorn	*Crataegus monogyna*	8	3	poor	poor	smothered by ivy	remove
329	English hawthorn	*Crataegus monogyna*	6	5	fair	fair	extensive ivy, added to site map in approximate location by arborist	remove
330	English hawthorn	*Crataegus monogyna*	6	7	fair	fair	extensive ivy	remove
331	English hawthorn	*Crataegus monogyna*	6	8	fair	fair	extensive ivy	remove
335	bigleaf maple	*Acer macrophyllum*	7	11	fair	fair	significant bark damage at lower trunk	remove
336	English hawthorn	*Crataegus monogyna*	14	14	fair	fair	multiple leaders	remove
337	Oregon ash	*Fraxinus latifolia*	8	9	good	good		remove

Attachment 4

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Condition[3]	Structure	Comments	Treatment
338	bigleaf maple	*Acer macrophyllum*	6	0	very poor	very poor	dead	remove
339	bigleaf maple	*Acer macrophyllum*	8	10	poor	poor	smothered by ivy	remove
340	bigleaf maple	*Acer macrophyllum*	8	5	poor	poor	smothered by ivy	remove
341	English hawthorn	*Crataegus monogyna*	8	8	poor	poor	smothered by ivy	remove
342	bigleaf maple	*Acer macrophyllum*	8	3	poor	poor	smothered by ivy	remove
343	bigleaf maple	*Acer macrophyllum*	8	10	poor	poor	smothered by ivy	remove
344	bigleaf maple	*Acer macrophyllum*	11	15	fair	fair	significant kink and decay at lower trunk	remove
345	bigleaf maple	*Acer macrophyllum*	11	15	fair	poor	severe lean, decay scar in lower trunk	remove
346	bigleaf maple	*Acer macrophyllum*	6,6	13	poor	poor	extensive dieback and decay	remove
348	Pacific dogwood	*Cornus nuttallii*	6	10	very poor	very poor	extensive dieback, smothered by ivy	remove
349	bigleaf maple	*Acer macrophyllum*	11,11, 15	16	fair	fair	multiple leaders at ground level with included bark	retain
350	bigleaf maple	*Acer macrophyllum*	6	11	fair	fair	one sided, overtopped by adjacent trees	retain
351	bigleaf maple	*Acer macrophyllum*	6,4	10	poor	poor	overtopped by adjacent trees, smothered by ivy	remove
352	bigleaf maple	*Acer macrophyllum*	7	7	fair	poor	significant ivy, poor trunk taper	remove
353	bigleaf maple	*Acer macrophyllum*	10	10	poor	poor	smothered by ivy	remove
354	bigleaf maple	*Acer macrophyllum*	6	11	poor	poor	smothered by ivy	remove
355	English hawthorn	*Crataegus monogyna*	12	8	poor	poor	smothered by ivy	remove
356	bigleaf maple	*Acer macrophyllum*	8	16	good	fair	multiple leaders	retain
357	Oregon ash	*Fraxinus latifolia*	8,5	6	poor	poor	smothered by ivy	remove
358	bigleaf maple	*Acer macrophyllum*	7,5	7	poor	poor	smothered by ivy	remove
359	bigleaf maple	*Acer macrophyllum*	10	16	poor	poor	overtopped by adjacent trees, smothered by ivy	remove
360	bigleaf maple	*Acer macrophyllum*	9,4	11	poor	poor	codominant at ground level, extensive ivy	remove
361	Douglas-fir	*Pseudotsuga menziesii*	8	7	good	good		retain

Attachment 4

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Condition[3]	Structure	Comments	Treatment
362	shore pine	*Pinus contorta* subsp. *contorta*	10	10	fair	fair	significant lean, sequoia pitch moth	retain
363	shore pine	*Pinus contorta subsp. contorta*	10	14	fair	fair	one sided, large pruning cuts at lower trunk, sequoia pitch moth	retain
364	shore pine	*Pinus contorta subsp. contorta*	10	10	fair	fair	one sided, codominant with included bark	retain
365	shore pine	*Pinus contorta subsp. contorta*	10	18	good	fair	codominant at 1', significant crown growth over parking lot	retain
366	bigleaf maple	*Acer macrophyllum*	12,12, 10	20	poor	poor	multiple leaders at ground level, smothered by ivy	remove
367	bigleaf maple	*Acer macrophyllum*	18,12, 10,8,8, 8,6	20	poor	poor	stump sprout, smothered by ivy	remove
368	English hawthorn	*Crataegus monogyna*	8	3	poor	poor	suppressed, smothered by ivy	remove
369	bigleaf maple	*Acer macrophyllum*	20,2	25	poor	poor	codominant at ground level, smothered by ivy	remove
370	bigleaf maple	*Acer macrophyllum*	10	10	poor	poor	smothered by ivy	remove
371	English hawthorn	*Crataegus monogyna*	10	8	fair	fair	extensive ivy	remove
372	English hawthorn	*Crataegus monogyna*	8,8	15	poor	poor	smothered by ivy	remove
373	English hawthorn	*Crataegus monogyna*	10	10	fair	fair	extensive ivy	remove
374	bigleaf maple	*Acer macrophyllum*	8	8	poor	poor	smothered by ivy	remove
375	English hawthorn	*Crataegus monogyna*	8,6	10	poor	poor	tagged 376 in field, smothered by ivy	remove
377	English hawthorn	*Crataegus monogyna*	8	10	fair	fair	extensive ivy	remove
378	Douglas-fir	*Pseudotsuga menziesii*	7	10	fair	poor	overtopped by adjacent trees, suppressed	remove
379	bigleaf maple	*Acer macrophyllum*	32,22, 10	40	very poor	very poor	extensive decay at lower trunk behind lean	remove
380	bigleaf maple	*Acer macrophyllum*	20	21	poor	poor	smothered by ivy	remove
381	Douglas-fir	*Pseudotsuga menziesii*	13	13	fair	fair	extensive ivy has deformed crown	remove
382	Douglas-fir	*Pseudotsuga menziesii*	5	0	very poor	very poor	dead	remove

