CITY OF
West Linn
22500 Salamo Road
West Linn, OR 97068

STAFF REPORT
FOR THE PLANNING COMMISSION

FILE NUMBER:	SUB-15-03/WAP-16-03
HEARING DATE:	April 20, 2016
REQUEST:	34-lot Subdivision and Water Resource Area Permit at 18000 Upper Midhill Drive
APPROVAL CRITERIA:	Community Development Code (CDC) Chapter 14, Single-Family Residential Attached and Detached/Duplex, R 4.5; Chapter 85, Land Division General Provisions; Chapter 32, Water Resource Area Protection.
STAFF REPORT PREPARED BY:	Peter Spir, Associate Planner

Planning Manager's Initials AB Development Review Engineer's Initials KQL

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GENERAL INFORMATION

OWNER:	18000 Upper Midhill Drive, LLC 1235 N Dutton Ave. #E Santa Rosa, CA 95401 Contact: David Chiddix
APPLICANT:	Upper Midhill Estates, LLC 931 SW King Ave. Portland, OR 97205 Contact: Ryan Zygar
CONSULTANT:	3J Consulting, Inc. 5075 SW Griffith Drive, Suite 150 Beaverton, OR 97005 Contact: Andrew Tull
SITE LOCATION:	18000 Upper Midhill Drive
LEGAL DESCRIPTION:	Clackamas County Assessor's Map 2S1E14CA0200
SITE SIZE:	6.1 acres
ZONING:	R-4.5, Single-Family Residential Attached and Detached/Duplex, 4,500 square foot minimum lot size for single family detached homes)
COMP PLAN DESIGNATION:	Medium-Density Residential
120-DAY PERIOD:	This application became complete on February 11, 2016. The 120-day maximum application-processing period initially ended on June 10, 2016. The applicant subsequently provided a 30-day waiver of the 120 day rule. Therefore, the 120 plus 30 day period lapses on July 10, 2016.
PUBLIC NOTICE:	Public notice was mailed to the all neighborhood associations and affected property owners on March 31, 2016. The property was posted with a notice sign on April 7, 2016. The notice was published in the West Linn Tidings on April 7, 2016. The notice requirements of CDC Chapter 99 have been met. In addition, the application was posted on the City's website March 31, 2016.

EXECUTIVE SUMMARY

The applicant seeks approval of an application for Subdivision Preliminary Plat for the development of 34 residential lots (Chene Blanc Subdivision) on the 6.1 acre site. All lots will exceed 4,500 square feet in size per the underlying R-4.5 zone, with the smallest lot being 4,615 square feet and the largest being 11,705 square feet. The majority of lots exceed 6,000 square feet. The lots will be occupied by single family detached homes. (*The 34 lots represent the minimum allowed to be in compliance with the City's minimum density requirement of 70 percent of maximum density (see CDC 85.200(J) (7) and staff finding 39.)*

The properties to the south are also zoned R-4.5 and developed with single family homes. Two streets: Upper Midhill Drive and Hillside Drive stub into the subject property from the south and will provide access to this subdivision. These two streets are proposed to extend onto the site and connect with one another to provide access to the lots. Properties to the north, east and west are in the City of Lake Oswego and occupied by single family homes. There is no means of vehicular access to the site from Lake Oswego. The property is within the Robinwood Neighborhood Association boundary.

The site comprises a tree covered hillside that slopes down from west to east at a fairly constant 14 percent. The trees have been cataloged (number, type, size and condition) by an arborist and those findings have been reviewed by the City's Arborist. Trees considered significant by the City Arborist total 169. The applicant proposes to save 50 of the significant trees plus an additional 62 non-significant trees.

The applicant provided a Jurisdictional Wetland Delineation, by Schott and Associates, which examined two small isolated wetlands at the north portion of the site and a small drainage ditch located in Tract D which is off-site and located in the City of Lake Oswego. Tract D is owned by the Marylhurst Homeowner's Association. The ditch intrudes onto the northeast corner of the site for approximately 120 feet before returning to Tract D and the City of Lake Oswego. The Oregon Department of State Lands (DSL) has provided a concurrence letter (December 7, 2015) regarding the two wetlands and found, after a site visit, that the drainage ditch is a "non-jurisdictional drainage ditch" and exempt per OAR 141-085-0515 (8).

GeoPacific Engineers conducted geologic and soil testing and analysis at the site. (See applicant's Technical Reports)

Transportation Engineers, Kittelson and Associates, have provided a Traffic Impact Analysis (TIA) with the scope of work including projected impacts at "build out" for nearby intersections including Arbor Drive and Marylhurst Drive. The Kittelson TIA was then reviewed by DKS Engineering who work for the City of West Linn to provide an independant third party review. ODOT engineers also reviewed Kittelson's TIA. (See applicant's Technical Reports) Kittelson followed up the TIA with a subsequent April 5, 2016 "*Chene Blanc Estates Development Supplemental Letter*" which was found acceptable by the City Engineer and DKS and consistent

with ODOT recommendations, including their discussion of appropriate off-site traffic mitigation measures.

The applicable approval criteria include:

- Chapter 14, R-4.5, Single-Family Residential Attached and Detached/Duplex;
- Chapter 85, Land Division General Provisions;
- Chapter 32, Water Resource Area Permit

Public comments: As of the publication date of this report, staff had received written comments from 22 individuals in opposition to the application. The written comments may be found in Exhibit PC-5.

RECOMMENDATION

Staff recommends approval of application SUB-15-03/WAP-16-03, based on: 1) the findings submitted by the applicant, which are incorporated by this reference, 2) supplementary staff findings included in the Addendum below, and 3) the addition of conditions of approval below. With these findings, the applicable approval criteria are met. The conditions are as follows:

1. **Site Plan. With the exception of modifications required by these conditions, the project shall conform to all submitted Plan Sheets dated 1/11/2016 (C000, C100, C105, C110, C 111, C112, C113, C114, C130, C200 (Preliminary Plat), C201, C210, C220, C230, C280, C300) and sheet L1 (landscaping) dated 10/14/15.**

2. **Engineering Standards. All public improvements and associated facilities including street improvements (per sheets C201, C210, C220), utilities (per sheet C300), grading (per sheet C230), onsite storm water design (per sheet C230 and C300), street lighting (per sheet C280), easements (per sheet C200), and easement locations are subject to the City Engineer's review, modification, and approval. These improvements must be designed, constructed, and completed prior to final plat approval or secured by instruments acceptable to the City Engineer.**

3. **Off-Site Traffic Mitigation. Prior to approval of the final plat, the applicant shall pay the cost of improvements for off-site traffic mitigation, as determined and approved by the City Engineer and ODOT, on Willamette Drive between Arbor Drive and Shady Hollow Way. (See Staff Finding No. 22 and 42.)**

4. Storm water Tract C. Prior to approval of the final plat, the applicant shall dedicate Storm water Tract C to the City of West Linn. (See Staff Finding No. 37.)

5. Mutual Maintenance and Easements. Prior to approval of the final plat, the applicant shall provide the City of West Linn, along with the final plat, a Mutual Maintenance and Reciprocal Access and Public Utility Easement for platted Lots 13-15 to ensure continued access and necessary maintenance of the shared drive in perpetuity. Lot 12 shall be excluded from using this easement. (See Staff Findings No. 33 and 43)

6. No Parking Signs. The applicant shall install signs reading "No Parking – Fire Lane" on one side of Hillside Drive. The signs shall be designed and installed in accordance with the latest Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD). (See Staff Finding No. 5)

7. Fire Flow. Prior to approval of the final plat, the applicant shall perform a fire flow test and submit a letter from Tualatin Valley Fire and Rescue showing adequate fire flow is present. (See Staff Finding No. 31)

8. Significant Tree Mitigation. Prior to approval of the final plat, the applicant will mitigate for the removal of 434 inches of DBH by planting street trees and landscape trees on the project site. The remaining trees which are not able to be planted on site will be mitigated for either in off-site plantings in a location chosen by the City's arborist or the applicant will pay a fee in lieu to the City for trees which cannot be planted on site. (See Staff Finding No. 41)

9. Access During Construction. Approved fire apparatus access roadways shall be installed and operational prior to any combustible construction or storage of combustible materials on the site. Temporary address signage shall also be provided during construction.

ADDENDUM

PLANNING COMMISSION STAFF REPORT

March 25, 2016

STAFF EVALUATION OF THE PROPOSAL'S COMPLIANCE WITH APPLICABLE CODE CRITERIA

CHAPTER 14, SINGLE-FAMILY RESIDENTIAL ATTACHED AND DETACHED/DUPLEX, R-4.5

14.030 PERMITTED USES

The following are uses permitted outright in this zoning district:

1. *Single-family detached residential unit.*
2. *Duplex residential units.*
3. *Family day care.*
4. *Single-family attached residential units.*
5. *Community recreation.*
6. *Residential home.*
7. *Utilities, minor.*
8. *Manufactured housing.*
9. *Transportation facilities*

Staff Finding 1: The applicant's subdivision proposes to accommodate 34 single-family detached homes. Per CDC 14.030(1), single family detached homes are permitted outright in this zone. This criterion is met.

14.070 DIMENSIONAL REQUIREMENTS, USES PERMITTED OUTRIGHT AND USES PERMITTED UNDER PRESCRIBED CONDITIONS

Except as may be otherwise provided by the provisions of this code, the following are the requirements for uses within this zone:

A. The minimum lot size shall be:

1. *For a single-family detached unit, 4,500 square feet.*
2. *For each attached single-family unit, 4,000 square feet.*
3. *For a duplex, 8,000 square feet or 4,000 square feet for each unit.*

B. The minimum front lot line length or the minimum lot width at the front lot line shall be 35 feet.

C. The average minimum lot width shall be 35 feet.

(....)

Staff Finding 2: All lots exceed 4,500 square feet. All lots have front lot line dimensions and average widths greater than the required 35 feet. The 20-foot wide shared private access drive for Lots 13-15 exceeds the minimum accessway width of 15 feet. These criteria are met.

The remaining criteria of 14.070 (E-J) are not applicable at this time since they only apply at the time of the construction of homes. At such time that building permits are applied for, the home plans will be reviewed by the Planning and Building Departments for compliance with these standards.

Regarding 14.090, Chapters 34: "Accessory Structures" and Chapter 35: "Temporary Structures" do not apply since no accessory or temporary structures are proposed. Chapters 38: "Additional Yard Area", Chapter 40: "Building Height", Chapter 41: "Structures on Steep Lots", and Chapter 42: "Clear Vision Areas" apply to structures and would only be applicable at such time that building permits are applied for. Chapter 44: "Fences" will only apply at such time that fences are proposed to be built. Chapter 46: "Parking" requires one off street parking space per home. This criteria will be met at such time that a building permit is applied for. Chapter 48: "Access" is addressed in Staff Findings No. 41-61. Chapter 52: "Signs" does not apply since no signs are proposed. Chapter 54: "Landscaping" does not apply to the development of detached single family residential development. Per Chapter 54.020(E) (1-3), landscaping requirements only apply to non-residential uses and all non-single family residential uses and are therefore not applicable.

II. CHAPTER 85, GENERAL PROVISIONS

85.200 APPROVAL CRITERIA
No tentative subdivision or partition plan shall be approved unless adequate public facilities will be available to provide service to the partition or subdivision area prior to final plat approval and the Planning Commission or Planning Director, as applicable, finds that the following standards have been satisfied, or can be satisfied by condition of approval.

A. Streets.
1. General. The location, width and grade of streets shall be considered in their relation to existing and planned streets, to the generalized or reasonable layout of streets on adjacent undeveloped parcels, to topographical conditions, to public convenience and safety, to accommodate various types of transportation (automobile, bus, pedestrian, bicycle), and to the proposed use of land to be served by the streets.
(....)

Staff Finding 3: This subdivision's ROW dedications provide for a looping road between Upper Midhill and Hillside Drives. This road is necessary to provide direct access to the lots and to provide TVFR and other emergency access. (A non-looping road would yield a cul de sac design which would violate cul de sac standards of 85.200(A)(11) (b): *"New cul-de-sacs and other closed-end streets ... shall not exceed 200 feet in length or serve more than 25 dwelling units"* as well as compromise TVFR and other emergency access.) The street width of 24 feet is consistent with local street standards (see staff findings 4 and 5). Six foot wide sidewalks and planter strips are also proposed to meet the dimensional requirements of this chapter. This criterion is met.

There is no opportunity to extend or connect streets in this subdivision to streets in adjacent subdivisions to the north, west or east since all surrounding properties are fully built out. The exception is two tracts "B" and "D" next to lot 34 which are owned by the Marylhurst Place Homeowner's Association and located in the City of Lake Oswego. Tract "B" is occupied by a storm water facility for the Lake Oswego subdivision. Tract "D" is occupied in part by a drainage ditch. Together, these tracts comprise 47 feet of frontage on Woodhurst Place. The fact that these tracts are privately owned, located in another city, already substantially occupied by other uses, located on a steep 27 percent slope (which would violate the maximum 15 percent local street grade) and would offer inadequate width to construct a local street effectively removes the option of extending a street from this subdivision to connect with Woodhurst Place.

2. Right-of-way and roadway widths. In order to accommodate larger tree-lined boulevards and sidewalks, particularly in residential areas, the standard right-of-way widths for the different street classifications shall be within the range listed below. But instead of filling in the right-of-way with pavement, they shall accommodate the amenities (e.g., boulevards, street trees, sidewalks). The exact width of the right-of-way shall be determined by the City Engineer or the approval authority. The following ranges will apply:

Street Classification	*Right of Way (from West Linn TSP)*
(....)	
Collector	*48-72 feet*
Local Street	*48-56 feet*
(....)	

Additional rights-of-way for slopes may be required. Sidewalks shall not be located outside of the right-of-way unless to accommodate significant natural features or trees.

Staff Finding 4: The interior street is classified as a local street. Local streets require a ROW width ranging from 48-56 feet. The proposed right of way width is 50 feet for the south section of Upper Midhill Drive. The width then transitions to a 48 foot until the portion of Hillside Drive along the west property line where the ROW width returns to 50 feet. These widths meet the required 48-56 foot dimension. The criteria is met.

3. Street widths. Street widths shall depend upon which classification of street is proposed. The classifications and required cross sections are established in Chapter 8 of the adopted TSP.
(...)

Staff Finding 5: The applicant proposes a curb to curb street width of 24 feet. This agrees with the minimum required width for a local street per the adopted Transportation System Plan (TSP). (Table 8-1 of the TSP requires two 12 foot wide travel lanes for local streets.) This street width will require that the applicant install signs reading "No Parking – Fire Lane" on one side of Hillside Drive. The signs shall be designed and installed in accordance with the latest Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD). See Condition of Approval 6. Therefore, the criteria is met.

4. The decision-making body shall consider the City Engineer's recommendations on the desired right-of-way width, pavement width and street geometry of the various street types within the subdivision after consideration by the City Engineer of the following criteria:
a. The type of road as set forth in the Transportation Master Plan.
(...)

Staff Finding 6: The City's Development Engineer has reviewed the proposal finds the proposed ROW and street widths to be consistent with the City standards, the TSP and this code. The criteria is met.

5. Additionally, when determining appropriate street width, the decision-making body shall consider the following criteria:
a. When a local street is the only street serving a residential area and is expected to carry more than the normal local street traffic load, the designs with two travel and one parking lane are appropriate.
b. Streets intended to serve as signed but unstriped bike routes should have the travel lane widened by two feet.
c. Collectors should have two travel lanes and may accommodate some parking. Bike routes are appropriate.
d. Arterials should have two travel lanes. On-street parking is not allowed unless part of a Street Master Plan. Bike lanes are required as directed by the Parks Master Plan and Transportation Master Plan.

Staff Finding 7: Hillside Drive and Upper Midhill Drive are local streets in that they exist only to provide local access to the 34 lots within this subdivision. The remaining criteria does not apply since these streets are not collectors or arterials nor are any bike lanes required. The criteria is met.

6. Reserve strips. Reserve strips or street plugs controlling the access to streets are not permitted unless owned by the City.

Staff Finding 8: No reserve strips are proposed so this criterion does not apply.

7. Alignment. All streets other than local streets or cul-de-sacs, as far as practical, shall be in alignment with existing streets by continuations of the centerlines thereof. The staggering of street alignments resulting in "T" intersections shall, wherever practical, leave a minimum distance of 200 feet between the centerlines of streets having approximately the same direction and otherwise shall not be less than 100 feet.

Staff Finding 9: Both Hillside Drive and Upper Midhill Drive extend the alignment of the existing sections of those respective streets. There are no "T" intersections. This criterion is met.

8. Future extension of streets. Where necessary to give access to or permit a satisfactory future subdivision of adjoining land, streets shall be extended to the boundary of the subdivision and the resulting dead-end streets may be approved without turnarounds. (Temporary turnarounds built to Fire Department standards are required when the dead-end street is over 100 feet long.)

Staff Finding 10: There is no opportunity to extend or stub out streets from this subdivision since all surrounding properties are fully built out with no reasonable expectation of future connection. The exception is two tracts "B" and "D" next to lot 34 which are owned by the Marylhurst Place Homeowner's Association and located in the City of Lake Oswego. Tract "B" is occupied by a storm water facility for the adjacent subdivision. Tract "D" is occupied in part by a drainage ditch. Together, these tracts comprise 47 feet of frontage on Woodhurst Place. The fact that these tracts are privately owned, located in another city, already substantially occupied by other uses, located on a steep 27 percent slope (which would violate the maximum 15 percent local street grade) and would offer inadequate width to construct a local street effectively removes the option of extending a street from this subdivision to connect with Woodhurst Place. This criterion is met.

9. Intersection angles. Streets shall be laid out to intersect angles as near to right angles as practical, except where topography requires lesser angles, but in no case less than 60 degrees unless a special intersection design is approved. Intersections which are not at right angles shall have minimum corner radii of 15 feet along right-of-way lines which form acute angles. Right-of-way lines at intersections with arterial streets shall have minimum curb radii of not less than 35 feet. Other street intersections shall have curb radii of not less than 25 feet. All radii shall maintain a uniform width between the roadway and the right-of-way lines. The intersection of more than two streets at any one point will not be allowed unless no alternative design exists.

Staff Finding 11: The only intersection within this subdivision is where Upper Midhill Drive which intersects Hillside Drive in the vicinity of Tract C. This is a right angle intersection. The criterion is met.

10. Additional right-of-way for existing streets. Wherever existing street rights-of-way adjacent to or within a tract are of inadequate widths based upon the standards of this chapter, additional right-of-way shall be provided at the time of subdivision or partition.

Staff Finding 12: Portions of Upper Midhill Drive and Hillside Drive (with different names) were platted in the 1923 Robinwood subdivision plat with ROW widths of 50 feet. Some of these ROWs will be extinguished through the platting of this subdivision. Portions of these ROW will be used to accommodate streets in this application plus a shared 16 foot wide private driveway to serve lots 13-15. For the remainder of the site, the applicant is providing new ROW ranging from 48-50 feet in width, which is consistent with City and TSP ROW standards. The criterion is met.

11. Cul-de-sacs.
a. New cul-de-sacs and other closed-end streets (not including stub streets intended to be connected) on sites containing less than five acres, or sites accommodating uses other than residential or mixed use development, are not allowed unless the applicant demonstrates that there is no feasible alternative due to:
1) Physical constraints (e.g., existing development, the size or shape of the site, steep topography, or a fish bearing stream or wetland protected by Chapter 32 CDC), or
(...)

Staff Finding 13: There are no cul de sacs within this subdivision. The criteria does not apply. (Staff notes that lots 13-15 will be accessed from a portion of a public ROW using a shared private 16 foot wide driveway. This use of this driveway will be pursuant to Condition of Approval 5 which also prohibits lot 12 from accessing this driveway.)

12. Street names. No street names shall be used which will duplicate or be confused with the names of existing streets within the City. Street names that involve difficult or unusual spellings are discouraged.

Staff Finding 14: The applicant will use the names of existing streets that stub out to this property. This criterion is met.

13. Grades and curves. Grades shall not exceed 8 percent on major or secondary arterials, 10 percent on collector streets, or 15 percent on any other street unless by variance. (...)

Staff Finding 15: The interior streets are local streets with a maximum allowed grade of 15 percent. The grade is 15 percent for a 60 foot long section of Hillside Drive and another 30 foot long section of that street reaching 13.5 percent. Most of the street grades are between six and eight percent. The criterion is met.

14. Access to local streets
(...)
15. Alleys
(...)

Staff Finding 16: All lots have access to local streets with the exception of lots 13-15 which will access Upper Midhill Drive via a shared private 16 foot wide driveway. This use of this driveway will be pursuant to Condition of Approval 5. The criteria is met. There are no arterials or alleys within this subdivision. Therefore, this criteria does not apply.

16. Sidewalks. Sidewalks shall be installed per CDC 92.010(H), Sidewalks. The residential sidewalk width is six feet plus planter strip...or to match existing sidewalks or right-of-way limitations.

Staff Finding 17: The applicant proposes to install six-foot sidewalks along all sections of Upper Midhill and Hillside Drives. (See sheets 201 (cross section) and 210 (site plan).) In response to slope conditions and to minimize grading adjacent to an existing retaining wall, the west section of Hillside Drive adjacent to double frontage lots on Woodhurst Place will have sidewalks placed adjacent to the curb with the planter strips behind the sidewalk. The City Engineer approves this configuration. The criterion is met.

17. Planter strip. The planter strip is between the curb and sidewalk providing space for a grassed or landscaped area and street trees. The planter strip shall be at least 6 feet wide...or in response to right-of-way limitations.

Staff Finding 18: The applicant proposes to install six-foot planter strips along all sections of Upper Midhill and Hillside Drives. In response to slope conditions, and to minimize grading adjacent to an existing retaining wall, the west section of Hillside Drive adjacent to double frontage lots on Woodhurst Place will have sidewalks placed adjacent to the curb with the planter strips and street trees behind the sidewalk. (See sheets 201 (cross section) and 210 (site plan).) The City Engineer approves this configuration. The criterion is met.

18. Streets and roads shall be dedicated without any reservations or restrictions.

Staff Finding 19: The applicant proposes to dedicate the streets without any reservations or restrictions. The criterion is met.

19. All lots in a subdivision shall have access to a public street. Lots created by partition may have access to a public street via an access easement pursuant to the standards and limitations set forth for such accessways in Chapter 48 CDC.

Staff Finding 20: All lots have access to public streets with the exception of lots 13-15 which will access Upper Midhill Drive via a shared private 16 foot wide driveway. The criterion is met.

20. Gated Streets
(...)
21. Entryway treatments and street isle design
(...)

Staff Finding 21: The subdivision will not be gated. The applicant is not proposing any subdivision monument/entry treatment. These criteria are met.

22. Based upon the determination of the City Manager or the Manager's designee, the applicant shall construct or cause to be constructed, or contribute a proportionate share of the costs, for all necessary off-site improvements identified by the transportation analysis

commissioned to address CDC 85.170(B)(2) that are required to mitigate impacts from the proposed subdivision. The proportionate share of the costs shall be determined by the City Manager or Manager's designee, who shall assume that the proposed subdivision provides improvements in rough proportion to identified impacts of the subdivision. Off-site transportation improvements will include bicycle and pedestrian improvements as identified in the adopted City of West Linn TSP.

Staff Finding 22: The applicant's Transportation Impact Analysis (TIA) was prepared by Kittelson and Associates. Those findings were then reviewed by DKS Engineering who work for the City of West Linn to provide an independant third party review. ODOT engineers also reviewed Kittelson's TIA and the proposed mitigation measures. The City Engineer and DKS found Kittelson's TIA findings and their subsequent April 5, 2016 "*Chene Blanc Estates Development Supplemental Letter*" to be acceptable and consistent with ODOT recommendations, including their discussion of appropriate off-site traffic mitigation measures on Willamette Drive between Arbor Drive and Shady Hollow Way.

The criterion is met by condition of approval 3.

B. Blocks and lots.
1. General
(...)
2. Sizes
(...)
3. Lot size and shape

Staff Finding 23: Staff incorporates the applicant's findings regarding blocks. All lots meet and exceed the 4,500 square foot minimum lot size and dimensional standards of the underlying R-4.5 zone. (Lot sizes range from 4,615 to 11,705 square feet.) All lots are sized to reasonably accommodate a detached single family home. These criteria are met.

4. Access. Access to subdivisions, partitions, and lots shall conform to the provisions of Chapter 48 CDC, Access, Egress and Circulation.

Staff Finding 24: Please see staff findings 42-56 for discussion of the "Access" criteria. The criterion is met.

5. Double frontage lots and parcels.
(...)
6. Lot and parcel side lines

Staff Finding 25: There are no double frontage lots within this subdivision. (There are double frontage lots in the City of Lake Oswego between Woodhurst Place and Hillside Drive that are adjacent to this subdivision. They are not part of this application. Also, whereas lot 12, which fronts on Hillside Drive, could be accessed off the private driveway that will serve lots 13-15,

Condition of Approval 5 will prohibit it.) All lot lines generally run at right angles or perpendicular to the abutting ROW except for three lots on curves where the lot lines radiate from the curve. These criteria are met.

7. Flag lots. Flag lots can be created where it can be shown that no other reasonable street access is possible to achieve the requested land division. A single flag lot shall have a minimum street frontage of 15 feet for its accessway. Where two to four flag lots share a common accessway, the minimum street frontage and accessway shall be eight feet in width per lot. Common accessways shall have mutual maintenance agreements and reciprocal access and utility easements. The following dimensional requirements shall apply to flag lots:
a. Setbacks applicable to the underlying zone shall apply to the flag lot.
(...)
e. As per CDC 48.030, the accessway shall have a minimum paved width of 12 feet.

Staff Finding 26: There are no flag lots in the subdivision. This criteria does not apply.

8. Large lots or parcels.

Staff Finding 27: Staff finds that lots 23 (9,583 square feet) and 28 (11,705 square feet) are large enough to be partitioned in the future to create one additional lot each given that the minimum lot size is 4,500 square feet. Any further development would require a minor partition and review of that application in the context of CDC Chapter 85. This criterion is met.

C. Pedestrian and bicycle trails.
(...)
Staff Finding 28: The sidewalks along all lot frontages will provide the necessary pedestrian facilities while the interior street will allow for bike circulation.

There are no opportunities available for the development of connective trails to adjoining subdivisions. The exception are two tracts "B" and "D" next to lot 34 which are owned by the Marylhurst Place Homeowner's Association and located in the City of Lake Oswego. Tract "B" is occupied by a storm water facility for the adjacent subdivision. Tract "D" is occupied by a drainage ditch. Together, these tracts comprise 47 feet of frontage on Woodhurst Place. The fact that these tracts are privately owned, located in another city, already substantially occupied by another use and located on a steep 27 percent slope effectively removes the option of constructing a pedestrian or bike path from this subdivision to connect with Woodhurst Place.

The footpath connecting the Hillside Drive ROW with Woodhurst Place in the City of Lake Oswego near the southwest corner of this site has the potential to provide a useful pedestrian link. The path is off-site, owned by the City of Lake Oswego and therefore outside of the purview of this application.

D. Transit Facilities.
(...)

Staff Finding 29: There are no transit facilities or service in this area so this criteria does not apply.

E. Grading. Grading of building sites shall conform to the following standards unless physical conditions demonstrate the propriety of other standards:
1. All cuts and fills shall comply with the excavation and grading provisions of the Uniform Building Code and the following:
a. Cut slopes shall not exceed one and one-half feet horizontally to one foot vertically (i.e., 67 percent grade).
b. Fill slopes shall not exceed two feet horizontally to one foot vertically (i.e., 50 percent grade). Please see the following illustration.
2. The character of soil for fill and the characteristics of lot and parcels made usable by fill shall be suitable for the purpose intended.
3. If areas are to be graded (more than any four-foot cut or fill), compliance with CDC 85.170(C) is required.
4. The proposed grading shall be the minimum grading necessary to meet roadway standards, and to create appropriate building sites, considering maximum allowed driveway grades.
(....)

Staff Finding 30: The applicant's submittal included a stamped geotechnical report by GeoPacific. The City's Development Engineer has reviewed the applicant's plans (Sheet C230) and geotechnical report and finds the grading and fill plans meet the criteria.

The grading plan is the minimum necessary to meet the allowable/maximum local street grade of 15 percent and provide appropriate building sites. Fill placed on lots to facilitate home construction may be required to undergo further geotechnical review as directed by the City Building Official based on individual lot conditions.

The criteria is met.

F. Water.
1. A plan for domestic water supply lines or related water service facilities shall be prepared consistent with the adopted Comprehensive Water System Plan, plan update, March 1987, and subsequent superseding revisions or updates.
2. Adequate location and sizing of the water lines.
3. Adequate looping system of water lines to enhance water quality.
4. For all non-single-family developments, there shall be a demonstration of adequate fire flow to serve the site.
5. A written statement, signed by the City Engineer, that water service can be made available to the site by the construction of on-site and off-site improvements and that such water service

has sufficient volume and pressure to serve the proposed development's domestic, commercial, industrial, and fire flows.

Staff Finding 31: Water is available in Upper Midhill and Hillside Drives. These waterlines will be looped through the subdivision. The City Engineer has confirmed the water system has sufficient water volume and pressure to serve the subdivision (see Sheet C300). The applicant shall submit a fire flow test for review and approval by TVFR per Condition of Approval 7. The criteria are met.

G. Sewer.
1. A plan prepared by a licensed engineer shall show how the proposal is consistent with the Sanitary Sewer Master Plan (July 1989). Agreement with that plan must demonstrate how the sanitary sewer proposal will be accomplished and how it is gravity-efficient. The sewer system must be in the correct basin and should allow for full gravity service.
2. Sanitary sewer information will include plan view of the sanitary sewer lines, including manhole locations and depth or invert elevations.
3. Sanitary sewer lines shall be located in the public right-of-way, particularly the street, unless the applicant can demonstrate why the alternative location is necessary and meets accepted engineering standards.
4. Sanitary sewer line should be at a depth that can facilitate connection with down-system properties in an efficient manner.
5. The sanitary sewer line should be designed to minimize the amount of lineal feet in the system.
6. The sanitary sewer line shall avoid disturbance of wetland and drainageways. In those cases where that is unavoidable, disturbance shall be mitigated pursuant to Chapter 32 CDC, Water Resource Area Protection, all trees replaced, and proper permits obtained. Dual sewer lines may be required so the drainageway is not disturbed.
7. Sanitary sewer shall be extended or stubbed out to the next developable subdivision or a point in the street that allows for reasonable connection with adjacent or nearby properties.
8. The sanitary sewer system shall be built pursuant to DEQ, City, and Tri-City Service District sewer standards. The design of the sewer system should be prepared by a licensed engineer, and the applicant must be able to demonstrate the ability to satisfy these submittal requirements or standards at the pre-construction phase.
9. A written statement, signed by the City Engineer, that sanitary sewers with sufficient capacity to serve the proposed development and that adequate sewage treatment plant capacity is available to the City to serve the proposed development

Staff Finding 32: The applicant proposes to install a sanitary sewer lines to service all lots within this subdivision (see Sheet C300). The system will be built to appropriate standards and the City Engineer has confirmed the sufficient capacity of the sanitary system and sewage treatment facility. These criteria are met.

I. Utility easements.

Subdivisions and partitions shall establish utility easements to accommodate the required service providers as determined by the City Engineer. The developer of the subdivision shall make accommodation for cable television wire in all utility trenches and easements so that cable can fully serve the subdivision.

Staff Finding 33: The applicant proposes to place all utilities within the public right of way or within appropriately dimensioned utility easements and tracts to serve the subdivision. Per Condition of Approval 5, the applicant shall provide the City of West Linn a Mutual Maintenance and Reciprocal Access and Public Utility Easement for platted Lots 13-15 to ensure continued access, utilities and maintenance of the shared drive in perpetuity. This criterion is met.

J. Supplemental provisions.
1. Wetland and natural drainageways.
2. Willamette and Tualatin Greenways.

Staff Finding 34: There are two small non-stream fed wetlands on the north portion of the site totaling 3,920 square feet. The City required a wetland delineation, which was prepared by Schott and Associates and is included in the applicant's submittal. (See also the outlined wetlands at northwest portion of the site on sheet C100.) The wetland delineation was confirmed by the Oregon Department of State Lands (DSL) in a concurrence letter which is part of the record.

In order to satisfy the City's requirement for street connectivity and TVFR emergency access and meet the allowable street grades, Hillside Drive connects with Upper Midhill Drive in the vicinity of the wetlands. The associated grading means that the wetlands will be filled and mitigated for, consistent with Chapter 32: Water Resource Areas. (See staff findings 72-77.)

Schott and Associates also identified a small non-jurisdictional drainage ditch on the north edge of the property. The ditch is located in Tract D which is in Lake Oswego and owned by the Marylhurst Homeowner's Association. The ditch intrudes onto the northeast corner of the site for approximately 120 feet before returning to Tract D and Lake Oswego. The Oregon Department of State Lands (DSL) has provided a concurrence letter (December 7, 2015) and found, after a site visit, that the drainage ditch is a "non-jurisdictional drainage ditch" and exempt per OAR 141-085-0515 (8). (According to the City of Lake Oswego Planning Department, the ditch was removed from the 1-B list of their Sensitive Lands Map and is not designated for resource protection. This means that there is no buffer or other resource requirement for it. The ditch is not on the City of West Linn's WRA map.)

City of Lake Oswego Storm water maps show two City of Lake Oswego storm water catch basins feeding 12-inch storm lines in Tract D which are intended to collect discharge from the ditch.

The development of this subdivision will result in a reduction of cross property storm water flow since storm water runoff from all impervious surfaces (streets, sidewalks, roofs, driveways, patios, etc.) will be intercepted and directed to the storm water lines on the streets in front of the subdivision's homes. Storm water will then be directed to the detention/treatment facility and then to the main storm water line near lot 23.

The property is not within the Willamette or Tualatin Greenways.
The criteria is met.

3. Street trees.
Street trees are required as identified in the appropriate section of the municipal code and Chapter 54 CDC.

Staff Finding 35: Street trees shall be installed as required in the West Linn Public Works Standards (see Sheet L1). These criteria are met.

4. Lighting.
To reduce ambient light and glare, high or low pressure sodium light bulbs shall be required for all subdivision street or alley lights. The light shall be shielded so that the light is directed downwards rather than omni-directional.

Staff Finding 36: The applicant's Photometric Plan (Sheet C280) identifies LED street lights which will produce no off site illumination. This criterion is met.

5. Dedications and exactions.
The City may require an applicant to dedicate land and/or construct a public improvement that provides a benefit to property or persons outside the property that is the subject of the application when the exaction is roughly proportional. No exaction shall be imposed unless supported by a determination that the exaction is roughly proportional to the impact of development.

Staff Finding 37: The applicant will dedicate right of way (ROW) for internal streets. The applicant will be dedicating to the City Tract C, which is the storm water treatment and detention pond for this subdivision. Dedication to the City is appropriate since it will allow for unrestricted access by City of West Linn Public Works crews for the maintenance of the storm water facility. The dedication is declared in Condition of Approval 4. There are no other dedications proposed or requested. This criterion is met.

6. Underground utilities.
All utilities, such as electrical, telephone, and television cable, that may at times be above ground or overhead shall be buried underground in the case of new development.

Staff Finding 38: The applicant shall underground utilities to meet the West Linn Public Works Standards. This criterion is met.

7. Density requirement.
Density shall occur at 70 percent or more of the maximum density allowed by the underlying zoning. These provisions would not apply when density is transferred from Type I and II lands as defined in CDC 02.030. Development of Type I or II lands are exempt from these provisions. Land divisions of three lots or less would also be exempt.

Staff Finding 39: The R-4.5 zone permits a maximum density of 9.6 dwelling units per net acre. Net acre is defined as "The total gross acres less the public right-of-way (ROW) and other acreage deductions, as applicable".

The gross site comprises 265,860 square feet. The ROW comprises 34,637 square feet. Type II lands are an applicable deduction. The two small wetlands in the north part of the site constitute Type II lands. The wetlands will be filled and mitigated for off-site. The larger wetland comprises 3,086 square feet. 2,344 square feet of this larger wetland falls within the proposed street ROW so it has already been deducted from the "developable net area". The remaining 742 square feet plus the smaller 877 square foot wetland total 1,619 square feet. After deducting the 1,619 square feet and the ROW dedication from the gross site area, the net site area is 5.2 acres.

5.2 net acres yields a maximum of 49 dwellings/lots (9.6 dwellings/lots per acre X 5.2 acres). Applying the 70 percent density requirement means that the minimum number of dwellings/lots allowed in the subdivision is 34 (49 X .7).

The applicant is proposing 34 dwellings/lots which is the minimum number of lots allowed. The criteria is met.

8. Mix requirement.
The "mix" rule means that developers shall have no more than 15 percent of the R-2.1 and R-3 development as single-family residential. The intent is that the majority of the site shall be developed as medium high density multi-family housing.

Staff Finding 40: The property is not zoned R-2.1 or R-3 so these provisions do not apply. This criterion is met.

9. Heritage trees/significant tree and tree cluster protection.
All heritage trees, as defined in the Municipal Code, shall be saved. Diseased heritage trees, as determined by the City Arborist, may be removed at his/her direction. All non-heritage trees and clusters of trees (three or more trees with overlapping dripline; however, native oaks need not have an overlapping dripline) that are considered significant by virtue of their size, type, location, health, or numbers shall be saved pursuant to CDC 55.100(B)(2). Trees are defined per the municipal code as having a trunk six inches in diameter or 19 inches in circumference at a point five feet above the mean ground level at the base of the trunk.

Staff Finding 41: The site comprises no heritage trees. There are 169 significant trees on the site (see C110-C114). Of these trees, 50 will be retained with a canopy totaling 77,863 square feet which translates to 33 percent of the existing tree canopy. Many of the trees scheduled for retention are along the north and east edges of the site which will increase the buffering to the adjacent Lake Oswego neighborhood. This amount exceeds the maximum 20 percent retention requirement.

Nineteen significant trees with a total DBH of 434 inches are proposed for removal due to street construction and associated grading. The applicant is proposing to mitigate by planting street 434 inches of DBH of trees and landscape trees on the project site. The remaining trees which are not able to be planted on site will be mitigated for either in off-site plantings in a location chosen by the City's arborist or the Applicant will pay a fee in lieu to the City for trees which cannot be planted on site per Condition of Approval 8.

This criterion is met.

III. CHAPTER 48, ACCESS CONTROL

48.025 ACCESS CONTROL
B. Access Control Standards
1. Traffic impact analysis requirements. The City or other agency with access jurisdiction may require a traffic study prepared by a qualified professional to determine access, circulation and other transportation requirements. (See also CDC 55.125, Traffic Impact Analysis.)

Staff Finding 42: A traffic impact analysis (TIA) was required since the criteria of 85.170(B) (2) are met. (Per the TIA, prepared by Kittelson and Associates, the projected Average Daily Trip count (ADT) of 389 trips exceeds the TIA threshold of 250 trips.) The TIA identified the existing and projected trip generations, trip distributions, turn movements plus levels of service and volume to capacity ratio of affected intersections. The study concluded with recommendations to address the projected impacts.

Those findings were then reviewed by DKS Engineering who work for the City of West Linn to provide an independant third party review. ODOT engineers also reviewed Kittelson's TIA and the proposed mitigation measures. The City Engineer and DKS found Kittelson's TIA findings and their subsequent April 5, 2016 "*Chene Blanc Estates Development Supplemental Letter*" to be acceptable and consistent with ODOT recommendations, including their discussion of appropriate off-site traffic mitigation measures on Willamette Drive between Arbor Drive and Shady Hollow Way.

The criterion is met by Condition of Approval 3.

2. The City or other agency with access permit jurisdiction may require the closing or consolidation of existing curb cuts or other vehicle access points, recording of reciprocal access

easements (i.e., for shared driveways), development of a frontage street, installation of traffic control devices, and/or other mitigation as a condition of granting an access permit, to ensure the safe and efficient operation of the street and highway system. Access to and from off-street parking areas shall not permit backing onto a public street.

Staff Finding 43: Access to lots 13-15 will be consolidated in a shared 16 foot wide private driveway. The City will require a reciprocal access easement, per Condition of Approval 5, for this driveway. Whereas lot 12, which fronts on Hillside Drive, could be accessed off the private driveway that will serve lots 13-15, Condition of Approval 5 will prohibit it. The criterion is met by condition.

3. Access options. When vehicle access is required for development (i.e., for off-street parking, delivery, service, drive-through facilities, etc.), access shall be provided by one of the following methods (planned access shall be consistent with adopted public works standards and TSP). These methods are "options" to the developer/subdivider.
a) Option 1. Access is from an existing or proposed alley or mid-block lane. If a property has access to an alley or lane, direct access to a public street is not permitted.
b) Option 2. Access is from a private street or driveway connected to an adjoining property that has direct access to a public street (i.e., "shared driveway"). A public access easement covering the driveway shall be recorded in this case to assure access to the closest public street for all users of the private street/drive.
c) Option 3. Access is from a public street adjacent to the development lot or parcel. If practicable, the owner/developer may be required to close or consolidate an existing access point as a condition of approving a new access. Street accesses shall comply with the access spacing standards in subsection (B) (6) of this section.