Attachment 4

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Condition[3]	Structure	Comments	Treatment
383	Douglas-fir	*Pseudotsuga menziesii*	6	0	very poor	very poor	dead	remove
384	Douglas-fir	*Pseudotsuga menziesii*	6	8	poor	poor	suppressed	remove
385	Douglas-fir	*Pseudotsuga menziesii*	6	0	very poor	very poor	dead	remove
386	Douglas-fir	*Pseudotsuga menziesii*	6	4	poor	poor	smothered by ivy	remove
388	English hawthorn	*Crataegus monogyna*	10	5	fair	fair	extensive ivy	remove
390	Douglas-fir	*Pseudotsuga menziesii*	8	0	very poor	very poor	dead	remove
392	Douglas-fir	*Pseudotsuga menziesii*	8	0	very poor	very poor	dead	remove
393	elm	*Ulmus sp.*	6	10	good	fair	one sided	retain
394	Douglas-fir	*Pseudotsuga menziesii*	5	4	poor	poor	suppressed	remove
395	elm	*Ulmus sp.*	6	6	fair	fair	bent trunk, overtopped by adjacent trees	retain
396	bigleaf maple	*Acer macrophyllum*	12,8,8, 7	20	fair	fair	multiple leaders at ground level, extensive ivy	retain
397	Douglas-fir	*Pseudotsuga menziesii*	9	8	fair	fair	one sided, overtopped by adjacent trees	remove
398	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 71	n/a
399	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 70	n/a
400	bigleaf maple	*Acer macrophyllum*	14	0	very poor	very poor	15' tall snag	remove
401	elm	*Ulmus sp.*	8	10	fair	fair	overtopped by adjacent trees	retain
402	elm	*Ulmus sp.*	8	10	fair	fair	overtopped by adjacent trees	retain
403	elm	*Ulmus sp.*	5	8	good	fair	overtopped by adjacent trees, added to site map in approximate location by arborist	retain
404	Oregon white oak	*Quercus garryana*	5	0	very poor	very poor	dead	remove
405	Oregon white oak	*Quercus garryana*	6	6	poor	poor	suppressed, added to site map in approximate location by arborist	remove
406	Oregon white oak	*Quercus garryana*	8	10	fair	fair	one sided, moderately suppressed, added to site map in approximate location by arborist	retain
407	English hawthorn	*Crataegus monogyna*	4,2,2	6	fair	fair	overtopped by adjacent trees, multiple leaders at ground level	remove

Attachment 4

Tree No.	Common Name	Scientific Name	DBH[1]	C-Rad[2]	Condition[3]	Structure	Comments	Treatment
407.1	sweet cherry	*Prunus avium*	6	15	fair	poor	overtopped by adjacent trees, moderately suppressed, tagged 407, added to site map in approximate location by arborist	remove
408	English hawthorn	*Crataegus monogyna*	8	10	fair	fair	overtopped by adjacent trees, significant ivy growth	remove
408.1	sweet cherry	*Prunus avium*	12,5	25	good	fair	codominant at ground level, 5" stem failed at 8', tagged 408, added to site map in approximate location by arborist	remove
409	Oregon white oak	*Quercus garryana*	14	5	poor	poor	suppressed	remove
410	bigleaf maple	*Acer macrophyllum*	6	0	very poor	very poor	dead	remove
411	English hawthorn	*Crataegus monogyna*	6	8	good	fair	overtopped by adjacent trees	remove
412	bigleaf maple	*Acer macrophyllum*	7,6	10	poor	poor	codominant at ground level, suppressed	remove
413	bigleaf maple	*Acer macrophyllum*	8	10	good	fair	one sided, overtopped by adjacent trees	retain
414	bigleaf maple	*Acer macrophyllum*	8	15	good	fair	one sided, overtopped by adjacent trees	retain
416	Pacific dogwood	*Cornus nuttallii*	8	8	fair	fair	extensive ivy	retain
417	elm	*Ulmus sp.*	8	15	good	fair	one sided	retain
418	elm	*Ulmus sp.*	8	0	very poor	very poor	dead	remove
419	bigleaf maple	*Acer macrophyllum*	7	9	good	fair	one sided, overtopped by adjacent trees	retain
420	purpleleaf plum	*Prunus cerasifera*	6	15	poor	poor	extreme lean, fallen over, labeled tree 312 in field	remove
421	n/a	n/a	n/a	n/a	n/a	n/a	same as tree 314	n/a

[1]**DBH** is the trunk diameter in inches measured per International Society of Arboriculture (ISA) standards.

[2]**C-Rad** is the approximate crown radius in feet.

[3]**Condition and Structure** ratings range from very poor, poor, fair, to good.

Attachment 5
Tree Protection Recommendations

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 outlined 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. Tree protection fencing may be set as shown in Attachment 2.
    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 4-foot high steel fencing on concrete blocks or 4-foot metal fencing secured to the ground with 6-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 LOCATION OF THIS TREE PROTECTION FENCING**
> **UNAUTHORIZED ENCROACHMENT MAY RESULT IN FINES**
>
> Please contact the project arborist if alterations to the location of the tree protection fencing are necessary.
>
> Todd Prager, Project Arborist, Teragan & Associates, 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 woody 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 6
Assumptions and Limiting Conditions

1. Any legal description provided to the consultant is assumed to be correct. The information provided by Yost Grube Hall Architecture and other members of the project team 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:
    - Provide an assessment of the existing trees;
    - Provide updated recommendations for tree removal and retention based on the updated site improvements; and
    - Provide updated protection recommendations for the trees to be retained.

CITY OF MILWAUKIE
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Preapplication Conference Report

Project ID: 20-003PA

This report is provided as a follow-up to the meeting that was held on 5/14/2020 at 10:00 AM

The Milwaukie Municipal Code is available here: www.qcode.us/codes/milwaukie/

APPLICANT AND PROJECT INFORMATION

Applicant:	Phil Krueger	**Applicant Role:** Representative
Applicant Address:	707 SW Washington St, Ste 1200, Portland, OR 97205	
Company:	Yost Grube Hall Architecture	
Project Name:	Waverly Woods	
Project Address:	10415 SE Waverly Ct and Adjacent Lot	**Zone:** R2
Project Description:	Phased construction of 6 multi-family buildings with a total of 130 units	
Current Use:	Vacant/multi-family residential	
Applicants Present:	Wendy Wyse- Owner Walker Ventures LLC; Scott Wyse- Owner Walker Ventures LLC; Diedre Colantino- Waverley Greens Property Manager; Mike Telling – Precision Construction; Daan Dommels - KPFF Civil; Matt Manzer- KPFF Civil; Kristine Connolly- Kittelson traffic engineer; Nels Hall- YGH; Phil Krueger- YGH; Yukari Kubo- YGH; Franklin Potts- YGH	
Staff Present:	Vera Kolias, Associate Planner; Dalton Vodden, Associate Engineer; Steve Adams, City Engineer; Peter Passarelli, Public Works Director; Julian Lawrence, Urban Forester; Stephanie Marcinkiewicz, Plans Examiner; Matt Amos, Fire Inspector, NCFD1	

PLANNING COMMENTS

Zoning Compliance (MMC Title 19)

☒	**Use Standards (e.g., residential, commercial, accessory)**	The application will include a request for a Planned Development and Willamette Greenway Review.
☒	**Dimensional Standards**	Per Table 19.302.4, the minimum setbacks for primary structures in the R-2 zone are: 15 ft for front, rear and street side yard and 5 ft for side yards. However, as part of a Planned Development (PD), those yards may be altered as part of the PD review process.