Staff Finding 44: The applicant proposes access to the majority of lots via Option 3 (above) which is access from a public street. The exception would be lots 13-15 which will be accessed via a "shared driveway" (Option 2). An access easement covering the shared driveway shall be recorded to ensure access to the public street for all users of the shared driveway per Condition of Approval 5. These criteria are met.

4. Subdivisions fronting onto an arterial street.
(...)
5. Double-frontage lots.
(...)

Staff Finding 45: This subdivision does not front on an arterial. There are no double frontage lots proposed within this subdivision; however lot 12, which fronts on Hillside Drive, could be accessed off the private driveway that will serve lots 13-15. Condition of Approval 5 will prohibit lot 12 from accessing that driveway.) These criteria do not apply.

6. Access spacing.

a. The access spacing standards found in Chapter 8 of the adopted Transportation System Plan (TSP) shall be applicable to all newly established public street intersections and non-traversable medians.
b. Private drives and other access ways are subject to the requirements of CDC 48.060.

Staff Finding 46: The proposal does not create any new intersections or non-traversable intersections. Access to all lots will be via a continuous local street (Hillside/Upper Midhill Street) with no intersecting streets. These criteria are met.

7. Number of access points.
8. Shared driveways.

Staff Finding 47: Staff incorporates applicant findings and references Staff Finding No. 44. These criteria are met.

C. Street connectivity and formation of blocks required.
In order to promote efficient vehicular and pedestrian circulation throughout the City, land divisions and large site developments shall produce complete blocks bounded by a connecting network of public and/or private streets, in accordance with the following standards:
1. Block length and perimeter.
The maximum block length shall not exceed 800 feet or 1,800 feet along an arterial.

Staff Finding 48: Staff finds that no block length exceeds 800 feet. Hillside Drive connects to Hillside Drive less than 800 feet from where it turns 90 degrees to connect with Upper Midhill Drive. Upper Midhill Drive connects to College View Drive less than 800 feet from where it turns 90 degrees to connect with Hillside Drive.

There is no opportunity to connect streets from this subdivision to streets within adjacent subdivisions to the north, west or east since all surrounding properties are fully built out. The exception is two tracts "B" and "D" next to lot 34 which are owned by the Marylhurst Place Homeowner's Association and located in the City of Lake Oswego. Tract "B" is occupied by a storm water facility for the adjacent subdivision. Tract "D" is occupied by a drainage ditch. Together, these tracts comprise 47 feet of frontage on Woodhurst Place. The fact that these tracts are privately owned, located in another city, already substantially occupied by another use, located on a steep 27 percent slope (which would violate the maximum 15 percent local street grade) and would offer inadequate width to construct a local street effectively removes the option of extending a street from this subdivision to connect with Woodhurst Place.

This criterion is met.

2. Street standards. Public and private streets shall also conform to Chapter 92 CDC, Required Improvements, and to any other applicable sections of the West Linn Community Development Code and approved TSP.

Staff Finding 49: All street designs and improvements shall be consistent with the provisions of CDC Chapters 92 and 85, and the West Linn Transportation System Plan (see Findings 3-7). This criterion is met.

48.030 MINIMUM VEHICULAR REQUIREMENTS FOR RESIDENTIAL USES

A. Direct individual access from single-family dwellings and duplex lots to an arterial street (...)

B. When any portion of any house is less than 150 feet from the adjacent right-of-way, access to the home is as follows:

1. One single-family residence, including residences with an accessory dwelling unit as defined in CDC 02.030, shall provide 10 feet of unobstructed horizontal clearance. Dual-track or other driveway designs that minimize the total area of impervious driveway surface are encouraged.

2. Two to four single-family residential homes equals a 14- to 20-foot-wide paved or all-weather surface. Width shall depend upon adequacy of line of sight and number of homes.

Staff Finding 50: No lots access arterials. All lots will have direct access to a public street with the exception of lots 13-15 which will access Upper Midhill Drive via a shared 16 foot wide private driveway dimensioned to meet the standards of this chapter. These criteria are met.

3. Maximum driveway grade shall be 15 percent. The 15 percent shall be measured along the centerline of the driveway only. Variations require approval of a Class II variance by the Planning Commission pursuant to Chapter 75 CDC. Regardless, the last 18 feet in front of the garage shall be under 12 percent grade as measured along the centerline of the driveway only. Grades elsewhere along the driveway shall not apply.

4. The driveway shall include a minimum of 20 feet in length between the garage door and the back of sidewalk, or, if no sidewalk is proposed, to the paved portion of the right-of-way.

C. When any portion of one or more homes is more than 150 feet from the adjacent right-of-way, the provisions of subsection B of this section shall apply in addition to the following provisions.

1. A turnaround may be required as prescribed by the Fire Chief.

2. Minimum vertical clearance for the driveway shall be 13 feet, six inches.

3. A minimum centerline turning radius of 45 feet is required unless waived by the Fire Chief.

4. There shall be sufficient horizontal clearance on either side of the driveway so that the total horizontal clearance is 20 feet

Staff Finding 51: The applicant proposes a shared private 16 foot wide driveway for Lots 13-15. Homes built on those lots will be less than 150 feet from the public ROW per TVFR standards. The access drive will have a 20 foot wide all weather surface with no vertical impediments. These criteria are met.

D. Access to five or more single-family homes shall be by a street built to full construction code standards. All streets shall be public. This full street provision may only be waived by variance.

Staff Finding 52: All access will be via streets built to City construction code standards with the exception of lots 13-15 which will access via a shared driveway built to meet Chapter 48 standards and TVFR requirements. This criterion is met.

E. Access and/or service drives for multi-family dwellings shall be fully improved with hard surface pavement:
1. With a minimum of 24-foot width when accommodating two-way traffic; or
2. With a minimum of 15-foot width when accommodating one-way traffic. Horizontal clearance shall be two and one-half feet wide on either side of the driveway.
3. Minimum vertical clearance of 13 feet, six inches.
4. Appropriate turnaround facilities per Fire Chief's standards for emergency vehicles when the drive is over 150 feet long. Fire Department turnaround areas shall not exceed seven percent grade unless waived by the Fire Chief.
5. The grade shall not exceed 10 percent on average, with a maximum of 15 percent.
6. A minimum centerline turning radius of 45 feet for the curve.
F. Where on-site maneuvering and/or access drives are necessary to accommodate required parking, in no case shall said maneuvering and/or access drives be less than that required in Chapters 46 and 48 CDC.
G. The number of driveways or curb cuts shall be minimized on arterials or collectors. Consolidation or joint use of existing driveways shall be required when feasible.
H. In order to facilitate through traffic and improve neighborhood connections, it may be necessary to construct a public street through a multi-family site.
I. Gated accessways to residential development other than a single-family home are prohibited.

Staff Finding 53: The provisions of 48.030(E) do not apply since this is not a multi-family project. The provisions of 48.030(F) do not apply since no multi-family or non-residential on-site maneuvering or on site drives are proposed. The provisions of 48.030(G) do not apply since there are no arterials or collectors within the project site. The provisions of 48.030(H) do not apply since this is not a multi-family project. The provisions of 48.030(I) do not apply since no gated accessway is proposed and this is a single family residential development. All access will be via streets built to City construction code standards with the exception of lots 13-15 which will access via a shared driveway built to meet Chapter 48 standards and TVFR requirements. This criterion is met.

48.060 WIDTH AND LOCATION OF CURB CUTS AND ACCESS SEPARATION REQUIREMENTS
A. Minimum curb cut width shall be 16 feet.
B. Maximum curb cut width shall be 36 feet, except along Highway 43 in which case the maximum curb cut shall be 40 feet. For emergency service providers, including fire stations, the maximum shall be 50 feet.

C. No curb cuts shall be allowed any closer to an intersecting street right-of-way line than the following:

1. On an arterial when intersected by another arterial, 150 feet.

(...)

6. On a local street when intersecting any other street, 35 feet.

D. There shall be a minimum distance between any two adjacent curb cuts on the same side of a public street, except for one-way entrances and exits, as follows:

1. On an arterial street, 150 feet.

2. On a collector street, 75 feet.

3. Between any two curb cuts on the same lot or parcel on a local street, 30 feet.

E. A rolled curb may be installed in lieu of curb cuts and access separation requirements.

F. Curb cuts shall be kept to the minimum, particularly on Highway 43. Consolidation of driveways is preferred. The standard on Highway 43 is one curb cut per business if consolidation of driveways is not possible.

Staff Finding 54: All curb cuts will be reviewed at the time of building permit applications and shall be required to comply with these setbacks and standards. (Given the frontage of the proposed lots and the minimum separation requirements for curb cuts on one lot ((D) (3) above), only one curb cut per lot is expected.) No rolled curbs are proposed. These criteria are met.

G. Adequate line of sight pursuant to engineering standards should be afforded at each driveway or accessway.

Staff Finding 55: All curb cuts will be reviewed at the time of building permit applications and shall be required to comply with the clear vision area standards of CDC Chapter 42. This criterion is met.

48.070 PLANNING DIRECTOR'S AUTHORITY TO RESTRICT ACCESS APPEAL PROVISIONS

(...)

48.080 BICYCLE AND PEDESTRIAN CIRCULATION

(...)

Staff Finding 56: Bicycle and pedestrian circulation is provided for by the interior street and adjacent sidewalks. These criteria are met.

IV. CHAPTER 55, DESIGN REVIEW

55.100 APPROVAL STANDARDS – CLASS II DESIGN REVIEW

B. Relationship to the natural and physical environment.
1. The buildings and other site elements (…)
2. All heritage trees (…)
a. Non-residential and residential projects on Type I and II lands (…)

Staff Finding 57: Staff incorporates applicant findings. The City Arborist finds that there are no heritage trees at the site. The wetlands are Type II lands (the only on-site Type I or II land) and are addressed in staff findings 67-72. These criteria are met.

b. Non-residential and residential projects on non-Type I and II lands shall set aside up to 20 percent of the area to protect trees and tree clusters that are determined to be significant, plus any heritage trees. Therefore, in the event that the City Arborist determines that a significant tree cluster exists at a development site, then up to 20 percent of the non-Type I and II lands shall be devoted to the protection of those trees, either by dedication or easement. The exact percentage is determined by establishing the driplines of the trees or tree clusters that are to be protected. In order to protect the roots which typically extend further, an additional 10-foot measurement beyond the dripline shall be added. The square footage of the area inside this "dripline plus 10 feet" measurement shall be the basis for calculating the percentage (see figure below). The City Arborist will identify which tree(s) are to be protected. Development of non-Type I and II lands shall also require the careful layout of streets, driveways, building pads, lots, and utilities to avoid significant trees, tree clusters, heritage trees, and other natural resources pursuant to this code. Exemptions of subsections (B) (2) (c), (e), and (f) of this section shall apply. Please note that in the event that more than 20 percent of the non-Type I and II lands comprise significant trees or tree clusters, the developer shall not be required to save the excess trees, but is encouraged to do so.

Staff Finding 58: There are a total of 169 trees identified as significant on this site. The significant tree canopy area on site totals 238,212 square feet or 5.4 acres. Of these trees, 50 significant trees will be retained through the site development and homebuilding process. A total of 77,863 square feet of significant canopy will be retained or 1.7 acres (see Sheets C110-C114). The proposed retention represents 33 percent of the site's existing canopy which exceeds the required retention of up to 20 percent. In addition to the trees determined to be significant, 62 additional non-significant trees have been proposed for retention.

The value of the proposed tree retention is increased by the fact that many of the trees are on the north and east perimeter of the development site which should provide buffering and screening to the neighboring homes.

There are no heritage trees. This tree inventory has been reviewed and affirmed by the City Arborist.

There are no trees on Type I or II lands. (The only Type I or II lands comprise the two small wetlands in the north part of the site. The wetlands will be filled in as part of the WRA application and subsequently mitigated off-site.)

This criterion is met.

c. Where stubouts of streets occur on abutting properties, and the extension of those streets will mean the loss of significant trees, tree clusters, or heritage trees, it is understood that tree loss may be inevitable. In these cases, the objective shall be to minimize tree loss. These provisions shall also apply in those cases where access, per construction code standards, to a lot or parcel is blocked by a row or screen of significant trees or tree clusters.

Staff Finding 59: No street stubouts occur on abutting properties. This criterion does not apply.

d. For both non-residential and residential development, the layout shall achieve at least 70 percent of maximum density for the developable net area. The developable net area excludes all Type I and II lands and up to 20 percent of the remainder of the site for the purpose of protection of stands or clusters of trees as defined in subsection (B)(2) of this section.

Staff Finding 60: The R-4.5 zone permits a maximum density of 9.6 dwelling units per net acre. Net acre is defined as "The total gross acres less the public right-of-way (ROW) and other acreage deductions, as applicable".

The gross site comprises 265,860 square feet. The ROW comprises 34,637 square feet. Type II lands are an applicable deduction. The two small wetlands in the north part of the site constitute Type II lands. The wetlands will be filled and mitigated for off-site. The larger wetland comprises 3,086 square feet. 2,344 square feet of this larger wetland falls within the proposed street ROW so it has already been deducted from the "developable net area". The remaining 742 square feet plus the smaller 877 square foot wetland total 1,619 square feet. After deducting the 1,619 square feet and the ROW dedication from the gross site area, the net site area is 5.2 acres.

The R-4.5 zone allows 9.6 dwellings/lots per acre. That translates to a maximum of 49 dwellings/lots (9.6 dwellings/lots per acre X 5.2 acres). Applying the 70 percent density requirement means that the minimum number of dwellings/lots allowed in the subdivision is 34 (49 X .7).

The applicant is proposing 34 dwellings/lots which is the minimum number of lots allowed. The criteria is met.

Staff finds that the applicant has set aside of 33 percent of the significant tree canopy, which exceeds the required 20 percent. The value of the proposed tree retention is increased by the fact that many of the trees are on the north and east perimeter of the development site

which should provide buffering and screening to the neighboring homes. This criterion is met.

e. For arterial and collector street projects, including Oregon Department of Transportation street improvements, the roads and graded areas shall avoid tree clusters where possible. Significant trees, tree clusters, and heritage tree loss may occur, however, but shall be minimized.

Staff Finding 61: There are no arterials or collectors within this project area; therefore the criteria does not apply.

f. If the protection of significant tree(s) or tree clusters is to occur in an area of grading that is necessary for the development of street grades, per City construction codes, which will result in an adjustment in the grade of over or under two feet, which will then threaten the health of the tree(s), the applicant will submit evidence to the Planning Director that all reasonable alternative grading plans have been considered and cannot work. The applicant will then submit a mitigation plan to the City Arborist to compensate for the removal of the tree(s) on an "inch by inch" basis (e.g., a 48-inch Douglas fir could be replaced by 12 trees, each four-inch). The mix of tree sizes and types shall be approved by the City Arborist.

Staff Finding 62: The interior street alignment was determined by a combination of existing ROW, the need to loop and connect Upper Midhill Drive and Hillside Drive for circulation, lot access and TVFR emergency access and the need to keep the interior road grade under 15 percent. As a result of the alignment and associated grading, the applicant will mitigate for the removal of 434 inches of DBH by planting "on an inch by inch basis" street trees and landscape trees on the project site. The remaining trees which are not able to be planted on site will be mitigated for either in off-site plantings in a location chosen by the City's arborist or the applicant will pay a fee in lieu to the City for trees which cannot be planted on site. This criterion is met by Condition of Approval 8.

V. CHAPTER 92, REQUIRED IMPROVEMENTS

92.010 PUBLIC IMPROVEMENTS FOR ALL DEVELOPMENT

The following improvements shall be installed at the expense of the developer and meet all City codes and standards:

A. Streets within subdivisions.
B. Extension of streets to subdivisions
C. Local and minor collector streets
D. Monuments

Staff Finding 63: The applicant shall install improvements to meet the West Linn Public Works Standards. These criteria are met.

E. Surface drainage and storm sewer system. A registered civil engineer shall prepare a plan and statement which shall be supported by factual data that clearly shows that there will be no

adverse impacts from increased intensity of runoff off site of a 100-year storm, or the plan and statement shall identify all off-site impacts and measures to mitigate those impacts commensurate to the particular land use application. Mitigation measures shall maintain pre-existing levels and meet buildout volumes, and meet planning and engineering requirements

Staff Finding 64: The applicant has submitted a Preliminary Storm Water Report that complies with City of West Linn Public Works Standards. The applicant shall install improvements to meet the Standards, including the proposed storm water facility.

Staff notes that there is a ditch, in Tract D which is owned by the Marylhurst Place Homeowners Association and within the City of Lake Oswego. The ditch intrudes onto the northeast corner of the site for approximately 120 feet before returning to Tract D and Lake Oswego. The Oregon Department of State Lands (DSL) has provided a concurrence letter (December 7, 2015) which declared, after a site visit, that the drainage ditch is a "non-jurisdictional drainage ditch" and exempt per OAR 141-085-0515 (8).

City of Lake Oswego Storm water maps show two City of Lake Oswego storm water catch basins feeding 12-inch storm lines in Tract D which are intended to collect discharge from the ditch.

The development of this subdivision will result in a reduction of cross property storm water flow since storm water runoff from all impervious surfaces (streets, sidewalks, roofs, driveways, patios, etc.) will be intercepted and directed to the storm water lines on the streets in front of the subdivision's homes. Storm water will then be directed to the detention/treatment facility and then to the main storm water line near lot 23.
This criterion is met.

F. Sanitary sewers
(...)
Q. Joint mailbox facilities

Staff Finding 65: The applicant shall comply with the requirements and install improvements to meet the West Linn Public Works Standards. These criteria are met.

92.030 IMPROVEMENT PROCEDURES
(...)

Staff Finding 66: The applicant shall comply with the requirements and install improvements to meet the West Linn Public Works Standards. These criteria are met.

WATER RESOURCE AREA

32.060 APPROVAL CRITERIA

No application for development on property containing a WRA shall be approved unless the approval authority finds that the proposed development is consistent with the following approval criteria, or can satisfy the criteria by conditions of approval:

A. WRA protection/minimizing impacts.
   1. Development shall be conducted in a manner that will avoid or, if avoidance is not possible, minimize adverse impact on WRAs.
   2. Mitigation and re-vegetation of disturbed WRAs shall be completed per CDC 32.090 and 32.100 respectively.

Staff Finding 67: The applicant's wetland consultant, Schott and Associates, inventoried and delineated the two small wetlands in the north portion of the site comprising 877 square feet and 3,086 square feet for a combined area of 3,963 square feet or .09 acres. (See also the outlined wetlands at northwest portion of the site on sheet C100.) The delineation received a letter of concurrence (December 7, 2015) from Oregon Department of State Land (DSL).

The applicant is proposing to fill the wetlands and mitigate off-site through the purchase of DSL mitigation credits, which is allowed by 32.090(C) (3). Review of alternatives determined that filling the wetlands is necessary to accommodate grading for the alignment of the looping street since it (a) follows the existing plat ROW, (b) provides access to all lots, (c) avoids an illegal non-connective cul de sac design, (d) achieves street grades of 15 percent or less; and (e) provides TVFR and other emergency responders with access to the subdivision. The criteria is met.

Schott and Associates inventoried the small drainage ditch along the north property line, primarily in Tract D, owned by the Marylhurst Homeowners Association and located in Lake Oswego. The ditch intrudes onto the northeast corner of the project site for approximately 120 feet before returning to Tract D and Lake Oswego.
Schott and Associates determined there were no wetlands associated with it. DSL's concurrence letter found, after a site visit, that the drainage ditch is a "non-jurisdictional drainage ditch" and exempt per OAR 141-085-0515 (8). According to the City of Lake Oswego Planning Department, the ditch was removed from the 1-B list of their Sensitive Lands Map and is not designated for resource protection: there is no buffer or other resource requirement for it. The ditch is not on the City of West Linn's WRA inventory.

B. Storm water and storm water facilities.
1. Proposed developments shall be designed to maintain the existing WRAs (....)

Staff Finding 68: The applicant has inventoried and delineated the two isolated wetlands and is proposing to fill them and mitigate off-site for the reasons outlined in Staff Finding No.67. Even if the wetlands were not removed, they are not associated with a stream so there is no opportunity to use the wetlands for storm water discharge. Storm water will instead be

intercepted from all impervious surfaces and directed into an approved storm water facility. The criteria is met.

C. Dedications and easements. The City shall request dedications of the WRA to the City when acquisition of the WRA by dedication or easement would serve a public purpose. When such a dedication or easement is mutually agreed upon, the applicant shall provide the documentation for the dedication or easement. Nothing in this section shall prohibit the City from condemning property if:

1. The property is necessary to serve an important public purpose; and
2. Alternative means of obtaining the property are unsuccessful.

Staff Finding 69: The applicant has inventoried and delineated the wetlands and is proposing to fill them in and mitigate off-site. There are no easements or dedications proposed. The criteria is met.

D. WRA width. Except for the exemptions in CDC 32.040, applications that are using the alternate review process of CDC 32.070, or as authorized by the approval authority consistent with the provisions of this chapter, all development is prohibited in the WRA as established in Table 32-2 below: (....)

Staff Finding 70: The applicant has inventoried and delineated the wetland and is proposing to fill them in and mitigate off-site. Consequently, no WRA transitions or setbacks are required. The criteria is met.

E. Roads, driveways and utilities.

1. New roads, driveways, or utilities shall avoid WRAs unless the applicant demonstrates that no other practical alternative exists. In that case, road design and construction techniques shall minimize impacts and disturbance to the WRA by the following methods (....)

Staff Finding 71: Filling the two small wetlands is necessary to accommodate the alignment of the looping street since it (a) follows the existing plat ROW, (b) provides access to all lots, (c) avoids an illegal non-connective cul de sac design, (d) achieve street grades of 15 percent or less, and (e) provides TVFR and other emergency responders with access. After filling the wetlands, the applicant will mitigate off-site through the purchase of DSL mitigation credits. The criteria is met.

F. Passive recreation. (....)

G. Daylighting Piped Streams (....)

H. The following habitat friendly development practices shall be incorporated into the design of any improvements or projects in the WRA to the degree possible (....)

Staff Finding 72: There are no proposals for passive recreation facilities at this site. There are no existing piped streams on this property. This criteria is not applicable.

PC-1 AFFIDAVIT AND NOTICE PACKET

AFFIDAVIT OF NOTICE

We, the undersigned do hereby certify that, in the interest of the party (parties) initiating a proposed land use, the following took place on the dates indicated below:

GENERAL

File No. SUB-15-03/WAIV-16-03 Applicant's Name Ryan Zygar - Upper Midhill Estates

Development Name _____

Scheduled Meeting/Decision Date 4-20-16

NOTICE: Notices were sent at least 20 days prior to the scheduled hearing, meeting, or decision date per Section 99.080 of the Community Development Code. **(check below)**

TYPE A ✓

A.	The applicant (date) 3-31-16	(signed)	S. Shroyer
B.	Affected property owners (date) 3-31-16	(signed)	S. Shroyer
C.	School District/Board (date) _____	(signed)	_____
D.	Other affected gov't. agencies (date) 3-31-16	(signed)	S. Shroyer
E.	Affected neighborhood assns. (date) 3-31-16 (All)	(signed)	S. Shroyer
F.	All parties to an appeal or review (date) _____	(signed)	_____

At least 10 days prior to the scheduled hearing or meeting, notice was published/posted:

Tidings (published date) 4-7-16 (signed) S. Shroyer

City's website (posted date) 3-31-16 (signed) S. Shroyer

SIGN

At least 10 days prior to the scheduled hearing, meeting or decision date, a sign was posted on the property per Section 99.080 of the Community Development Code.

(date) April 7 (signed) _____

NOTICE: Notices were sent at least 14 days prior to the scheduled hearing, meeting, or decision date per Section 99.080 of the Community Development Code. **(check below)**

TYPE B _____

A.	The applicant (date) _____	(signed)	_____
B.	Affected property owners (date) _____	(signed)	_____
C.	School District/Board (date) _____	(signed)	_____
D.	Other affected gov't. agencies (date) _____	(signed)	_____
E.	Affected neighborhood assns. (date) _____	(signed)	_____

Notice was posted on the City's website at least 10 days prior to the scheduled hearing or meeting.

Date: _____ (signed) _____

STAFF REPORT mailed to applicant, City Council/Planning Commission and any other applicable parties 10 days prior to the scheduled hearing.

(date) _____ (signed) _____

FINAL DECISION notice mailed to applicant, all other parties with standing, and, if zone change, the County surveyor's office.

(date) _____ (signed) _____

p:\devrvw\forms\affidvt of notice-land use (9/09)

PUBLIC NOTICE CHECKLIST

SUB-15-03/WAP-16-03

FILE NO.: _____ **SITE ADDRESS:** 18000 Upper Midhill Dr.

21E14CA 200

PROJECT MANAGER: PETER SPIR **DATE:** March 15 1/6

MAILING DEADLINE DATE – 14-day or ~~20-day~~ (circle one): _____

PUBLISH IN LOCAL PAPER (10 days prior): **Yes** ✓ **No** _____

MEETING DATE: April 20, 2016

SEND TO (check where applicable):

Applicant: Name: See attached Applicant Address: _____

If Applicant Representative or Owner to receive please list in others below:

School District/Board _____

Metro _____

Tri-Met _____

Clackamas County _____

ODOT (if on State Hwy. or over 40 dwelling units) ✓

Neighborhood Assn(s).

(please specify) All

Division of State Lands _____

US Army Corps of Engineers _____

Stafford-Tualatin CPO _____

City of Lake Oswego _____

Dept. of Fish & Wildlife _____

Other(s): _____

Other(s): See attached

Other(s): _____

Other(s): _____

Other(s): _____

Other(s): _____

CITY OF WEST LINN PLANNING COMMISSION
PUBLIC HEARING NOTICE
FILE NO. SUB-15-03 and WAP-16-03

The West Linn Planning Commission is scheduled to hold a public hearing on **Wednesday, April 20, 2016, starting at 6:30 p.m.** in the Council Chambers of City Hall, 22500 Salamo Road, West Linn, to consider a request for 34-Lot Subdivision and Water Resource Area (WRA) permit at 18000 Upper Midhill Drive.

The criteria applicable to subdivision and WRA permit are found in Chapters 85 and 32 respectively, of the West Linn Community Development Code (CDC). CDC Chapter 14 (Single-Family Residential Attached and Detached/Duplex, R-4.5) is also applicable. The decision by the Planning Commission to approve or deny this request will be based upon the applicable criteria. At the hearing, it is important that comments relate specifically to the applicable criteria.

You have been notified of this proposal because County records indicate that you own property within 500 feet of the subject property (tax Lot 200 of Clackamas County Assessor's Map 21E 14CA) or as otherwise required by Chapter 99 of the CDC.

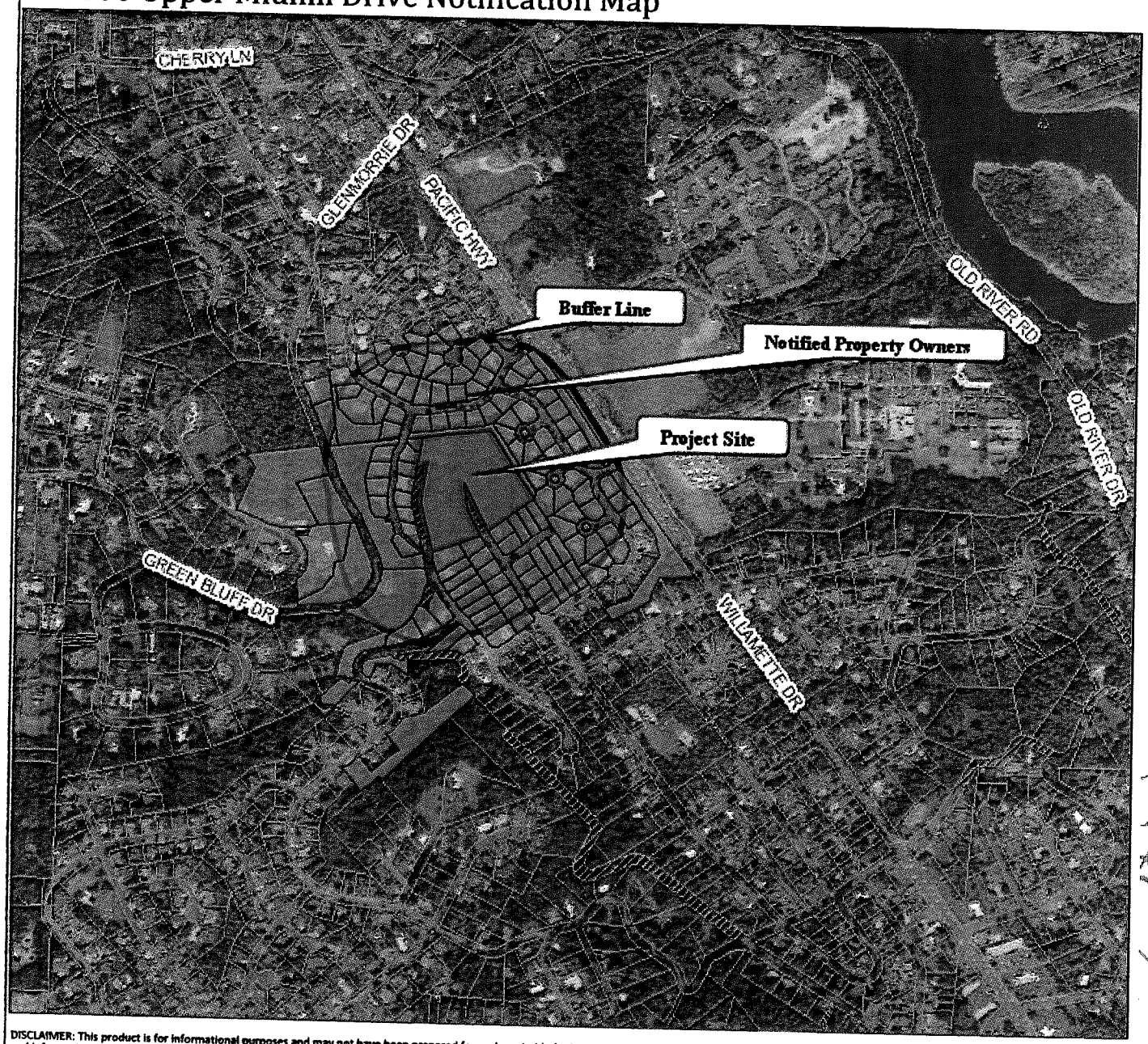
The complete application for file number SUB-15-03 and WAP-16-03 is available for inspection at no cost at City Hall or via the web site at https://westlinnoregon.gov/planning/18000-upper-midhill-drive-34-lot-subdivision. Printed copies can be obtained at City Hall for a minimal charge per page.

At least ten days prior to the hearing, a copy of the staff report will be available for inspection at no cost or copies can be obtained for a minimal charge per page. For further information, please contact Associate Planner Peter Spir at pspir@westlinnoregon.gov or 503-723-2539 or at City Hall, 22500 Salamo Road, West Linn, OR 97068.

The hearing will be conducted in accordance with the rules of Section 99.170 of the CDC. Anyone wishing to present written testimony on this proposed action may do so in writing prior to, or at the public hearing. Oral testimony may be presented at the public hearing. At the public hearing, the Planning Commission will receive a staff presentation, and invite both oral and written testimony. The Planning Commission may continue the public hearing to another meeting to obtain additional information, leave the record open for additional evidence, arguments, or testimony, or close the public hearing and take action on the application as provided by state law. **It is important to submit all evidence (in writing or at the hearing) to the Planning Commission. City Council review of any appeal is on the record.** Failure to raise an issue in person or by letter at some point prior to the close of the hearing, or failure to provide sufficient specificity to afford the decision maker an opportunity to respond to the issue, precludes an appeal to the Land Use Board of Appeals (LUBA) based on that issue.

SUB-15-03-notice500

18000 Upper Midhill Drive Notification Map



City of West Linn

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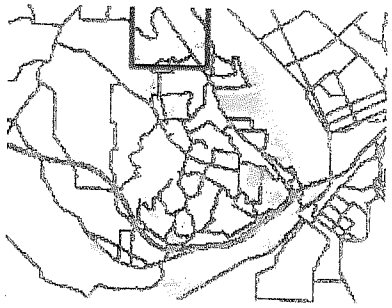
Scale 1:9,600 - 1 in = 800 ft
Scale is based on 8-1/2 x 11 paper size



Map created by: SSHROYER
Date Created: 06-Nov-15 10:12 AM

WEST LINN GIS

DISCLAIMER: This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information. Source: West Linn GIS (Geographic Information System) MapOptix.

CITY OF West Linn

CITY COUNCIL MEETING

PROJECT # SUB-15-03/WAP-16-03
MAIL: 3/31/16 TIDINGS: 4/7/16

CITIZEN CONTACT INFORMATION

To lessen the bulk of agenda packets, land use application notice, and to address the worries of some City residents about testimony contact information and online application packets containing their names and addresses as a reflection of the mailing notice area, this sheet substitutes for the photocopy of the testimony forms and/or mailing labels. A copy is available upon request.

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FILE NO. SUB-15-03 and WAP-16-03

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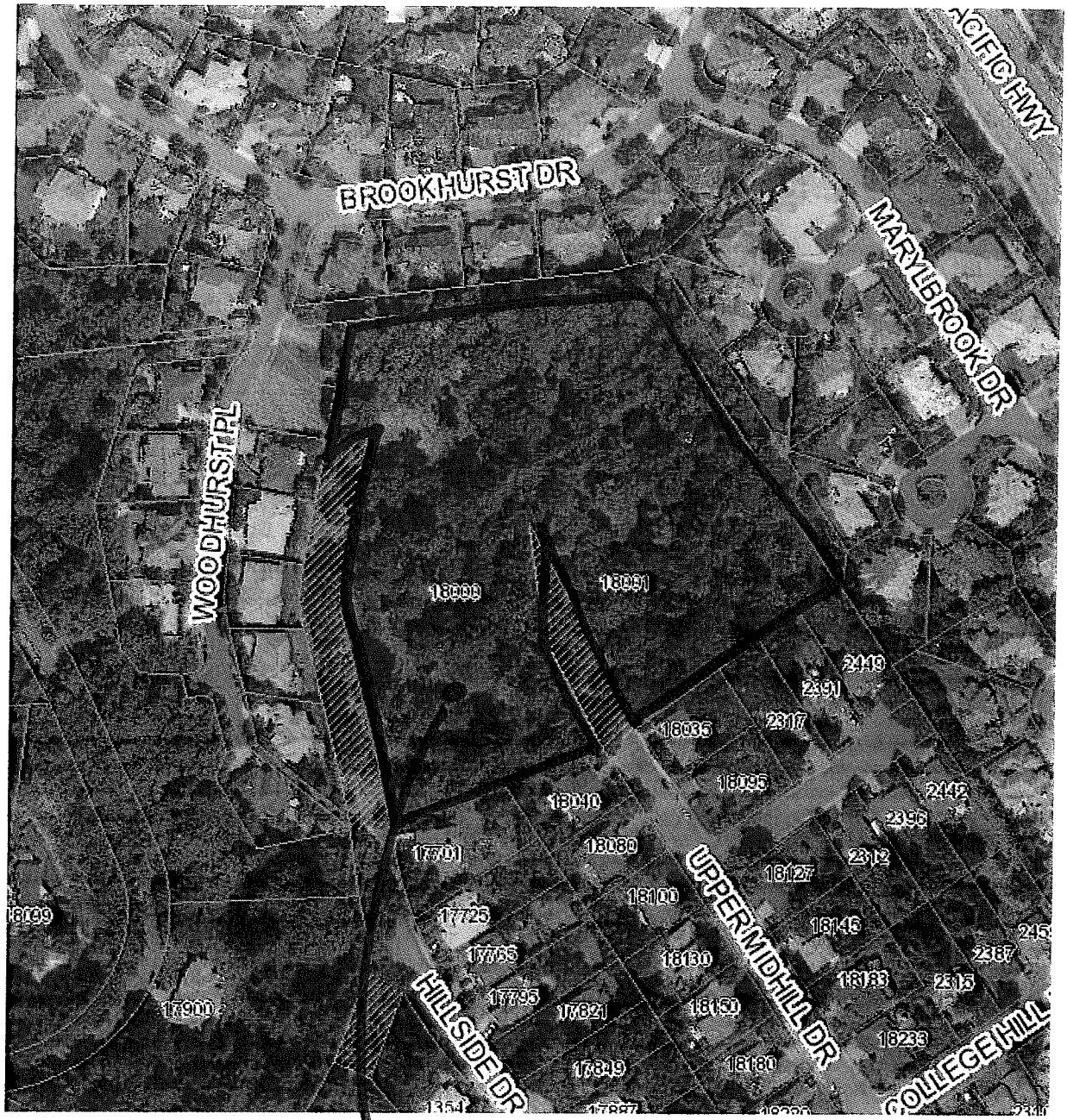
SUB-15-03-notice TIDINGS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MARYLBROOK DR
WOODHURST PL
HILLSIDE DR
UPPERMIDHILL DR
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SITE
SUB-15-03
500' R

PC-2 COMPLETENESS LETTER

City of West Linn

February 23, 2016

Upper Midhill Estates, LLC
Attn: Ryan Zygar
931 SW King Ave.
Portland, OR. 97205

SUBJECT: SUB-15-03 and WAP-16-03 application for 34-Lot Subdivision and Water Resource Area permit at 18000 Upper Midhill Drive.

Dear Mr. Zygar:

On February 1, 2016, the Planning Department received your resubmittal with a subsequent addendum, which included a signed application for a Water Resource Area permit, on February 11, 2016. These submittals fulfill the applicable requirements necessary to make a determination that **your application is now complete**. The City has 120 days, from February 11, 2016, to exhaust all local review; that period ends June 10, 2016.

Please be aware that a determination of a complete application does not guarantee a recommendation of approval from staff for your proposal as submitted – it signals that staff believes you have provided the necessary information for the Planning Commission to render a decision on your proposal.

A 20-day public notice will be prepared and mailed for a public hearing before the Planning Commission.

Contact me at 503-723-2539, or by email at pspir@westlinnoregon.gov if you have any questions or comments.

Sincerely,

PeterSpir

Peter Spir
Associate Planner

PC-3 APPLICANT'S SUBMITTAL

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING
610 SW Alder Street, Suite 700, Portland, OR 97205 503.228.5230 503.273.8169

April 5, 2016

Project #: 18758.0

Khoi Le
City of West Linn
22500 Salamo Road
West Linn, Oregon 97069

REGISTERED PROFESSIONAL ENGINEER
59948PE
OREGON
July 12, 2005
ANTHONY S. YI
EXPIRES: 6/30/2016

RE: Chene Blanc Estates Development - Supplemental Letter

Dear Khoi,

This letter addresses the recommendations provided in the March 21, 2016 memorandum prepared by DKS summarizing their review of the Chene Blanc Estates Traffic Impact Analysis (TIA). *A copy of the memorandum is included in Attachment A*. The recommendations presented in the memorandum are included below in italics, followed by our response.

Recommendation: *Collect review comments from ODOT.*

> **Response:** The Oregon Department of Transportation (ODOT) reviewed the TIA and provided input on the proposed mitigations at the Willamette Drive (OR 43)/Arbor Drive intersection. Their input is reflected in the responses below.

Recommendation: *Consider traffic operations during peak hours with the addition of Marylhurst University Traffic.*

> **Response:** Traffic counts were conducted at the study intersections in June 2015. The counts were seasonally adjusted to 30th Highest Hour Volumes (30HV) in accordance with the Seasonal Trend Table methodology outlined in the ODOT Analysis Procedures Manual (APM). The methodology resulted in a seasonal adjustment factor of 1.01. The 30HV reflect conditions along OR 43 during the peak month of the year, which occurs in August when school is not in session. The seasonal adjustment factor was applied to through volumes along OR 43 as well as all turning movement volumes at all study intersections to ensure a conservative analysis.

Recommendation: *Identify primary pedestrian/bicycle connections from site to transit and major activity generators and identify recommended improvements.*

> **Response:** There is a continuous network of sidewalks and paths that connect the proposed development to the transit stops located at the OR 43/Marybrook Drive intersection, which is also the main entrance to Marylhurst University. While there are gaps in the sidewalk network that connect the proposed development to the transit stops located at the OR 43/Arbor Drive

intersection, as well as other destinations along OR 43 and to Midhill Park, the existing network of sidewalks and shoulders currently provide the pedestrian connections that are off-site and located along adjacent land uses. In addition to full site frontage improvements along both sides of Upper Midhill Drive from the current roadway terminus to Hillside Drive, the proposed development will contribute to the long-term implementation of pedestrian and bicycle improvements along Arbor Drive, Upper Midhill Drive, and OR 43 through its System Development Charges as well as a proportionate share contribution to improvements at the OR 43/Arbor Drive intersection as described below.