		The application should specify all setback and dimensional standards that will vary from the required base zone standards. A table or diagram would be appropriate to convey this information. Please note the method of calculating minimum and maximum density in MMC 19.202.4 given the areas of steep slopes on the site. The PD provides for an increase in density if necessary, but detailed calculations will be required to confirm compliance.
Land Use Review Process		
☒	**Applications Needed**	Step 1: Transportation Facilities Review (TFR) – to begin the TIS process Step 2: Combined Preliminary & Final Planned Development; Willamette Greenway Review; Lot Consolidation; Transportation Facilities Review (TIS) – merged from Step 1 Step 3: Development Review during permitting for each phase/building
☒	**Fees**	TFR = $1,000 Willamette Greenway Review = $2,000 Preliminary PD = $2,000 Final PD = $5,000 Final Plat = $200 (for each phase) Development Review = $200 (for each phase) LLA/LC = $200 (For concurrent applications, the most expensive application is charged full price and the fees for all other applications are discounted 25%.)
☒	**Review Type: Type II** **Type IV** **Type III** **Type V**	TFR = Type II Preliminary PD = Type III Final PD = Type IV Willamette Greenway = Type III Development Review = Type I LLC/LC = Type I
Overlay Zones (MMC 19.400)		
☒	**Willamette Greenway**	MMC 19.401: Please note the approval criteria for the approval of Willamette Greenway (WG) review. This is reviewed concurrently with the PD and requires a narrative for each criterion. The PD provides for buildings in excess of 3 stories within the WG overlay, but also notes that views both to and from the river are important, as well as tree removal.
☐	**Natural Resources**	
☐	**Historic Preservation**	
☐	**Flex Space Overlay**	
Site Improvements/Site Context		
☒	**Landscaping Requirements**	All planned unit developments will have at least one-third of the gross area devoted to open space and/or outdoor recreational areas. At least half of the required open space

		and/or recreational areas will be of the same general character as the area containing dwelling units. Open space and/or recreational areas do not include public or private streets.
☒	**Onsite Pedestrian/Bike Improvements (MMC 19.504, 19.606, and 19.609)**	Please note the standards for pedestrian paths and location, including paving materials as well as the bicycle parking requirements. Please note that bike parking cannot be accommodated solely inside the dwelling units to be considered compliant with the standards.
☐	**Connectivity to surrounding properties**	
☐	**Circulation**	
☒	**Building Design Standards (MMC 19.505)**	MMC 19.505.3 would apply to the proposed development. The PD process allows for a new set of development standards; the submitted application must identify where the PD would modify these standards.
☐	**Downtown Design Standards (MMC 19.508)**	
Parking Standards (MMC 19.600)		
☐	**Residential Off-Street Parking Requirements**	
☒	**Multi-Family/Commercial Parking Requirements**	Off-street parking requirements would be evaluated site-wide. Any modifications to the required parking standards would be addressed via a parking modification per 19.605.2 that would be incorporated into the final PD.
Approval Criteria (MMC 19.900)		
☒	**Planned Developments (MMC 19.311)**	Please review the Development Standards (19.311.3) and the Approval Criteria identified in 19.311.9, which details all of the applicable approval criteria.
☐	**Amendments to Maps and Ordinances (MMC 19.902)**	
☒	**Development Review (MMC 19.906)**	Development review will accompany the building permit process for each phase or building to confirm compliance with the code and the PD approval.
☐	**Variance (MMC 19.911)**	
Land Division (MMC Title 17)		
☒	**Design Standards**	http://www.qcode.us/codes/milwaukie/view.php?topic=17-17_28&frames=off
☐	**Preliminary Plat Requirements**	
☐	**Final Plat Requirements (See Engineering Section of this Report)**	

Sign Code Compliance (MMC Title 14)		
☒	**Sign Requirements**	Sign Districts Residential Zones: http://www.qcode.us/codes/milwaukie/view.php?topic=14-14_16-14_16_010&frames=off
Noise (MMC Title 16)		
☐	**Noise Mitigation (MMC 16.24)**	
Neighborhood District Associations		
☒	**Historic Milwaukie**	https://www.milwaukieoregon.gov/citymanager/historic-milwaukie-nda
Other Permits/Registration		
☐	**Business Registration**	
☐	**Home Occupation Compliance (MMC 19.507)**	
Additional Planning Notes		
The applicant included the following Planning-related questions: • What is the process for a lot line adjustment and can this occur concurrent with Planned Development Review? **Yes. See information above.**		
ENGINEERING & PUBLIC WORKS COMMENTS		
Public Facility Improvements (MMC 19.700)		
☒	**Applicability (MMC 19.702)**	Chapter 19.700 of the Milwaukie Municipal Code (MMC) applies to partitions, subdivisions, new construction and modification and or expansions of existing structures or uses that produce a projected increase in vehicle trips.
☒	**Transportation Facilities Review (MMC 19.703)**	The City Engineer has determined that a Traffic Impact Study (TIS) will be required for this development. The review for the TIS will be completed under a Transportation Facility Review (TFR) land use application. This is a Type II application.
☒	**Transportation Impact Study (MMC 19.704)**	A transportation impact study is to be prepared by the applicant and reviewed by the city to determine steps necessary to mitigate transportation impacts at time of development.
☒	**Agency Notification (MMC 19.707)**	City of Milwaukie will coordinate TIS Agency notification.

☒	**Transportation Requirements (MMC 19.708)**	All developments subject to 19.700 shall comply with city access management standards contained in MMC 12.16, clear vision standards MMC 12.24, and improve adjacent rights-of-way to street design standards MMC 19.708.2.
☒	**Utility Requirements (MMC 19.709)**	Existing public utilities appear to be adequate to serve the proposed development.
Flood Hazard Area (MMC 18)		
☐	**Development Permit (MMC 18.04.100)**	No special management flood hazard area mapped on site.
☐	**General Standards (MMC 18.04.150)**	
☐	**Specific Standards (MMC 18.04.160)**	
☐	**Floodways (MMC 18.04.170)**	
Environmental Protection (MMC 16)		
☐	**Weak Foundation Soils (MMC 16.16)**	
☒	**Erosion Control (MMC 16.28)**	Development of the site will require an erosion control permit. Direct erosion control questions to Jeremiah Sonne – sonnej@milwaukieoregon.gov
☐	**Tree Cutting (MMC 16.32)**	Urban forester's review of the tree removal report notes that: 5 trees listed to remain are non-native, and 18 are in poor overall condition: Tree protection plan, including Appendix 4, is very good. A landscaping plan, showing trees and shrubs to be planted, has not been submitted. Milwaukie's Suggested Canopy Trees for the Yard document attached.
Public Services (MMC 13)		
☒	**Water System (MMC 13.04)**	A Field Utility Connection Form must be completed to file for service connection. The system development charges, meter equipment fee, and the connect service fee must be paid prior to connection. The applicant is responsible for exposing and burying the service. City crews shall make the connection and extend service to property.
☒	**Sewer System (MMC 13.12)**	All structures containing sanitary facilities shall be connected to the sewer system. Currently, there are no credits or waiver of fees for onsite treatment or pretreatment. The sewer system user at all times shall at their expense, operate, and maintain the service lateral and building sewer in a sanitary manner to the collection trunk or interceptor sewer at no expense to the City.
☒	**Stormwater Management (MMC 13.14)**	Compliance with the city's NPDES permit requires development to mitigate impacts through facility design consistent with the City of Portland Stormwater Management Manual. Proprietary treatment devices are allowed under the performance-based design approach.
☒	**System Development Charge (MMC 13.28.040)**	System development charges (SDCs) will be applied and collected at the time of building permits. Fees include water SDC, wastewater SDC, stormwater SDC, transportation SDC, parks and recreation SDC. Additional fees exist for water service connection and sewer connection.

☐	**Fee in Lieu of Construction (MMC 13.32)**	A fee in lieu of construction is not expected for this development. The applicant is expected to construct any necessary improvements at the time of development.
	Public Places (MMC 12)	
☒	**Right of Way Permit (MMC 12.08.020)**	Each phase of public improvement and accessway construction will be completed under a right-of-way permit which will a public improvement project. Cost of permit is 5.5% of the cost of the improvements, performance bond prior to construction, and 12-month maintenance bond.
☒	**Access Requirements (MMC 12.16.040)**	Minimum distance from the nearest dege of driveway to the nearest intersecting face of curb of Lava and Waverly is 100ft. The accessway size for the development is to be between 24ft and 30ft.
☒	**Clear Vision (MMC 12.24)**	Intersections and driveways must comply with clear vision requirements, including removing all plantings, fences, walls, structures, temporary or permanent obstructions, excluding the occasional utility pole or tree, exceeding 3ft in height within 20ft radius of where the lot line intersects the accessway. Open wire fencing up to 6ft tall obscuring sight not more than 10% and trees with all branches and foliage removed to the height of 8ft are allowed.
	Additional Engineering & Public Works Notes	
	The applicant included the following questions in the application materials:	

BUILDING COMMENTS

All drawings must be submitted electronically through www.buildingpermits.oregon.gov

New buildings or remodels shall meet all the provisions of the current applicable Oregon Building Codes. All State adopted building codes can be found online at: https://www.oregon.gov/bcd/codes-stand/Pages/adopted-codes.aspx.

All building permit applications are electronic and can be applied for online with a valid CCB license number or engineer/architect license at www.buildingpermits.oregon.gov . Each permit type and subpermit type are separate permits and will need to be applied for individually. Plans need to be uploaded to their specific permits in PDF format as a total plan set (not individual pages) if size allows.

Note: Plumbing and electrical plan reviews (when required) are done off site so two (2) paper copies will be required for those reviews only. Paper copies should be delivered to our office for processing.

Site utilities require a separate plumbing permit. This permit will require plumbing plan review so two (2) paper copies will be required for this review. Paper copies should be delivered to the Building Division office for processing. The grading plan submitted to the Engineering Department does not cover this review.

If you have any building related questions, please email us at building@milwaukieoregon.gov.

Additional Building Notes

Fire sprinklers and alarms as required by OSSC shall be provided throughout.