Recommendation: *Indicate if other mitigation concepts were considered and (if needed) why they were not recommended.*

Response: Four alternatives were considered to mitigate traffic conditions at the OR 43/Arbor Drive intersection, including:

- Alternative 1: Installation of a separate eastbound right-turn lane on Arbor Drive. Arbor Drive is relatively narrow. Therefore, right-turning motorists are not able to slip past through/left-turning motorists at the intersection. This alternative would allow them to slip past; however, it impacts the properties located in the northwest and southwest corners of the OR 43/Arbor Drive intersection and does not improve traffic operations for the eastbound left-turn movement, which is the critical movement at the intersection. Therefore, this alternative was not identified in the TIA.
- Alternative 2: Installation of a center two-way left-turn lane on OR 43. This alternative provides a significant improvement in traffic operations and safety at the intersection.
    - Northbound and southbound left-turning motorists can use the center two-way left-turn lane to complete left-turns onto Arbor Drive, which separates slowed or stopped motorists from through motorists and reduces the potential for conflicts at the intersection.
    - Eastbound and westbound left-turning motorists can use the center two-way left-turn lane to complete two-stage left-turn movements onto OR 43, which significantly improves the delay associated with the eastbound and westbound left-turn movement as well as the eastbound and westbound right-turn movements, eliminating the need for separate right turn lanes.

  This alternative is consistent with the OR 43 Conceptual Design Plan that is currently underway. This alternative is also consistent with the input received from ODOT on potential mitigations for the intersection. A variation of this alternative was identified in the TIA; however, it has been updated to reflect ODOT comments as described below.
- Alternative 3: Installation of a separate eastbound right-turn lane on Arbor Drive and separate northbound and southbound left-turn lanes on OR 43. This alternative provides a minimal improvement over the previous alternative; however, it still impacts the properties

located in the northwest and southwest corners of the OR 43/Arbor Drive intersection. Therefore, this alternative was not identified in the TIA.

- Alternative 4: Installation of a traffic signal. Preliminary signal warrants indicate that a signal is not warranted under year 2015 existing, year 2017 background, and year 2017 total traffic conditions. Therefore, this alternative is not recommended

Recommendation: *Provide traffic operations with the shift in site traffic.*

Response: As indicated above, provision of a center two-way left-turn lane on OR 43 would improve traffic operations at the OR 43/Arbor Drive intersection and increase the capacity of the eastbound left-turn movement to accommodate additional vehicles during the weekday morning and evening peak hours. Further evaluation of year 2017 total traffic conditions with the center two-way left-turn lane indicates that the eastbound left-turn movement has sufficient capacity to accommodate all of the existing eastbound left-turning vehicles and all of the eastbound left-turn vehicles associated with the proposed development. *Attachment B contains the worksheets used to evaluate year 2017 total traffic conditions with the proposed mitigations and the potential shift in traffic.*

Recommendation: *Provide supporting assumptions and analysis related to dimensions shown, including traffic queuing.*

Response: The year 2017 total traffic conditions analysis (with and without the proposed mitigation and/or shift in traffic) indicates that the northbound left and southbound left-turn queues are not expected to exceed 25 feet during the weekday morning and weekday evening peak hours. *The queuing analysis worksheets are included in Attachment B.* However, ODOT requires a minimum of 100-feet of storage on all its facilities and 130-feet of deceleration distance followed by a 25:1 taper rate on all its facilities posted 35 miles per hour (mph).

Recommendation: *At discretion of City staff, clarify proportional share assumptions.*

Response: The proportionate share estimate was determined by dividing the total number of site-generated trips that are expected to enter the OR 43/Arbor Drive intersection during the weekday morning and weekday evening peak hours by the total enter volumes.

The proposed development is estimated to generate approximately 34 trips during the weekday morning and 40 trips during the weekday evening peak hours. Approximately 45 percent of all trips are expected to travel to/from the north on OR 43, 50 percent are expected to travel to/from the south on OR 43, and five percent are expected to travel to/from the west on Marylhurst Drive. All trips to/from the north (15 morning, 17 evening) are expected to enter the OR 43/Arbor Drive intersection (with and without a potential shift in traffic), while only 50 percent of all trips to/from the south (10 morning, 11 evening) and none of the trips to/from the east are expected to enter the intersection. Therefore, a total of 25 site-generated trips are expected to enter the intersection during the weekday morning peak hour at which time the

total enter volume is expected to be 1,416 and 28 site-generated trips are expected to enter the intersection during the weekday evening peak hour at which time the total enter volume is expected to be 1,671. Therefore, the proportion of site-generated trips to total entering volumes is approximately 1.8 in the morning and 1.7 in the evening peak hours. It should be noted that this represents a decrease in the proportion of site-generated trips to total entering volume presented in the TIA because while the total number of site-generated trips has remained the same, the total entering volume has increased along with the build-out year (2016 versus 2017).

Recommendation: *At discretion of City staff, provide cost estimates for improvement that is consistent with standard cross section and incorporates sufficient vehicle queue storage.*

Response: The concept sketch and cost estimate have been updated to reflect input from ODOT and the City on off-site mitigations. The updated sketch includes approximately 50-feet of storage on the north and 100-feet of storage on the south side of the intersection with appropriate deceleration lengths and tapers. It also includes improvements consistent with the OR 43 Concept Plan. The updated cost estimate is a planning level estimate that includes widening the roadway and the installation of sidewalks, cycle tracks, and landscape strips. It also accounts for drainage and provides for contingencies, but may not account for the full impacts to the culvert located north of the intersection. *The updated concept sketch and cost estimate worksheets are included in Attachment C.*

Responses to other review notes:

The background and total traffic conditions analyses were updated to reflect year 2017 traffic conditions. The updated analyses were performed using Synchro 9, which implements the 2000 HCM methodology for signalized intersections and the 2010 HCM methodology for unsignalized intersections. The results of the analyses highlight some of the significant differences in the methodologies. For example, the OR 43/Arbor Drive intersection, which was found to have a v/c ratio of 1.05 using the HCM 2000 methodology, was found to have a v/c ratio of 0.28 using the HCM 2010 methodology. The results were confirmed using HCS 2010 software, which also implements the HCM 2010 methodology. Despite the results in the updated analysis, the proposed mitigation measure at the OR 43/Arbor Drive intersection are still recommended to address safety concerns at the intersection.

We trust that this letter provides you with sufficient information related to the Chene Blanc Estates Development. Please feel free to contact us with any additional questions or comments.

Sincerely,
KITTELSON & ASSOCIATES, INC.

Matt Bell
Transportation Planner

Attachment A Technical Review Summary

DKS

720 SW Washington St.
Suite 500
Portland, OR 97205
503.243.3500
www.dksassociates.com

MEMORANDUM

DATE: March 21, 2016

TO: Khoi Le, City of West Linn

FROM: Garth Appanaitis, PE

SUBJECT: Chene Blanc Estates TIA Review
West Linn On Call - Task 1 P16043-001

Per your request of March 1, 2016, we have reviewed the traffic impact analysis (TIA)[1] provided for the proposed Chene Blanc Estates residential development on Upper Midhill Drive. This review focused on the technical components of the analysis, which are summarized in the following sections. Based on our review of submitted materials, additional analysis components should be considered and clarification should be provided for the proposed mitigation at Willamette Drive / Arbor Drive.

TECHNICAL REVIEW SUMMARY

This section provide a summary of our technical review, which is organized into significant items and additional review notes for consideration that could be pursued at the City's discretion.

Significant Items

The following items have significant potential to alter the finding of transportation impacts and related recommendations:

- Page 1 - Did ODOT Review TIA and provide comments? OR 43 is an ODOT roadway and they will need to review proposed mitigation.
  - *Recommendation: Collect review comments from ODOT.*
- Page 4 - Notes that observations were performed in July 2015, and Appendix A shows traffic counts were collected June 17, 2015. This appears to be after Spring 2015 term had ended for Marylhurst University. Due to the proximity to the university, there is potential for higher traffic volumes during the school year and no adjustments appear to have been made.
  - *Recommendation: Consider traffic operations during peak hours with the addition of Marylhurst University traffic.*
- Page 5 - Deficiencies noted for pedestrian system, however this is no discussion of how this relates to access to transit and connections to major activity generators (such as commercial locations near Fairview Way). If needed, pedestrian and bicycle improvements (such as gap infill and/or crossing improvements) should be identified.
  - *Recommendation: Identify primary pedestrian/bicycle connections from site to transit and major activity generators and identify recommended improvements.*
- Page 14 - Mitigation is proposed for the intersection of Willamette Drive / Arbor Drive. As noted, the proposed mitigation would both improve intersection operations and provide a safety improvement to address northbound rear-end crashes. No additional information was provided regarding other

[1] Memorandum: Chene Blanc Estates Residential Development Transportation Impact Analysis, prepared by Kittelson & Associates, Inc., January 29, 2016.

mitigation options. It is not clear if other mitigation options were considered or warrants checked. Traffic volumes indicate that there are more vehicles making a southbound left during the p.m. peak hour than a northbound left during either the a.m. or p.m. peak hour.
    - *Recommendation: Indicate if other mitigation concepts were considered and (if needed) why they were not recommended.*
- Page 16 - Figure 8 indicated that with mitigated traffic conditions no eastbound left turn vehicles were assumed to shift back to Arbor Drive (which were assumed to shift to Marylhurst Drive due to traffic conditions). How would intersection operate with vehicles shifted back to this location? In addition, northbound left turn traffic traveling to the site may shift from Marylhurst Drive to Arbor Drive if a turn lane was provided.
    - *Recommendation: Provide traffic operations with the shift in site traffic.*
- Page 17 - Mitigation concept shown in Figure 9 generally appears sound schematically (without regard to dimensions), but no information is provided about design assumptions to support striping lengths, including design speed and queueing analysis.
    - *Recommendation: Provide supporting assumptions and analysis related to dimensions shown, including traffic queuing.*
- Page 18 - Proportionate share magnitude is provided without supporting methodology or calculations. It is assumed that total entering volume was used for calculation, but this is not documented. As noted, additional site traffic may shift to this intersection with the proposed mitigation.
    - *Recommendation: At discretion of City staff, clarify proportional share assumptions.*
- Page 18 - Notes that cost estimate was provided to City for proposed mitigation but was not included in TIA. The proposed mitigation does not seem to include urban design components that are consistent with the City's design standards (curb gutter and sidewalk) and is likely underestimating the cost of improvements.
    - *Recommendation: At discretion of City staff, provide cost estimates for improvement that is consistent with standard cross section and incorporates sufficient vehicle queue storage.*

Other Review Notes

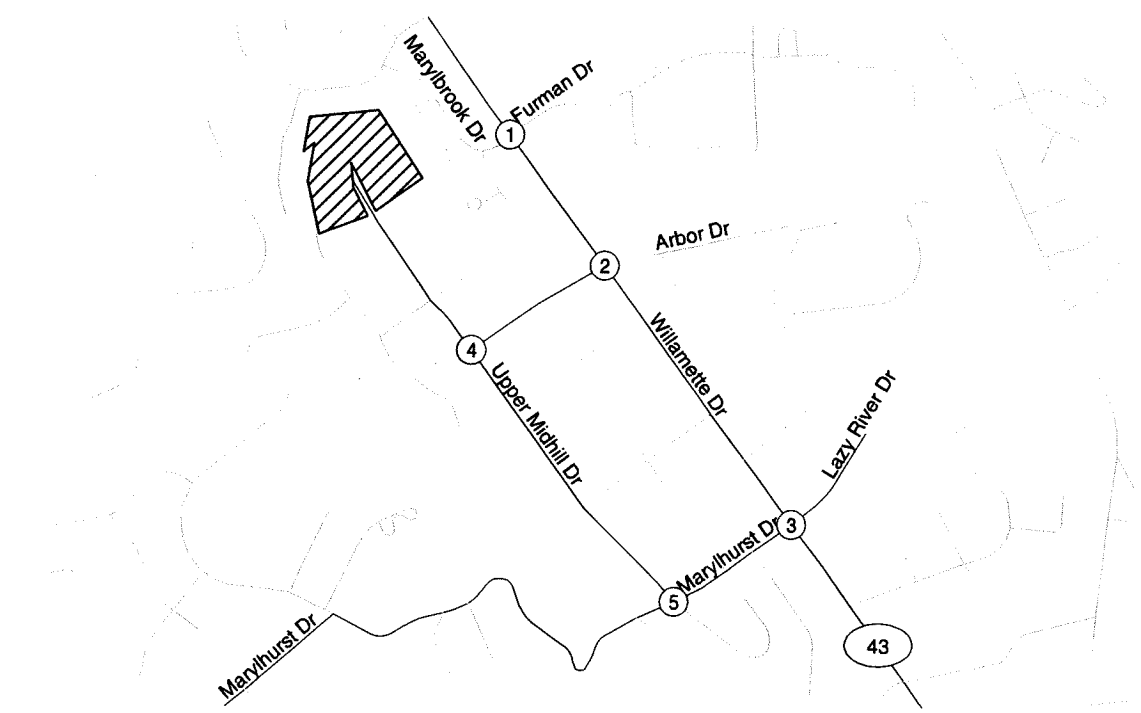
The following items were noted during the technical review and are not likely to significantly affect the analysis findings.

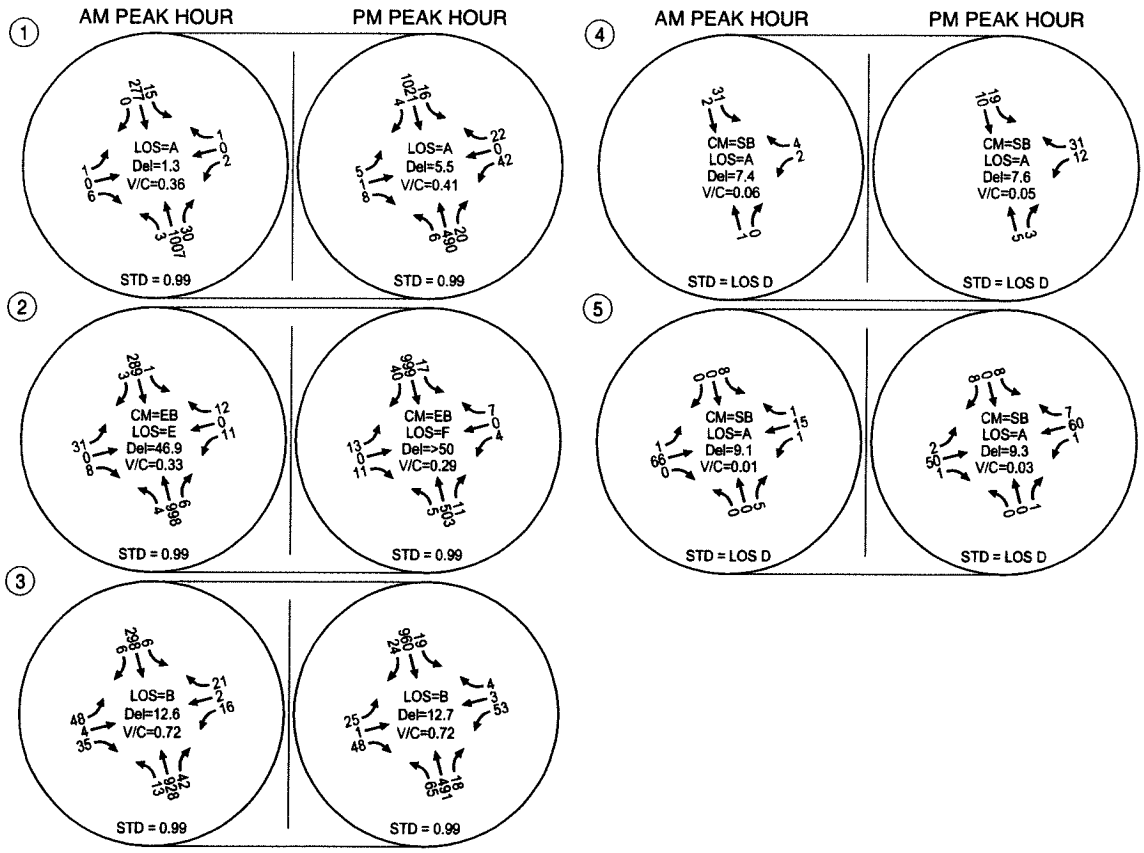
- Page 1 - Notes "construction of the proposed development is expected to occur in 2015 with full build-out and occupancy in 2016" - Did construction occur? Is occupancy still anticipated for 2016, or does it need to be pushed later with additional traffic growth? Due to the small rate of annual growth assumed, this is not likely to have a significant impact on the findings.
- Page 4 - Table 1 - OR 43 has a 5 lane section at Marylbrook Dr/Furman Dr.
- Page 5 - Roadway volumes were seasonally factored, but no mention is made of factor methodology, resultant factor used, nor of adjustments for school traffic.
- Page 7 - Figure 4 indicates that Willamette Drive / Arbor Drive has a v/c ratio that exceeds 1.0 in the p.m. peak hour. Since existing volumes were counted, a v/c ratio that exceeds 1.0 should be explained.
- Page 8 - There is a note that the 2000 HCM was used without reason provided for not using 2010 HCM. HCM 2010 should be used for unsignalized intersection capacity analysis unless precluded by a unique configuration, which does not appear to be present.
- Page 8 - Note that Appendix C includes the intersection capacity analysis worksheets. It appears that Synchro 7 was used for the analysis, which is an older version of the software with bugs that were addressed in later versions. It is unclear why this software version was used in place of Version 8 or 9.
- Page 9 - Crash analysis summarized in Table 2 does not indicate crash rates for intersections. Page 9 - The text notes that "no other trends or patters were identified" in the crash analysis, but there were

four turn crashes that occurred at Willamette Drive / Arbor Drive. These crashes are listed in the table but no description is provided in the text.
    - Upon further review, the remaining turn crashes involved a number of different approaches and movements and do not indicate a pattern.
- Page 9 - Crash analysis indicates that there is a recurring pattern of rear end crashes at Willamette Drive / Arbor Drive notes potential mitigation measures are listed at a later point in report.
    - Upon further review, the rear end crashes occurred in the northbound approach, which would be corrected with the recommended left turn lane.
- Page 12 - Trip distribution notes that no trips will be added to the eastbound left turn at Willamette Drive / Arbor Drive due to operational issues. While delay may deter drivers, some may still choose to use this movement. Further, some may use the movement due to proximity and other existing traffic may divert to other locations. Site generated traffic may use this movement.

If you have any questions, please call.

Attachment B Traffic Operations Analysis





CM = CRITICAL MOVEMENT (TWSC)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED/AWSC) / CRITICAL MOVEMENT LEVEL OF SERVICE (TWSC)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED/AWSC) / CRITICAL MOVEMENT CONTROL DELAY (TWSC)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO
TWC = TWO-WAY STOP CONTROL
AWSC= ALL-WAY STOP CONTROL
STD = MOBILITY STANDARD

Existing Traffic Conditions
Weekday AM & PM Peak Hour
West Linn, OR

Figure 4

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING PLANNING

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	6	2	0	1	3	1007	30	15	277	0
Future Volume (vph)	1	0	6	2	0	1	3	1007	30	15	277	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		1.00	0.99		1.00	1.00	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00	1.00	0.99	1.00	1.00	1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1805	1594		1803	1615	1789	3438	1477	1687	3438	
Flt Permitted		1.00	1.00		1.00	1.00	0.57	1.00	1.00	0.25	1.00	
Satd. Flow (perm)		1900	1594		1898	1615	1076	3438	1477	451	3438	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	1	0	6	2	0	1	3	1071	32	16	295	0
RTOR Reduction (vph)	0	0	6	0	0	1	0	0	5	0	0	0
Lane Group Flow (vph)	0	1	0	0	2	0	3	1071	27	16	295	0
Confl. Peds. (#/hr)			1	1			9					9
Confl. Bikes (#/hr)									3			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	5%	7%	7%	5%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		8	4	4	4	2		2	6		6
Actuated Green, G (s)		1.2	1.2		1.2	1.2	84.3	83.3	83.3	86.3	84.3	
Effective Green, g (s)		1.2	1.2		1.2	1.2	84.3	83.3	83.3	86.3	84.3	
Actuated g/C Ratio		0.01	0.01		0.01	0.01	0.84	0.83	0.83	0.86	0.84	
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.3	4.8	4.8	2.3	4.8	
Lane Grp Cap (vph)		22	19		22	19	914	2863	1230	413	2898	
v/s Ratio Prot							0.00	c0.31		c0.00	0.09	
v/s Ratio Perm		0.00	0.00		c0.00	0.00	0.00		0.02	0.03		
v/c Ratio		0.05	0.00		0.09	0.00	0.00	0.37	0.02	0.04	0.10	
Uniform Delay, d1		48.8	48.8		48.9	48.8	1.2	2.0	1.4	1.0	1.3	
Progression Factor		1.00	1.00		1.00	1.00	0.39	0.27	1.00	1.00	1.00	
Incremental Delay, d2		0.6	0.1		1.3	0.0	0.0	0.3	0.0	0.0	0.0	
Delay (s)		49.5	48.9		50.2	48.8	0.5	0.8	1.4	1.1	1.4	
Level of Service		D	D		D	D	A	A	A	A	A	
Approach Delay (s)		49.0			49.7			0.9			1.4	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	1.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	49.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	31	0	8	11	0	12	4	998	6	1	289	3
Future Vol, veh/h	31	0	8	11	0	12	4	998	6	1	289	3
Conflicting Peds, #/hr	0	0	1	1	0	0	1	0	0	0	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	6	0	0	0	0	0	0	4	0	0	5	0
Mvmt Flow	34	0	9	12	0	13	4	1085	7	1	314	3

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1423	1420	318	1421	1419	1090	318	0	0	1092	0	0
Stage 1	319	319	-	1098	1098	-	-	-	-	-	-	-
Stage 2	1104	1101	-	323	321	-	-	-	-	-	-	-
Critical Hdwy	7.16	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.16	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.16	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.554	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	111	138	727	115	138	264	1253	-	-	647	-	-
Stage 1	684	657	-	260	291	-	-	-	-	-	-	-
Stage 2	252	290	-	693	655	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	105	136	726	113	136	264	1252	-	-	646	-	-
Mov Cap-2 Maneuver	105	136	-	113	136	-	-	-	-	-	-	-
Stage 1	678	655	-	258	288	-	-	-	-	-	-	-
Stage 2	237	287	-	683	653	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	46.9	31.4	0	0
HCM LOS	E	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1252	-	-	127	161	646	-	-
HCM Lane V/C Ratio	0.003	-	-	0.334	0.155	0.002	-	-
HCM Control Delay (s)	7.9	0	-	46.9	31.4	10.6	0	-
HCM Lane LOS	A	A	-	E	D	B	A	-
HCM 95th %tile Q(veh)	0	-	-	1.3	0.5	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	4	35	16	2	21	13	928	42	6	298	6
Future Volume (vph)	48	4	35	16	2	21	13	928	42	6	298	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.95			0.93		1.00	0.99		1.00	1.00	
Flt Protected		0.97			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1723			1701		1568	1802		1805	1812	
Flt Permitted		0.86			0.84		0.56	1.00		0.19	1.00	
Satd. Flow (perm)		1517			1452		926	1802		355	1812	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	52	4	38	17	2	23	14	998	45	6	320	6
RTOR Reduction (vph)	0	28	0	0	21	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	66	0	0	21	0	14	1042	0	6	326	0
Confl. Peds. (#/hr)	2					2	1					1
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	15%	5%	0%	0%	4%	33%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)		8.4			8.4		77.7	76.6		77.5	76.5	
Effective Green, g (s)		8.4			8.4		77.7	76.6		77.5	76.5	
Actuated g/C Ratio		0.08			0.08		0.78	0.77		0.78	0.76	
Clearance Time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Vehicle Extension (s)		2.5			2.5		2.3	5.2		2.3	5.2	
Lane Grp Cap (vph)		127			121		726	1380		289	1386	
v/s Ratio Prot							c0.00	c0.58		0.00	0.18	
v/s Ratio Perm		c0.04			0.01		0.01			0.02		
v/c Ratio		0.52			0.17		0.02	0.76		0.02	0.23	
Uniform Delay, d1		43.9			42.6		2.5	6.5		6.3	3.4	
Progression Factor		1.00			1.00		1.00	1.00		1.92	1.80	
Incremental Delay, d2		2.6			0.5		0.0	3.9		0.0	0.4	
Delay (s)		46.5			43.1		2.5	10.4		12.0	6.5	
Level of Service		D			D		A	B		B	A	
Approach Delay (s)		46.5			43.1			10.3			6.6	
Approach LOS		D			D			B			A	

Intersection Summary				
HCM 2000 Control Delay	12.6	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.72			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.0	
Intersection Capacity Utilization	66.6%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Intersection	
Intersection Delay, s/veh	7.3
Intersection LOS	A

Movement	WBU	WBL	WBR	NBU	NBT	NBR	SBU	SBL	SBT
Traffic Vol, veh/h	0	2	4	0	1	0	0	31	2
Future Vol, veh/h	0	2	4	0	1	0	0	31	2
Peak Hour Factor	0.92	0.66	0.66	0.92	0.66	0.66	0.92	0.66	0.66
Heavy Vehicles, %	2	0	0	2	100	0	2	0	0
Mvmt Flow	0	3	6	0	2	0	0	47	3
Number of Lanes	0	1	0	0	1	0	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	6.7	8.7	7.4
HCM LOS	A	A	A

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	33%	94%
Vol Thru, %	100%	0%	6%
Vol Right, %	0%	67%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	1	6	33
LT Vol	0	2	31
Through Vol	1	0	2
RT Vol	0	4	0
Lane Flow Rate	2	9	50
Geometry Grp	1	1	1
Degree of Util (X)	0.002	0.009	0.057
Departure Headway (Hd)	5.653	3.654	4.105
Convergence, Y/N	Yes	Yes	Yes
Cap	635	978	878
Service Time	3.667	1.682	2.107
HCM Lane V/C Ratio	0.003	0.009	0.057
HCM Control Delay	8.7	6.7	7.4
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0	0	0.2

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	1	66	0	1	15	1	0	0	5	8	0	0
Future Vol, veh/h	1	66	0	1	15	1	0	0	5	8	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	1	0	1	1	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	100	0	0	0	18	0	0	0	0	0	0	0
Mvmt Flow	1	74	0	1	17	1	0	0	6	9	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	19	0	0	75	0	0	98	98	75	101	98	18
Stage 1	-	-	-	-	-	-	77	77	-	21	21	-
Stage 2	-	-	-	-	-	-	21	21	-	80	77	-
Critical Hdwy	5.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	3.1	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1140	-	-	1537	-	-	889	796	992	885	796	1066
Stage 1	-	-	-	-	-	-	937	835	-	1003	882	-
Stage 2	-	-	-	-	-	-	1003	882	-	934	835	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1140	-	-	1537	-	-	887	793	991	878	793	1065
Mov Cap-2 Maneuver	-	-	-	-	-	-	887	793	-	878	793	-
Stage 1	-	-	-	-	-	-	935	833	-	1001	880	-
Stage 2	-	-	-	-	-	-	1002	880	-	928	833	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.4	8.7	9.1
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	991	1140	-	-	1537	-	-	878
HCM Lane V/C Ratio	0.006	0.001	-	-	0.001	-	-	0.01
HCM Control Delay (s)	8.7	8.2	0	-	7.3	0	-	9.1
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	1	8	42	0	22	6	490	20	16	1021	4
Future Volume (vph)	5	1	8	42	0	22	6	490	20	16	1021	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		1.00	1.00		1.00	0.99	1.00	1.00	0.97	1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1822	1615		1719	1594	1805	3505	1570	1803	3471	1576
Flt Permitted		0.78	1.00		0.75	1.00	0.24	1.00	1.00	0.45	1.00	1.00
Satd. Flow (perm)		1479	1615		1364	1594	453	3505	1570	846	3471	1576
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	5	1	9	46	0	24	7	538	22	18	1122	4
RTOR Reduction (vph)	0	0	8	0	0	22	0	0	5	0	0	1
Lane Group Flow (vph)	0	6	1	0	46	2	7	538	17	18	1122	3
Confl. Peds. (#/hr)	1					1	1		2	2		1
Confl. Bikes (#/hr)									4			3
Heavy Vehicles (%)	0%	0%	0%	5%	0%	0%	0%	3%	0%	0%	4%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		8	4	4	4	2		2	6		6
Actuated Green, G (s)		7.7	7.7		7.7	7.7	87.7	86.7	86.7	89.9	87.8	87.8
Effective Green, g (s)		7.7	7.7		7.7	7.7	87.7	86.7	86.7	89.9	87.8	87.8
Actuated g/C Ratio		0.07	0.07		0.07	0.07	0.80	0.79	0.79	0.82	0.80	0.80
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.3	4.8	4.8	2.3	4.8	4.8
Lane Grp Cap (vph)		103	113		95	111	373	2762	1237	709	2770	1257
v/s Ratio Prot							0.00	0.15		c0.00	c0.32	
v/s Ratio Perm		0.00	0.00		c0.03	0.00	0.01		0.01	0.02		0.00
v/c Ratio		0.06	0.01		0.48	0.02	0.02	0.19	0.01	0.03	0.41	0.00
Uniform Delay, d1		47.8	47.6		49.2	47.6	2.4	2.9	2.5	1.9	3.3	2.2
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.2	0.0		2.8	0.0	0.0	0.2	0.0	0.0	0.2	0.0
Delay (s)		47.9	47.6		52.1	47.7	2.4	3.1	2.5	1.9	3.5	2.2
Level of Service		D	D		D	D	A	A	A	A	A	A
Approach Delay (s)		47.7			50.5			3.0			3.5	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	13	0	11	4	0	7	5	503	11	17	999	40
Future Vol, veh/h	13	0	11	4	0	7	5	503	11	17	999	40
Conflicting Peds, #/hr	0	0	0	0	0	0	1	0	1	1	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	15	0	0	0	0	0	0	2	0	6	4	2
Mvmt Flow	14	0	12	4	0	8	5	553	12	19	1098	44

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1731	1733	1121	1733	1749	560	1142	0	0	565	0	0
Stage 1	1157	1157	-	570	570	-	-	-	-	-	-	-
Stage 2	574	576	-	1163	1179	-	-	-	-	-	-	-
Critical Hdwy	7.25	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.16	-	-
Critical Hdwy Stg 1	6.25	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.25	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.635	4	3.3	3.5	4	3.3	2.2	-	-	2.254	-	-
Pot Cap-1 Maneuver	64	89	253	70	87	532	619	-	-	987	-	-
Stage 1	225	273	-	510	509	-	-	-	-	-	-	-
Stage 2	482	505	-	239	267	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	60	83	253	63	81	532	618	-	-	986	-	-
Mov Cap-2 Maneuver	60	83	-	63	81	-	-	-	-	-	-	-
Stage 1	222	259	-	504	503	-	-	-	-	-	-	-
Stage 2	469	499	-	215	253	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	59.2	32.3	0.1	0.1
HCM LOS	F	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	618	-	-	92	144	986	-	-
HCM Lane V/C Ratio	0.009	-	-	0.287	0.084	0.019	-	-
HCM Control Delay (s)	10.9	0	-	59.2	32.3	8.7	0	-
HCM Lane LOS	B	A	-	F	D	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.1	0.3	0.1	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	1	48	53	3	4	65	491	18	19	960	24
Future Volume (vph)	25	1	48	53	3	4	65	491	18	19	960	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.98			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.91			0.99		1.00	0.99		1.00	1.00	
Flt Protected		0.98			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1654			1763		1770	1852		1716	1821	
Flt Permitted		0.90			0.69		0.17	1.00		0.45	1.00	
Satd. Flow (perm)		1512			1265		309	1852		815	1821	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	26	1	50	55	3	4	68	511	19	20	1000	25
RTOR Reduction (vph)	0	46	0	0	3	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	31	0	0	59	0	68	529	0	20	1024	0
Confl. Peds. (#/hr)	1		2	2		1	1		3	3		1
Confl. Bikes (#/hr)									5			3
Heavy Vehicles (%)	0%	0%	2%	2%	0%	0%	2%	2%	0%	5%	4%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)		8.1			8.1		80.5	75.8		75.3	73.2	
Effective Green, g (s)		8.1			8.1		80.5	75.8		75.3	73.2	
Actuated g/C Ratio		0.08			0.08		0.80	0.76		0.75	0.73	
Clearance Time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Vehicle Extension (s)		2.5			2.5		2.3	5.2		2.3	5.2	
Lane Grp Cap (vph)		122			102		317	1403		632	1332	
v/s Ratio Prot							c0.01	0.29		0.00	c0.56	
v/s Ratio Perm		0.02			c0.05		0.16			0.02		
v/c Ratio		0.25			0.58		0.21	0.38		0.03	0.77	
Uniform Delay, d1		43.1			44.3		8.2	4.1		3.1	8.2	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.8			6.8		0.2	0.8		0.0	4.3	
Delay (s)		43.9			51.1		8.4	4.9		3.1	12.5	
Level of Service		D			D		A	A		A	B	
Approach Delay (s)		43.9			51.1			5.3			12.4	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	12.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	69.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Intersection Delay, s/veh	7.2
Intersection LOS	A

Movement	WBU	WBL	WBR	NBU	NBT	NBR	SBU	SBL	SBT
Traffic Vol, veh/h	0	12	31	0	5	3	0	19	10
Future Vol, veh/h	0	12	31	0	5	3	0	19	10
Peak Hour Factor	0.92	0.69	0.69	0.92	0.69	0.69	0.92	0.69	0.69
Heavy Vehicles, %	2	0	3	2	0	0	2	11	0
Mvmt Flow	0	17	45	0	7	4	0	28	14
Number of Lanes	0	1	0	0	1	0	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	6.9	6.9	7.6
HCM LOS	A	A	A

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	28%	66%
Vol Thru, %	62%	0%	34%
Vol Right, %	38%	72%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	8	43	29
LT Vol	0	12	19
Through Vol	5	0	10
RT Vol	3	31	0
Lane Flow Rate	12	62	42
Geometry Grp	1	1	1
Degree of Util (X)	0.012	0.063	0.051
Departure Headway (Hd)	3.815	3.615	4.335
Convergence, Y/N	Yes	Yes	Yes
Cap	937	988	828
Service Time	1.843	1.646	2.353
HCM Lane V/C Ratio	0.013	0.063	0.051
HCM Control Delay	6.9	6.9	7.6
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0	0.2	0.2

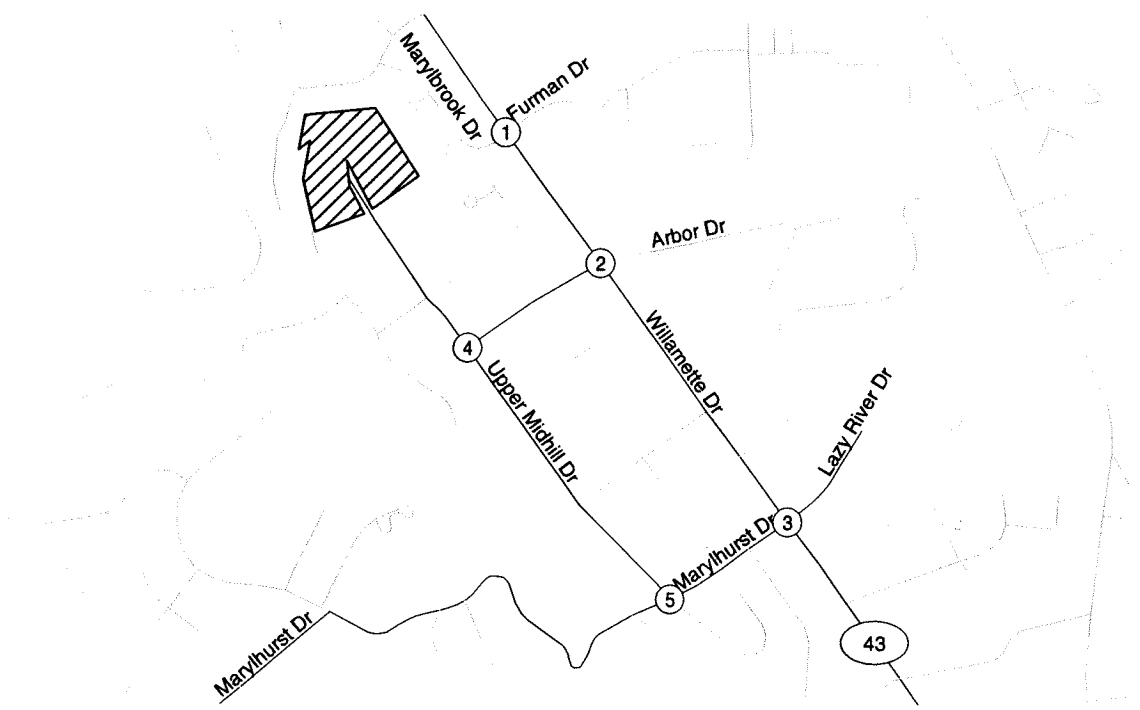
Intersection	
Int Delay, s/veh	1.3

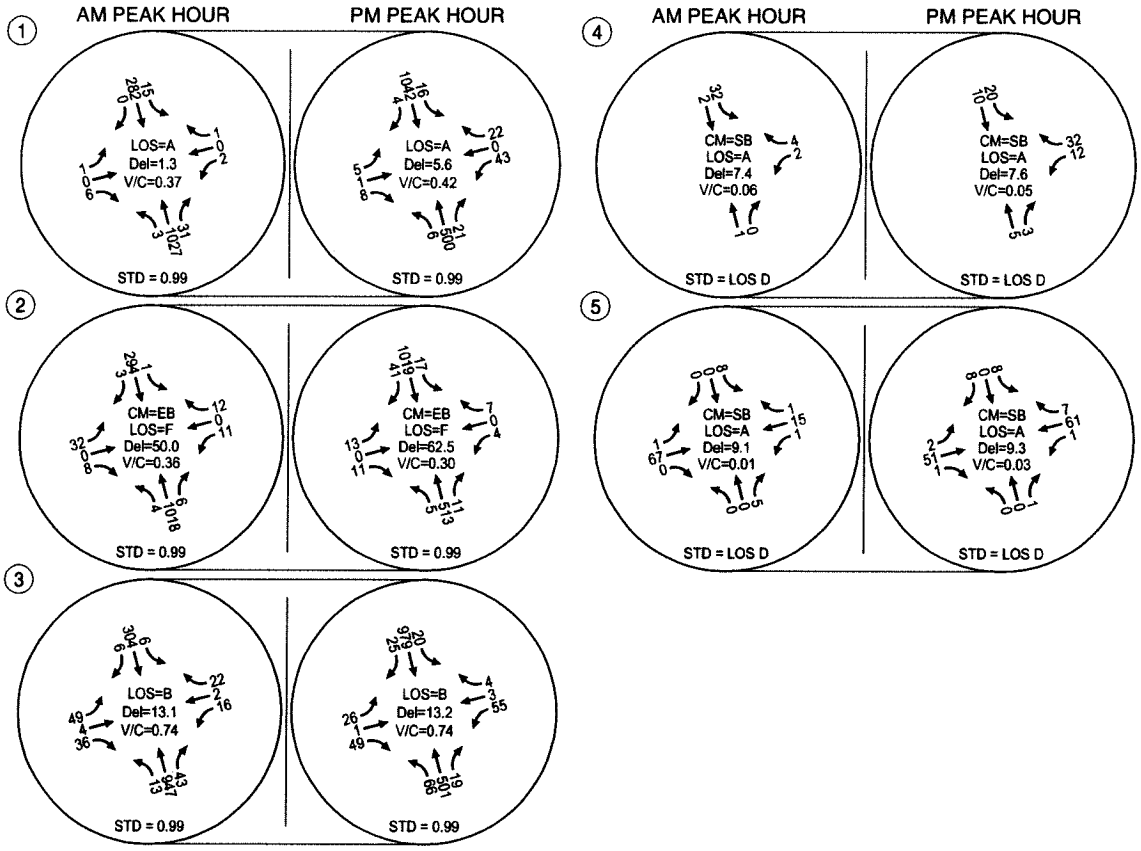
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	2	50	1	1	60	7	0	0	1	8	0	8
Future Vol, veh/h	2	50	1	1	60	7	0	0	1	8	0	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	67	67	67	67	67	67	67	67	67	67	67	67
Heavy Vehicles, %	0	4	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	3	75	1	1	90	10	0	0	1	12	0	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	100	0	0	76	0	0	185	184	75	180	180	95
Stage 1	-	-	-	-	-	-	81	81	-	98	98	-
Stage 2	-	-	-	-	-	-	104	103	-	82	82	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1505	-	-	1536	-	-	780	714	992	786	717	967
Stage 1	-	-	-	-	-	-	932	832	-	913	818	-
Stage 2	-	-	-	-	-	-	907	814	-	931	831	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1505	-	-	1536	-	-	769	712	992	783	715	967
Mov Cap-2 Maneuver	-	-	-	-	-	-	769	712	-	783	715	-
Stage 1	-	-	-	-	-	-	930	830	-	911	817	-
Stage 2	-	-	-	-	-	-	895	813	-	928	829	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.1	8.6	9.3
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	992	1505	-	-	1536	-	-	865
HCM Lane V/C Ratio	0.002	0.002	-	-	0.001	-	-	0.028
HCM Control Delay (s)	8.6	7.4	0	-	7.3	0	-	9.3
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0.1