OTHER FEES

☐	**Construction Excise Tax** Affordable Housing CET – Applies to any project with a construction value of over 100,000.	**Calculation:** Valuation *12% (.12)
☐	**Metro Excise Tax** Metro – Applies to any project with a construction value of over $100,000.	**Calculation:** Valuation *.12% (.0012)
☐	**School Excise Tax** School CET – Applies to any new square footage.	**Calculation:** Commercial = $0.67 a square foot, Residential = $1.35 a square foot (not including garages)

FIRE DISTRICT COMMENTS

Please see the attached memorandum for fire district comments.

COORDINATION WITH OTHER AGENCIES

Applicant must communicate directly with outside agencies. These may include the following:

- Metro
- Trimet
- North Clackamas School District
- North Clackamas Parks and Recreation District (NCPRD)
- Oregon Parks and Recreation
- ODOT/ODOT Rail
- Department of State Lands
- Oregon Marine Board
- Oregon Department of Fish and Wildlife (ODOT)
- State Historic Preservation Office
- Clackamas County Transportation and Development

MISCELLANEOUS

	State or County Approvals Needed	
☐	**Boiler Approval (State)**	
☐	**Elevator Approval (State)**	
☐	**Health Department Approval (County)**	
	Arts Tax	
☐	**Neighborhood Office Permit**	

Other Right-of-Way Permits		
☒	**Major: Construction**	All accessway and frontage improvements must be completed under a right-of-way permit.
☐	**Minor:**	
☐	**Painted Intersection Program Permits:**	
	☐ **artMOB Application**	
	☐ **Traffic Control Plan (Engineering)**	
☐	**Parklet:**	
	☐ **Parklet Application/ Planning Approval**	
	☐ **Engineering Approval**	
	☐ **Building Approval**	
☐	**Sidewalk Café:**	
☐	**Tree Removal Permit:**	A tree removal permit is required for any tree being removed in the right-of-way. No tree may be removed until the completion of a two-week posting period.

Infrastructure/Utilities

Applicant must communicate directly with utility providers. These may include the following:

- PGE
- NW Natural
- Clackamas River Water (CRW)
- Telecomm (Comcast, Century Link)
- Water Environmental Services (WES)
- Garbage Collection (Waste Management, Hoodview Disposal and Recycling)

Economic Development/Incentives

☐	**Enterprise Zone:**	
☐	**Vertical Housing Tax Credit:**	
☐	**New Market Tax Credits:**	
☐	**Housing Resources:**	

PLEASE SEE NOTE AND CONTACT INFORMATION ON THE FOLLOWING PAGE

This is only preliminary preapplication conference information based on the applicant's proposal, and does not cover all possible development scenarios. Other requirements may be added after an applicant submits land use applications or building permits. City policies and code requirements are subject to change. If a note in this report contradicts the Milwaukie Municipal Code, the MMC supersedes the note. If you have any questions, please contact the City staff that attended the conference (listed on Page 1). Contact numbers for these staff are City staff listed at the end of the report.

Sincerely,

City of Milwaukie Development Review Team

BUILDING DEPARTMENT

Samantha Vandagriff	**Building Official**	**503-786-7611**
Harmony Drake	**Permit Specialist**	**503-786-7623**
Stephanie Marcinkiewicz	**Inspector/Plans Examiner**	**503-786-7636**

ENGINEERING DEPARTMENT

Steve Adams	**City Engineer**	**503-786-7605**
Dalton Vodden	**Associate Engineer**	**503-786-7617**
Alex Roller	**Engineering Tech II**	**503-786-7695**

PLANNING DEPARTMENT

Dennis Egner	**Planning Director**	**503-786-7654**
Brett Kelver	**Associate Planner**	**503-786-7657**
Vera Kolias	**Associate Planner**	**503-786-7653**
Mary Heberling	**Assistant Planner**	**503-786-7658**

COMMUNITY DEVELOPMENT DEPARTMENT

Leila Aman	**Community Development Director**	**503-786-7616**
Alison Wicks	**Development Programs Manager**	**503-786-7661**
Alicia Martin	**Administrative Specialist II**	**503-786-7600**
Tempest Blanchard	**Administrative Specialist II**	**503-786-7600**
Dan Harris	**Administrative Specialist II**	**503-786-7600**

CLACKAMAS FIRE DISTRICT

Mike Boumann	**Lieutenant Deputy Fire Marshal**	**503-742-2673**
Matt Amos	**Fire Inspector**	**503-742-2660**

Clackamas County Fire District #1
Fire Prevention Office

E-mail Memorandum

To: City of Milwaukie Planning Department

From: Matt Amos, Fire Inspector, Clackamas Fire District #1

Date: 12/05/2020

Re: Waverley Woods 10415 SE Waverley Ct. 20-003PA

This review is based upon the current version of the Oregon Fire Code (OFC), as adopted by the Oregon State Fire Marshal's Office. The scope of review is typically limited to fire apparatus access and water supply, although the applicant must comply with all applicable OFC requirements. When buildings are completely protected with an approved automatic fire sprinkler system, the requirements for fire apparatus access and water supply may be modified as approved by the fire code official. The following items should be addressed by the applicant:

COMMENTS:

A Fire Access and Water Supply plan is required for subdivisions and commercial buildings over 1000 square feet in size or when required by Clackamas Fire District #1. The plan shall show fire apparatus access, fire lanes, fire hydrants, fire lines, available fire flow, FDC location (if applicable), building square footage, and type of construction. The applicant shall provide fire flow tests per NFPA 291, and shall be no older than 12 months. Work to be completed by experienced and responsible persons and coordinated with the local water authority.