CM = CRITICAL MOVEMENT (TWSC)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED/AWSC) / CRITICAL MOVEMENT LEVEL OF SERVICE (TWSC)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED/AWSC) / CRITICAL MOVEMENT CONTROL DELAY (TWSC)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO
TWC = TWO-WAY STOP CONTROL
AWSC= ALL-WAY STOP CONTROL
STD = MOBILITY STANDARD

Year 2017 Background Traffic Conditions
Weekday AM & PM Peak Hour
West Linn, OR

Figure 5

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING PLANNING

\\kittelson.com\fs\H_Portland\projfile\18758 - West Linn Reesman Property Residential\dwgs\figs\18758_fig1.dwg Apr 05, 2016 - 1:48pm - mbell Layout Tab: Fig05

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	6	2	0	1	3	1027	31	15	282	0
Future Volume (vph)	1	0	6	2	0	1	3	1027	31	15	282	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		1.00	0.99		1.00	1.00	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00	1.00	0.99	1.00	1.00	1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1805	1594		1803	1615	1789	3438	1477	1687	3438	
Flt Permitted		1.00	1.00		1.00	1.00	0.57	1.00	1.00	0.25	1.00	
Satd. Flow (perm)		1900	1594		1898	1615	1071	3438	1477	440	3438	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	1	0	6	2	0	1	3	1093	33	16	300	0
RTOR Reduction (vph)	0	0	6	0	0	1	0	0	6	0	0	0
Lane Group Flow (vph)	0	1	0	0	2	0	3	1093	27	16	300	0
Confl. Peds. (#/hr)			1	1			9					9
Confl. Bikes (#/hr)									3			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	5%	7%	7%	5%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		8	4	4	4	2		2	6		6
Actuated Green, G (s)		1.2	1.2		1.2	1.2	84.3	83.3	83.3	86.3	84.3	
Effective Green, g (s)		1.2	1.2		1.2	1.2	84.3	83.3	83.3	86.3	84.3	
Actuated g/C Ratio		0.01	0.01		0.01	0.01	0.84	0.83	0.83	0.86	0.84	
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.3	4.8	4.8	2.3	4.8	
Lane Grp Cap (vph)		22	19		22	19	910	2863	1230	404	2898	
v/s Ratio Prot							0.00	c0.32		c0.00	0.09	
v/s Ratio Perm		0.00	0.00		c0.00	0.00	0.00		0.02	0.03		
v/c Ratio		0.05	0.00		0.09	0.00	0.00	0.38	0.02	0.04	0.10	
Uniform Delay, d1		48.8	48.8		48.9	48.8	1.2	2.0	1.4	1.0	1.4	
Progression Factor		1.00	1.00		1.00	1.00	0.36	0.27	1.00	1.00	1.00	
Incremental Delay, d2		0.6	0.1		1.3	0.0	0.0	0.3	0.0	0.0	0.0	
Delay (s)		49.5	48.9		50.2	48.8	0.4	0.8	1.4	1.1	1.4	
Level of Service		D	D		D	D	A	A	A	A	A	
Approach Delay (s)		49.0			49.7			0.9			1.4	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	1.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	50.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	32	0	8	11	0	12	4	1018	6	1	294	3
Future Vol, veh/h	32	0	8	11	0	12	4	1018	6	1	294	3
Conflicting Peds, #/hr	0	0	1	1	0	0	1	0	0	0	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	6	0	0	0	0	0	0	4	0	0	5	0
Mvmt Flow	35	0	9	12	0	13	4	1107	7	1	320	3

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1450	1447	323	1448	1445	1112	324	0	0	1114	0	0
Stage 1	324	324	-	1119	1119	-	-	-	-	-	-	-
Stage 2	1126	1123	-	329	326	-	-	-	-	-	-	-
Critical Hdwy	7.16	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.16	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.16	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.554	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	107	133	723	110	133	256	1247	-	-	634	-	-
Stage 1	680	653	-	253	285	-	-	-	-	-	-	-
Stage 2	244	283	-	688	652	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	101	131	722	108	131	256	1246	-	-	633	-	-
Mov Cap-2 Maneuver	101	131	-	108	131	-	-	-	-	-	-	-
Stage 1	674	651	-	251	282	-	-	-	-	-	-	-
Stage 2	230	281	-	678	650	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	50	32.6	0	0
HCM LOS	F	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1246	-	-	122	155	633	-	-
HCM Lane V/C Ratio	0.003	-	-	0.356	0.161	0.002	-	-
HCM Control Delay (s)	7.9	0	-	50	32.6	10.7	0	-
HCM Lane LOS	A	A	-	F	D	B	A	-
HCM 95th %tile Q(veh)	0	-	-	1.4	0.6	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	4	36	16	2	22	13	947	43	6	304	6
Future Volume (vph)	49	4	36	16	2	22	13	947	43	6	304	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.95			0.92		1.00	0.99		1.00	1.00	
Flt Protected		0.97			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1722			1699		1568	1801		1805	1812	
Flt Permitted		0.86			0.84		0.56	1.00		0.18	1.00	
Satd. Flow (perm)		1519			1457		918	1801		334	1812	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	53	4	39	17	2	24	14	1018	46	6	327	6
RTOR Reduction (vph)	0	28	0	0	22	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	68	0	0	21	0	14	1063	0	6	333	0
Confl. Peds. (#/hr)	2					2	1					1
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	15%	5%	0%	0%	4%	33%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)		8.6			8.6		77.5	76.4		77.3	76.3	
Effective Green, g (s)		8.6			8.6		77.5	76.4		77.3	76.3	
Actuated g/C Ratio		0.09			0.09		0.78	0.76		0.77	0.76	
Clearance Time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Vehicle Extension (s)		2.5			2.5		2.3	5.2		2.3	5.2	
Lane Grp Cap (vph)		130			125		718	1375		272	1382	
v/s Ratio Prot							0.00	c0.59		c0.00	0.18	
v/s Ratio Perm		c0.04			0.01		0.01			0.02		
v/c Ratio		0.52			0.17		0.02	0.77		0.02	0.24	
Uniform Delay, d1		43.7			42.4		2.6	6.8		6.8	3.4	
Progression Factor		1.00			1.00		1.00	1.00		1.90	1.80	
Incremental Delay, d2		2.8			0.5		0.0	4.3		0.0	0.4	
Delay (s)		46.6			42.9		2.6	11.1		13.0	6.6	
Level of Service		D			D		A	B		B	A	
Approach Delay (s)		46.6			42.9			11.0			6.7	
Approach LOS		D			D			B			A	

Intersection Summary				
HCM 2000 Control Delay	13.1	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.74			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.0	
Intersection Capacity Utilization	68.0%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Intersection	
Intersection Delay, s/veh	7.3
Intersection LOS	A

Movement	WBU	WBL	WBR	NBU	NBT	NBR	SBU	SBL	SBT
Traffic Vol, veh/h	0	2	4	0	1	0	0	32	2
Future Vol, veh/h	0	2	4	0	1	0	0	32	2
Peak Hour Factor	0.92	0.66	0.66	0.92	0.66	0.66	0.92	0.66	0.66
Heavy Vehicles, %	2	0	0	2	100	0	2	0	0
Mvmt Flow	0	3	6	0	2	0	0	48	3
Number of Lanes	0	1	0	0	1	0	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	6.7	8.7	7.4
HCM LOS	A	A	A

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	33%	94%
Vol Thru, %	100%	0%	6%
Vol Right, %	0%	67%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	1	6	34
LT Vol	0	2	32
Through Vol	1	0	2
RT Vol	0	4	0
Lane Flow Rate	2	9	52
Geometry Grp	1	1	1
Degree of Util (X)	0.002	0.009	0.059
Departure Headway (Hd)	5.655	3.658	4.105
Convergence, Y/N	Yes	Yes	Yes
Cap	635	977	877
Service Time	3.668	1.685	2.108
HCM Lane V/C Ratio	0.003	0.009	0.059
HCM Control Delay	8.7	6.7	7.4
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0	0	0.2

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	1	67	0	1	15	1	0	0	5	8	0	0
Future Vol, veh/h	1	67	0	1	15	1	0	0	5	8	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	1	0	1	1	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	100	0	0	0	18	0	0	0	0	0	0	0
Mvmt Flow	1	75	0	1	17	1	0	0	6	9	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	19	0	0	76	0	0	100	100	76	102	100	18
Stage 1	-	-	-	-	-	-	79	79	-	21	21	-
Stage 2	-	-	-	-	-	-	21	21	-	81	79	-
Critical Hdwy	5.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	3.1	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1140	-	-	1536	-	-	886	794	991	884	794	1066
Stage 1	-	-	-	-	-	-	935	833	-	1003	882	-
Stage 2	-	-	-	-	-	-	1003	882	-	932	833	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1140	-	-	1536	-	-	884	791	990	877	791	1065
Mov Cap-2 Maneuver	-	-	-	-	-	-	884	791	-	877	791	-
Stage 1	-	-	-	-	-	-	933	831	-	1001	880	-
Stage 2	-	-	-	-	-	-	1002	880	-	926	831	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.4	8.7	9.1
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	990	1140	-	-	1536	-	-	877
HCM Lane V/C Ratio	0.006	0.001	-	-	0.001	-	-	0.01
HCM Control Delay (s)	8.7	8.2	0	-	7.3	0	-	9.1
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	1	8	43	0	23	6	500	21	16	1042	4
Future Volume (vph)	5	1	8	43	0	23	6	500	21	16	1042	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		1.00	1.00		1.00	0.99	1.00	1.00	0.97	1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1822	1615		1719	1594	1805	3505	1570	1803	3471	1576
Flt Permitted		0.78	1.00		0.75	1.00	0.23	1.00	1.00	0.44	1.00	1.00
Satd. Flow (perm)		1482	1615		1364	1594	441	3505	1570	837	3471	1576
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	5	1	9	47	0	25	7	549	23	18	1145	4
RTOR Reduction (vph)	0	0	8	0	0	23	0	0	5	0	0	1
Lane Group Flow (vph)	0	6	1	0	47	2	7	549	18	18	1145	3
Confl. Peds. (#/hr)	1					1	1		2	2		1
Confl. Bikes (#/hr)									4			3
Heavy Vehicles (%)	0%	0%	0%	5%	0%	0%	0%	3%	0%	0%	4%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		8	4	4	4	2		2	6		6
Actuated Green, G (s)		7.8	7.8		7.8	7.8	87.6	86.6	86.6	89.8	87.7	87.7
Effective Green, g (s)		7.8	7.8		7.8	7.8	87.6	86.6	86.6	89.8	87.7	87.7
Actuated g/C Ratio		0.07	0.07		0.07	0.07	0.80	0.79	0.79	0.82	0.80	0.80
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.3	4.8	4.8	2.3	4.8	4.8
Lane Grp Cap (vph)		105	114		96	113	363	2759	1236	701	2767	1256
v/s Ratio Prot							0.00	0.16		c0.00	c0.33	
v/s Ratio Perm		0.00	0.00		c0.03	0.00	0.02		0.01	0.02		0.00
v/c Ratio		0.06	0.01		0.49	0.02	0.02	0.20	0.01	0.03	0.41	0.00
Uniform Delay, d1		47.7	47.5		49.2	47.5	2.4	3.0	2.5	1.9	3.4	2.3
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.2	0.0		2.8	0.0	0.0	0.2	0.0	0.0	0.2	0.0
Delay (s)		47.8	47.5		52.0	47.6	2.4	3.1	2.5	1.9	3.6	2.3
Level of Service		D	D		D	D	A	A	A	A	A	A
Approach Delay (s)		47.6			50.5			3.1			3.5	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	50.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	13	0	11	4	0	7	5	513	11	17	1019	41
Future Vol, veh/h	13	0	11	4	0	7	5	513	11	17	1019	41
Conflicting Peds, #/hr	0	0	0	0	0	0	1	0	1	1	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	15	0	0	0	0	0	0	2	0	6	4	2
Mvmt Flow	14	0	12	4	0	8	5	564	12	19	1120	45

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1765	1767	1143	1767	1783	571	1165	0	0	576	0	0
Stage 1	1180	1180	-	581	581	-	-	-	-	-	-	-
Stage 2	585	587	-	1186	1202	-	-	-	-	-	-	-
Critical Hdwy	7.25	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.16	-	-
Critical Hdwy Stg 1	6.25	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.25	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.635	4	3.3	3.5	4	3.3	2.2	-	-	2.254	-	-
Pot Cap-1 Maneuver	61	85	246	66	83	524	607	-	-	978	-	-
Stage 1	218	266	-	503	503	-	-	-	-	-	-	-
Stage 2	475	500	-	232	260	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	57	79	246	59	77	524	606	-	-	977	-	-
Mov Cap-2 Maneuver	57	79	-	59	77	-	-	-	-	-	-	-
Stage 1	215	251	-	497	497	-	-	-	-	-	-	-
Stage 2	462	494	-	208	245	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	62.5	34	0.1	0.1
HCM LOS	F	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	606	-	-	88	136	977	-	-
HCM Lane V/C Ratio	0.009	-	-	0.3	0.089	0.019	-	-
HCM Control Delay (s)	11	0	-	62.5	34	8.8	0	-
HCM Lane LOS	B	A	-	F	D	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.1	0.3	0.1	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	1	49	55	3	4	66	501	19	20	979	25
Future Volume (vph)	26	1	49	55	3	4	66	501	19	20	979	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.98			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.91			0.99		1.00	0.99		1.00	1.00	
Flt Protected		0.98			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1655			1763		1770	1852		1716	1821	
Flt Permitted		0.90			0.68		0.16	1.00		0.44	1.00	
Satd. Flow (perm)		1512			1249		289	1852		802	1821	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	27	1	51	57	3	4	69	522	20	21	1020	26
RTOR Reduction (vph)	0	47	0	0	3	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	32	0	0	61	0	69	541	0	21	1045	0
Confl. Peds. (#/hr)	1		2	2		1	1		3	3		1
Confl. Bikes (#/hr)									5			3
Heavy Vehicles (%)	0%	0%	2%	2%	0%	0%	2%	2%	0%	5%	4%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)		8.2			8.2		80.4	75.7		75.2	73.1	
Effective Green, g (s)		8.2			8.2		80.4	75.7		75.2	73.1	
Actuated g/C Ratio		0.08			0.08		0.80	0.76		0.75	0.73	
Clearance Time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Vehicle Extension (s)		2.5			2.5		2.3	5.2		2.3	5.2	
Lane Grp Cap (vph)		123			102		301	1401		622	1331	
v/s Ratio Prot							c0.01	0.29		0.00	c0.57	
v/s Ratio Perm		0.02			c0.05		0.17			0.02		
v/c Ratio		0.26			0.60		0.23	0.39		0.03	0.79	
Uniform Delay, d1		43.1			44.3		9.0	4.2		3.2	8.5	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.8			8.1		0.2	0.8		0.0	4.7	
Delay (s)		43.9			52.4		9.2	5.0		3.2	13.2	
Level of Service		D			D		A	A		A	B	
Approach Delay (s)		43.9			52.4			5.5			13.0	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Intersection Delay, s/veh	7.2
Intersection LOS	A

Movement	WBU	WBL	WBR	NBU	NBT	NBR	SBU	SBL	SBT
Traffic Vol, veh/h	0	12	32	0	5	3	0	20	10
Future Vol, veh/h	0	12	32	0	5	3	0	20	10
Peak Hour Factor	0.92	0.69	0.69	0.92	0.69	0.69	0.92	0.69	0.69
Heavy Vehicles, %	2	0	3	2	0	0	2	11	0
Mvmt Flow	0	17	46	0	7	4	0	29	14
Number of Lanes	0	1	0	0	1	0	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	6.9	6.9	7.6
HCM LOS	A	A	A

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	27%	67%
Vol Thru, %	62%	0%	33%
Vol Right, %	38%	73%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	8	44	30
LT Vol	0	12	20
Through Vol	5	0	10
RT Vol	3	32	0
Lane Flow Rate	12	64	43
Geometry Grp	1	1	1
Degree of Util (X)	0.012	0.064	0.052
Departure Headway (Hd)	3.821	3.613	4.342
Convergence, Y/N	Yes	Yes	Yes
Cap	936	990	827
Service Time	1.846	1.642	2.357
HCM Lane V/C Ratio	0.013	0.065	0.052
HCM Control Delay	6.9	6.9	7.6
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0	0.2	0.2

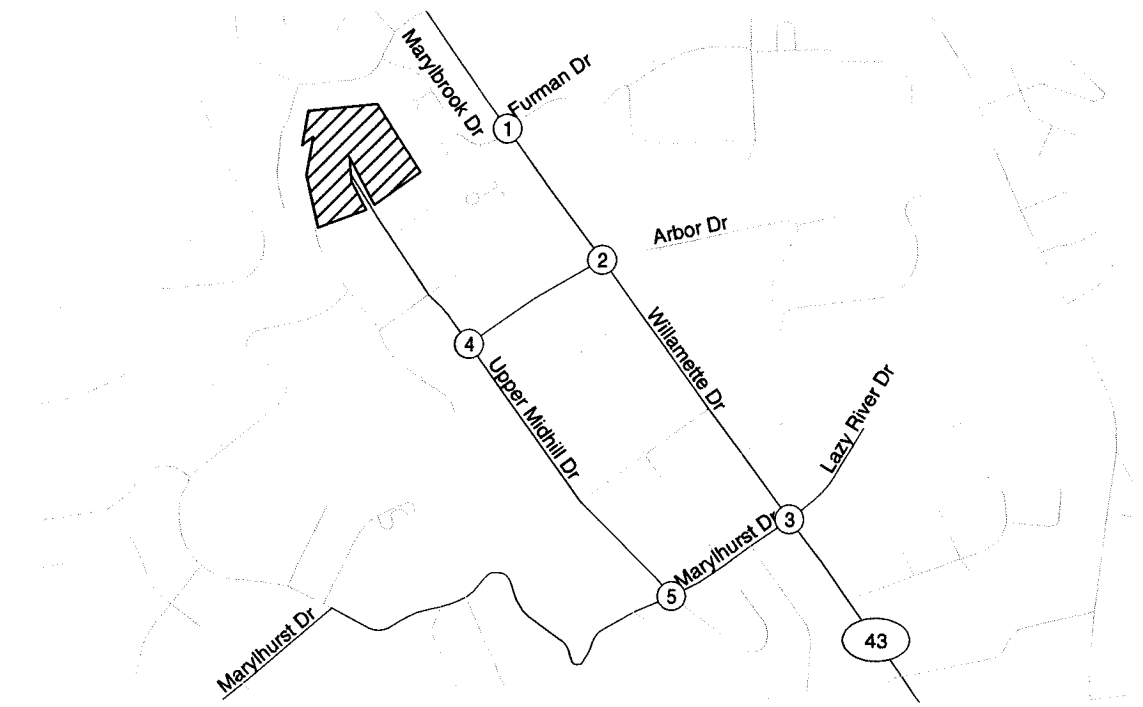
Intersection	
Int Delay, s/veh	1.3

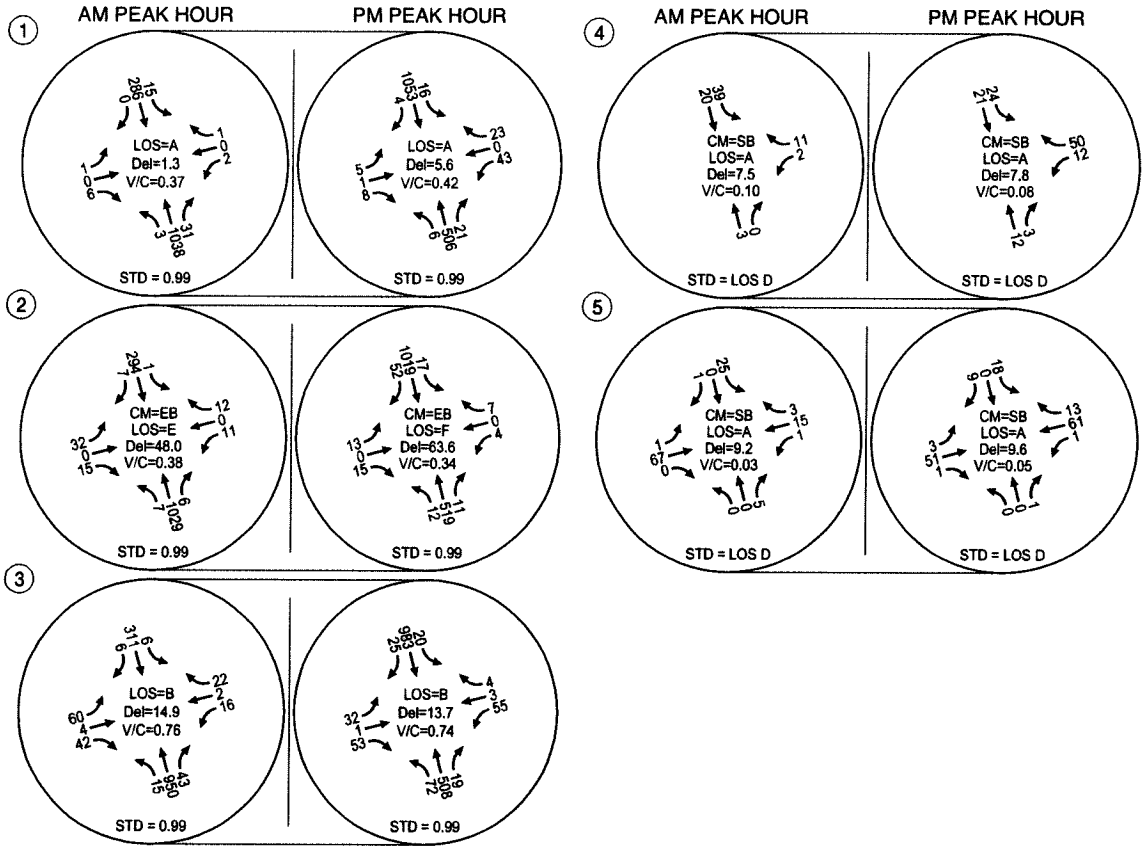
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	2	51	1	1	61	7	0	0	1	8	0	8
Future Vol, veh/h	2	51	1	1	61	7	0	0	1	8	0	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	67	67	67	67	67	67	67	67	67	67	67	67
Heavy Vehicles, %	0	4	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	3	76	1	1	91	10	0	0	1	12	0	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	101	0	0	78	0	0	188	187	77	183	183	96
Stage 1	-	-	-	-	-	-	83	83	-	99	99	-
Stage 2	-	-	-	-	-	-	105	104	-	84	84	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1504	-	-	1533	-	-	777	711	990	783	715	966
Stage 1	-	-	-	-	-	-	930	830	-	912	817	-
Stage 2	-	-	-	-	-	-	906	813	-	929	829	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1504	-	-	1533	-	-	766	709	990	780	713	966
Mov Cap-2 Maneuver	-	-	-	-	-	-	766	709	-	780	713	-
Stage 1	-	-	-	-	-	-	928	828	-	910	816	-
Stage 2	-	-	-	-	-	-	894	812	-	926	827	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.1	8.6	9.3
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	990	1504	-	-	1533	-	-	863
HCM Lane V/C Ratio	0.002	0.002	-	-	0.001	-	-	0.028
HCM Control Delay (s)	8.6	7.4	0	-	7.4	0	-	9.3
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0.1





CM = CRITICAL MOVEMENT (TWSC)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED/AWSC) / CRITICAL MOVEMENT LEVEL OF SERVICE (TWSC)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED/ AWSC) / CRITICAL MOVEMENT CONTROL DELAY (TWSC)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO
TWC = TWO-WAY STOP CONTROL
AWSC= ALL-WAY STOP CONTROL
STD = MOBILITY STANDARD

Year 2017 Total Traffic Conditions
Weekday AM & PM Peak Hour
West Linn, OR

Figure 7

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING PLANNING

\\kittelson.com\fs\H_Portland\proj\file\18758 - West Linn Reesman Property Residential\dwgs\figs\18758_fig1.dwg Apr 05, 2016 - 1:48pm - mbell Layout Tab: Fig07

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	6	2	0	1	3	1038	31	15	286	0
Future Volume (vph)	1	0	6	2	0	1	3	1038	31	15	286	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		1.00	0.99		1.00	1.00	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00	1.00	0.99	1.00	1.00	1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1805	1594		1803	1615	1789	3438	1477	1687	3438	
Flt Permitted		1.00	1.00		1.00	1.00	0.57	1.00	1.00	0.24	1.00	
Satd. Flow (perm)		1900	1594		1898	1615	1067	3438	1477	435	3438	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	1	0	6	2	0	1	3	1104	33	16	304	0
RTOR Reduction (vph)	0	0	6	0	0	1	0	0	6	0	0	0
Lane Group Flow (vph)	0	1	0	0	2	0	3	1104	27	16	304	0
Confl. Peds. (#/hr)			1	1			9					9
Confl. Bikes (#/hr)									3			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	5%	7%	7%	5%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		8	4	4	4	2		2	6		6
Actuated Green, G (s)		1.2	1.2		1.2	1.2	84.3	83.3	83.3	86.3	84.3	
Effective Green, g (s)		1.2	1.2		1.2	1.2	84.3	83.3	83.3	86.3	84.3	
Actuated g/C Ratio		0.01	0.01		0.01	0.01	0.84	0.83	0.83	0.86	0.84	
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.3	4.8	4.8	2.3	4.8	
Lane Grp Cap (vph)		22	19		22	19	906	2863	1230	400	2898	
v/s Ratio Prot							0.00	c0.32		c0.00	0.09	
v/s Ratio Perm		0.00	0.00		c0.00	0.00	0.00		0.02	0.03		
v/c Ratio		0.05	0.00		0.09	0.00	0.00	0.39	0.02	0.04	0.10	
Uniform Delay, d1		48.8	48.8		48.9	48.8	1.2	2.1	1.4	1.1	1.4	
Progression Factor		1.00	1.00		1.00	1.00	0.46	0.29	1.00	1.00	1.00	
Incremental Delay, d2		0.6	0.1		1.3	0.0	0.0	0.3	0.0	0.0	0.0	
Delay (s)		49.5	48.9		50.2	48.8	0.6	0.9	1.4	1.1	1.4	
Level of Service		D	D		D	D	A	A	A	A	A	
Approach Delay (s)		49.0			49.7			0.9			1.4	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	1.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	50.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	32	0	15	11	0	12	7	1029	6	1	294	7
Future Vol, veh/h	32	0	15	11	0	12	7	1029	6	1	294	7
Conflicting Peds, #/hr	0	0	1	1	0	0	1	0	0	0	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	6	0	0	0	0	0	0	4	0	0	5	0
Mvmt Flow	35	0	16	12	0	13	8	1118	7	1	320	8

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1471	1468	325	1473	1468	1124	328	0	0	1126	0	0
Stage 1	327	327	-	1138	1138	-	-	-	-	-	-	-
Stage 2	1144	1141	-	335	330	-	-	-	-	-	-	-
Critical Hdwy	7.16	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.16	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.16	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.554	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	103	129	721	106	129	252	1243	-	-	628	-	-
Stage 1	677	651	-	247	279	-	-	-	-	-	-	-
Stage 2	239	278	-	683	649	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	96	126	720	102	126	252	1242	-	-	627	-	-
Mov Cap-2 Maneuver	96	126	-	102	126	-	-	-	-	-	-	-
Stage 1	665	649	-	243	274	-	-	-	-	-	-	-
Stage 2	223	273	-	666	647	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	48	34.2	0.1	0
HCM LOS	E	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1242	-	-	133	148	627	-	-
HCM Lane V/C Ratio	0.006	-	-	0.384	0.169	0.002	-	-
HCM Control Delay (s)	7.9	0	-	48	34.2	10.8	0	-
HCM Lane LOS	A	A	-	E	D	B	A	-
HCM 95th %tile Q(veh)	0	-	-	1.6	0.6	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	4	42	16	2	22	15	950	43	6	311	6
Future Volume (vph)	60	4	42	16	2	22	15	950	43	6	311	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.95			0.92		1.00	0.99		1.00	1.00	
Flt Protected		0.97			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1724			1699		1568	1802		1805	1812	
Flt Permitted		0.84			0.86		0.54	1.00		0.16	1.00	
Satd. Flow (perm)		1489			1491		889	1802		305	1812	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	65	4	45	17	2	24	16	1022	46	6	334	6
RTOR Reduction (vph)	0	27	0	0	21	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	87	0	0	22	0	16	1067	0	6	339	0
Confl. Peds. (#/hr)	2					2	1					1
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	15%	5%	0%	0%	4%	33%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)		10.8			10.8		76.3	74.2		74.1	73.1	
Effective Green, g (s)		10.8			10.8		76.3	74.2		74.1	73.1	
Actuated g/C Ratio		0.11			0.11		0.76	0.74		0.74	0.73	
Clearance Time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Vehicle Extension (s)		2.5			2.5		2.3	5.2		2.3	5.2	
Lane Grp Cap (vph)		160			161		692	1337		241	1324	
v/s Ratio Prot							c0.00	c0.59		0.00	0.19	
v/s Ratio Perm		c0.06			0.01		0.02			0.02		
v/c Ratio		0.55			0.13		0.02	0.80		0.02	0.26	
Uniform Delay, d1		42.3			40.4		2.9	8.2		8.4	4.5	
Progression Factor		1.00			1.00		1.00	1.00		1.84	1.59	
Incremental Delay, d2		3.0			0.3		0.0	5.0		0.0	0.5	
Delay (s)		45.3			40.6		2.9	13.2		15.5	7.5	
Level of Service		D			D		A	B		B	A	
Approach Delay (s)		45.3			40.6			13.0			7.7	
Approach LOS		D			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	14.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Intersection Delay, s/veh	7.4
Intersection LOS	A

Movement	WBU	WBL	WBR	NBU	NBT	NBR	SBU	SBL	SBT
Traffic Vol, veh/h	0	2	11	0	3	0	0	39	20
Future Vol, veh/h	0	2	11	0	3	0	0	39	20
Peak Hour Factor	0.92	0.66	0.66	0.92	0.66	0.66	0.92	0.66	0.66
Heavy Vehicles, %	2	0	0	2	100	0	2	0	0
Mvmt Flow	0	3	17	0	5	0	0	59	30
Number of Lanes	0	1	0	0	1	0	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	6.7	8.8	7.5
HCM LOS	A	A	A

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	15%	66%
Vol Thru, %	100%	0%	34%
Vol Right, %	0%	85%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	3	13	59
LT Vol	0	2	39
Through Vol	3	0	20
RT Vol	0	11	0
Lane Flow Rate	5	20	89
Geometry Grp	1	1	1
Degree of Util (X)	0.007	0.02	0.101
Departure Headway (Hd)	5.704	3.584	4.071
Convergence, Y/N	Yes	Yes	Yes
Cap	629	991	884
Service Time	3.727	1.633	2.078
HCM Lane V/C Ratio	0.008	0.02	0.101
HCM Control Delay	8.8	6.7	7.5
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0	0.1	0.3

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	1	67	0	1	15	3	0	0	5	25	0	1
Future Vol, veh/h	1	67	0	1	15	3	0	0	5	25	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	1	0	1	1	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	100	0	0	0	18	0	0	0	0	0	0	0
Mvmt Flow	1	75	0	1	17	3	0	0	6	28	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	21	0	0	76	0	0	101	102	76	103	101	20
Stage 1	-	-	-	-	-	-	79	79	-	22	22	-
Stage 2	-	-	-	-	-	-	22	23	-	81	79	-
Critical Hdwy	5.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	3.1	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1137	-	-	1536	-	-	885	792	991	882	793	1064
Stage 1	-	-	-	-	-	-	935	833	-	1002	881	-
Stage 2	-	-	-	-	-	-	1002	880	-	932	833	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1137	-	-	1536	-	-	882	789	990	875	790	1063
Mov Cap-2 Maneuver	-	-	-	-	-	-	882	789	-	875	790	-
Stage 1	-	-	-	-	-	-	933	831	-	1000	879	-
Stage 2	-	-	-	-	-	-	1000	878	-	926	831	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.4	8.7	9.2
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	990	1137	-	-	1536	-	-	881
HCM Lane V/C Ratio	0.006	0.001	-	-	0.001	-	-	0.033
HCM Control Delay (s)	8.7	8.2	0	-	7.3	0	-	9.2
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	1	8	43	0	23	6	506	21	16	1053	4
Future Volume (vph)	5	1	8	43	0	23	6	506	21	16	1053	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		1.00	1.00		1.00	0.99	1.00	1.00	0.97	1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1822	1615		1719	1594	1805	3505	1570	1803	3471	1576
Flt Permitted		0.78	1.00		0.75	1.00	0.23	1.00	1.00	0.44	1.00	1.00
Satd. Flow (perm)		1482	1615		1364	1594	434	3505	1570	831	3471	1576
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	5	1	9	47	0	25	7	556	23	18	1157	4
RTOR Reduction (vph)	0	0	8	0	0	23	0	0	5	0	0	1
Lane Group Flow (vph)	0	6	1	0	47	2	7	556	18	18	1157	3
Confl. Peds. (#/hr)	1					1	1		2	2		1
Confl. Bikes (#/hr)									4			3
Heavy Vehicles (%)	0%	0%	0%	5%	0%	0%	0%	3%	0%	0%	4%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		8	4	4	4	2		2	6		6
Actuated Green, G (s)		7.8	7.8		7.8	7.8	87.6	86.6	86.6	89.8	87.7	87.7
Effective Green, g (s)		7.8	7.8		7.8	7.8	87.6	86.6	86.6	89.8	87.7	87.7
Actuated g/C Ratio		0.07	0.07		0.07	0.07	0.80	0.79	0.79	0.82	0.80	0.80
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.3	4.8	4.8	2.3	4.8	4.8
Lane Grp Cap (vph)		105	114		96	113	358	2759	1236	696	2767	1256
v/s Ratio Prot							0.00	0.16		c0.00	c0.33	
v/s Ratio Perm		0.00	0.00		c0.03	0.00	0.02		0.01	0.02		0.00
v/c Ratio		0.06	0.01		0.49	0.02	0.02	0.20	0.01	0.03	0.42	0.00
Uniform Delay, d1		47.7	47.5		49.2	47.5	2.4	3.0	2.5	1.9	3.4	2.3
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.2	0.0		2.8	0.0	0.0	0.2	0.0	0.0	0.2	0.0
Delay (s)		47.8	47.5		52.0	47.6	2.5	3.1	2.5	1.9	3.6	2.3
Level of Service		D	D		D	D	A	A	A	A	A	A
Approach Delay (s)		47.6			50.5			3.1			3.6	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	50.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	13	0	15	4	0	7	12	519	11	17	1019	52
Future Vol, veh/h	13	0	15	4	0	7	12	519	11	17	1019	52
Conflicting Peds, #/hr	0	0	0	0	0	0	1	0	1	1	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	15	0	0	0	0	0	0	2	0	6	4	2
Mvmt Flow	14	0	16	4	0	8	13	570	12	19	1120	57

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1793	1795	1149	1797	1817	577	1177	0	0	582	0	0
Stage 1	1186	1186	-	603	603	-	-	-	-	-	-	-
Stage 2	607	609	-	1194	1214	-	-	-	-	-	-	-
Critical Hdwy	7.25	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.16	-	-
Critical Hdwy Stg 1	6.25	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.25	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.635	4	3.3	3.5	4	3.3	2.2	-	-	2.254	-	-
Pot Cap-1 Maneuver	58	81	244	63	79	520	601	-	-	973	-	-
Stage 1	217	265	-	489	492	-	-	-	-	-	-	-
Stage 2	462	488	-	230	257	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	53	74	244	55	72	520	600	-	-	972	-	-
Mov Cap-2 Maneuver	53	74	-	55	72	-	-	-	-	-	-	-
Stage 1	210	250	-	473	476	-	-	-	-	-	-	-
Stage 2	440	472	-	202	242	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	63.6	36	0.2	0.1
HCM LOS	F	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	600	-	-	91	128	972	-	-
HCM Lane V/C Ratio	0.022	-	-	0.338	0.094	0.019	-	-
HCM Control Delay (s)	11.1	0	-	63.6	36	8.8	0	-
HCM Lane LOS	B	A	-	F	E	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	1.3	0.3	0.1	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	1	53	55	3	4	72	508	19	20	983	25
Future Volume (vph)	32	1	53	55	3	4	72	508	19	20	983	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.98			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.92			0.99		1.00	0.99		1.00	1.00	
Flt Protected		0.98			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1662			1763		1770	1852		1717	1821	
Flt Permitted		0.89			0.64		0.15	1.00		0.44	1.00	
Satd. Flow (perm)		1506			1180		281	1852		796	1821	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	33	1	55	57	3	4	75	529	20	21	1024	26
RTOR Reduction (vph)	0	50	0	0	3	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	39	0	0	61	0	75	548	0	21	1049	0
Confl. Peds. (#/hr)	1		2	2		1	1		3	3		1
Confl. Bikes (#/hr)									5			3
Heavy Vehicles (%)	0%	0%	2%	2%	0%	0%	2%	2%	0%	5%	4%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)		8.3			8.3		80.5	75.6		74.9	72.8	
Effective Green, g (s)		8.3			8.3		80.5	75.6		74.9	72.8	
Actuated g/C Ratio		0.08			0.08		0.80	0.76		0.75	0.73	
Clearance Time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Vehicle Extension (s)		2.5			2.5		2.3	5.2		2.3	5.2	
Lane Grp Cap (vph)		124			97		299	1400		615	1325	
v/s Ratio Prot							c0.01	0.30		0.00	c0.58	
v/s Ratio Perm		0.03			c0.05		0.19			0.02		
v/c Ratio		0.31			0.63		0.25	0.39		0.03	0.79	
Uniform Delay, d1		43.2			44.4		9.5	4.2		3.2	8.7	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.0			11.1		0.3	0.8		0.0	4.9	
Delay (s)		44.2			55.5		9.7	5.1		3.2	13.7	
Level of Service		D			E		A	A		A	B	
Approach Delay (s)		44.2			55.5			5.6			13.4	
Approach LOS		D			E			A			B	

Intersection Summary			
HCM 2000 Control Delay	13.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	75.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Intersection Delay, s/veh	7.3
Intersection LOS	A

Movement	WBU	WBL	WBR	NBU	NBT	NBR	SBU	SBL	SBT
Traffic Vol, veh/h	0	12	50	0	12	3	0	24	21
Future Vol, veh/h	0	12	50	0	12	3	0	24	21
Peak Hour Factor	0.92	0.69	0.69	0.92	0.69	0.69	0.92	0.69	0.69
Heavy Vehicles, %	2	0	3	2	0	0	2	11	0
Mvmt Flow	0	17	72	0	17	4	0	35	30
Number of Lanes	0	1	0	0	1	0	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	7	7.1	7.8
HCM LOS	A	A	A

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	19%	53%
Vol Thru, %	80%	0%	47%
Vol Right, %	20%	81%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	15	62	45
LT Vol	0	12	24
Through Vol	12	0	21
RT Vol	3	50	0
Lane Flow Rate	22	90	65
Geometry Grp	1	1	1
Degree of Util (X)	0.024	0.09	0.079
Departure Headway (Hd)	3.988	3.604	4.368
Convergence, Y/N	Yes	Yes	Yes
Cap	895	987	820
Service Time	2.026	1.654	2.393
HCM Lane V/C Ratio	0.025	0.091	0.079
HCM Control Delay	7.1	7	7.8
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0.3	0.3