Prior to the start of the project, a pre-construction meeting shall be held with Clackamas Fire District #1. The project manager/contractor is responsible for developing a written fire safety program. This program shall be made available for review by Clackamas Fire District #1. The plan should address the following:

- **a. Good Housekeeping**
- **b. On-site security**
- **c. Fire protection systems**
  - **i. For construction operations, installation of new fire protection systems as construction progress**
  - **ii. For demolition operations, preservation of existing fire protection systems during demolition**
- **d. Development of a pre-fire plan with the local fire department**

e. **Consideration of special hazards resulting from previous occupancies**
f. **Protection of existing structures and equipment from exposure fires resulting from construction, alteration and demolition operations.**

For additional information please refer to the Oregon Fire Code Chapter 33, and NFPA 241.

Emergency responder radio coverage must be tested or provided due to the following

1. **Any building with one or more basement or below-grade building levels.**
2. **Any underground building.**
3. **Any building more than five stories in height.**
4. **Any building 50,000 square feet in size or larger.**
5. **Any building that, through performance testing, does not meet the requirement of section 510.**

Access:

1) Provide address numbering that is clearly visible from the street.
2) No part of a building may be more than 150 feet from an approved fire department access road.
3) Provide an approved turnaround for dead end access roads exceeding 150 feet in length.
4) Fire Department turnarounds shall meet the dimensions found in the fire code applications guide.
5) Fire apparatus access roads must support a 75,000 lb. fire apparatus. If a gravel turnaround is proposed it shall meet this requirement.
6) Buildings exceeding 30 feet in height shall require extra width and proximity provisions for aerial apparatus.
7) Access streets between 26 feet and less than 32 feet in width must have parking restricted to one side of the street. Access streets less than 26 feet in width must have parking restricted on both sides of the street. No parking restrictions for access roads 32 feet wide or more.

Water Supply

1) Fire Hydrants, Commercial Buildings: Where a portion of the building is more than 400 feet from a hydrant on a fire apparatus access road, as measured in an approved route around the exterior of the building, on-site fire hydrants and mains shall be provided.

Note: This distance may be increased to 600 feet for buildings equipped throughout with an approved automatic sprinkler system.

2) All new buildings shall have a firefighting water supply that meets the fire flow requirements of the Fire Code. Maximum spacing between hydrants on street frontage shall not exceed 500 feet. Additional private on-site fire hydrants may be required for larger buildings.
3) Prior to the start of combustible construction required fire hydrants shall be operational and accessible.
4) The fire department connection (FDC) for any fire sprinkler system shall be placed as near as possible to the street, and within 100 feet of a fire hydrant.

Fire Safety During Construction

The purpose of this document is to outline the minimum requirements in Clackamas Fire District #1 for subdivisions and commercial buildings during construction, alteration, and demolition. The following items, along with the requirements on OFC Chapter 33, and NFPA 241 will be inspected and enforced by the fire district during activities regulated by the referenced standards.

Fire Safety Program: In accordance with NFPA 241 Chapter 7 a fire safety program shall include provisions for: Housekeeping, on-site security, fire protection systems, pre fire coordination with the fire district, fire district notification, protection of existing structures and equipment from exposure fires.

Temporary Offices and Sheds: Separation of the structures shall be in accordance with table 4.2.1 in NFPA 241.

Table 4.2.1 Separation Distances

Temporary Structure Exposing Wall Length		Minimum Separation Distance	
m	ft	m	ft
6	20	9	30
9	30	11	35
12	40	12	40
15	50	14	45
18	60	15	50
>18	>60	18	60

Hot Work: Shall be conducted in accordance with OFC Chapter 35. Permits are not required, but records of the operations should be maintained on site for 48 hours after the hot work has been completed. The fire district shall be notified prior to any hot work operation that will required fire protection or detection systems to be taken out of service. A fire watch is required in areas with combustible materials, and shall continue for no less than 30 minutes after operations are completed, or two hours after roofing operations. The fire watch

shall have a fire extinguisher with a rating of not less than 2-A:20-B:C within 30 feet of the operation. A pre hot work check shall be completed prior to work.

Access: Approved access for fire fighting shall be provided within 100 feet of all fire fighting equipment. (Stand Pipes, FDC's, Hydrants)

Water Supply: Hydrants shall be in service, and available for use prior to the arrival of combustible material on site.