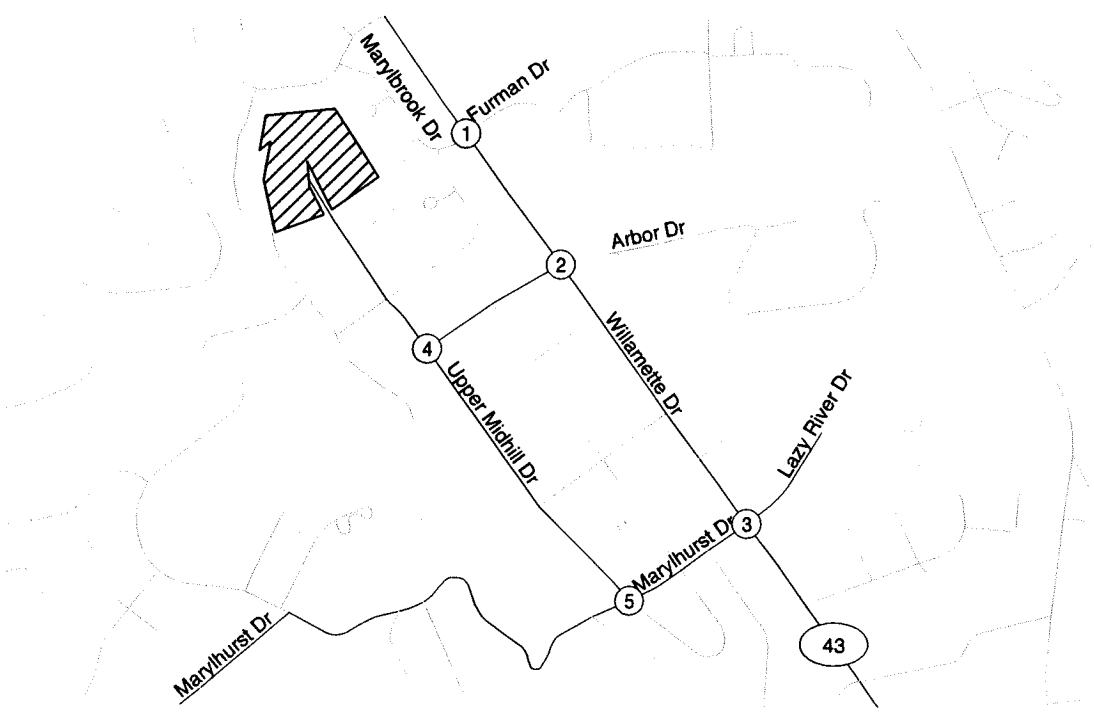
Intersection	
Int Delay, s/veh	1.9

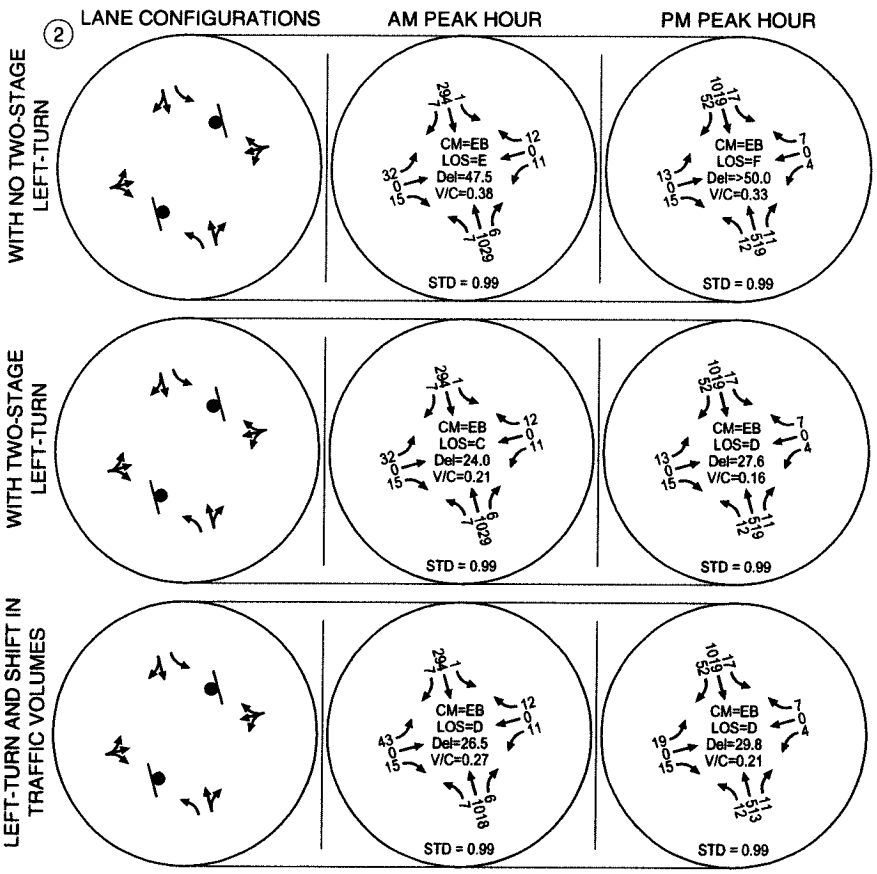
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	3	51	1	1	61	13	0	0	1	18	0	9
Future Vol, veh/h	3	51	1	1	61	13	0	0	1	18	0	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	67	67	67	67	67	67	67	67	67	67	67	67
Heavy Vehicles, %	0	4	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	4	76	1	1	91	19	0	0	1	27	0	13

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	110	0	0	78	0	0	196	199	77	191	191	101
Stage 1	-	-	-	-	-	-	86	86	-	104	104	-
Stage 2	-	-	-	-	-	-	110	113	-	87	87	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1493	-	-	1533	-	-	767	700	990	773	708	960
Stage 1	-	-	-	-	-	-	927	827	-	907	813	-
Stage 2	-	-	-	-	-	-	900	806	-	926	827	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1493	-	-	1533	-	-	754	697	990	769	705	960
Mov Cap-2 Maneuver	-	-	-	-	-	-	754	697	-	769	705	-
Stage 1	-	-	-	-	-	-	924	825	-	904	812	-
Stage 2	-	-	-	-	-	-	887	805	-	922	825	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0.1	8.6	9.6
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	990	1493	-	-	1533	-	-	824
HCM Lane V/C Ratio	0.002	0.003	-	-	0.001	-	-	0.049
HCM Control Delay (s)	8.6	7.4	0	-	7.4	0	-	9.6
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0.2





CM = CRITICAL MOVEMENT (TWSC)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED/AWSC) / CRITICAL MOVEMENT LEVEL OF SERVICE (TWSC)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED/AWSC) / CRITICAL MOVEMENT CONTROL DELAY (TWSC)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO
TWC = TWO-WAY STOP CONTROL
AWSC= ALL-WAY STOP CONTROL
STD = MOBILITY STANDARD

Year 2017 Total Traffic Conditions - Mitigated Weekday AM & PM Peak Hour West Linn, OR

Figure 8

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING PLANNING

H:\profile\18758 - West Linn Reesman Property Residential\dwgs\figs\18758_fig1.dwg Apr 05, 2016 - 11:59am - mbell Layout Tab: Fig08

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	32	0	15	11	0	12	7	1029	6	1	294	7
Future Vol, veh/h	32	0	15	11	0	12	7	1029	6	1	294	7
Conflicting Peds, #/hr	0	0	1	1	0	0	1	0	0	0	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	6	0	0	0	0	0	0	4	0	0	5	0
Mvmt Flow	35	0	16	12	0	13	8	1118	7	1	320	8

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1471	1468	325	1473	1468	1124	328	0	0	1126	0	0
Stage 1	327	327	-	1138	1138	-	-	-	-	-	-	-
Stage 2	1144	1141	-	335	330	-	-	-	-	-	-	-
Critical Hdwy	7.16	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.16	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.16	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.554	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	103	129	721	106	129	252	1243	-	-	628	-	-
Stage 1	677	651	-	247	279	-	-	-	-	-	-	-
Stage 2	239	278	-	683	649	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	97	128	720	103	128	252	1242	-	-	627	-	-
Mov Cap-2 Maneuver	97	128	-	103	128	-	-	-	-	-	-	-
Stage 1	672	649	-	245	277	-	-	-	-	-	-	-
Stage 2	225	276	-	666	647	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	47.5	34	0.1	0
HCM LOS	E	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1242	-	-	134	149	627	-	-
HCM Lane V/C Ratio	0.006	-	-	0.381	0.168	0.002	-	-
HCM Control Delay (s)	7.9	-	-	47.5	34	10.8	-	-
HCM Lane LOS	A	-	-	E	D	B	-	-
HCM 95th %tile Q(veh)	0	-	-	1.6	0.6	0	-	-

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	32	0	15	11	0	12	7	1029	6	1	294	7
Future Vol, veh/h	32	0	15	11	0	12	7	1029	6	1	294	7
Conflicting Peds, #/hr	0	0	1	1	0	0	1	0	0	0	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	6	0	0	0	0	0	0	4	0	0	5	0
Mvmt Flow	35	0	16	12	0	13	8	1118	7	1	320	8

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1471	1468	325	1473	1468	1124	328	0	0	1126	0	0
Stage 1	327	327	-	1138	1138	-	-	-	-	-	-	-
Stage 2	1144	1141	-	335	330	-	-	-	-	-	-	-
Critical Hdwy	7.16	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.16	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.16	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.554	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	103	129	721	106	129	252	1243	-	-	628	-	-
Stage 1	677	651	-	247	279	-	-	-	-	-	-	-
Stage 2	239	278	-	683	649	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	97	128	720	103	128	252	1242	-	-	627	-	-
Mov Cap-2 Maneuver	183	221	-	197	222	-	-	-	-	-	-	-
Stage 1	672	649	-	245	277	-	-	-	-	-	-	-
Stage 2	225	276	-	666	647	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	24	23.3	0.1	0
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1242	-	-	240	222	627	-	-
HCM Lane V/C Ratio	0.006	-	-	0.213	0.113	0.002	-	-
HCM Control Delay (s)	7.9	-	-	24	23.3	10.8	-	-
HCM Lane LOS	A	-	-	C	C	B	-	-
HCM 95th %tile Q(veh)	0	-	-	0.8	0.4	0	-	-

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	43	0	15	11	0	12	7	1018	6	1	294	7
Future Vol, veh/h	43	0	15	11	0	12	7	1018	6	1	294	7
Conflicting Peds, #/hr	0	0	1	1	0	0	1	0	0	0	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	6	0	0	0	0	0	0	4	0	0	5	0
Mvmt Flow	47	0	16	12	0	13	8	1107	7	1	320	8

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1460	1456	325	1461	1456	1112	328	0	0	1114	0	0
Stage 1	327	327	-	1126	1126	-	-	-	-	-	-	-
Stage 2	1133	1129	-	335	330	-	-	-	-	-	-	-
Critical Hdwy	7.16	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.16	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.16	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.554	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	105	131	721	108	131	256	1243	-	-	634	-	-
Stage 1	677	651	-	251	282	-	-	-	-	-	-	-
Stage 2	242	281	-	683	649	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	99	130	720	105	130	256	1242	-	-	633	-	-
Mov Cap-2 Maneuver	186	224	-	200	224	-	-	-	-	-	-	-
Stage 1	672	649	-	249	280	-	-	-	-	-	-	-
Stage 2	228	279	-	666	647	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	26.5	22.9	0.1	0
HCM LOS	D	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1242	-	-	230	226	633	-	-
HCM Lane V/C Ratio	0.006	-	-	0.274	0.111	0.002	-	-
HCM Control Delay (s)	7.9	-	-	26.5	22.9	10.7	-	-
HCM Lane LOS	A	-	-	D	C	B	-	-
HCM 95th %tile Q(veh)	0	-	-	1.1	0.4	0	-	-

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	13	0	15	4	0	7	12	519	11	17	1019	52
Future Vol, veh/h	13	0	15	4	0	7	12	519	11	17	1019	52
Conflicting Peds, #/hr	0	0	0	0	0	0	1	0	1	1	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	15	0	0	0	0	0	0	2	0	6	4	2
Mvmt Flow	14	0	16	4	0	8	13	570	12	19	1120	57

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1793	1795	1149	1797	1817	577	1177	0	0	582	0	0
Stage 1	1186	1186	-	603	603	-	-	-	-	-	-	-
Stage 2	607	609	-	1194	1214	-	-	-	-	-	-	-
Critical Hdwy	7.25	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.16	-	-
Critical Hdwy Stg 1	6.25	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.25	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.635	4	3.3	3.5	4	3.3	2.2	-	-	2.254	-	-
Pot Cap-1 Maneuver	58	81	244	63	79	520	601	-	-	973	-	-
Stage 1	217	265	-	489	492	-	-	-	-	-	-	-
Stage 2	462	488	-	230	257	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	55	78	244	57	76	520	600	-	-	972	-	-
Mov Cap-2 Maneuver	55	78	-	57	76	-	-	-	-	-	-	-
Stage 1	212	260	-	478	481	-	-	-	-	-	-	-
Stage 2	445	477	-	210	252	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	60.9	35	0.2	0.1
HCM LOS	F	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	600	-	-	94	132	972	-	-
HCM Lane V/C Ratio	0.022	-	-	0.327	0.092	0.019	-	-
HCM Control Delay (s)	11.1	-	-	60.9	35	8.8	-	-
HCM Lane LOS	B	-	-	F	E	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	1.3	0.3	0.1	-	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	13	0	15	4	0	7	12	519	11	17	1019	52
Future Vol, veh/h	13	0	15	4	0	7	12	519	11	17	1019	52
Conflicting Peds, #/hr	0	0	0	0	0	0	1	0	1	1	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	15	0	0	0	0	0	0	2	0	6	4	2
Mvmt Flow	14	0	16	4	0	8	13	570	12	19	1120	57

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1793	1795	1149	1797	1817	577	1177	0	0	582	0	0
Stage 1	1186	1186	-	603	603	-	-	-	-	-	-	-
Stage 2	607	609	-	1194	1214	-	-	-	-	-	-	-
Critical Hdwy	7.25	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.16	-	-
Critical Hdwy Stg 1	6.25	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.25	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.635	4	3.3	3.5	4	3.3	2.2	-	-	2.254	-	-
Pot Cap-1 Maneuver	58	81	244	63	79	520	601	-	-	973	-	-
Stage 1	217	265	-	489	492	-	-	-	-	-	-	-
Stage 2	462	488	-	230	257	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	55	78	244	57	76	520	600	-	-	972	-	-
Mov Cap-2 Maneuver	151	184	-	148	175	-	-	-	-	-	-	-
Stage 1	212	260	-	478	481	-	-	-	-	-	-	-
Stage 2	445	477	-	210	252	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	27.6	18.9	0.2	0.1
HCM LOS	D	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	600	-	-	190	272	972	-	-
HCM Lane V/C Ratio	0.022	-	-	0.162	0.044	0.019	-	-
HCM Control Delay (s)	11.1	-	-	27.6	18.9	8.8	-	-
HCM Lane LOS	B	-	-	D	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.6	0.1	0.1	-	-

Intersection	
Int Delay, s/veh	0.9

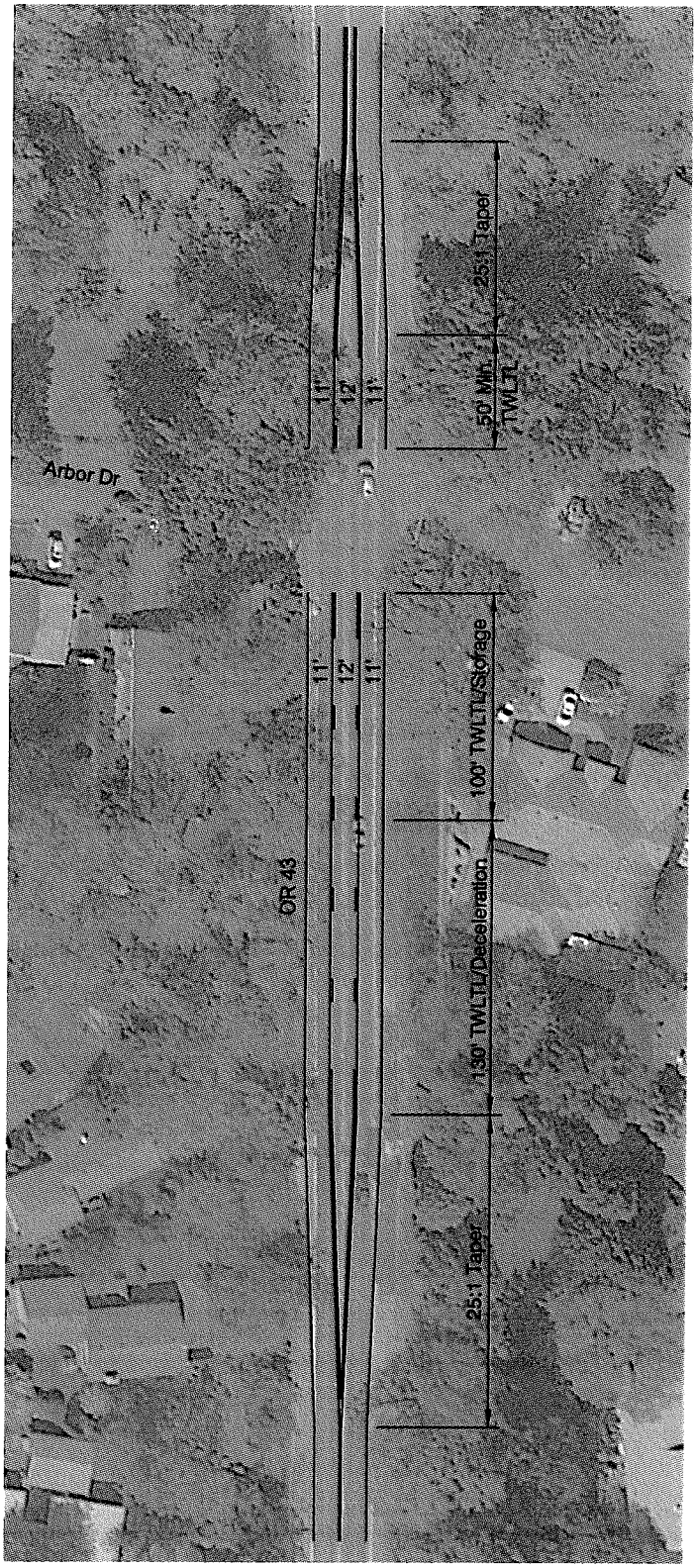
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	19	0	15	4	0	7	12	513	11	17	1019	52
Future Vol, veh/h	19	0	15	4	0	7	12	513	11	17	1019	52
Conflicting Peds, #/hr	0	0	0	0	0	0	1	0	1	1	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	15	0	0	0	0	0	0	2	0	6	4	2
Mvmt Flow	21	0	16	4	0	8	13	564	12	19	1120	57

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1786	1788	1149	1790	1810	571	1177	0	0	576	0	0
Stage 1	1186	1186	-	596	596	-	-	-	-	-	-	-
Stage 2	600	602	-	1194	1214	-	-	-	-	-	-	-
Critical Hdwy	7.25	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.16	-	-
Critical Hdwy Stg 1	6.25	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.25	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.635	4	3.3	3.5	4	3.3	2.2	-	-	2.254	-	-
Pot Cap-1 Maneuver	59	82	244	64	80	524	601	-	-	978	-	-
Stage 1	217	265	-	494	495	-	-	-	-	-	-	-
Stage 2	466	492	-	230	257	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	56	79	244	58	77	524	600	-	-	977	-	-
Mov Cap-2 Maneuver	152	184	-	149	176	-	-	-	-	-	-	-
Stage 1	212	260	-	483	484	-	-	-	-	-	-	-
Stage 2	449	481	-	210	252	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	29.8	18.7	0.2	0.1
HCM LOS	D	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	600	-	-	182	274	977	-	-
HCM Lane V/C Ratio	0.022	-	-	0.205	0.044	0.019	-	-
HCM Control Delay (s)	11.1	-	-	29.8	18.7	8.8	-	-
HCM Lane LOS	B	-	-	D	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.7	0.1	0.1	-	-

Attachment C OR 43 Concept Sketch and Cost Estimate



Highway 43 at Arbor Drive Intersection Concept
West Linn, OR

Figure 9

Roadway Characteristics							Clearing & Grubbing				
										area	
Street Name	Segment Length (ft)	Current Width (ft)	Planned Width (ft)	New Pavement (sqft)	Curbs (ft)	Sidewalk (sqft)	pavement	ditches	sidewalk	sqft	acres
OR 43	345.00	32.00	38.00	2070.00	690.00	8970.00	2070.00	0.00	8970.00	11040.00	0.25

Excavation								Embankment			
pavement		Ditches		Sidewalk		Volume		sidewalk		Volume	
area (sqft)	depth (ft)	area (sqft)	depth (ft)	area (sqft)	depth (ft)	cu ft	cu yard	area (sqft)	depth (ft)	cu ft	cu yard
2070.00	2.00	0.00	1.50	8970.00	0.50	8625.00	319.44	8970	0.5	4485	166.11

Clearing and Grubing	Excavation (Cut)	Embankment (Fill)	Rehabilitation (2" G&I)	New Pavement (6"/12")	New Curb	New Sidewalk	Pavement Removal	Subtotal (Roadworks)	Storm Drain System	Landscaping	Signing and Striping
$20,000	$15	$20	$2	$5	$15	$7	$10		15%	5%	5%
$ 5,069	$ 4,792	$ 3,322	$ 16,560	$ 10,350	$ 10,350	$ 58,305	$ -	$ 108,748	$ 16,312	$ 5,437	$ 5,437

Subtotal (other)	Subtotal (Roadworks + Other)	Mobilization	Traffic Control	Subtotal (Mobilization & Traffic Control)	Total	Contingency	Estimated Construction Cost	Architecture/Engineering	Construction Management	Estimated profesional fees	Estimated Project Cost
		10%	5%			25%		25%	15%		
$ 27,187	$ 135,935	$ 13,593.47	$ 6,796.73	$ 20,390	$ 156,325	$ 39,081.23	$ 195,406	$ 48,851.53	$ 29,310.92	$ 78,162	$ 273,569

Spir, Peter

From: Garth Appanaitis <gaa@dksassociates.com>
Sent: Wednesday, April 06, 2016 10:47 AM
To: Spir, Peter
Cc: Le, Khoi
Subject: Re: Chene Blanc Estates Development - Supplemental Letter

Khoi,
I just left a voicemail for you, but in general the responses look fine. I can provide more detailed responses, but I wanted to get you this info ASAP as you are preparing the staff report.

Two primary items:
1) They still did not account for Marylhurst traffic, which I suspect would degrade conditions (given the proximity), but I don't think it would significantly impact the findings and alter the proposed mitigation at Arbor.

2) There should be some additional coordination with ODOT about the proposed improvement and estimated cost on OR 43. The proportionate share amount looks ok (1.8%) but the unit cost assumptions seem low at first glance (I need to confirm) and they don't include the full stretch of OR 43 (down to Shady Hollow) as requested by ODOT.

Regarding transportation COA, I think they would include the items laid out in Page 2 of their response, which includes:
1) Full site frontage improvements along both sides of Upper Midhill Drive from the current roadway terminus to hillside Drive
2) Contribution of transportation SDCs
3) Proportionate share of improvements on OR 43, details and amount to be approved by ODOT.

Let me know if you need anything else as you wrap up the staff report.
Thanks,
Garth

On Tue, Apr 5, 2016 at 4:07 PM, Garth Appanaitis <gaa@dksassociates.com> wrote:
I'll review and provide comment by early tomorrow.
Garth

On Tue, Apr 5, 2016 at 3:51 PM, Spir, Peter <Pspir@westlinnoregon.gov> wrote:

Garth and Khoi

We are really pushing the envelope on this staff report so, indeed, noon at the latest!

Peter

Peter Spir
Associate Planner
22500 Salamo Rd.
West Linn, Oregon 97068
Pspir@westlinnoregon.gov
westlinnoregon.gov
Phone (503) 723-2539

West Linn

Click to Connect!

From: Le, Khoi
Sent: Tuesday, April 05, 2016 3:31 PM
To: gaa@dksassociates.com
Cc: Spir, Peter <Pspir@westlinnoregon.gov>
Subject: Fwd: Chene Blanc Estates Development - Supplemental Letter

Garth,

Can you review and provide us with your recommendations by noon tomorrow.

Thanks, Khoi

Sent from my iPhone

Khoi Le, Civil Engineer II
Public Works Support, #1517

West Linn

Begin forwarded message:

From: "Matt Bell" <mbell@kittelson.com>
To: "Le, Khoi" <kle@westlinnoregon.gov>, "Spir, Peter" <Pspir@westlinnoregon.gov>
Cc: "Andrew Tull (andrew.tull@3j-consulting.com)" <andrew.tull@3j-consulting.com>, "Aaron Murphy (aaron.murphy@3j-consulting.com)" <aaron.murphy@3j-consulting.com>, "Anthony Yi" <AYI@kittelson.com>
Subject: Chene Blanc Estates Development - Supplemental Letter

Civil Engineering
Water Resources
Land Use Planning

January 29, 2016

City of West Linn
Mr. Peter Spir
Associate Planner
22500 Salamo Road
West Linn, OR 97068

SUBJECT: UPPER MIDHILL ESTATES (15-03)

Dear Peter,

I am writing on behalf of our client, Upper Midhill Estates, LLC, to transmit the information identified in the City's November 19th incompleteness determination and to request that the application for the Upper Midhill Estates Subdivision (SUB-15-03) be deemed complete. The following has been provided to document our response to each of the requests listed within the November 19th incompleteness notification. The applicant is providing all of the missing information identified in the incompleteness determination as required by ORS 227.178(2)(a).

Incomplete items per the Planning Department are as follows:

1. CDC Chapter 85.160(B) Requires stamp and signature of the engineer.

Applicant's Finding: The Applicant's engineer has not stamped and sign a preliminary plan set as preliminary plans should never be confused for construction ready plans. Final construction plans will be stamped and signed by the project's engineer of record. The Applicant has provided an engineer's stamp on the preliminary plans with a "preliminary" watermark over the stamp. The final approved drawings will be signed.

2. CDC Chapter 85.160(D) (3) Rename "Preliminary Plat" as "Tentative Plan" (sheet C200)

Applicant's Finding: The Applicant has changed the name of sheet C200 to Tentative Plan.

3. CDC Chapter 85.160(D) (4) Location of the proposed division of land, with a tie to the City coordinate system, where established, and a description sufficient to define its location and boundaries, and a legal description of the tract boundaries.

Applicant's Finding: The Applicant has provided plans which have been designed using a survey which has been prepared using a coordinate system which is familiar to the City of West Linn.

4. CDC Chapter 85.160(E) (1) The location, widths, and names of all existing or platted streets and rights-of-way within or adjacent to the tract (within 50 feet), together with easements

and other important features such as section lines, donation land claim corners, section corners, City boundary lines, and monuments.

Applicant's Finding: The Applicant has added the location, widths, and names off all existing or platted streets and rights-of-way within or adjacent to the tract within 50 feet, as well as easements, section lines, donation land claim corners, section corners, City boundary lines, and monuments to the preliminary plat.

5. CDC Chapter 85.160(E) (5) and 55.100(B) (2) Provide City Arborist's review and mapping of significant trees.

Applicant's Finding: The City's Arborist, Mike Perkins, has performed an inspection of the site and has verbally confirmed that the project arborist's report is accurate. Formal correspondence has been requested from the City's Arborist but has not been provided to the Applicant.

6. CDC Chapter 85.160(E) (5) Trees on non-Type I and II lands shall have their "dripline plus 10 feet" protected area calculated per CDC 55.100(B) (2) and expressed in square feet, and also as a percentage of total non-Type I and II area.

Applicant's Finding: A delineation line has been added to separate the Type I and II land located in the south-west corner of the property. Only 2 significant trees lie outside of the land Types I and II, both lie within ROW improvements and thus must be removed.

7. CDC Chapter 85.160(E) (8) Show zoning onsite and properties adjacent to site (including Lake Oswego properties)

Applicant's Finding: The Applicant has revised the Site Plan (Sheet C200) to show the zoning on and adjacent to the subject property.

8. CDC Chapter 85.170(A) (3) Legal description of the tract.

Applicant's Finding: The Applicant has provided a condensed legal description on each page of the preliminary land use plan set. The Applicant has further provided a full legal description contained within a title report as an attachment to this correspondence.

9. CDC Chapter 85.200(J) (7) and 85.170(A) (7). Please verify density calculations. Sheet C200 states that there is a gross site area of 6.10 acres. CDC Chapter 85 offers no deduction in net acres due to ROW or public facilities. There is a deduction, per 85.200(J) (7), for Type I and II lands which comprise 3,963 square feet of wetlands. The net area is 261,897 square feet (6.10 acres (265,860 square feet) minus 3,963 square feet). 261,897 square feet divided by 4,500 square foot minimum lot size yields 58 lots which may be reduced (X .70) to 40 lots. The provisions of CDC Chapter 24: Planned Unit Development may provide alternative densities but would require a PUD application. (The PUD deposit fee is $4,200 plus $400 per acre.)

Applicant's Finding: The City has confirmed that the density proposed within this application for subdivision falls within the allowable ranges permitted within the R-4.5 zoning district, since the definition of net acreage excludes rights of way.

10. CDC Chapter 85.170(A) (8) Show slopes (incl. sheet C130) by breakdowns as required by 55.110(B) (3) (Type I and II lands). Also, the current slope breakdown (sheet C130) uses color/patterns that are difficult to tell apart. Please use contrasting colors or patterns.

Applicant's Finding: The slope break down has been adjusted to show Type I and II lands. The colors can be better distinguished by either the submitted 11x17's or the electronic copies of the revised plan set.

11. CDC Chapter 85.170(A) Grading. Please relocate/show retaining walls and *"proposed gravel outfall"* (as shown on sheet C210 map and legend) within the site boundaries and not on adjacent properties unless easements for those facilities can be provided.

Applicant's Finding: The Applicant now shows the proposed retaining walls and gravel outfalls. These lie within the site boundary.

12. CDC Chapter 85.200(B) (4) Please address the approval criteria of CDC Chapter 48: Access.

Applicant's Finding: Chapter 48 of the CDC has been added to the narrative. The Applicant has addressed the applicable approval criteria.

13. CDC Chapter 85.200(B) (7) Lots 13, 14 and 15 must be provided with legal access. An agreement with the City for access across undeveloped ROW may be required.

Applicant's Finding: The Applicant will enter into a shared access and maintenance agreement for access to lots 13, 14, and 15.

14. CDC Chapter 85.200(A) (12) Although the original Robinwood plat named the undeveloped internal street: Scenic Drive- that does not reconcile with the fact that the street will be an extension of Hillside Drive. Please rename Scenic Drive as Hillside Drive.

Applicant's Finding: The Applicant has adjusted the name from Scenic Drive to Hillside Drive.

15. CDC Chapter 85.200(F) (5) Need to request a statement from the City Engineer that there is sufficient water service available.

Applicant's Finding: The Applicant has confirmed with the City Engineer that sufficient water service is available.

16. CDC Chapter 85.200(G) (9) Need to request a statement from the City Engineer that there is sufficient sewer capacity available.

Applicant's Finding: The Applicant has confirmed with the City Engineer that sufficient sewer service is available.

17. CDC Chapter 32.020(A) A Water Resource Area (WRA) permit is required. The application form needs to be amended to add a WRA permit. The WRA permit fee is $2,600 plus a re-vegetation inspection fee of $250.

Applicant's Finding: The Applicant has provided a fee to enable the City's review of a Water Resource Area Permit, and will revise the application form to mark the appropriate box. The standards and criteria for approval of such development are addressed under Chapter 32 of the application.

18. CDC Chapter 32.050 Provide WRA application per this section or request waiver where CDC Chapter 85: Land Division submittal has already addressed that item or where it is not applicable.

Applicant's Finding: The Applicant has provided a fee to enable the City's review of a Water Resource Area Permit, and has clarified that it is expressly requesting approval of development within a WRA as allowed by Chapter 32.

19. CDC Chapter 32.060, 32.080 (A) (B) (C) (D) please provide responses to these approval criteria. (The Schott and Associates report does not address these code sections and approval criteria.)

Applicant's Finding: The Applicant's revised application has addressed the applicable sections of CDC Chapter 32, including the standard process approval criteria of 32.060. The alternative process approval criteria of Section 32.080 do not apply to this application.

20. CDC Chapter 32.050(F) (5) requires delineation of the WRA. The Schott and Associates report discusses two small PEM wetlands totaling 0.09 acres and a "defined ditch" at the north edge of the site but does not make a finding that the ditch is a wetland (page 4 of the report). However, the "Wetland Determination Data Form" for sample point 6 states that the sampled area is within a wetland. Staff also notes that the applicant finding on page 27 of the 3J submittal states that there are two areas of WRA on this site including an ephemeral drainageway. Please reconcile these comments. If the drainageway does in fact include a wetland then it needs to be mapped and the appropriate setbacks of Chapter 32 would apply. (The City of West Linn has only extended WRA designation to ephemeral streams where they are headwaters that evolve into an intermittent and/or perennial stream.)

Applicant's Finding: The Applicant's Wetland Delineation Report does not show a wetland within the sample points along the ephemeral drainage along the site's Northern Boundary. The Applicant has provided a letter of Concurrence from the Oregon State Department of State Lands identifying the two small wetlands located on

the site. The drainage located along the northern edge of the property is exempt from state permitting requirements due to its status as a man-made drainage facility and it is not considered to be a wetland or a water of the state.

21. Traffic Impact Analysis: Update figure 2 to reflect the most recent site plan. Include proposed mitigation exhibits for illustration. Provide cost estimate of proposed mitigations and full improvement to accommodate mitigations. Provide analysis for other modes: pedestrian, bike, transit, and truck analysis.

Applicant's Finding: The Applicant's Traffic Impact Analysis has been updated and has been submitted along with this letter and the revised plans.

22. Geotechnical Report: Update figure 2 to reflect the most recent site plan. Storm water facility has been redesigned to be located at middle of the site instead of at the NW corner of the site. Revise the observation and recommendation in accordance with the new location.

Applicant's Finding: The Applicant's Geotechnical Report has not been updated as the findings within the report are not impacted by the change in the preliminary subdivision layout.

23. Sheet C201: Local Road not Neighborhood Route. 6' sidewalk on curb tight sidewalk. 6.5' including curb. Revise Section A-A. Spelling error on Section B-B.

Applicant's Finding: The title has been adjusted to read Local Road. Typical Section A-A has been adjusted to show a 6.0' sidewalk. The spelling error on Section B-B has been corrected.

24. Sheet C210: 6' sidewalk on curb tight sidewalk. 6.5' including curb. Why there is a stop in the middle of the roadway? Provide new street signs. Show location of new street sign and pole.

Applicant's Finding: The Applicant has adjusted the sidewalk in the typical sections. The stop sign has been removed. A new street sign has been added between lot 15 and Tract C.

25. Tract A will be replaced by an easement.

Applicant's Finding: The Applicant has removed Tract A and replaced this area with an easement over the adjoining lots.

26. Tract B shall be eliminated and the property will be consolidated with adjacent lots.

Applicant's Finding: The Applicant has removed the Tract and the adjacent lots have been consolidated.

27. Retaining wall in the detention pond area must be replaced in tier. No geo-grid will be allowed to extend inside the public utility easement.

Applicant's Finding: The Applicant has designed tiered walls in order eliminate the need for geo-grid.

28. The street pavement width is preferred to be 28 wide to allow on street parking. Discuss with Khoi how this can be achieved.
29.

Applicant's Finding: The Applicant has proposed a street layout with on-street parking along one side of the proposed road network. This design has been preliminarily evaluated by the City's Engineer.

We trust that these responses and materials will assist in the City's favorable evaluation of the application. Please feel free to contact us with any questions that you may have. We will be ready to respond to any questions or requests for any further clarification.

Sincerely,

Andrew Tull
Principal Planner
3J Consulting, Inc.

Attachments: Revised Land Use Narrative
Revised Site Plan and Utility Plans
Preliminary Title Report
Revised Traffic Impact Analysis
DSL Letter of Concurrence for Wetlands

File

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Appendix List
Appendix A - Land Use Application
Appendix B - Pre-Application Conference Notes
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GENERAL INFORMATION

Property Owner:	18000 Midhill Drive, LLC 1235 North Dutton Ave, Suite E Santa Rosa, CA 95401 Contact: David Chiddix
Applicant:	Upper Midhill Estates, LLC 931 SW King Avenue Portland, OR 97205 Contact: Ryan Zygar Phone: 360-798-4838 Email: ryan@zygar.com
Applicant's Representative:	3J Consulting, Inc. 5075 SW Griffith Drive, Suite 150 Beaverton, OR 97005 Contact: Andrew Tull Phone: 503-545-1907 Email: andrew.tull@3j-consulting.com

SITE INFORMATION

Tax Lot Numbers:	2S1E13CA0200
Address:	18000 Upper Midhill Drive
Size:	6.10 acres
Zoning Designation:	R-4.5 (City of West Linn)
Neighborhood:	Robinwood
Comprehensive Plan:	Medium Density Residential
Existing Use:	The site is vacant.
Street Functional Classification:	The site currently takes access from Upper Midhill Drive, a local street. Adjacent College View Drive, Scenic Drive and Hillside Drive are local streets.
Surrounding Zoning:	North, East and West- City of Lake Oswego South- R-4.5 (West Linn)

INTRODUCTION

APPLICANT'S REQUEST

The Applicant seeks approval of an application for Subdivision Preliminary Plat and Water Resource Area (WRA) Review for the development of 34 residential lots (Chêne Blanc Estates). This narrative describes the proposed subdivision of the site and documents compliance with the relevant sections of the City of West Linn's Community Development Code ("CDC").

PROPOSED SITE IMPROVEMENTS

The project site consists of a total of 6.10 acres. The property is located at the north end of Upper Midhill Drive, adjacent to the City of Lake Oswego to the north. The site is currently vacant. The 34 lots will take access from either Upper Midhill Drive or Hillside Drive, both local streets.

The intent of this subdivision is to provide thirty-four (34) buildable lots on the subject property. Each of the proposed lots will exceed the minimum of 4,500 square feet in size, for development with single-family detached homes, a use permitted outright in the R-4.5 zone. This application would create thirty-four (34) lots for needed housing, contributing to the City's inventory of diverse and available housing stock.

The lot layout and configuration of streets and drainage are dictated by four main factors: topography, existing street grades, the abundance of significant trees, and the city's requirement that any development provide a minimum of 34 lots. The application demonstrates how these factors have been successfully addressed in compliance with all applicable criteria.

APPLICABLE CRITERIA

The following sections of the CDC have been extracted as they have been deemed to be applicable to the proposal. Following each applicable criteria or design standard, the Applicant has provided a series of draft findings. The intent of providing code and detailed responses and findings is to document that the proposed development has satisfied the approval criteria for Subdivision Preliminary Plat.

DIVISION 2. ZONING PROVISIONS

CHAPTER 14. SINGLE-FAMILY RESIDENTIAL ATTACHED AND DETACHED/DUPLEX, R-4.5

14.030 PERMITTED USES

The following uses are permitted outright in this zoning district.

1. **Single-family detached residential unit.**
2. **Duplex residential units.**
3. **Family day care.**
4. **Single-family attached residential units.**
5. **Community recreation.**
6. **Residential home.**
7. **Utilities, minor.**
8. **Manufactured housing.**
9. **Transportation facilities (Type I). (Ord. 1180, 1986; Ord. 1226, 1988; Ord. 1248, 1989; Ord. 1354, 1994; Ord. 1584, 2008)**

Applicant's Finding:	The proposed subdivision is intended for single-family detached residential units, a use permitted outright in the R-4.5 zone.
	The requirements of this section have been satisfied.

14.070 DIMENSIONAL REQUIREMENTS, USES PERMITTED OUTRIGHT AND USES PERMITTED UNDER PRESCRIBED CONDITIONS

Except as may be otherwise provided by the provisions of this code, the following are the requirements for uses within this zone:

A. **The minimum lot size shall be:**
   1. **For a single-family detached unit, 4,500 square feet.**
   2. **For each attached single-family unit, 4,000 square feet.**
   3. **For a duplex, 8,000 square feet or 4,000 square feet for each unit.**

B. **The minimum front lot line length or the minimum lot width at the front lot line shall be 35 feet.**

C. **The average minimum lot width shall be 35 feet.**

D. ***Repealed by Ord. 1622.***

E. **The minimum yard dimensions or minimum building setback areas from the lot line shall be:**
   1. **For a front yard, 20 feet; except for steeply sloped lots where the provisions of CDC 41.010 shall apply.**

2. For an interior side yard, five feet.
3. For a side yard abutting a street, 15 feet.
4. For a rear yard, 20 feet.

F. The maximum building height shall be 35 feet, except for steeply sloped lots in which case the provisions of CDC 41.010 shall apply.

G. The maximum lot coverage shall be 40 percent.

H. The minimum width of an accessway to a lot which does not abut a street or a flag lot shall be 15 feet.

I. The floor area ratio shall be 0.45. Type I and II lands shall not be counted toward lot area when determining allowable floor area ratio, except that a minimum floor area ratio of 0.30 shall be allowed regardless of the classification of lands within the property. That 30 percent shall be based upon the entire property including Type I and II lands. Existing residences in excess of this standard may be replaced to their prior dimensions when damaged without the requirement that the homeowner obtain a non-conforming structures permit under Chapter 66 CDC.

J. The sidewall provisions of Chapter 43 CDC shall apply. (Ord. 1226, 1988; Ord. 1308, 1991; Ord. 1377, 1995; Ord. 1538, 2006; Ord. 1622 § 24, 2014)

Applicant's Finding:

The proposed lots range in size from 4,615 square feet to 9,905 square feet, well over the 4,500 square foot minimum for single-family detached residential in the R-4.5 zone. The lot widths at front property line and lot width averages all exceed 35 feet, as demonstrated on the submitted plans. There are no accessways proposed as all lots access a public street. Yard dimensions, building height, lot coverage, floor area ratios and sidewall provisions will all meet the requirements of this section and will be verified at time of building permit submittal.

The requirements of this section have been satisfied.

DIVISION 8. LAND DIVISION

CHAPTER 85. GENERAL PROVISIONS

85.170 SUPPLEMENTAL SUBMITTAL REQUIREMENTS FOR TENTATIVE SUBDIVISION OR PARTITION PLAN

B. Transportation.

2. Traffic Impact Analysis (TIA).

a. Purpose. The purpose of this section of the code is to implement Section 660-012-0045(2)(e) of the State Transportation Planning Rule that requires the City to adopt a process to apply conditions to development proposals in order to minimize adverse impacts to and protect transportation facilities. This section establishes the standards for when a proposal must be reviewed for potential traffic impacts; when a Traffic Impact Analysis must be submitted with a development application in order to determine whether conditions are needed to minimize impacts to and protect transportation facilities; what must be in a Traffic Impact Study; and who is qualified to prepare the study.

b. Typical average daily trips. The latest edition of the Trip Generation manual, published by the Institute of Transportation Engineers (ITE) shall be used as the standards by which to gauge average daily vehicle trips.

c. When required. A Traffic Impact Analysis may be required to be submitted to the City with a land use application, when the following conditions apply:

1) The development application involves one or more of the following actions:

(A) A change in zoning or a plan amendment designation; or

Applicant's Finding: The Applicant is not proposing a change in zoning or a plan amendment designation as a part of this land use application, therefore a Traffic Impact Analysis is not required per this subsection.

The requirements of this section have been satisfied.

(B) Any proposed development or land use action that ODOT states may have operational or safety concerns along a State highway; and

Applicant's Finding: The proposed development is not located along a State highway, therefore a Traffic Impact Analysis is not required per this subsection.

The requirements of this section have been satisfied.

(C) The development shall cause one or more of the following effects, which can be determined by field counts, site observation, traffic impact analysis or study, field measurements, crash history, Institute of Transportation Engineers Trip Generation manual; and information and studies provided by the local reviewing jurisdiction and/or ODOT:

(1) An increase in site traffic volume generation by 250 average daily trips (ADT) or more (or as required by the City Engineer); or

Applicant's Finding: The *Institute of Transportation Engineers Trip Generation Manual, 9th Edition* estimates an average increase in daily trips as 9.5 trips/ residential lot. The proposed 34 lot subdivision will generate 323 average daily trips (ADT), exceeding the 250 ADT threshold. Therefore, the submittal includes a Transportation Impact Analysis prepared by Kittleson & Associates, Inc. in support of this project.

The requirements of this section have been satisfied.

(2) An increase in use of adjacent streets by vehicles exceeding the 20,000-pound gross vehicle weights by 10 vehicles or more per day; or

Applicant's Finding: The proposed development is intended to serve primarily residential traffic and is not estimated to increase the use of adjacent streets by vehicles exceeding 20,000-pound gross vehicle weights by 10 vehicles or more per day, therefore a Traffic Impact Analysis is not required per this subsection.

The requirements of this section have been satisfied.

(3) The location of the access driveway does not meet minimum intersection sight distance requirements, or is located where vehicles entering or leaving the property are restricted, or such vehicles queue or hesitate on the State highway, creating a safety hazard; or

Applicant's Finding: Proposed access driveways have been designed to meet the minimum intersection site distance for new single family homes.

The requirements of this section have been satisfied.

(4) The location of the access driveway does not meet the access spacing standard of the roadway on which the driveway is located; or

Applicant's Finding: Proposed access driveways have been designed to meet the minimum intersection site distance for new single family homes.

The requirements of this section have been satisfied.

(5) A change in internal traffic patterns that may cause safety problems, such as backup onto the highway or traffic crashes in the approach area.

Applicant's Finding: No changes to local traffic patterns hold the potential to cause off-site safety problems.

The requirements of this section have been satisfied.

d. Traffic impact analysis requirements.

1) Preparation. A Traffic Impact Analysis shall be prepared by a professional engineer qualified under OAR 734-051-0040. The City shall commission the traffic analysis and it will be paid for by the applicant.

2) Transportation Planning Rule compliance. See CDC 105.050(D), Transportation Planning Rule Compliance.

3) Pre-application conference. The applicant will meet with West Linn Public Works prior to submitting an application that requires a traffic impact application. This meeting will determine the required elements of the TIA and the level of analysis expected.

e. Approval criteria.

1) Criteria. When a Traffic Impact Analysis is required, approval of the development proposal requires satisfaction of the following criteria:

(A) The Traffic Impact Analysis was prepared by a professional traffic engineer qualified under OAR 734-051-0040; and

(B) If the proposed development shall cause one or more of the effects in subsection (B)(2) of this section, or other traffic hazard or negative impact to a transportation

facility, the Traffic Impact Analysis includes mitigation measures that meet the City's level of service and are satisfactory to the City Engineer, and ODOT when applicable; and

(C) The proposed site design and traffic and circulation design and facilities, for all transportation modes, including any mitigation measures, are designed to:

(1) Have the least negative impact on all applicable transportation facilities; and

(2) Accommodate and encourage non-motor vehicular modes of transportation to the extent practicable; and

(3) Make the most efficient use of land and public facilities as practicable; and

(4) Provide the most direct, safe and convenient routes practicable between on-site destinations, and between on-site and off-site destinations; and

(5) Otherwise comply with applicable requirements of the City of West Linn Community Development Code.

f. Conditions of approval. The City may deny, approve, or approve the proposal with appropriate conditions.

1) Dedication of land for streets, transit facilities, sidewalks, bikeways, paths, or accessways shall be required where the existing transportation system will be impacted by or is inadequate to handle the additional burden caused by the proposed use.

2) Improvements such as paving, curbing, installation or contribution to traffic signals, or construction of sidewalks, bikeways, accessways, paths, or streets that serve the proposed use where the existing transportation system may be burdened by the proposed use may be required.

Applicant's Finding:

The transportation impact analysis submitted with this application was prepared by a professional traffic engineer and finds that the proposed subdivision can be constructed while maintaining safe and acceptable traffic operations at the study intersection and adjacent roadways. The following is a list of recommended mitigation measures:

- Construct an extension of Upper Midhill Road consistent with the City's local street standard.
- Shrubbery and landscaping near the internal intersections and site access points should be maintained to ensure adequate sight distance.
- Develop a cost estimate for the proposed improvements to the Arbor/highway 43 intersection in coordination with the City and ODOT staff and pay a proportionate share (estimated at 1.9 percent) of the total cost of the improvements. A preliminary cost estimate has been provided to the City detailing the anticipated costs of the Highway 43 Road widening.

The requirements of this section have been satisfied.

85.200 APPROVAL CRITERIA

No tentative subdivision or partition plan shall be approved unless adequate public facilities will be available to provide service to the partition or subdivision area prior to final plat approval and the Planning Commission or Planning Director, as applicable, finds that the following standards have been satisfied, or can be satisfied by condition of approval.

A. Streets.

1. General. The location, width and grade of streets shall be considered in their relation to existing and planned streets, to the generalized or reasonable layout of streets on adjacent undeveloped lot or parcels, to topographical conditions, to public convenience and safety, to accommodate various types of transportation (automobile, bus, pedestrian, bicycle), and to the proposed use of land to be served by the streets. The functional class of a street aids in defining the primary function and associated design standards for the facility. The hierarchy of the facilities within the network in regard to the type of traffic served (through or local trips), balance of function (providing access and/or capacity), and the level of use (generally measured in vehicles per day) are generally dictated by the functional class. The street system shall assure an adequate traffic or circulation system with intersection angles, grades, tangents, and curves appropriate for the traffic to be carried. Streets should provide for the continuation, or the appropriate projection, of existing principal streets in surrounding areas and should not impede or adversely affect development of adjoining lands or access thereto.

To accomplish this, the emphasis should be upon a connected continuous pattern of local, collector, and arterial streets rather than discontinuous curvilinear streets and cul-de-sacs. Deviation from this pattern of connected streets should only be permitted in cases of extreme topographical challenges including excessive slopes (35 percent-plus), hazard areas, steep drainageways, wetlands, etc. In such cases, deviations may be allowed but the connected continuous pattern must be reestablished once the topographic challenge is passed. Streets should be oriented with consideration of the sun, as site conditions allow, so that over 50 percent of the front building lines of homes are oriented within 30 degrees of an east-west axis.

Internal streets are the responsibility of the developer. All streets bordering the development site are to be developed by the developer with, typically, half-street improvements or to City standards prescribed by the City Engineer. Additional travel lanes may be required to be consistent with adjacent road widths or to be consistent with the adopted Transportation System Plan (TSP) and any adopted updated plans.

An applicant may submit a written request for a waiver of abutting street improvements if the TSP prohibits the street improvement for which the waiver is requested. Those areas with numerous (particularly contiguous) under-developed or undeveloped tracts will be required to install street improvements. When an applicant requests a waiver of street improvements and the waiver is granted, the applicant shall pay an in-lieu fee equal to the estimated cost, accepted by the City Engineer, of the otherwise required street improvements. As a basis for this determination, the City Engineer shall consider the cost of similar improvements in recent development projects and may require up to three estimates from the applicant. The amount of the fee shall be established prior to the Planning Commission's decision on the associated application. The in-lieu fee shall be used for in kind or related improvements. Streets shall also be laid out to avoid and protect tree clusters and significant trees, but not to the extent that it would compromise connectivity requirements per this subsection (A)(1), or bring the density below 70 percent of the maximum density for the developable net area. The developable net area is calculated by taking the total site acreage and deducting Type I and II lands; then up to 20 percent of the remaining land may be excluded as necessary for the purpose of protecting significant tree clusters or stands as defined in CDC 55.100(B)(2).

Applicant's Finding:

This site is located north end of Upper Midhill Drive, a local street. The development will include the extension of Hillside Drive, also a local street. The development of this site will not negatively affect the connectivity of these two streets. Figure 8-6 of the West Linn Transportation System Plan - Future Local Street Connectivity Improvements, does not identify a new street connection within or adjacent to this site. However, the proposed subdivision will include connection of Upper Midhill Drive to Hillside Drive to provide connectivity throughout this site.

The extension of Upper Midhill and Hillside will require right-of-way dedication with this subdivision. The Applicant proposes additional right-of-way within the site for the extension of both of these streets, as discussed below. Sidewalks and planter strips are also proposed.

This section requires the developer to be responsible for the construction of internal streets. The Applicant proposes full responsibility for construction of the extensions of Upper Midhill and Hillside.

The requirements of this section have been satisfied.

2. Right-of-way and roadway widths. In order to accommodate larger tree-lined boulevards and sidewalks, particularly in residential areas, the standard right-of-way widths for the different street classifications shall be within the range listed below. But instead of filling in the right-of-way with pavement, they shall accommodate the amenities (e.g., boulevards, street trees, sidewalks). The exact width of the right-of-way shall be determined by the City Engineer or the approval authority. The following ranges will apply:

Street Classification	Right-of-Way
Local Street	40' – 60'

Additional rights-of-way for slopes may be required. Sidewalks shall not be located outside of the right-of-way unless to accommodate significant natural features or trees.

Applicant's Finding:

The Applicant proposes dedication of a variable width between 48' and 50' of right-of-way within the site for both Upper Midhill and Hillside, as shown on the preliminary plat, sheet C200. These dedications are consistent with the Transportation System Plan (TSP) requirements of 40'-60' ROW for a local street.

The requirements of this section have been satisfied.

3. Street widths. Street widths shall depend upon which classification of street is proposed. The classifications and required cross sections are established in Chapter 8 of the adopted TSP.

Applicant's Finding:

The width of the paved section of the extensions of Upper Midhill and Hillside will be 24 feet, per the TSP standard for a local street.

The requirements of this section have been satisfied.

4. The decision-making body shall consider the City Engineer's recommendations on the desired right-of-way width, pavement width and street geometry of the various street types within the subdivision after consideration by the City Engineer of the following criteria:

- **a. The type of road as set forth in the Transportation Master Plan.**
- **b. The anticipated traffic generation.**
- **c. On-street parking requirements.**
- **d. Sidewalk and bikeway requirements.**
- **e. Requirements for placement of utilities.**
- **f. Street lighting.**
- **g. Drainage and slope impacts.**
- **h. Street trees.**
- **i. Planting and landscape areas.**
- **j. Existing and future driveway grades.**
- **k. Street geometry.**
- **l. Street furniture needs, hydrants.**

Applicant's Finding: The City's Development Engineer has reviewed the proposal and made recommendations to the applicant, which are incorporated into the proposed roadway configuration.

The Applicant has specifically requested a modification along the western edge of the extension of Hillside Drive. This modification would involve the placement of a curb-tight sidewalk along the western edge of the street. The curb-tight sidewalk has been proposed in order to reduce grading impacts and wall construction along the roadway's western edge. The western edge of Hillside currently abuts several existing structures.

The requirements of this section have been satisfied.

5. Additionally, when determining appropriate street width, the decision-making body shall consider the following criteria:

- **a. When a local street is the only street serving a residential area and is expected to carry more than the normal local street traffic load, the designs with two travel and one parking lane are appropriate.**
- **b. Streets intended to serve as signed but unstriped bike routes should have the travel lane widened by two feet.**
- **c. Collectors should have two travel lanes and may accommodate some parking. Bike routes are appropriate.**
- **d. Arterials should have two travel lanes. On-street parking is not allowed unless part of a Street Master Plan. Bike lanes are required as directed by the Parks Master Plan and Transportation Master Plan.**

Applicant's Finding: The local street load will not exceed that expected of a residential area. This site is also not designated as a bike route and does not include collector or arterial streets.

The requirements of this section have been satisfied.

6. Reserve strips. **Reserve strips or street plugs controlling the access to streets are not permitted unless owned by the City.**

Applicant's Finding: The applicant does not propose reserve strips or street plugs with this application. All rights-of-way will be dedicated to the edge of the adjoining properties.

The requirements of this section have been satisfied.

7. Alignment. **All streets other than local streets or cul-de-sacs, as far as practical, shall be in alignment with existing streets by continuations of the centerlines thereof. The staggering of street alignments resulting in "T" intersections shall, wherever practical, leave a minimum distance of 200 feet between the centerlines of streets having approximately the same direction and otherwise shall not be less than 100 feet.**

Applicant's Finding: The extension of both local streets will be in direct alignment. One "L" shaped intersection between Hillside and Upper Midhill Drive is proposed, where the two streets intersect at the northwestern corner of the site.

The requirements of this section have been satisfied.

8. Future extension of streets. **Where necessary to give access to or permit a satisfactory future subdivision of adjoining land, streets shall be extended to the boundary of the subdivision and the resulting dead-end streets may be approved without turnarounds. (Temporary turnarounds built to Fire Department standards are required when the dead-end street is over 100 feet long.)**

Applicant's Finding: The Applicant proposes to construct Upper Midhill to connect to Hillside, both local public streets.

The requirements of this section have been satisfied.

9. Intersection angles. **Streets shall be laid out to intersect angles as near to right angles as practical, except where topography requires lesser angles, but in no case less than 60 degrees unless a special intersection design is approved. Intersections which are not at right angles shall have minimum corner radii of 15 feet along right-of-way lines which form acute angles. Right-of-way lines at intersections with arterial streets shall have minimum curb radii of not less than 35 feet. Other street intersections shall have curb radii of not less than 25 feet. All radii shall maintain a uniform width between the roadway and the right-of-way lines. The intersection of more than two streets at any one point will not be allowed unless no alternative design exists.**

Applicant's Finding: The proposed street configuration includes one intersection between Hillside and Upper Midhill Drive. The proposed intersection has limited options for alignment due to the grading necessary to connect these two streets. The proposed angle between Upper Midhill and Hillside Drive is approximately 74 degrees.

The requirements of this section have been satisfied.

10. Additional right-of-way for existing streets. Wherever existing street rights-of-way adjacent to or within a tract are of inadequate widths based upon the standards of this chapter, additional right-of-way shall be provided at the time of subdivision or partition.

Applicant's Finding: Additional right-of-way for extensions of Upper Midhill and Hillside, as discussed above, will be dedicated at time of subdivision.

The requirements of this section have been satisfied.

11. Cul-de-sacs.

a. New cul-de-sacs and other closed-end streets (not including stub streets intended to be connected) on sites containing less than 5 acres, or sites accommodating uses other than residential or mixed use development, are not allowed unless the applicant demonstrates that there is no feasible alternative due to :***

Applicant's Finding: No cul-de-sacs are proposed with this subdivision.

The requirements of this section have been satisfied.

12. Street names. No street names shall be used which will duplicate or be confused with the names of existing streets within the City. Street names that involve difficult or unusual spellings are discouraged. Street names shall be subject to the approval of the Planning Commission or Planning Director, as applicable. Continuations of existing streets shall have the name of the existing street. Streets, drives, avenues, ways, boulevards, and lanes shall describe through streets. Place and court shall describe cul-de-sacs. Crescent, terrace, and circle shall describe loop or arcing roads.

Applicant's Finding: The street names of Upper Midhill and Hillside Drive are established. No new street names are proposed.

The requirements of this section have been satisfied.

13. Grades and curves. Grades shall not exceed 8 percent on major or secondary arterials, 10 percent on collector streets, or 15 percent on any other street unless by variance. Willamette Drive/Highway 43 shall be designed to a minimum horizontal and vertical design speed of 45 miles per hour, subject to Oregon Department of Transportation (ODOT) approval. Arterials shall be designed to a minimum horizontal and vertical design speed of 35 miles per hour. Collectors shall be designed to a minimum horizontal and vertical design speed of 30 miles per hour. All other streets shall be designed to have a minimum centerline radii of 50 feet. Super elevations (i.e., banking) shall not exceed four percent. The centerline profiles of all streets may be provided where terrain constraints (e.g., over 20 percent slopes) may result in considerable deviation from the originally proposed alignment.

Applicant's Finding: The grade of the extensions of Hillside Drive and Hillside Drive will not exceed 15 percent, per this standard. All city centerline radii standards will be met.

The requirements of this section have been satisfied.

14. Access to local streets. Intersection of a local residential street with an arterial street may be prohibited by the decision-making authority if suitable alternatives exist for providing interconnection of proposed local residential streets with other local streets. Where a subdivision or partition abuts or contains an existing or proposed major arterial street, the decision-making authority may require marginal access streets, reverse-frontage lots with suitable depth, visual barriers, noise barriers, berms, no-access reservations along side and rear property lines, and/or other measures necessary for adequate protection of residential properties from incompatible land uses, and to ensure separation of through traffic and local traffic.

Applicant's Finding: The subject property does not abut nor contain an existing or proposed Major Arterial Street, nor is an intersection of a Local Residential Street with an Arterial Street proposed.

The requirements of this section have been satisfied.

15. Alleys. Alleys shall be provided in commercial and industrial districts unless other permanent provisions for access to off-street parking and loading facilities are made as approved by the decision-making authority. While alley intersections and sharp changes in alignment should be avoided, the corners of necessary alley intersections shall have radii of not less than 10 feet. Alleys may be provided in residential subdivisions or multi-family projects. The decision to locate alleys shall consider the relationship and impact of the alley to adjacent land uses. ***

Applicant's Finding: No alleys are proposed with this subdivision.

The requirements of this section have been satisfied.

16. Sidewalks. Sidewalks shall be installed per CDC 92.010(H), Sidewalks. The residential sidewalk width is six feet plus planter strip as specified below. Sidewalks in commercial zones shall be constructed per subsection (A)(3) of this section. See also subsection C of this section. Sidewalk width may be reduced with City Engineer approval to the minimum amount (e.g., four feet wide) necessary to respond to site constraints such as grades, mature trees, rock outcroppings, etc., or to match existing sidewalks or right-of-way limitations.

Applicant's Finding: The applicant proposes to install a 6-foot sidewalk plus planter strip along the both sides of Upper Midhill and Hillside within this property, per this standard.

The requirements of this section have been satisfied.

17. Planter strip. The planter strip is between the curb and sidewalk providing space for a grassed or landscaped area and street trees. The planter strip shall be at least 6 feet wide to accommodate a fully matured tree without the boughs interfering with pedestrians on the sidewalk or vehicles along the curbline. Planter strip width may be reduced or eliminated, with City Engineer approval, when it cannot

be corrected by site plan, to the minimum amount necessary to respond to site constraints such as grades, mature trees, rock outcroppings, etc., or in response to right-of-way limitations.

Applicant's Finding: The applicant proposes to install a minimum 6-foot planter strip between all proposed sidewalks and paved street sections on Upper Midhill. The Applicant proposes a curb-tight sidewalk configuration along the western edge of Hillside in order to reduce the intensity of grading and wall construction required adjacent to the site's neighboring single family homes.

The requirements of this section have been satisfied.

18. Streets and roads shall be dedicated without any reservations or restrictions.

Applicant's Finding: No reservations or restrictions are proposed with the street dedication.

The requirements of this section have been satisfied.

19. All lots in a subdivision shall have access to a public street. Lots created by partition may have access to a public street via an access easement pursuant to the standards and limitations set forth for such accessways in Chapter 48 CDC.

Applicant's Finding: All lots have direct access to a public street.

The requirements of this section have been satisfied.

20. Gated streets. Gated streets are prohibited in all residential areas on both public and private streets. A driveway to an individual home may be gated.

Applicant's Finding: Gated streets are not proposed.

The requirements of this section have been satisfied.

21. Entryway treatments and street isle design. When the applicant desires to construct certain walls, planters, and other architectural entryway treatments within a subdivision, the following standards shall apply:

a. All entryway treatments except islands shall be located on private property and not in the public right-of-way.

b. Planter islands may be allowed provided there is no structure (i.e., brick, signs, etc.) above the curbline, except for landscaping. Landscaped islands shall be set back a minimum of 24 feet from the curbline of the street to which they are perpendicular.

c. All islands shall be in public ownership. The minimum aisle width between the curb and center island curbs shall be 14 feet. Additional width may be required as determined by the City Engineer.

d. Brick or special material treatments are acceptable at intersections with the understanding that the City will not maintain these sections except with asphalt overlay, and that they must meet the

Americans with Disabilities Act (ADA) standards. They shall be laid out to tie into existing sidewalks at intersections.

e. Maintenance for any common areas and entryway treatments (including islands) shall be guaranteed through homeowners association agreements, CC&Rs, etc.

f. Under Chapter 52 CDC, subdivision monument signs shall not exceed 32 square feet in area.

Applicant's Finding: The applicant does not propose to construct entryway treatments to the subdivision at this time.

The requirements of this section have been satisfied.

22. Based upon the determination of the City Manager or the Manager's designee, the applicant shall construct or cause to be constructed, or contribute a proportionate share of the costs, for all necessary off-site improvements identified by the transportation analysis commissioned to address CDC 85.170(B)(2) that are required to mitigate impacts from the proposed subdivision. The proportionate share of the costs shall be determined by the City Manager or Manager's designee, who shall assume that the proposed subdivision provides improvements in rough proportion to identified impacts of the subdivision. Off-site transportation improvements will include bicycle and pedestrian improvements as identified in the adopted City of West Linn TSP.

Applicant's Finding: The submitted Transportation Impact Analysis includes the following mitigation measures:

- Construct an extension of Upper Midhill Road consistent with the City's local street standard.
- Shrubbery and landscaping near the internal intersections and site access points should be maintained to ensure adequate sight distance.
- Develop a cost estimate for the proposed improvements to the Arbor/highway 43 intersection in coordination with the City and ODOT staff and pay a proportionate share (estimated at 1.9 percent) of the total cost of the improvements. A preliminary cost estimate for the Arbor/Highway 43 widening has been provided to staff for review.

The Applicant proposes to accomplish these mitigation measures with this subdivision project.

The requirements of this section have been satisfied.

B. Blocks and lots.

1. General. The length, width, and shape of blocks shall be designed with due regard for the provision of adequate building sites for the use contemplated; consideration of the need for traffic safety, convenience, access, circulation, and control; and recognition of limitations and opportunities of topography and solar access.

Applicant's Finding: The lot layout is based on due regard for the provision of adequate building sites; traffic safety, convenience, access, circulation and control; and the limitations and opportunities of topography and existing roadway network. The lots are generously sized to accommodate homes that are similar in nature to those in surrounding subdivisions. The

extensions of Upper Midhill Drive and Hillside Drive allow all traffic access from a local-classification street. The site is adjacent to the City's boundary to the north, east and west, limiting connectivity options. The lots are all deep in the north-south direction, thus enhancing solar access on the building sites.

The requirements of this section have been satisfied.

2. Sizes. The recommended block size is 400 feet in length to encourage greater connectivity within the subdivision. Blocks shall not exceed 800 feet in length between street lines, except for blocks adjacent to arterial streets or unless topographical conditions or the layout of adjacent streets justifies a variation. Designs of proposed intersections shall demonstrate adequate sight distances to the City Engineer's specifications. Block sizes and proposed accesses must be consistent with the adopted TSP.

Applicant's Finding: Though the site has topographic considerations as well as the location adjacent to the City limits, no block length exceeds 800 feet. Hillside Drive connects to Hillside Drive less than 800 feet from where it turns 90 degrees to connect with Upper Midhill Drive. Upper Midhill Drive connects to College View Drive less than 800 feet from where it turns 90 degrees to connect with Hillside Drive. The entire site is looped to enhance connectivity and meet the intent of the block length standards.

The requirements of this section have been satisfied.

3. Lot size and shape. Lot or parcel size, width, shape, and orientation shall be appropriate for the location of the subdivision or partition, for the type of use contemplated, for potential utilization of solar access, and for the protection of drainageways, trees, and other natural features. No lot or parcel shall be dimensioned to contain part of an existing or proposed street. All lots or parcels shall be buildable. "Buildable" describes lots that are free of constraints such as wetlands, drainageways, etc., that would make home construction impossible. Lot or parcel sizes shall not be less than the size required by the zoning code unless as allowed by planned unit development (PUD).
Depth and width of properties reserved or laid out for commercial and industrial purposes shall be adequate to provide for the off-street parking and service facilities required by the type of use proposed.

Chapter 14- Single-Family Residential Detached and Attached, R-4.5 standards are as follows:

Lot Size (Detached Dwelling Units)	**4,500 square feet**
Lot Size (Attached Dwelling Units)	**4,000 square feet**
Front Lot Line Length/Minimum Lot Width at Front Lot Line	**35 feet**
Average Minimum Lot Width	**35 feet**

Applicant's Finding: All proposed lots are a minimum of 4,500 square feet in size to accommodate single-family detached dwelling units. All 34 proposed lots exceed the minimum requirements for front lot line length, lot width and lot depth.

The requirements of this section have been satisfied.

4. Access. Access to subdivisions, partitions, and lots shall conform to the provisions of Chapter 48 CDC, Access, Egress and Circulation.

Applicant's Finding: Section 48.020.B states: "All lots shall have access from a public street or from a platted private street approved under the land division chapter." All proposed lots will have access from a public street.

The requirements of this section have been satisfied.

5. Double frontage lots and parcels. Double frontage lots and parcels have frontage on a street at the front and rear property lines. Double frontage lots and parcels shall be avoided except where they are essential to provide separation of residential development from arterial streets or adjacent non-residential activities, or to overcome specific disadvantages of topography and orientation. A planting screen or impact mitigation easement at least 10 feet wide, and across which there shall be no right of access, may be required along the line of building sites abutting such a traffic artery or other incompatible use.

Applicant's Finding: Due to the location of the Upper Midhill right-of-way and topography of the site, Lots 21 and 22 are double frontage. However, the tip of Upper Midhill, which will be the rear of these two lots, is a local street that will be providing access to other homes in the subdivision. No access restrictions are necessary. Two double-frontage lots were unavoidable to accommodate the topography, the need for connectivity, and the existing public street pattern.

The requirements of this section have been satisfied.

6. Lot and parcel side lines. The lines of lots and parcels, as far as is practicable, should run at right angles to the street upon which they face, except that on curved streets they should be radial to the curve.

Applicant's Finding: Though the shape of the subject site is somewhat irregular, all side lot lines run at approximate right angles to the streets upon which they face as far as practicable.

The requirements of this section have been satisfied.

7. Flag lots. Flag lots can be created where it can be shown that no other reasonable street access is possible to achieve the requested land division. A single flag lot shall have a minimum street frontage of 15 feet for its accessway. Where two to four flag lots share a common accessway, the minimum street frontage and accessway shall be eight feet in width per lot. Common accessways shall have mutual maintenance agreements and reciprocal access and utility easements. ***

Applicant's Finding: There are no flag lots proposed with this subdivision.

The requirements of this section have been satisfied.

8. Large lots or parcels. In dividing tracts into large lots or parcels which, at some future time, are likely to be redivided, the approval authority may:
a. require that the blocks be of such size and shape, and be so divided into building sites, and contain such easements and site restrictions as will provide for extension and opening of streets at intervals which will permit a subsequent division of any tract into lots or parcels of smaller size; or
b. alternately, in order to prevent further subdivision or partition of oversized and constrained lots or parcels, restrictions may be imposed on the subdivision or partition plat.

Applicant's Finding: Lot 5 is sized such that it could be redivided in the future; however, the location of the lot adjacent to Tract A and the width of the lot's frontage make redivision very unlikely. If redivision is proposed in the future, all requirements of the R-4.5 zone could be met while accommodating two parcels from lot 5.

The requirements of this section have been satisfied.

C. Pedestrian and bicycle trails.

1. Trails or multi-use pathways shall be installed, consistent and compatible with federal ADA requirements and with the Oregon Transportation Planning Rule, between subdivisions, cul-de-sacs, and streets that would otherwise not be connected by streets due to excessive grades, significant tree(s), and other constraints natural or manmade. Trails shall also accommodate bicycle or pedestrian traffic between neighborhoods and activity areas such as schools, libraries, parks, or commercial districts. Trails shall also be required where designated by the Parks Master Plan.

Applicant's Finding: The proposed extensions of Upper Midhill Drive and Hillside Drive include sidewalks and, therefore, additional trails or pedestrian connections are not required. There are no existing trail connections which require connection from this site.

The requirements of this section have been satisfied.

D. Transit facilities.

1. The applicant shall consult with Tri-Met and the City Engineer to determine the appropriate location of transit stops, bus pullouts, future bus routes, etc., contiguous to or within the development site. If transit service is planned to be provided within the next two years, then facilities such as pullouts shall be constructed per Tri-Met standards at the time of development. More elaborate facilities, like shelters, need only be built when service is existing or imminent. Additional rights-of-way may be required of developers to accommodate buses.

Applicant's Finding: Transit facilities have not been identified by Tri-Met or the City Development Engineer adjacent to this property.

The requirements of this section have been satisfied.

E. Grading. Grading of building sites shall conform to the following standards unless physical conditions demonstrate the propriety of other standards:

1. All cuts and fills shall comply with the excavation and grading provisions of the Uniform Building Code and the following:

a. Cut slopes shall not exceed one and one-half feet horizontally to one foot vertically (i.e., 67 percent grade).

b. Fill slopes shall not exceed two feet horizontally to one foot vertically (i.e., 50 percent grade). Please see the following illustration.***

2. The character of soil for fill and the characteristics of lot and parcels made usable by fill shall be suitable for the purpose intended.

3. If areas are to be graded (more than any four-foot cut or fill), compliance with CDC 85.170(C) is required.

4. The proposed grading shall be the minimum grading necessary to meet roadway standards, and to create appropriate building sites, considering maximum allowed driveway grades.

5. Type I lands shall require a report submitted by an engineering geologist, and Type I and Type II lands shall require a geologic hazard report.

6. Repealed by Ord. 1635.

7. On land with slopes in excess of 12 percent, cuts and fills shall be regulated as follows:

a. Toes of cuts and fills shall be set back from the boundaries of separate private ownerships at least three feet, plus one-fifth of the vertical height of the cut or fill. Where an exception is required from that requirement, slope easements shall be provided.

b. Cuts shall not remove the toe of any slope where a severe landslide or erosion hazard exists (as described in subsection (G)(5) of this section).

c. Any structural fill shall be designed by a registered engineer in a manner consistent with the intent of this code and standard engineering practices, and certified by that engineer that the fill was constructed as designed.

d. Retaining walls shall be constructed pursuant to Section 2308(b) of the Oregon State Structural Specialty Code.

e. Roads shall be the minimum width necessary to provide safe vehicle access, minimize cut and fill, and provide positive drainage control.

8. Land over 50 percent slope shall be developed only where density transfer is not feasible. The development will provide that:

a. At least 70 percent of the site will remain free of structures or impervious surfaces.

b. Emergency access can be provided.

c. Design and construction of the project will not cause erosion or land slippage.

d. Grading, stripping of vegetation, and changes in terrain are the minimum necessary to construct the development in accordance with subsection J of this section.

Applicant's Finding: A geotechnical engineering report is included with this submittal. A preliminary grading plan has been included in the submitted plans which complies with all criteria of this subsection. The Applicant has provided a plan which minimizes cuts and fills and reduces the need for significant retaining walls where possible.

The requirements of this section have been satisfied.

F. Water.

1. A plan for domestic water supply lines or related water service facilities shall be prepared consistent with the adopted Comprehensive Water System Plan, plan update, March 1987, and subsequent superseding revisions or updates.

2. Adequate location and sizing of the water lines.

3. Adequate looping system of water lines to enhance water quality.

4. For all non-single-family developments, there shall be a demonstration of adequate fire flow to serve the site.

5. A written statement, signed by the City Engineer, that water service can be made available to the site by the construction of on-site and off-site improvements and that such water service has sufficient volume and pressure to serve the proposed development's domestic, commercial, industrial, and fire flows.

Applicant's Finding:	The applicant will connect all lots to public water per the submitted Composite Utility Plan, sheet C300. This plan is consistent with the adopted Comprehensive Water System Plan. The requirements of this section have been satisfied.

G. Sewer.

1. A plan prepared by a licensed engineer shall show how the proposal is consistent with the Sanitary Sewer Master Plan (July 1989). Agreement with that plan must demonstrate how the sanitary sewer proposal will be accomplished and how it is gravity-efficient. The sewer system must be in the correct basin and should allow for full gravity service.

2. Sanitary sewer information will include plan view of the sanitary sewer lines, including manhole locations and depth or invert elevations.

3. Sanitary sewer lines shall be located in the public right-of-way, particularly the street, unless the applicant can demonstrate why the alternative location is necessary and meets accepted engineering standards.

4. Sanitary sewer line should be at a depth that can facilitate connection with down-system properties in an efficient manner.

5. The sanitary sewer line should be designed to minimize the amount of lineal feet in the system.

6. The sanitary sewer line shall avoid disturbance of wetland and drainageways. In those cases where that is unavoidable, disturbance shall be mitigated pursuant to Chapter 32 CDC, Water Resource Area Protection, all trees replaced, and proper permits obtained. Dual sewer lines may be required so the drainageway is not disturbed.

7. Sanitary sewer shall be extended or stubbed out to the next developable subdivision or a point in the street that allows for reasonable connection with adjacent or nearby properties.

8. The sanitary sewer system shall be built pursuant to DEQ, City, and Tri-City Service District sewer standards. The design of the sewer system should be prepared by a licensed engineer, and the applicant must be able to demonstrate the ability to satisfy these submittal requirements or standards at the pre-construction phase.

9. A written statement, signed by the City Engineer, that sanitary sewers with sufficient capacity to serve the proposed development and that adequate sewage treatment plant capacity is available to the City to serve the proposed development.

Applicant's Finding: The applicant will connect all lots to public sanitary sewer per the submitted Composite Utility Plan, Sheet C300. The proposed sanitary sewer system is consistent with the Sanitary Sewer Master Plan, is in the correct basin and allows for full gravity service.

The requirements of this section have been satisfied.

H. Storm

1. A stormwater quality and detention plan shall be submitted which complies with the submittal criteria and approval standards contained within Chapter 33 CDC. It shall include profiles of proposed drainageways with reference to the adopted Storm Drainage Master Plan.

2. Storm treatment and detention facilities shall be sized to accommodate a 25-year storm incident. A registered civil engineer shall prepare a plan and statement which shall be supported by factual data that clearly shows that there will be no adverse off-site impacts from increased intensity of runoff downstream or constriction causing ponding upstream. The plan and statement shall identify all on- or off-site impacts and measures to mitigate those impacts. The plan and statement shall, at a minimum, determine the off-site impacts from a 25-year storm.

3. Plans shall demonstrate how storm drainage will be collected from all impervious surfaces including roof drains. Storm drainage connections shall be provided to each dwelling unit/lot. The location, size, and type of material selected for the system shall correlate with the 25-year storm incident.

4. Treatment of storm runoff shall meet municipal code standards.

Applicant's Finding: The proposed stormwater treatment and detention has been designed to meet City standards, as detailed in the submitted stormwater report. The project will be served by a stormwater facility located at midpoint of the development in Tract C.

The requirements of this section have been satisfied.

I. Utility easements. Subdivisions and partitions shall establish utility easements to accommodate the required service providers as determined by the City Engineer. The developer of the subdivision shall make accommodation for cable television wire in all utility trenches and easements so that cable can fully serve the subdivision.

Applicant's Finding: The applicant will establish utility easements as determined by the City Engineer and shown on the preliminary plat.

The requirements of this section have been satisfied.

J. Supplemental provisions.

1. Wetland and natural drainageways. Wetlands and natural drainageways shall be protected as required by Chapter 32 CDC, Water Resource Area Protection. Utilities may be routed through the protected corridor as a last resort, but impact mitigation is required.

Applicant's Finding: There is an ephemeral drainageway on the northwest property line that will be protected as required by Chapter 32. There are two small wetlands on the site that will be removed

and mitigated to accommodate the public roadway network. Given the minimum density requirements and the need to grade and connect roadways on site, routing utilities and roadways through the two small wetlands cannot be avoided, and is therefore allowed under Chapter 32. This is discussed further in response to the provisions of Chapter 32.

2. Willamette and Tualatin Greenways. The approval authority may require the dedication to the City or setting aside of greenways which will be open or accessible to the public. Except for trails or paths, such greenways will usually be left in a natural condition without improvements. Refer to Chapter 28 CDC for further information on the Willamette and Tualatin River Greenways.

Applicant's Finding: No greenways exist on this site or have been identified for dedication on this property. This property is not adjacent to the Willamette or Tualatin River and, therefore, a River Greenway is not feasible on this site.

The requirements of this section have been satisfied.

3. Street trees. Street trees are required as identified in the appropriate section of the municipal code and Chapter 54 CDC.

Applicant's Finding: Street trees will be installed as part of the public improvements with the development of this subdivision.

The requirements of this section have been satisfied.

4. Lighting. To reduce ambient light and glare, high or low pressure sodium light bulbs shall be required for all subdivision street or alley lights. The light shall be shielded so that the light is directed downwards rather than omni-directional.

Applicant's Finding: Any street light installation within the subdivision will utilize LED fixtures.

The requirements of this section have been satisfied.

5. Dedications and exactions. The City may require an applicant to dedicate land and/or construct a public improvement that provides a benefit to property or persons outside the property that is the subject of the application when the exaction is roughly proportional. No exaction shall be imposed unless supported by a determination that the exaction is roughly proportional to the impact of development.

Applicant's Finding: The applicant is proposing right-of-way dedication and improvements that are roughly proportional to the development of a 34-lot subdivision. The proposed improvements include, the creation and improvement of a local street network from which the proposed homes will take access, a new infrastructure system for the provision of urban services to the development, and a contribution of a proportionate share of the eventual improvements to the intersection improvements associated with Highway 43 and Arbor Drive.

The requirements of this section have been satisfied.

6. Underground utilities. All utilities, such as electrical, telephone, and television cable, that may at times be above ground or overhead shall be buried underground in the case of new development. The exception would be in those cases where the area is substantially built out and adjacent properties have above-ground utilities and where the development site's frontage is under 200 feet and the site is less than one acre. High voltage transmission lines, as classified by Portland General Electric or electric service provider, would also be exempted. Where adjacent future development is expected or imminent, conduits may be required at the direction of the City Engineer. All services shall be underground with the exception of standard above-grade equipment such as some meters, etc.

Applicant's Finding: All utilities will be installed in compliance with this section.

The requirements of this section have been satisfied.

7. Density requirement. Density shall occur at 70 percent or more of the maximum density allowed by the underlying zoning. These provisions would not apply when density is transferred from Type I and II lands as defined in CDC 02.030. Development of Type I or II lands are exempt from these provisions. Land divisions of three lots or less would also be exempt.

Applicant's Finding: The R-4.5 zone permits a maximum density of 9.68 dwelling units per net acre. Net acre is defined as "The total gross acres less the public right-of-way and other acreage deductions, as applicable". The net acreage of this site after removal of dedicated right-of way is 5.10 acres. At 9.68 dwelling units per net acre, the maximum number of dwelling units on this site is 49. The minimum density of this site is 70% of 49 units, or 34 units, which is the number of dwelling units proposed.

The requirements of this section have been satisfied.

8. Mix requirement. The "mix" rule means that developers shall have no more than 15 percent of the R-2.1 and R-3 development as single-family residential. The intent is that the majority of the site shall be developed as medium high density multi-family housing.

Applicant's Finding: This property is zoned R-4.5 and, therefore, the use of the parcel as an entirely residential development is permitted.

The requirements of this section have been satisfied.