Standpipes: In buildings required to have stand pipes, not less than one shall be provided for use during construction. Hose connections shall be in place adjacent to stairs, and be extended to within one floor of the highest point of construction.

Means of Egress: In buildings greater than 50 feet, or 4 stories in height, shall have at least one temporary **Lighted** stairway. This stairway shall remain clear of obstructions and be readily available for use.

Portable Fire Extinguishers: Structures under construction, alteration, and demolition shall be provided with not less than one 2-A:10-B:C portable fire extinguisher within 75 feet of all portions of the building. Additional fire extinguishers shall be placed at each stairway where combustible materials are present, in every storage shed. Additional fire extinguishers shall be available for other hazardous operations.

Waste Disposal: Accumulations of combustible waste shall be removed for the structure at the end of every work shift.

Storage of Flammable and Combustible Liquids and Gasses: No more than 60 gallons of Class I and II liquids shall be stored in or within 50 feet of the structure. Storage areas shall be marked with "No Smoking" signs. Appropriate NFPA 704 placards shall be in place.

For Additional Information Please Refer to the Following:

Temp Heating equipment OFC Section 3303, NFPA 241 Section 5.2

Smoking Restrictions OFC 3304, NFPA 241 Section 5.3

Explosive Materials OFC 3307, NFPA 241 Section 5.6

Roofing Operations OFC 3317, NFPA 241 Chapter 9

Suggested Canopy Trees for the Yard

Categories	Botanic name	Common name
Western US - Evergreen	*Abies bracteata*	Bristlecone fir
	Abies concolor	White fir
	Abies grandis	Grand fir
	Arbutus arizonica	Arizona madrone
	Arbutus menziesii	Madrone
	Calocedrus decurrens	Incense cedar
	Chamaecyparis lawsoniana	Port Orford cedar
	Hesperocyparis abrahmsiana	Santa Cruz Cypress
	Hesperocyparis arizonica	Arizona cypress
	Hesperocyparis bakeri	Baker cypress
	Hesperocyparis forbesii	Tecate cypress
	Hesperocyparis sargentii	Sargent's cypress
	Juniperus californica	California juniper
	Juniperus occidentalis	Western juniper
	Notholithocarpus densiflorus	Tanoak
	Prunus ilicifolia	Hollly-leaf cherry
	Pseudotsuga menziesii	Douglas-fir
	Sequoia sempervirens	Coast redwood
	Sequoiadendron giganteum	Giant sequoia
	Taxus baccata	Pacific yew
	Torreya californica	California nutmeg
	Umbellularia californica	Oregon myrtle

Western US - Deciduous	*Acer macrophyllum*	Big-leaf maple
	Aesculus californica	California buckeye
	Alnus rhombifolia	White alder
	Celtis reticulata	Net-leaf hackberry
	Juglans californica	Southern California walnut
	Juglans hindsii	Northern California walnut
	Platanus racemosa	California sycamore
Western US - Oaks	*Quercus arizonica*	Arizona white oak
	Quercus chrysolepsis	Canyon live oak
	Quercus douglasii	Blue oak
	Quercus engelmannii	Engelmann oak
	Quercus garryana	Oregon white oak
	Quercus kelloggii	Black oak
	Quercus lobata	Valley oak
	Quercus oblongifolia	Arizona blue oak
	Quercus tomentella	Island oak
	Quercus wislizeni	Interior live oak

Western US - Pines	*Pinus contorta*	Shore or Lodgepole pine
	Pinus coulteri	Coulter pine
	Pinus jeffreyi	Jeffrey pine
	Pinus lambertiana	Sugar pine
	Pinus ponderosa Willamette Valley variety	Ponderosa pine
	Pinus sabiniana	Ghost pine
	Pinus torreyana	Torrey pine
Mediterranean Basin	*Abies pinsapo*	Spanish fir
	Alnus cordata	Italian alder
	Arbutus unedo	Strawberry tree
	Carpinus betulus	European hornbeam
	Castanea sativa	Spanish chestnut
	Cedrus libani	Mediterranean cedar
	Cupressus sempervirens	Italian cypress
	Fagus sylvatica	European beech
	Laurus nobilis	Bay laurel
	Olea europaea	Olive tree
	Pinus halapensis	Allepo pine
	Pinus nigra	Black pine
	Pinus pinaster	Maritime pine
	Pinus pinea	Italian stone pine
	Quercus ilex	Holly oak
	Quercus pubescens	Downy oak
	Quercus suber	Cork oak

Others	*Cedrus deodara*	Deodar cedar
	Chamaerops humilis	Mediterranean fan palm
	Ginkgo biloba	Ginkgo
	Metasequoia glyptostroboides	Dawn redwood
	Taxodium distichum	Bald cypress
	Trachycarpus fortunei	Windmill palm