9. Heritage trees/significant tree and tree cluster protection. All heritage trees, as defined in the Municipal Code, shall be saved. Diseased heritage trees, as determined by the City Arborist, may be removed at his/her direction. All non-heritage trees and clusters of trees (three or more trees with overlapping dripline; however, native oaks need not have an overlapping dripline) that are considered significant by virtue of their size, type, location, health, or numbers shall be saved pursuant to CDC

55.100(B)(2). Trees are defined per the municipal code as having a trunk six inches in diameter or 19 inches in circumference at a point five feet above the mean ground level at the base of the trunk.

Applicant's Finding: No heritage trees have been identified on this site. Tree preservation is discussed further in this report in Section 55.100.

The requirements of this section have been satisfied.

DIVISION 3. SUPPLEMENTAL PROVISIONS AND EXCEPTIONS

CHAPTER 32. WATER RESOURCE AREA PROTECTION

Chapter 32 provides for protection of water resource areas, but also allows development of roads and utilities within water resource areas if it cannot be avoided. Such development requires approval through a Water Resource Area Protection (WRAP) review. The following findings for Chapter 32 address both the supplemental findings requirements of Chapter 85 and the required findings for the requested WRAP approval.

32.010 PURPOSES

32.010(I) Provide for uses and activities in WRAs that have negligible impact on such areas; and to provide for other uses that must be located in such areas in a way that will avoid or, when avoidance is not possible, minimize potential impacts.

This application for development within the two small wetlands WRAs is consistent with the purpose of Chapter 32, because the internal street layout cannot avoid impact to the wetlands while serving the minimum lot density and providing connection to the existing rights of way and construction of street widths and grades required by city street standards. Because the two small isolated wetlands provide minimal functional benefits, and because there are no opportunities for on-site mitigation, the impact of eliminating the wetlands is mitigated through the purchase of Wetland Banking Credits from the Oregon Department of State Lands.

32.020 APPLICABILITY

32.020. A. This chapter applies to all development, activity or uses within WRAs identified on the WRA Map. It also applies to all verified, unmapped WRAs. The WRA Map shall be amended to include the previously unmapped WRAs.

There are no WRAs identified on the city's WRA map. However, the applicant has located and provided delineations for three unmapped WRAs. There is a drainageway along the northwest property line and two small wetland areas isolated from any apparent drainage or riparian areas. The wetland delineation and the response by the Division of State Lands are attached.

32.030. PROHIBITED USES

Development within WRAs is prohibited unless allowed by the matrix in Section 32.030. That matrix allows "driveways/streets/bridges," both in the Water Resource and in the Water Resource Area, if "a WRA crossing is the only available route." Crossing the two small wetland WRAs cannot be avoided because the internal street layout cannot avoid the wetlands while serving the minimum lot density and providing connection to the existing rights of way and construction of street widths and grades required by city street standards.

32.050. APPLICATION

A. An application requesting approval for a use or activity regulated by this chapter shall be initiated by the property owner, or the owner's authorized agent, and shall include an application form and the appropriate deposit or fee as indicated on the master fee schedule.

Applicant's Finding: The Applicant has submitted the required forms, fees, and application materials.

The requirements of this section have been satisfied.

B. A pre-application conference shall be a prerequisite to the filing of the application.

Applicant's Finding: The Applicant attended a pre-application conference with the City of West Linn prior to submitting this application.

The requirements of this section have been satisfied.

C. The applicant shall submit maps and diagrams at 11 by 17 inches and a written narrative addressing the approval criteria and requirements of this chapter, and any additional copies required by the Planning Director.

Applicant's Finding: The Applicant has submitted full and half sized plans for this Application. All required copies have been submitted.

The requirements of this section have been satisfied.

D. Where review of soil maps, Department of Geology and Mineral Industries (DOGAMI) maps, or on-site inspection by the City Engineer reveals evidence of slope failures or that WRA slopes are potentially unstable or prone to failure, geotechnical studies may be required to demonstrate that the proposed development will not cause, or contribute to, slope failure or increased erosion or sedimentation in the WRA or adversely impact surface or modify groundwater flow or hydrologic conditions. These geotechnical studies shall include all necessary measures to avoid or correct the potential hazard.

Applicant's Finding: The Applicant has submitted a geotechnical report which addresses slopes on the property. in this instance, the WRA is not located in an area with unusually steep slopes or areas of geological concern.

The requirements of this section have been satisfied.

E. Applications proposing that streets or utilities cross water resources, or any other development that modifies the water resource, shall present evidence in the form of adopted utility master plans or transportation master plans, or findings from a registered Oregon civil engineer, certified engineering geologist or similarly qualified professional to demonstrate that the development or improvements are consistent with accepted engineering practices.

Applicant's Finding: The Applicant has documented at several points within this narrative that if connectivity is to be achieved, as required by this code and desired by the City, the WRA's on site will be impacted due to the amount of grading necessary to facilitate the desired connection. The plans attached to this application have been prepared by a registered Oregon Civil Engineer.

The requirements of this section have been satisfied.

F. Site plan. The applicant shall submit a site plan which contains the following information, as applicable:

1. The name, address, and telephone number of the applicant, the scale (lineal) of the plan, and a north arrow.

2. Property lines, rights-of-way, easements, etc.

3. Topographic information at two-foot contour increments identifying both existing grades and proposed grade changes.

4. A slope map delineating slopes zero to 25 percent and over 25 percent.

5. Boundaries of the WRA, specifically delineating the water resource, and any riparian corridor boundary. If the proposal includes development of a wetland, a wetlands delineation prepared by a professional wetland specialist will be required. The wetland delineation may be required to be accepted or waived through the Department of State Lands (DSL) delineation review process.

6. Location of existing and proposed development, including all existing and proposed structures, accessory structures, any areas of fill or excavation, water resource crossings, alterations to vegetation, or other alterations to the site's natural state.

7. Identify the location and square footage of previously disturbed areas, areas that are to be temporarily disturbed, and area to be permanently disturbed or developed.

8. When an application proposes development within the WRA, an inventory of vegetation within the WRA, sufficient to categorize the existing condition of the WRA, including:

a. The type and general quality of ground cover, including the identification of dominant species and any occurrence of non-native, invasive species;

b. Square footage of ground cover; and

c. Square footage of tree canopy as measured either through aerial photographs or by determining the tree drip lines. Where only a portion of a WRA is to be disturbed, the tree inventory need only apply to the impacted area. The remaining treed area shall be depicted by outlining the canopy cover.

9. Locations of all significant trees as defined by the City Arborist.

10. Identify adopted transportation, utility and other plan documents applicable to this proposal.

11. For cases processed under CDC 32.110 (hardship), provide the maximum disturbed area (MDA) calculations.

Applicant's Finding: The Applicant has submitted all of the submission materials required by this section.

The requirements of this section have been satisfied.

G. Construction management plan. The applicant shall submit a construction management plan which includes the following:

1. The location of proposed TDAs (site ingress/egress for construction equipment, areas for storage of material, construction activity areas, grading and trenching, etc.) that will subsequently be restored to original grade and replanted with native vegetation, shall be identified, mapped and enclosed with fencing per subsection (G)(3) of this section.

2. Appropriate erosion control measures consistent with Clackamas County Erosion Prevention and Sediment Control Planning and Design Manual, rev. 2008, and a tentative schedule of work.

3. The WRA shall be protected, prior to construction, with an anchored chain link fence (or equivalent approved by the City) at its perimeter that shall remain undisturbed, except as specifically authorized by the approval authority. Additional fencing to delineate approved TDAs may be required. Fencing shall be mapped and identified in the construction management plan and maintained until construction is complete.

Applicant's Finding: The Applicant has submitted a site construction plan which is compliant with the requirements of this chapter.

The requirements of this section have been satisfied.

H. Mitigation plan prepared in accordance with the requirements in CDC 32.090.

Applicant's Finding: The Applicant proposes to mitigate off-site in accordance with the requirements of the Oregon Department of State Lands. No mitigation plan has therefore been prepared.

The requirements of this section have been satisfied.

I. Re-vegetation plan prepared in accordance with the requirements in CDC 32.100.

Applicant's Finding: The Applicant has provided a preliminary planting and landscape plan for the site.

The requirements of this section have been satisfied.

J. The Planning Director may modify the submittal requirements per CDC 99.035.

Applicant's Finding: The Applicant submitted all information which has been requested by the Planning Director.

The requirements of this section have been satisfied.

K. The following additional requirements apply to applications being submitted under the alternative review process pursuant to CDC 32.070 and 32.080.

1. **Identify the affected WRA and describe the functions it performs (see Table 32-4).**

2. **Provide a scaled map that delineates the proposed WRA boundaries determined to be sufficient to sustain the functions occurring at the site and a narrative that justifies the proposal, consistent with CDC 32.080.**

3. **Identify the recommended WRA boundary at the site with colored tape, survey markers or other easily identified means for field inspection by staff.**

4. **Consultant required for alternate review process.**

a. **The narrative and analysis required by CDC 32.070 and 32.080 shall be prepared and signed by a qualified natural resource professional, such as a wildlife biologist, botanist, or hydrologist. The Planning Director shall determine the scope of work and specific products required from the consultant. The Planning Director may require a mitigation plan pursuant to CDC 32.090 and/or a re-vegetation plan pursuant to CDC 32.100.**

b. **The Planning Director may waive the consultant requirement for simple or minor projects if he or she determines that it is not necessary in order to satisfy the requirements of this chapter. (Ord. 1623 § 1, 2014)**

Applicant's Finding: The Applicant has submitted for a WRA permit under the requirements of 32.060, the standard review process. The Applicant has not pursued a permit under 32.070 or 32.080 through an alternative review process. The requirements of this section do not apply.

32.060 APPROVAL CRITERIA (STANDARD PROCESS)

A. WRA protection/minimizing impacts.

1. Development shall be conducted in a manner that will avoid or, if avoidance is not possible, minimize adverse impact on WRAs.

Applicant's Finding: The site contains three areas which are subject to the City's WRA standards. The first area is an elongated drainage corridor which consists of a man-made overland drainage route which serves subdivisions which are located off-site. It is believed that this drainage area was created on the Applicant's property by mistake as a drainage tract which was probably intended to contain the drainage route was created as part of the neighboring subdivision.

The second area consists of two small wetlands which are isolated from any apparent drainage or riparian areas.

The first WRA area, along the site's northern boundary, will be avoided by the proposed development. The two isolated wetlands will be impacted by the development as they fall within an area which is planned to be heavily impacted by the construction of a new public roadway.

Where possible, adverse impacts on the site's water quality resource areas has been avoided.

The requirements of this section have been satisfied.

2. Mitigation and re-vegetation of disturbed WRAs shall be completed per CDC 32.090 and 32.100 respectively.

Applicant's Finding: There are two small wetlands on the site that will be removed to accommodate the public roadway network. Given the minimum density requirements and the need to grade and

connect roadways on site, there is no alternative to routing utilities and roadways through the two wetlands. No mitigation for the proposed buffer areas have been proposed however, the Applicant is proposing to mitigate for the wetland through the purchase of wetland mitigation credits through Department of State Lands wetland mitigation banking system.

The proposed mitigation through the department of state lands has been discussed with the City's planning director and is permitted through section 32.090.B.4. As permitted by Section 32.090.D, the Applicant has proposed to mitigate for impacts to the wetlands on site using the State of Oregon's mitigation banking system at the rates charged by the State's wetland banks at the time of application.

The requirements of this section have been satisfied.

B. Storm water and storm water facilities.

1. Proposed developments shall be designed to maintain the existing WRAs and utilize them as the primary method of storm water conveyance through the project site unless:

a. The surface water management plan calls for alternate configurations (culverts, piping, etc.); or

b. Under CDC 32.070, the applicant demonstrates that the relocation of the water resource will not adversely impact the function of the WRA including, but not limited to, circumstances where the WRA is poorly defined or not clearly channelized.

Re-vegetation, enhancement and/or mitigation of the re-aligned water resource shall be required as applicable.

Applicant's Finding:

The proposed development does not propose to use any of the existing WRA's on site as part of the project's stormwater management system. The existing drainage along the northern edge of the site is believed to have been constructed as part of another development's stormwater management system however this system is located uphill from the proposed development and therefore not suitable for providing service to the subject property.

The other small wetland facilities are isolated and will be filled in order to allow the site's proposed roadways to connect. No alternative to preservation of the proposed WRA's exists. Mitigation for the impacted WRA's has been proposed through a state required wetland mitigation bank.

The requirements of this section have been satisfied.

2. Public and private storm water detention, storm water treatment facilities and storm water outfall or energy dissipaters (e.g., rip rap) may encroach into the WRA if:

a. Accepted engineering practice requires it;

b. Encroachment on significant trees shall be avoided when possible, and any tree loss shall be consistent with the City's Tree Technical Manual and mitigated per CDC 32.090;

c. There shall be no direct outfall into the water resource, and any resulting outfall shall not have an erosive effect on the WRA or diminish the stability of slopes; and

d. There are no reasonable alternatives available.

A geotechnical report may be required to make the determination regarding slope stability.

Applicant's Finding: The proposed storm water facilities will not be located or encroach into any WRA.

The requirements of this section are not applicable.

3. Roadside storm water conveyance swales and ditches may be extended within rights-of-way located in a WRA. When possible, they shall be located along the side of the road furthest from the water resource. If the conveyance facility must be located along the side of the road closest to the water resource, it shall be located as close to the road/sidewalk as possible and include habitat friendly design features (treatment train, rain gardens, etc.).

Applicant's Finding: The applicant is not proposing locating roadside stormwater conveyance swales or ditches within a WRA.

The requirements of this section are not applicable.

4. Storm water detention and/or treatment facilities in the WRA shall be designed without permanent perimeter fencing and shall be landscaped with native vegetation.

Applicant's Finding: The proposed storm water facilities will not encroach into a WRA located on site.

The requirements of this section are not applicable.

5. Access to public storm water detention and/or treatment facilities shall be provided for maintenance purposes. Maintenance driveways shall be constructed to minimum width and use water permeable paving materials. Significant trees, including roots, shall not be disturbed to the degree possible. The encroachment and any tree loss shall be mitigated per CDC 32.090. There shall also be no adverse impacts upon the hydrologic conditions of the site.

Applicant's Finding: Access to storm water detention and treatment facilities will not be located within any WRA.

The requirements of this section have been satisfied.

C. Dedications and easements. The City shall request dedications of the WRA to the City when acquisition of the WRA by dedication or easement would serve a public purpose. When such a dedication or easement is mutually agreed upon, the applicant shall provide the documentation for the dedication or easement. Nothing in this section shall prohibit the City from condemning property if:

1. The property is necessary to serve an important public purpose; and

2. Alternative means of obtaining the property are unsuccessful.

Applicant's Finding: The Applicant has proposed to maintain a 15 foot WRA buffer along an ephemeral stream located along the property's northern boundary. While originally proposed as a tract, the

City has requested that the WRA buffer be integrated into the lots which adjoin the ephemeral stream.

The requirements of this section are not applicable.

D. WRA width. Except for the exemptions in CDC 32.040, applications that are using the alternate review process of CDC 32.070, or as authorized by the approval authority consistent with the provisions of this chapter, all development is prohibited in the WRA as established in Table 32-2 below:

Applicant's Finding: The two small wetlands on the site that will be removed and mitigated. The ephemeral stream which runs along the site's northern boundary, has been provided with a fifteen (15) foot wide protective buffer. No encroachments into this buffer have been proposed. The width of the WRA is consistent with the requirements of this section.

E. Roads, driveways and utilities.

1. New roads, driveways, or utilities shall avoid WRAs unless the applicant demonstrates that no other practical alternative exists. In that case, road design and construction techniques shall minimize impacts and disturbance to the WRA by the following methods:

a. New roads and utilities crossing riparian habitat areas or streams shall be aligned as close to perpendicular to the channel as possible.

b. Roads and driveways traversing WRAs shall be of the minimum width possible to comply with applicable road standards and protect public safety. The footprint of grading and site clearing to accommodate the road shall be minimized.

c. Road and utility crossings shall avoid, where possible:

1) Salmonid spawning or rearing areas;

2) Stands of mature conifer trees in riparian areas;

3) Highly erodible soils;

4) Landslide prone areas;

5) Damage to, and fragmentation of, habitat; and

6) Wetlands identified on the WRA Map.

2. Crossing of fish bearing streams and riparian corridors shall use bridges or arch-bottomless culverts or the equivalent that provides comparable fish protection, to allow passage of wildlife and fish and to retain the natural stream bed.

3. New utilities spanning fish bearing stream sections, riparian corridors, and wetlands shall be located on existing roads/bridges, elevated walkways, conduit, or other existing structures or installed underground via tunneling or boring at a depth that avoids tree roots and does not alter the hydrology sustaining the water resource, unless the applicant demonstrates that it is not physically possible or it is cost prohibitive. Bore pits associated with the crossings shall be restored upon project completion. Dry, intermittent streams may be crossed with open cuts during a time period approved by the City and any agency with jurisdiction.

Applicant's Finding: The Applicant has demonstrated that because of the site's grades and proximity to existing roadways that no alternative exists which would allow the site's two adjoining

roadways to be connected. The Applicant has therefore proposed to impact the two small, isolated wetlands which are located near the center of the site. Street widths are the minimum allowed. Because no practical alternative exists, the requirements of this section are met. Because of the small size and isolated nature of the two small wetlands, each wetland will be completely eliminated by a road crossing and related grading, thereby eliminating the surrounding unmapped water resource area. There will be no development within the more significant types of water resource areas identified by 32.060(E)(1)c.

4. No fill or excavation is allowed within the ordinary high water mark of a water resource, unless all necessary permits are obtained from the City, U.S. Army Corps of Engineers and Oregon Department of State Lands (DSL).

Applicant's Finding: The Applicant is in the process of applying for all necessary permits from the City, the US Army Corps of Engineers, and the Department of State Lands. No construction activities will be initiated prior to the issuance of all required permits.

5. Crossings of fish bearing streams shall be aligned, whenever possible, to serve multiple properties and be designed to accommodate conduit for utility lines. The applicant shall, to the extent legally permissible, work with the City to provide for a street layout and crossing location that will minimize the need for additional stream crossings in the future to serve surrounding properties.

Applicant's Finding: There are two small wetlands on the site that will be removed and mitigated to accommodate the public roadway network. Given the minimum density requirements and the need to grade and connect roadways on site, there is no alternative to routing utilities and roadways through the two wetlands. This is discussed further in response to the provisions of Chapter 32.

The requirements of this section have been satisfied.

F. Passive recreation. Low impact or passive outdoor recreation facilities for public use including, but not limited to, multi-use paths and trails, not exempted per CDC 32.040(B)(2), viewing platforms, historical or natural interpretive markers, and benches in the WRA, are subject to the following standards:

1. Trails shall be constructed using non-hazardous, water permeable materials with a maximum width of four feet or the recommended width under the applicable American Association of State Highway and Transportation Officials (AASHTO) standards for the expected type and use, whichever is greater.

2. Paved trails are limited to the area within 20 feet of the outer boundary of the WRA, and such trails must comply with the storm water provisions of this chapter.

3. All trails in the WRA shall be set back from the water resource at least 30 feet except at stream crossing points or at points where the topography forces the trail closer to the water resource.

4. Trails shall be designed to minimize disturbance to existing vegetation, work with natural contours, avoid the fall line on slopes where possible, avoid areas with evidence of slope failure and ensure that trail runoff does not create channels in the WRA.

5. Foot bridge crossings shall be kept to a minimum. When the stream bank adjacent to the foot bridge is accessible (e.g., due to limited vegetation or topography), where possible, fences or railings shall be installed from the foot bridge and extend 15 feet beyond the terminus of the foot bridge to discourage trail users and pets from accessing the stream bank, disturbing wildlife and habitat areas, and causing vegetation loss, stream bank erosion and stream turbidity. Bridges shall not be made of continuous impervious materials or be treated with toxic substances that could leach into the WRA.

6. Interpretive facilities (including viewpoints) shall be at least 10 feet from the top of the water resource's bankfull flow/OHW or delineated wetland edge and constructed with a fence between users and the resource. Interpretive signs may be installed on footbridges.

Applicant's Finding: There are two small wetlands on the site that will be removed and mitigated. Due to the small size and relatively low value of the small ephemeral stream which is located on site, and the difficulty associated with maintaining access to a resource located behind a series of homes, passive recreation will not be provided within the WRA area.

The requirements of this section have been satisfied.

G. Daylighting Piped Streams.

1. As part of any application, covered or piped stream sections shown on the WRA Map are encouraged to be "daylighted" or opened. Once it is daylighted, the WRA will be limited to 15 feet on either side of the stream. Within that WRA, water quality measures are required which may include a storm water treatment system (e.g., vegetated bioswales), continuous vegetative ground cover (e.g., native grasses) at least 15 feet in width that provides year round efficacy, or a combination thereof.

Applicant's Finding: No piped streams exist on the site which will require daylighting as part of this application.

The requirements of this section have been satisfied.

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H. The following habitat friendly development practices shall be incorporated into the design of any improvements or projects in the WRA to the degree possible:

1. Restore disturbed soils to original or higher level of porosity to regain infiltration and storm water storage capacity.

Applicant's Finding: The Applicant is not proposing any improvements within the fifteen foot wide WRA buffer area which exists along the site's northern boundary. The area is generally in good condition and is vegetated with an existing stand of deciduous and coniferous trees. The trees in this area have been proposed to be retained in order to meet the City's tree retention standards and to buffer the existing residential neighborhoods located adjacent to the site from the proposed development activities. The existing trees proposed for retention provide a habitat value and will continue to do so through their preservation.

As no site improvements have been proposed within the WRA on site which has been proposed for retention, the requirements of this section do not apply.

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32.070 ALTERNATE REVIEW PROCESS

This section establishes a review and approval process that applicants can use when there is reason to believe that the width of the WRA prescribed under the standard process (CDC 32.060(D)) is larger than necessary to protect the functions of the water resource at a particular site. It allows a qualified professional to determine what water resources and associated functions (see Table 32-4 below) exist at a site and the WRA width that is needed to maintain those functions. (Ord. 1623 § 1, 2014)

Applicant's Finding: The Applicant has not proposed a review under an alternative review process. The requirements of this section do not apply.

32.080 APPROVAL CRITERIA (ALTERNATE REVIEW PROCESS)

Applications reviewed under the alternate review process shall meet the following approval criteria:

A. The proposed WRA shall be, at minimum, qualitatively equal, in terms of maintaining the level of functions allowed by the WRA standards of CDC 32.060(D).

Applicant's Finding: The Applicant has not proposed a review under an alternative review process. The requirements of this section do not apply.

32.090 MITIGATION PLAN

A A mitigation plan shall only be required if development is proposed within a WRA (including development of a PDA). (Exempted activities of CDC 32.040 do not require mitigation unless specifically stated. Temporarily disturbed areas, including TDAs associated with exempted activities, do not require mitigation, just grade and soil restoration and re-vegetation.) The mitigation plan shall satisfy all applicable provisions of CDC 32.100, Re-Vegetation Plan Requirements.

B. Mitigation shall take place in the following locations, according to the following priorities (subsections (B)(1) through (4) of this section):

1. On-site mitigation by restoring, creating or enhancing WRAs.

2. Off-site mitigation in the same sub-watershed will be allowed, but only if the applicant has demonstrated that:

a. It is not practicable to complete mitigation on-site, for example, there is not enough area on-site; and

b. The mitigation will provide equal or superior ecological function and value.

3. Off-site mitigation outside the sub-watershed will be allowed, but only if the applicant has demonstrated that:

a. It is not practicable to complete mitigation on-site, for example, there is not enough area on-site; and

b. The mitigation will provide equal or superior ecological function and value.

4. Purchasing mitigation credits though DSL or other acceptable mitigation bank.

C. Amount of mitigation.

1. The amount of mitigation shall be based on the square footage of the permanent disturbance area by the application. For every one square foot of non-PDA disturbed area, on-site mitigation shall require one square foot of WRA to be created, enhanced or restored.

2. For every one square foot of PDA that is disturbed, on-site mitigation shall require one half a square foot of WRA vegetation to be created, enhanced or restored.

3. For any off-site mitigation, including the use of DSL mitigation credits, the requirement shall be for every one square foot of WRA that is disturbed, two square feet of WRA shall be created, enhanced or restored. The DSL mitigation credits program or mitigation bank shall require a legitimate bid on the cost of on-site mitigation multiplied by two to arrive at the appropriate dollar amount.

D. The Planning Director may limit or define the scope of the mitigation plan and submittal requirements commensurate with the scale of the disturbance relative to the resource and pursuant to the authority of Chapter 99 CDC. The Planning Director may determine that a consultant is required to complete all or a part of the mitigation plan requirements.

E. A mitigation plan shall contain the following information:

1. A list of all responsible parties including, but not limited to, the owner, applicant, contractor, or other persons responsible for work on the development site.

2. A map showing where the specific adverse impacts will occur and where the mitigation activities will occur.

3. A re-vegetation plan for the area(s) to be mitigated that meets the standards of CDC 32.100.

4. An implementation schedule, including timeline for construction, mitigation, mitigation maintenance, monitoring, and reporting. All in-stream work in fish bearing streams shall be done in accordance with the Oregon Department of Fish and Wildlife.

5. Assurances shall be established to rectify any mitigation actions that are not successful within the first three years. This may include bonding or other surety. (Ord. 1623 § 1, 2014)

Applicant's Finding:	Mitigation for the 3,963 square feet of wetland area is proposed through the purchase of wetland credits through the Department of State Land. Wetland Mitigation Credits are available within the area at a purchase price of approximately $200,000 per acre. As on-site mitigation is not proposed, a mitigation plan has not been prepared. The requirements of this section have been satisfied.

CHAPTER 42. CLEAR VISION AREAS

42.020 CLEAR VISION AREAS REQUIRED, USES PROHIBITED

A. A clear vision area shall be maintained on the corners of all property adjacent to an intersection as provided by CDC 42.040 and 42.050.

B. A clear vision area shall contain no planting, fence, wall, structure or temporary or permanent obstruction (except for an occasional utility pole or tree) exceeding three feet in height, measured from the top of the curb, or, where no curb exists, from the street centerline grade, except that trees exceeding this height may be located in this area, provided all branches below eight feet are removed. (Ord. 1192, 1987)

42.030 EXCEPTIONS

The following described area in Willamette shall be exempt from the provisions of this chapter. The parcels of land zoned General Commercial which abut Willamette Falls Drive, located between 10th and 16th Streets. Beginning at the intersection of Willamette Falls Drive and 11th Street on 7th Avenue to 16th Street; on 16th Street to 9th Avenue; on 9th Avenue to 14th Street to the Tualatin River; following the Tualatin River and Willamette River to 12th Street; on 12th Street to 4th Avenue; on 4th Avenue to 11th Street; on 11th Street to Willamette Falls Drive. This described area does not include the northerly side of Willamette Falls Drive.

42.040 COMPUTATION; STREET AND ACCESSWAY 24 FEET OR MORE IN WIDTH

The clear vision area for all street intersections and street and accessway intersections (accessways having 24 feet or more in width) shall be that triangular area formed by the right-of-way or property lines along such lots and a straight line joining the right-of-way or property line at points which are 30 feet distant from the intersection of the right-of-way line and measured along such lines.

42.050 COMPUTATION; ACCESSWAY LESS THAN 24 FEET IN WIDTH

The clear vision area for street and accessway intersections (accessways having less than 24 feet in width) shall be that triangular area whose base extends 30 feet along the street right-of-way line in both directions from the centerline of the accessway at the front setback line of a single-family and two-family residence, and 30 feet back from the property line on all other types of uses.

Applicant's Finding:	All clear vision areas at the intersections of public streets with driveways or other public streets on the subject site will be free of plantings, fences, walls, structures and obstructions, meeting the requirements for clear vision areas. **The requirements of this section have been satisfied.**

CHAPTER 44. FENCES

44.020 SIGHT-OBSCURING FENCE; SETBACK AND HEIGHT LIMITATIONS

A. A sight- or non-sight-obscuring fence may be located on the property line or in a yard setback area subject to the following:

1. The fence is located within:

a. A required front yard area, and it does not exceed three feet, except pillars and driveway entry features subject to the requirements of Chapter 42 CDC, Clear Vision Areas, and approval by the Planning Director;

b. A required side yard which abuts a street and it is within that portion of the side yard which is also part of the front yard setback area and it does not exceed three feet;

c. A required side yard which abuts a street and it is within that portion of the side yard which is not also a portion of the front yard setback area and it does not exceed six feet provided the provisions of Chapter 42 CDC are met;

d. A required rear yard which abuts a street and it does not exceed six feet; or

e. A required side yard area which does not abut a street or a rear yard and it does not exceed six feet.

Applicant's Finding: New fences are not indicated on the proposed plans because the exact locations have yet to be determined. All fences constructed as part of this subdivision will meet the requirements of these standards.

B. Fence or wall on a retaining wall. When a fence is built on a retaining wall or an artificial berm, the following standards shall apply:

1. When the retaining wall or artificial berm is 30 inches or less in height from finished grade, the maximum fence or wall height on top of the retaining wall shall be six feet.

2. When the retaining wall or earth berm is greater than 30 inches in height, the combined height of the retaining wall and fence or wall from finished grade shall not exceed eight and one-half feet.

3. Fences or walls located on top of retaining walls or earth berms in excess of 30 inches above finished grade may exceed the total allowed combined height of eight and one-half feet; provided, that the fence or wall is located a minimum of two feet from the retaining wall and the fence or wall height shall not exceed six feet.

Applicant's Finding: Any fences built on retaining walls will meet these standards.

The requirements of this section have been satisfied.

44.030 SCREENING OF OUTDOOR STORAGE

A. All service, repair, and storage activities carried on in connection with any commercial, business or industrial activity and not conducted within an enclosed building shall be screened from view of all adjacent properties and adjacent streets by a sight-obscuring fence.

B. The sight-obscuring fence shall be in accordance with provisions of Chapter 42 CDC, Clear Vision Areas, and shall be subject to the provisions of Chapter 55 CDC, Design Review.

Applicant's Finding: This site is residential and no service, repair, or storage activities in connection with commercial, business, or industry activities are proposed.

44.040 LANDSCAPING

Landscaping which is located on the fence line and which impairs sight vision shall not be located within the clear vision area as provided in Chapter 42 CDC.

44.050 STANDARDS FOR CONSTRUCTION

A. The structural side of the fence shall face the owner's property; and

B. The sides of the fence abutting adjoining properties and the street shall be maintained. (Ord. 1291, 1990

Applicant's Finding: Any fences built will meet these standards.

The requirements of this section have been satisfied.

CHAPTER 48. ACCESS, EGRESS AND CIRCULATION

48.025 ACCESS CONTROL

B. Access control standards.

1. Traffic impact analysis requirements. The City or other agency with access jurisdiction may require a traffic study prepared by a qualified professional to determine access, circulation and other transportation requirements. (See also CDC 55.125, Traffic Impact Analysis.)

Applicant's Finding: The Applicant has provided a Traffic Impact Analysis under Appendix D of this land use application.

The requirements of this section have been satisfied.

2. The City or other agency with access permit jurisdiction may require the closing or consolidation of existing curb cuts or other vehicle access points, recording of reciprocal access easements (i.e., for shared driveways), development of a frontage street, installation of traffic control devices, and/or other mitigation as a condition of granting an access permit, to ensure the safe and efficient operation of the street and highway system. Access to and from off-street parking areas shall not permit backing onto a public street.

Applicant's Finding: The Applicant has proposed a street network which provides safe and logical vehicular circulation through the site as well as opportunities for on-street parking. A reciprocal access easement and maintenance agreement will be required for lots utilizing shared driveways.

The requirements of this section have been satisfied.

3. Access options. When vehicle access is required for development (i.e., for off-street parking, delivery, service, drive-through facilities, etc.), access shall be provided by one of the following methods (planned access shall be consistent with adopted public works standards and TSP). These methods are "options" to the developer/subdivider.

a) Option 1. Access is from an existing or proposed alley or mid-block lane. If a property has access to an alley or lane, direct access to a public street is not permitted.

b) Option 2. Access is from a private street or driveway connected to an adjoining property that has direct access to a public street (i.e., "shared driveway"). A public access easement covering the driveway shall be recorded in this case to assure access to the closest public street for all users of the private street/drive.

c) Option 3. Access is from a public street adjacent to the development lot or parcel. If practicable, the owner/developer may be required to close or consolidate an existing access point as a condition of approving a new access. Street accesses shall comply with the access spacing standards in subsection (B)(6) of this section.

Applicant's Finding: The Applicant is proposing access to the site via Option 3. The proposed design utilizes existing undeveloped right-of-way in addition to newly dedicated right-of-way for a public

street. Access to the site will be provided at the terminus of Upper Midhill Drive and Hillside Drive.

The requirements of this section have been satisfied.

4. Subdivisions fronting onto an arterial street. New residential land divisions fronting onto an arterial street shall be required to provide alleys or secondary (local or collector) streets for access to individual lots. When alleys or secondary streets cannot be constructed due to topographic or other physical constraints, access may be provided by consolidating driveways for clusters of two or more lots (e.g., includes flag lots and mid-block lanes).

Applicant's Finding: The proposed development does not front onto an arterial road.

The requirements of this section are not applicable

5. Double-frontage lots. When a lot or parcel has frontage onto two or more streets, access shall be provided first from the street with the lowest classification. For example, access shall be provided from a local street before a collector or arterial street. When a lot or parcel has frontage opposite that of the adjacent lots or parcels, access shall be provided from the street with the lowest classification.

Applicant's Finding: No double fronted lots will be created as part of this subdivision.

The requirements of this section have been satisfied.

6. Access spacing.

a. The access spacing standards found in Chapter 8 of the adopted Transportation System Plan (TSP) shall be applicable to all newly established public street intersections and non-traversable medians.

b. Private drives and other access ways are subject to the requirements of CDC 48.060.

Applicant's Finding: The Applicant's proposed spacing meets the requirements of Chapter 8 of the City's Transportation System Plan.

The requirements of this section have been satisfied.

7. Number of access points. For single-family (detached and attached), two-family, and duplex housing types, one street access point is permitted per lot or parcel, when alley access cannot otherwise be provided; except that two access points may be permitted corner lots (i.e., no more than one access per street), subject to the access spacing standards in subsection (B)(6) of this section. The number of street access points for multiple family, commercial, industrial, and public/institutional developments shall be minimized to protect the function, safety and operation of the street(s) and sidewalk(s) for all users. Shared access may be required, in conformance with subsection (B)(8) of this section, in order to maintain the required access spacing, and minimize the number of access points.

Applicant's Finding: The Applicant is proposing only one access point for each new single family lot.

The requirements of this section have been satisfied.

8. Shared driveways. The number of driveway and private street intersections with public streets shall be minimized by the use of shared driveways with adjoining lots where feasible. The City shall require shared driveways as a condition of land division or site design review, as applicable, for traffic safety and access management purposes in accordance with the following standards:

a. Shared driveways and frontage streets may be required to consolidate access onto a collector or arterial street. When shared driveways or frontage streets are required, they shall be stubbed to adjacent developable parcels to indicate future extension. "Stub" means that a driveway or street temporarily ends at the property line, but may be extended in the future as the adjacent lot or parcel develops. "Developable" means that a lot or parcel is either vacant or it is likely to receive additional development (i.e., due to infill or redevelopment potential).

b. Access easements (i.e., for the benefit of affected properties) shall be recorded for all shared driveways, including pathways, at the time of final plat approval or as a condition of site development approval.

c. Exception. Shared driveways are not required when existing development patterns or physical constraints (e.g., topography, lot or parcel configuration, and similar conditions) prevent extending the street/driveway in the future.

Applicant's Finding: The Applicant has proposed a shared access drive for lots 13, 14 and 15. The shared driveway will take access to Upper Midhill Drive, a local street. The Applicant will record a shared access and maintenance agreement over the shared access drive at the time of final plat submission.

The requirements of this section have been satisfied.

C. Street connectivity and formation of blocks required. In order to promote efficient vehicular and pedestrian circulation throughout the City, land divisions and large site developments shall produce complete blocks bounded by a connecting network of public and/or private streets, in accordance with the following standards:

1. Block length and perimeter. The maximum block length shall not exceed 800 feet or 1,800 feet along an arterial.

2. Street standards. Public and private streets shall also conform to Chapter 92 CDC, Required Improvements, and to any other applicable sections of the West Linn Community Development Code and approved TSP.

3. Exception. Exceptions to the above standards may be granted when blocks are divided by one or more pathway(s), in conformance with the provisions of CDC 85.200(C), Pedestrian and Bicycle Trails, or cases where extreme topographic (e.g., slope, creek, wetlands, etc.) conditions or compelling functional limitations preclude implementation, not just inconveniences or design challenges. (Ord. 1635 § 25, 2014; Ord. 1636 § 33, 2014)

Applicant's Finding: Though the site has topographic considerations as well as the location adjacent to the City limits, no block length exceeds 800 feet. Hillside Drive connects to Hillside Drive less than 800 feet from where it turns 90 degrees to connect with Upper Midhill Drive. Upper Midhill Drive connects to College View Drive less than 800 feet from where it turns 90 degrees to connect with Hillside Drive. The entire site is looped to enhance connectivity and meet the intent of the block length standards.

The requirements of this section have been satisfied.

48.030 MINIMUM VEHICULAR REQUIREMENTS FOR RESIDENTIAL USES

A. Direct individual access from single-family dwellings and duplex lots to an arterial street, as designated in the transportation element of the Comprehensive Plan, is prohibited for lots or parcels created after the effective date of this code where an alternate access is either available or is expected to be available by imminent development application. Evidence of alternate or future access may include temporary cul-de-sacs, dedications or stubouts on adjacent lots or parcels, or tentative street layout plans submitted at one time by adjacent property owner/developer or by the owner/developer, or previous owner/developer, of the property in question.

In the event that alternate access is not available as determined by the Planning Director and City Engineer, access may be permitted after review of the following criteria:

1. Topography.
2. Traffic volume to be generated by development (i.e., trips per day).
3. Traffic volume presently carried by the street to be accessed.
4. Projected traffic volumes.
5. Safety considerations such as line of sight, number of accidents at that location, emergency vehicle access, and ability of vehicles to exit the site without backing into traffic.
6. The ability to consolidate access through the use of a joint driveway.
7. Additional review and access permits may be required by State or County agencies.

Applicant's Finding: The proposed development does not include direct access to arterials.

The requirements of this section do not apply.

B. When any portion of any house is less than 150 feet from the adjacent right-of-way, access to the home is as follows:

1. One single-family residence, including residences with an accessory dwelling unit as defined in CDC 02.030, shall provide 10 feet of unobstructed horizontal clearance. Dual-track or other driveway designs that minimize the total area of impervious driveway surface are encouraged.

Applicant's Finding: All proposed driveways within 150 feet of the adjacent right-of-way associated with Upper Midhill Drive and Hillside Drive will provide at least 10 feet of unobstructed horizontal clearance.

The requirements of this section have been satisfied.

2. Two to four single-family residential homes equals a 14- to 20-foot-wide paved or all-weather surface. Width shall depend upon adequacy of line of sight and number of homes.

Applicant's Finding: The proposed shared driveway which will serve lots 13, 14 and 15 will consist of a 16 foot wide paved surface with a 20 foot clearance area.

The requirements of this section have been satisfied.

3. Maximum driveway grade shall be 15 percent. The 15 percent shall be measured along the centerline of the driveway only. Variations require approval of a Class II variance by the Planning Commission pursuant to Chapter 75 CDC. Regardless, the last 18 feet in front of the garage shall be under 12 percent grade as measured along the centerline of the driveway only. Grades elsewhere along the driveway shall not apply.

Applicant's Finding: All proposed driveways will meet the maximum grade standards of this code.

The requirements of this section have been satisfied.

4. The driveway shall include a minimum of 20 feet in length between the garage door and the back of sidewalk, or, if no sidewalk is proposed, to the paved portion of the right-of-way.

Applicant's Finding: **All proposed homes will have individual driveway areas of at least 20 feet in length to allow for parking of vehicles off of the common access ways or public roads.**

The requirements of this section have been satisfied.

C. When any portion of one or more homes is more than 150 feet from the adjacent right-of-way, the provisions of subsection B of this section shall apply in addition to the following provisions.

1. A turnaround may be required as prescribed by the Fire Chief.

2. Minimum vertical clearance for the driveway shall be 13 feet, six inches.

3. A minimum centerline turning radius of 45 feet is required unless waived by the Fire Chief.

Applicant's Finding: The Applicant is not proposing any homes that will be more than 150 feet from the adjacent right-of-way.

The requirements of this section are not applicable.

4. There shall be sufficient horizontal clearance on either side of the driveway so that the total horizontal clearance is 20 feet.

Applicant's Finding: All proposed driveways will have a horizontal clearance of at least 20 feet.

The requirements of this section have been satisfied.

D. Access to five or more single-family homes shall be by a street built to full construction code standards. All streets shall be public. This full street provision may only be waived by variance.

Applicant's Finding: Access to the proposed lots will be provided by the extensions of Upper Midhill Drive and Hillside Drive, which are both public streets.

The requirements of this section have been satisfied.

48.060 WIDTH AND LOCATION OF CURB CUTS AND ACCESS SEPARATION REQUIREMENTS

A. Minimum curb cut width shall be 16 feet.

Applicant's Finding: All proposed curb cuts exceed the minimum 16 foot standard.

The requirements of this section have been satisfied.

B. Maximum curb cut width shall be 36 feet, except along Highway 43 in which case the maximum curb cut shall be 40 feet. For emergency service providers, including fire stations, the maximum shall be 50 feet.

Applicant's Finding: The maximum width of the curb cuts provided is less than 36 feet.

The requirements of this section have been satisfied.

C. No curb cuts shall be allowed any closer to an intersecting street right-of-way line than the following:

1. **On an arterial when intersected by another arterial, 150 feet.**
2. **On an arterial when intersected by a collector, 100 feet.**
3. **On an arterial when intersected by a local street, 100 feet.**
4. **On a collector when intersecting an arterial street, 100 feet.**
5. **On a collector when intersected by another collector or local street, 35 feet.**
6. **On a local street when intersecting any other street, 35 feet.**

Applicant's Finding: The Applicant's proposed driveway spacing exceeds the minimum 35 foot spacing requirements for local streets intersecting any other streets.

The requirements of this section have been satisfied.

D. There shall be a minimum distance between any two adjacent curb cuts on the same side of a public street, except for one-way entrances and exits, as follows:

***

3. Between any two curb cuts on the same lot or parcel on a local street, 30 feet.

Applicant's Finding: A minimum distance of 30 feet of spacing has been provided between curb cuts along Upper Midhill Drive and Hillside drive.

The requirements of this section have been satisfied.

E. A rolled curb may be installed in lieu of curb cuts and access separation requirements.

Applicant's Finding: No rolled curbs have been proposed. The requirements of this section do not apply.

The requirements of this section have been satisfied.

F. Curb cuts shall be kept to the minimum, particularly on Highway 43. Consolidation of driveways is preferred. The standard on Highway 43 is one curb cut per business if consolidation of driveways is not possible.

Applicant's Finding: The requirements of this section do not apply.

G. Adequate line of sight pursuant to engineering standards should be afforded at each driveway or accessway. (Ord. 1270, 1990; Ord. 1584, 2008; Ord. 1636 § 35, 2014)

Applicant's Finding: The proposed driveways will comply with the City's engineering standards for site distance. This requirement will be verified at the time of building permit submission for each individual home site and driveway.

The requirements of this section have been satisfied.

48.070 PLANNING DIRECTOR'S AUTHORITY TO RESTRICT ACCESS APPEAL PROVISIONS

A. In order to provide for increased traffic movement on congested streets and eliminate turning movement problems, the Planning Director and the City Engineer, or his designee, may restrict the location of driveways on said street and require the location of driveways on adjacent streets upon the finding that the proposed access would:

1. Provide inadequate access for emergency vehicles; or

Applicant's Finding: The proposed development continues a public street network into the site which will be constructed in accordance with the City's requirements for emergency vehicle access. Adequate access for emergency vehicles has been provided throughout the site.

The requirements of this section have been satisfied.

2. Cause or increase hazardous conditions to exist which would constitute a clear and present danger to the public health safety and general welfare.

Applicant's Finding: The site has no hazardous conditions which would be exacerbated by the development proposal.

The requirements of this section have been satisfied.

48.080 BICYCLE AND PEDESTRIAN CIRCULATION

A. Within all multi-family developments (except two-family/duplex dwellings), each residential dwelling shall be connected to vehicular parking stalls, common open space, and recreation facilities by a pedestrian pathway system having a minimum width of six feet and constructed of an all-weather

material. The pathway material shall be of a different color or composition from the driveway. (Bicycle routes adjacent to the travel lanes do not have to be of different color or composition.)

B. Bicycle and pedestrian ways within a subdivision shall be constructed according to the provisions in CDC 85.200(A)(3).

Applicant's Finding: The Applicant has provided for the extension of Upper Midhill Drive and Hillside drive into the proposed development. The streets will provide facilities for both pedestrians and cyclists consistent with the City's Standards for public streets.

The requirements of this section have been satisfied.

CHAPTER 54. LANDSCAPING

54.020 APPROVAL CRITERIA

A. Every development proposal requires inventorying existing site conditions which include trees and landscaping. In designing the new project, every reasonable attempt should be made to preserve and protect existing trees and to incorporate them into the new landscape plan. Similarly, significant landscaping (e.g., bushes, shrubs) should be integrated. The rationale is that saving a 30-foot-tall mature tree helps maintain the continuity of the site, they are qualitatively superior to two or three two-inch caliper street trees, they provide immediate micro-climate benefits (e.g., shade), they soften views of the street, and they can increase the attractiveness, marketability, and value of the development.

Applicant's Finding: This subdivision application includes a tree inventory and preservation plan focused on maintaining significant trees and clusters. Roads, utilities, and lots have been carefully placed to allow the retention of as many trees as possible.

B. To encourage tree preservation, the parking requirement may be reduced by one space for every significant tree that is preserved in the parking lot area for a maximum reduction of 10 percent of the required parking. The City Parks Supervisor or Arborist shall determine the significance of the tree and/or landscaping to determine eligibility for these reductions.

Applicant's Finding: No parking areas, aside from driveways, are required for residential subdivisions. No parking reduction is requested.

C. Developers must also comply with the municipal code chapter on tree protection.

Applicant's Finding: The developer will comply with all municipal code requirements for tree protection.

D. Heritage trees. Heritage trees are trees which, because of their age, type, notability, or historical association, are of special importance. Heritage trees are trees designated by the City Council following review of a nomination. A heritage tree may not be removed without a public hearing at least 30 days prior to the proposed date of removal. Development proposals involving land with heritage tree(s) shall

be required to protect and save the tree(s). Further discussion of heritage trees is found in the municipal code.

Applicant's Finding: No heritage trees have been identified on this site.

The requirements of this section have been satisfied.

E. (Not applicable to single-family residential)

F. Landscaping (trees) in new subdivision.

1. Street trees shall be planted by the City within the planting strips (minimum six-foot width) of any new subdivision in conformity with the street tree plan for the area, and in accordance with the planting specifications of the Parks and Recreation Department. All trees shall be planted during the first planting season after occupancy. In selecting types of trees, the City Arborist may determine the appropriateness of the trees to local conditions and whether that tree has been overplanted, and whether alternate species should be selected. Also see subsection (C) of this section.

2. The cost of street trees shall be paid by the developer of the subdivision.

3. The fee per street tree, as established by the City, shall be based upon the following:

a. The cost of the tree;

b. Labor and equipment for original placement;

c. Regular maintenance necessary for tree establishment during the initial two-year period following the City schedule of maintenance; and

d. A two-year replacement warranty based on the City's established failure rate. (Ord. 1408, 1998; Ord. 1463, 2000)

Applicant's Finding: The applicant will pay for the installation of street trees by the City and maintain the trees for the two-year establishment period.

The requirements of this section have been satisfied.

54.030 PLANTING STRIPS FOR MODIFIED AND NEW STREETS

All proposed changes in width in a public street right-of-way or any proposed street improvement shall, where feasible, include allowances for planting strips. Plans and specifications for planting such areas shall be integrated into the general plan of street improvements. This chapter requires any multi-family, commercial, or public facility which causes change in public right-of-way or street improvement to comply with the street tree planting plan and standards.

Applicant's Finding: Minimum width 6-foot-wide planting strips will be installed between the sidewalk and the asphalt within the right-of-way In all occasions except where a modification has been proposed.

The requirements of this section have been satisfied.

54.040 INSTALLATION

A. All landscaping shall be installed according to accepted planting procedures.

B. The soil and plant materials shall be of good quality.

C. Landscaping shall be installed in accordance with the provisions of this code.

D. Certificates of occupancy shall not be issued unless the landscaping requirements have been met or other arrangements have been made and approved by the City such as the posting of a bond.

Applicant's Finding: All landscaping installation will meet the requirements of this section.

The requirements of this section have been satisfied.

54.050 PROTECTION OF STREET TREES

Street trees may not be topped or trimmed unless approval is granted by the Parks Supervisor or, in emergency cases, when a tree imminently threatens power lines.

Applicant's Finding: There are no existing street trees adjacent to this property.

The requirements of this section have been satisfied.

54.060 MAINTENANCE

A. The owner, tenant and their agent, if any, shall be jointly and severally responsible for the maintenance of all landscaping which shall be maintained in good condition so as to present a healthy, neat, and orderly appearance and shall be kept free from refuse and debris.

B. All plant growth in interior landscaped areas shall be controlled by pruning, trimming, or otherwise so that:

1. **It will not interfere with the maintenance or repair of any public utility;**
2. **It will not restrict pedestrian or vehicular access; and**
3. **It will not constitute a traffic hazard because of reduced visibility.**

Applicant's Finding: The owners of this property, including future homeowners, will be responsible for maintenance of landscaping.

The requirements of this section have been satisfied.

54.070 SPECIFICATION SUMMARY

*****25% of residential/multi-family site must be landscaped.**

Applicant's Finding: A minimum of 25% of this site will be landscaped as part of the yards of future homes.

The requirements of this section have been satisfied.

DIVISION 4. DESIGN REVIEW

CHAPTER 55. DESIGN REVIEW

55.100 APPROVAL STANDARDS - CLASS II DESIGN REVIEW

B. Relationship to the natural and physical environment.

1. The buildings and other site elements shall be designed and located so that all heritage trees, as defined in the municipal code, shall be saved. Diseased heritage trees, as determined by the City Arborist, may be removed at his/her direction.

Applicant's Finding: No heritage trees were identified on this site.

The requirements of this section have been satisfied.

2. All heritage trees, as defined in the municipal code, all trees and clusters of trees ("cluster" is defined as three or more trees with overlapping driplines; however, native oaks need not have an overlapping dripline) that are considered significant by the City Arborist, either individually or in consultation with certified arborists or similarly qualified professionals, based on accepted arboricultural standards including consideration of their size, type, location, health, long term survivability, and/or numbers, shall be protected pursuant to the criteria of subsections (B)(2)(a) through (f) of this section. In cases where there is a difference of opinion on the significance of a tree or tree cluster, the City Arborist's findings shall prevail. It is important to acknowledge that all trees are not significant and, further, that this code section will not necessarily protect all trees deemed significant.

Applicant's Finding: The findings of subsections (B)(2)(a) through (f) are found below.

The requirements of this section have been satisfied.

a. Non-residential and residential projects on Type I and II lands shall protect all heritage trees and all significant trees and tree clusters by either the dedication of these areas or establishing tree conservation easements. Development of Type I and II lands shall require the careful layout of streets, driveways, building pads, lots, and utilities to avoid heritage trees and significant trees and tree clusters, and other natural resources pursuant to this code. The method for delineating the protected trees or tree clusters ("dripline + 10 feet") is explained in subsection (B)(2)(b) of this section. Exemptions of subsections (B)(2)(c), (e), and (f) of this section shall apply.

Applicant's Finding: This site is not classified as Type I or Type II and, therefore, this standard is not applicable to the vast majority of the property. The Applicant has submitted a slope analysis showing the slopes present on the site. A very small portion of type I and Type II lands exist on the property however these areas fall within a portion of the site which is located adjacent to a Water Quality Resource and in the southernmost corner of the property. No significant trees have been identified within the steeper sloped portions of the site. These areas

adjacent to the WRA will not be developed at the time of site construction and tree protection within these areas will be achieved. The southernmost corner of the site will require development to allow for the necessary extension of the roadway network.

The requirements of this section have been satisfied.

b. Non-residential and residential projects on non-Type I and II lands shall set aside up to 20 percent of the area to protect trees and tree clusters that are determined to be significant, plus any heritage trees. Therefore, in the event that the City Arborist determines that a significant tree cluster exists at a development site, then up to 20 percent of the non-Type I and II lands shall be devoted to the protection of those trees, either by dedication or easement. The exact percentage is determined by establishing the driplines of the trees or tree clusters that are to be protected. In order to protect the roots which typically extend further, an additional 10-foot measurement beyond the dripline shall be added. The square footage of the area inside this "dripline plus 10 feet" measurement shall be the basis for calculating the percentage (see figure below). The City Arborist will identify which tree(s) are to be protected. Development of non-Type I and II lands shall also require the careful layout of streets, driveways, building pads, lots, and utilities to avoid significant trees, tree clusters, heritage trees, and other natural resources pursuant to this code. Exemptions of subsections (B)(2)(c), (e), and (f) of this section shall apply. Please note that in the event that more than 20 percent of the non-Type I and II lands comprise significant trees or tree clusters, the developer shall not be required to save the excess trees, but is encouraged to do so.

Applicant's Finding: The proposed subdivision is located on primarily non-Type I and II lands. Streets, driveways, building pads, lots and utilities have been carefully laid out so as to avoid significant trees and clusters with particular attention to the vegetation around the boundary of the site. The site plan's concept includes deeper than necessary lots around the boundary with the specific goal of retaining a buffer of trees between this site and the neighboring, developed properties. Every reasonable effort has been made to retain trees as they enhance the value of the properties for the developer and the future homeowners. The applicant has inventoried all trees on site and has consulted with the City's arborist to determine which trees on site are significant. The applicant is proposing tree preservation consistent with these requirements, as detailed in the tree plan.

There are a total of 169 trees identified as significant on this site. The significant tree canopy area on site totals 238,212 square feet or 5.4 acres. Of these trees, 50 significant trees will be retained through the site development and homebuilding process. A total of 77,863 square feet of significant canopy will be retained or 1.7 acres. The proposed retention represents 33 percent of the site's existing canopy. In addition to the trees determined to be significant, 62 additional non-significant trees have been proposed for retention. The retention of these trees has been made possible through the Applicant's careful placement of streets, driveways, building pads, lots and utilities throughout the project site. With larger than required back yards and purposeful placement of utilities, the site's preservation requirement of 20% of the significant tree canopy has been met and exceeded.

The requirements of this section have been satisfied.

c. Where stubouts of streets occur on abutting properties, and the extension of those streets will mean the loss of significant trees, tree clusters, or heritage trees, it is understood that tree loss may be inevitable. In these cases, the objective shall be to minimize tree loss. These provisions shall also apply in those cases where access, per construction code standards, to a lot or parcel is blocked by a row or screen of significant trees or tree clusters.

Applicant's Finding: No street stub outs are proposed on abutting properties.

The requirements of this section have been satisfied.

d. For both non-residential and residential development, the layout shall achieve at least 70 percent of maximum density for the developable net area. The developable net area excludes all Type I and II lands and up to 20 percent of the remainder of the site for the purpose of protection of stands or clusters of trees as defined in subsection (B)(2) of this section.

Applicant's Finding: The R-4.5 zone permits a maximum density of 9.68 dwelling units per net acre. Net acre is defined as "The total gross acres less the public right-of-way and other acreage deductions, as applicable". The net acreage of this site after removal of dedicated right-of way is 5.10 acres. At 9.68 dwelling units per net acre, the maximum number of dwelling units on this site is 49. The minimum density of this site is 70% of 49 units, or 34 units, which is the number of dwelling units proposed.

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The requirements of this section have been satisfied.

e. For arterial and collector street projects, including Oregon Department of Transportation street improvements, the roads and graded areas shall avoid tree clusters where possible. Significant trees, tree clusters, and heritage tree loss may occur, however, but shall be minimized.

Applicant's Finding: No arterial or collector street projects are included with this development application.

The requirements of this section have been satisfied.

f. If the protection of significant tree(s) or tree clusters is to occur in an area of grading that is necessary for the development of street grades, per City construction codes, which will result in an adjustment in the grade of over or under two feet, which will then threaten the health of the tree(s), the applicant will submit evidence to the Planning Director that all reasonable alternative grading plans have been considered and cannot work. The applicant will then submit a mitigation plan to the City Arborist to compensate for the removal of the tree(s) on an "inch by inch" basis (e.g., a 48-inch Douglas fir could be replaced by 12 trees, each four-inch). The mix of tree sizes and types shall be approved by the City Arborist.

Applicant's Finding: 19 significant trees with a total DBH of 434 inches are proposed for removal due to street construction. The Applicant is proposing to mitigate for the removal of 434 inches of DBH by planting street trees and landscape trees on the project site. The remaining trees which are not able to be planted on site will be mitigated for either in off-site plantings in a location chosen by the City's arborist or the Applicant will pay a fee in lieu to the City for trees which cannot be planted on site.

The requirements of this section have been satisfied.

DIVISION 8. LAND DIVISIONS

CHAPTER 92. REQUIRED IMPROVEMENTS

92.010 PUBLIC IMPROVEMENTS FOR ALL DEVELOPMENT

The following improvements shall be installed at the expense of the developer and meet all City codes and standards:

A. Streets within subdivisions.

1. All streets within a subdivision, including alleys, shall be graded for the full right-of-way width and improved to the City's permanent improvement standards and specifications which include sidewalks and bicycle lanes, unless the decision-making authority makes the following findings:

a. The right-of-way cannot be reasonably improved in a manner consistent with City road standards or City standards for the protection of wetlands and natural drainageways.

b. The right-of-way does not provide a link in a continuous pattern of connected local streets, or, if it does provide such a link, that an alternative street link already exists or the applicant has proposed an alternative street which provides the necessary connectivity, or the applicant has proven that there is no feasible location on the property for an alternative street providing the link.

2. When the decision-making authority makes these findings, the decision-making authority may impose any of the following conditions of approval:

a. A condition that the applicant initiate vacation proceedings for all or part of the right-of-way.

b. A condition that the applicant build a trail, bicycle path, or other appropriate way.

If the applicant initiates vacation proceedings pursuant to subsection (A)(2)(a) of this section, and the right-of-way cannot be vacated because of opposition from adjacent property owners, the City Council shall consider and decide whether to process a City-initiated street vacation pursuant to Chapter 271 ORS.

Construction staging area shall be established and approved by the City Engineer. Clearing, grubbing, and grading for a development shall be confined to areas that have been granted approval in the land use approval process only. Clearing, grubbing, and grading outside of land use approved areas can only be approved through a land use approval modification and/or an approved Building Department grading permit for survey purposes. Catch basins shall be installed and connected to pipe lines leading to storm sewers or drainageways.

B. Extension of streets to subdivisions. The extension of subdivision streets to the intercepting paving line of existing streets with which subdivision streets intersect shall be graded for the full right-of-way width and improved to a minimum street structural section and width of 24 feet.

C. Local and minor collector streets within the rights-of-way abutting a subdivision shall be graded for the full right-of-way width and approved to the City's permanent improvement standards and

specifications. The City Engineer shall review the need for street improvements and shall specify whether full street or partial street improvements shall be required. The City Engineer shall also specify the extent of storm drainage improvements required. The City Engineer shall be guided by the purpose of the City's systems development charge program in determining the extent of improvements which are the responsibility of the subdivider.

D. Monuments. Upon completion of the first pavement lift of all street improvements, monuments shall be installed and/or reestablished at every street intersection and all points of curvature and points of tangency of street centerlines with an iron survey control rod. Elevation benchmarks shall be established at each street intersection monument with a cap (in a monument box) with elevations to a U.S. Geological Survey datum that exceeds a distance of 800 feet from an existing benchmark.

E. Surface drainage and storm sewer system. A registered civil engineer shall prepare a plan and statement which shall be supported by factual data that clearly shows that there will be no adverse impacts from increased intensity of runoff off site of a 100-year storm, or the plan and statement shall identify all off-site impacts and measures to mitigate those impacts commensurate to the particular land use application. Mitigation measures shall maintain pre-existing levels and meet buildout volumes, and meet planning and engineering requirements.

F. Sanitary sewers. Sanitary sewers shall be installed to City standards to serve the subdivision and to connect the subdivision to existing mains.

1. If the area outside the subdivision to be directly served by the sewer line has reached a state of development to justify sewer installation at the time, the Planning Commission may recommend to the City Council construction as an assessment project with such arrangement with the subdivider as is desirable to assure financing his share of the construction.

2. If the installation is not made as an assessment project, the City may reimburse the subdivider an amount estimated to be a proportionate share of the cost for each connection made to the sewer by property owners outside of the subdivision for a period of 10 years from the time of installation of the sewers. The actual amount shall be determined by the City Administrator considering current construction costs.

G. Water system. Water lines with valves and fire hydrants providing service to each building site in the subdivision and connecting the subdivision to City mains shall be installed. Prior to starting building construction, the design shall take into account provisions for extension beyond the subdivision and to adequately grid the City system. Hydrant spacing is to be based on accessible area served according to the City Engineer's recommendations and City standards. If required water mains will directly serve property outside the subdivision, the City may reimburse the developer an amount estimated to be the proportionate share of the cost for each connection made to the water mains by property owners outside the subdivision for a period of 10 years from the time of installation of the mains. If oversizing of water mains is required to areas outside the subdivision as a general improvement, but to which no new connections can be identified, the City may reimburse the developer that proportionate share of the cost for oversizing. The actual amount and reimbursement method shall be as determined by the City Administrator considering current or actual construction costs.

H. Sidewalks.

1. Sidewalks shall be installed on both sides of a public street and in any special pedestrian way within the subdivision, except that in the case of primary or secondary arterials, or special type

industrial districts, or special site conditions, the Planning Commission may approve a subdivision without sidewalks if alternate pedestrian routes are available.

In the case of the double-frontage lots, provision of sidewalks along the frontage not used for access shall be the responsibility of the developer. Providing front and side yard sidewalks shall be the responsibility of the land owner at the time a request for a building permit is received. Additionally, deed restrictions and CC&Rs shall reflect that sidewalks are to be installed prior to occupancy and it is the responsibility of the lot or homeowner to provide the sidewalk, except as required above for double-frontage lots.

2. On local streets serving only single-family dwellings, sidewalks may be constructed during home construction, but a letter of credit shall be required from the developer to ensure construction of all missing sidewalk segments within four years of final plat approval pursuant to CDC 91.010(A)(2).

3. The sidewalks shall measure at least six feet in width and be separated from the curb by a six-foot minimum width planter strip. Reductions in widths to preserve trees or other topographic features, inadequate right-of-way, or constraints, may be permitted if approved by the City Engineer in consultation with the Planning Director.

4. Sidewalks should be buffered from the roadway on high volume arterials or collectors by landscape strip or berm of three and one-half-foot minimum width.

5. The City Engineer may allow the installation of sidewalks on one side of any street only if the City Engineer finds that the presence of any of the factors listed below justifies such waiver:

a. The street has, or is projected to have, very low volume traffic density;

b. The street is a dead-end street;

c. The housing along the street is very low density; or

d. The street contains exceptional topographic conditions such as steep slopes, unstable soils, or other similar conditions making the location of a sidewalk undesirable.

I. Bicycle routes. If appropriate to the extension of a system of bicycle routes, existing or planned, the Planning Commission may require the installation of separate bicycle lanes within streets and separate bicycle paths.

J. Street name signs. All street name signs and traffic control devices for the initial signing of the new development shall be installed by the City with sign and installation costs paid by the developer.

K. Dead-end street signs. Signs indicating "future roadway" shall be installed at the end of all discontinued streets. Signs shall be installed by the City per City standards, with sign and installation costs paid by the developer.

L. Signs indicating future use shall be installed on land dedicated for public facilities (e.g., parks, water reservoir, fire halls, etc.). Sign and installation costs shall be paid by the developer.

M. Street lights. Street lights shall be installed and shall be served from an underground source of supply. The street lighting shall meet IES lighting standards. The street lights shall be the shoe-box style

light (flat lens) with a 30-foot bronze pole in residential (non-intersection) areas. The street light shall be the cobra head style (drop lens) with an approximate 50-foot (sized for intersection width) bronze pole. The developer shall submit to the City Engineer for approval of any alternate residential, commercial, and industrial lighting, and alternate lighting fixture design. The developer and/or homeowners association is required to pay for all expenses related to street light energy and maintenance costs until annexed into the City.

N. Utilities. The developer shall make necessary arrangements with utility companies or other persons or corporations affected for the installation of underground lines and facilities. Electrical lines and other wires, including but not limited to communication, street lighting, and cable television, shall be placed underground.

O. Curb cuts and driveways. Curb cuts and driveway installations are not required of the subdivider at the time of street construction, but, if installed, shall be according to City standards. Proper curb cuts and hard-surfaced driveways shall be required at the time buildings are constructed.

P. Street trees. Street trees shall be provided by the City Parks and Recreation Department in accordance with standards as adopted by the City in the Municipal Code. The fee charged the subdivider for providing and maintaining these trees shall be set by resolution of the City Council.

Q. Joint mailbox facilities shall be provided in all residential subdivisions, with each joint mailbox serving at least two, but no more than eight, dwelling units. Joint mailbox structures shall be placed in the street right-of-way adjacent to roadway curbs. Proposed locations of joint mailboxes shall be designated on a copy of the tentative plan of the subdivision, and shall be approved as part of the tentative plan approval. In addition, sketch plans for the joint mailbox structures to be used shall be submitted and approved by the City Engineer prior to final plat approval. (Ord. 1180, 1986; Ord. 1192, 1987; Ord. 1287, 1990; Ord. 1321, 1992; Ord. 1339, 1993; Ord. 1401, 1997; Ord. 1408, 1998; Ord. 1442, 1999)

Applicant's Finding:	All improvements will be installed per the submitted plans and in conformance with the requirements of this title. The requirements of this section have been satisfied.

92.030 IMPROVEMENT PROCEDURES

In addition to other requirements, improvements installed by the developer, either as a requirement of these regulations or at the developer's own option, shall conform to the requirements of this title and permanent improvement standards and specifications adopted by the City and shall be installed in accordance with the following procedure:

A. Improvement work shall not be commenced until plans have been checked for adequacy and approved by the City. To the extent necessary for evaluation of the proposal, the improvement plans may be required before approval of the tentative plan of a subdivision or partition. Plans shall be prepared in accordance with the requirements of the City.

B. Improvement work shall not be commenced until the City has been notified in advance, and if work has been discontinued for any reason, it shall not be resumed until the City has been notified.

C. Improvements shall be constructed under the Engineer. The City may require changes in typical sections and details in the public interest if unusual conditions arise during construction to warrant the change.

D. All underground utilities, sanitary sewers, and storm drains installed in streets by the subdivider or by any utility company shall be constructed prior to the surfacing of the streets. Stubs for service connections for underground utilities and sanitary sewers shall be placed to a length obviating the necessity for disturbing the street improvements when service connections are made.

E. A digital and mylar map showing all public improvements as built shall be filed with the City Engineer upon completion of the improvements. (Ord. 1408, 1998)

Applicant's Finding: All improvements will be installed in conformance with the requirements of this title.

The requirements of this section have been satisfied.

DIVISION 9. ADMINISTRATIVE PROCEDURES
CHAPTER 99 PROCEDURES FOR DECISION MAKING: QUASI-JUDICIAL

99.030 APPLICATION PROCESS: WHO MAY APPLY, PRE-APPLICATION CONFERENCE, REQUIREMENTS, REFUSAL OF APPLICATION, FEES

A. Who may apply.

1. Applications for approval required under this chapter may be initiated by:

a. The owner of the property that is the subject of the application or the owner's duly authorized representative;

b. The purchaser of such property who submits a duly executed written contract or copy thereof, which has been recorded with the Clackamas Clerk;

c. A lessee in possession of such property who submits written consent of the owner to make such application; or

d. Motion by the Planning Commission or City Council.

2. Any person authorized by this chapter to submit an application for approval may be represented by an agent who is authorized in writing by such a person to make the application.

Applicant's Finding: The owner of the property is initiating this application for approval.

The requirements of this section have been satisfied.

B. Pre-application conferences.

1. Subject to subsection (B)(4) of this section, a pre-application conference is required for, but not limited to, ***l. land divisions.

Applicant's Finding: A pre-application meeting was held September 3, 2015.

The requirements of this section have been satisfied.

C. The requirements for making an application.

1. The application shall be made on forms provided by the Director as provided by CDC 99.040(A)(1);

2. The application shall be complete and shall contain the information requested on the form, shall address the appropriate submittal requirements and approval criteria in sufficient detail for review and action, and shall be accompanied by the deposit or fee required by CDC 99.033. No application will be accepted if not accompanied by the required fee or deposit. In the event an additional deposit is required by CDC 99.033 and not provided within the time required, the application shall be rejected without further processing or deliberation and all application materials shall be returned to the applicant, notwithstanding any determination of completeness. (Ord. 1527, 2005; Ord. 1568, 2008; Ord. 1590 § 1, 2009; Ord. 1599 § 6, 2011)

Applicant's Finding:	This application has been made on forms provided by the City's Planning Department. The application contains the necessary information and the required fee. The requirements of this section have been satisfied.

99.033 FEES

The Council shall adopt a schedule of fees reasonably calculated to defray the expenses of the administrative process. The Council may establish either a set fee or a deposit system in which the applicant pays a deposit and the City determines the total administrative cost at the end of the process and refunds any unused amount of the deposit to the applicant. No additional deposit shall be required for additional costs that are incurred because the matter is referred to or called up by a higher decision-making authority. The Council shall charge no fees for City-initiated land use applications or appeals filed by a recognized neighborhood association pursuant to the provisions of CDC 99.240. (Ord. 1527, 2005; Ord. 1568, 2008; Ord. 1604 § 70, 2011)

Applicant's Finding:	The required fee was submitted with the land use application. The requirements of this section have been satisfied.

99.038 NEIGHBORHOOD CONTACT REQUIRED FOR CERTAIN APPLICATIONS

Prior to submittal of an application for any subdivision, conditional use permit, multi-family project, planned unit development of four or more lots, non-residential buildings of over 1,500 square feet, or a zone change that requires a Comprehensive Plan amendment, the applicant shall contact and discuss the proposed development with any affected neighborhood as provided in this section. Although not required for other or smaller projects, contact with neighbors is highly recommended. The Planning Director may require neighborhood contact pursuant to this section prior to the filing of an application for any other development permit if the Director deems neighborhood contact to be beneficial.

A. Purpose. The purpose of neighborhood contact is to identify potential issues or conflicts regarding a proposed application so that they may be addressed prior to filing. This contact is intended to result in a better application and to expedite and lessen the expense of the review process by avoiding needless delays, appeals, remands, or denials. The City expects an applicant to take the reasonable concerns and recommendations of the neighborhood into consideration when preparing an application. The City expects the neighborhood association to work with the applicant to provide such input.

B. The applicant shall contact by letter all recognized neighborhood associations whose boundaries contain all or part of the site of the proposed development and all property owners within 500 feet of the site.

C. The letter shall be sent by to the president of the neighborhood association, and to one designee as submitted to the City by the neighborhood association, and shall be sent by regular mail to the other officers of the association and the property owners within 500 feet. If another neighborhood association boundary is located within the 500-foot notice radius, the letter shall be sent to that association's president, and to one designee as submitted to the City by the neighborhood association as well. The letter shall briefly describe the nature and location of the proposed development, and invite the association and interested persons to a meeting to discuss the proposal in more detail. The meeting shall be scheduled at the association's regularly scheduled monthly meeting, or at another time at the discretion of the association, and not less than 20 days from the date of mailing of the notice. If the meeting is scheduled as part of the association's regular monthly meeting, the letter shall explain that the proposal may not be the only topic of discussion on the meeting agenda. The letter shall encourage concerned citizens to contact their association president, or their association designee, with any questions that they may want to relay to the applicant.

Neighborhood contact shall be initiated by the applicant by mailing the association president, and to one designee as submitted to the City by the neighborhood association, a letter, return receipt requested, formally requesting, within 60 days, a date and location to have their required neighborhood meeting. The 60 days shall be calculated from the date that the applicant mails this letter to the association. If the neighborhood association does not want to meet within the 60-day timeframe, or if there is no neighborhood association, the applicant may hold a public meeting during the evening after 6:00 p.m., or on the weekend no less than 20 days from the date of mailing of the notice. All meetings shall be held at a location open to the public within the boundaries of the association or at a public facility within the City of West Linn. If the meeting is held at a business, it shall be posted at the time of the meeting as the meeting place and shall note that the meeting is open to the public and all interested persons may attend.

D. On the same date the letters described in subsections A through C of this section are mailed, the applicant shall provide and post notice on the property subject to the proposed application. The notice shall be posted at a location visible from the public right-of-way. If the site is not located adjacent to a through street, then an additional sign shall be posted on the nearest through street. The sign notice shall be at least 11 inches by 17 inches in size on durable material and in clear, legible writing. The notice shall state that the site may be subject to a proposed development (e.g., subdivision, variance, conditional use) and shall set forth the name of the applicant and a telephone number where the applicant can be reached for additional information. The site shall remain posted until the conclusion of the meeting.

E. An application shall not be accepted as complete unless and until the applicant demonstrates compliance with this section by including with the application:

1. A copy of the certified letter to the neighborhood association with a copy of return receipt;

2. A copy of the letter to officers of the association and to property owners within 500 feet, including an affidavit of mailing and a copy of the mailing list containing the names and addresses of such owners and residents;

3. A copy of the required posted notice, along with an affidavit of posting;

4. A copy of the minutes of the meetings, produced by the neighborhood association, which shall include a record of any verbal comments received, and copies of any written comments from property owners, residents, and neighborhood association members. If there are no minutes, the applicant may provide a summary of the meeting comments. The applicant shall also send a copy of the summary to the chair of the neighborhood association. The chair shall be allowed to supplement the summary with any additional comments regarding the content of the meeting, as long as such comments are filed before the record is closed;

5. An audiotape of the meeting; and

6. In the event that it is discovered by staff that the aforementioned procedures of this section were not followed, or that a review of the audio tape and meeting minutes show the applicant has made a material misrepresentation of the project at the neighborhood meeting, the application shall be deemed incomplete until the applicant demonstrates compliance with this section. (Ord. 1425, 1998; Ord. 1474, 2001; Ord. 1568, 2008; Ord. 1590 § 1, 2009)

Applicant's Finding: This section requires the applicant to contact and discuss the proposed development with any affected neighborhood as provided in this section.

A meeting was held with the Robinwood and Skyline Ridge Neighborhood Associations on August 11, 2015. The meeting was scheduled and noticed per the requirements of this section, and the required neighborhood meeting documentation is submitted with this application. The applicant provided renderings and information regarding the proposed subdivision and answered all questions asked by the members of the neighborhood association.

The requirements of this section have been satisfied.

SUMMARY AND CONCLUSION

Based upon the materials submitted herein, the Applicant respectfully requests that the City's Planning Commission approve this 34-lot subdivision and water resource area permit.

Oregon
Kate Brown, Governor

Department of State Lands
775 Summer Street NE, Suite 100
Salem, OR 97301-1279
(503) 986-5200
FAX (503) 378-4844
www.oregon.gov/dsl

December 7, 2015

1800 Midhill Drive LLC
Attn: David Chiddix
1235 North Dutton Avenue, Suite E
Santa Rosa, CA 95401

Re: WD #2015-0463 Wetland Delineation Report for the Reeseman Property, Clackamas County;
T 2S R 1E S 14CA TL 200

Dear Mr. Chiddix:

The Department of State Lands has reviewed the wetland delineation report prepared by Schott and Associates for the site referenced above. Based upon the information presented in the report, a site visit on December 4, 2015, and additional information submitted upon request, we concur with the wetland and waterway boundaries as mapped in Figure 6 of the report. Within the study area, two wetlands (totaling approximately 0.9 acres) and one excavated waterway were identified.

The wetlands are subject to the permit requirements of the state Removal-Fill Law. Under current regulations, a state permit is required for cumulative fill or annual excavation of 50 cubic yards or more in wetlands. In addition, the excavated waterway is exempt per OAR 141-085-0515 (8); therefore, it is not subject to these state permit requirements.

This concurrence is for purposes of the state Removal-Fill Law only. Federal or local permit requirements may apply as well. The Army Corps of Engineers will review the report and make a determination of jurisdiction for purposes of the Clean Water Act at the time that a permit application is submitted. We recommend that you attach a copy of this concurrence letter to both copies of any subsequent joint permit application to speed application review.

Please be advised that state law establishes a preference for avoidance of wetland impacts. Because measures to avoid and minimize wetland impacts may include reconfiguring parcel layout and size or development design, we recommend that you work with Department staff on appropriate site design before completing the city or county land use approval process.

This concurrence is based on information provided to the agency. The jurisdictional determination is valid for five years from the date of this letter unless new information necessitates a revision. Circumstances under which the Department may change a determination are found in OAR 141-090-0045 (available on our web site or upon request). In addition, laws enacted by the legislature and/or rules adopted by the Department may result in a change in jurisdiction; individuals and applicants are subject to the regulations that are in effect at the time of the removal-fill activity or complete permit application. The applicant, landowner, or agent may submit a request for reconsideration of this determination in writing within six months of the date of this letter.

Thank you for having the site evaluated. Please phone me at 503-986-5232 if you have any questions.

Sincerely,

Peter Ryan, PWS
Jurisdiction Coordinator

Approved by

Kathy Verble, CPSS
Aquatic Resource Specialist

Enclosures

ec: Cari Cramer, Schott and Associates
City of West Linn Planning Department (Map enclosed for updating LWI)
Dominic Yballe, Corps of Engineers
Melinda Butterfield, DSL

WD 2015-0463

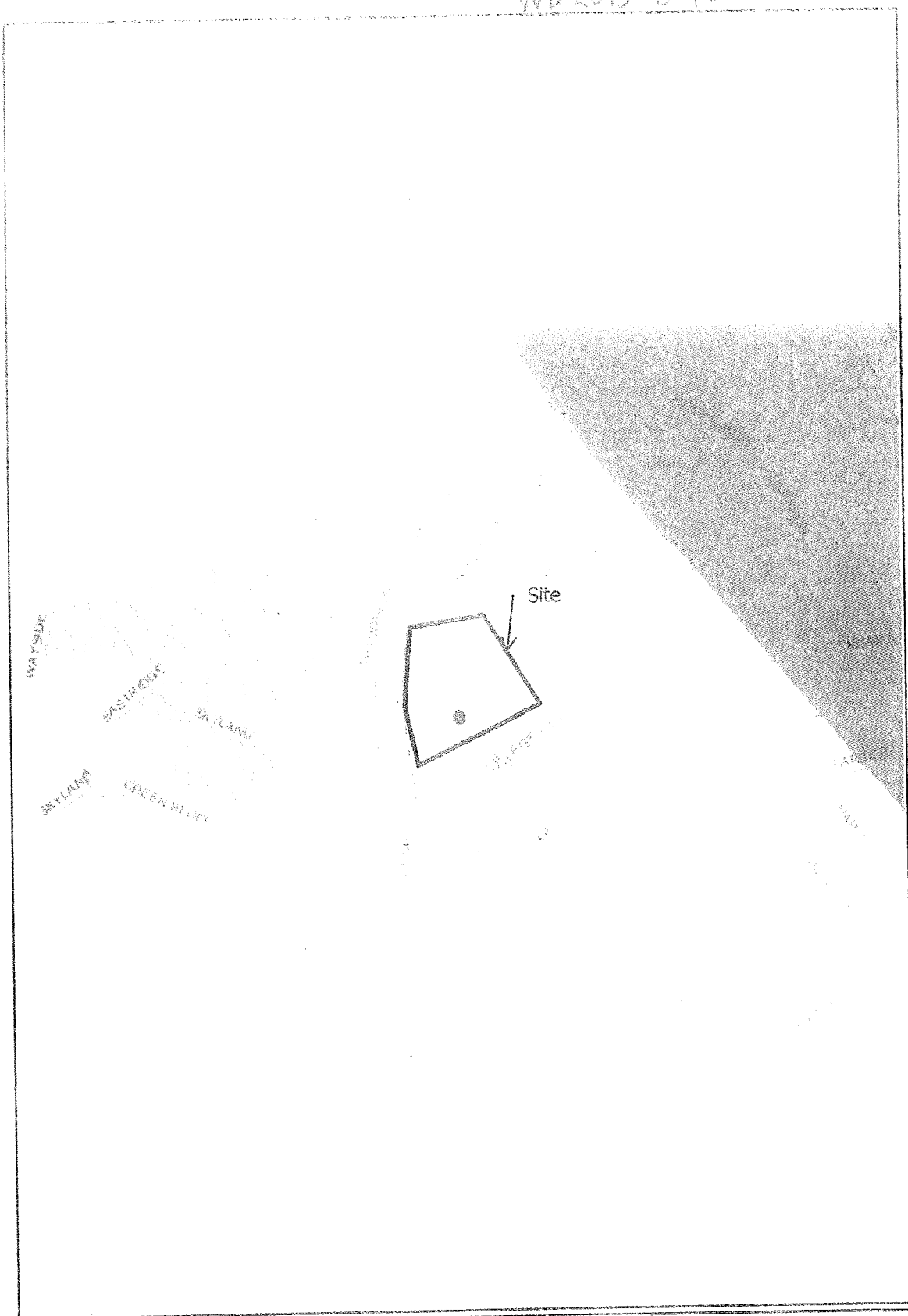
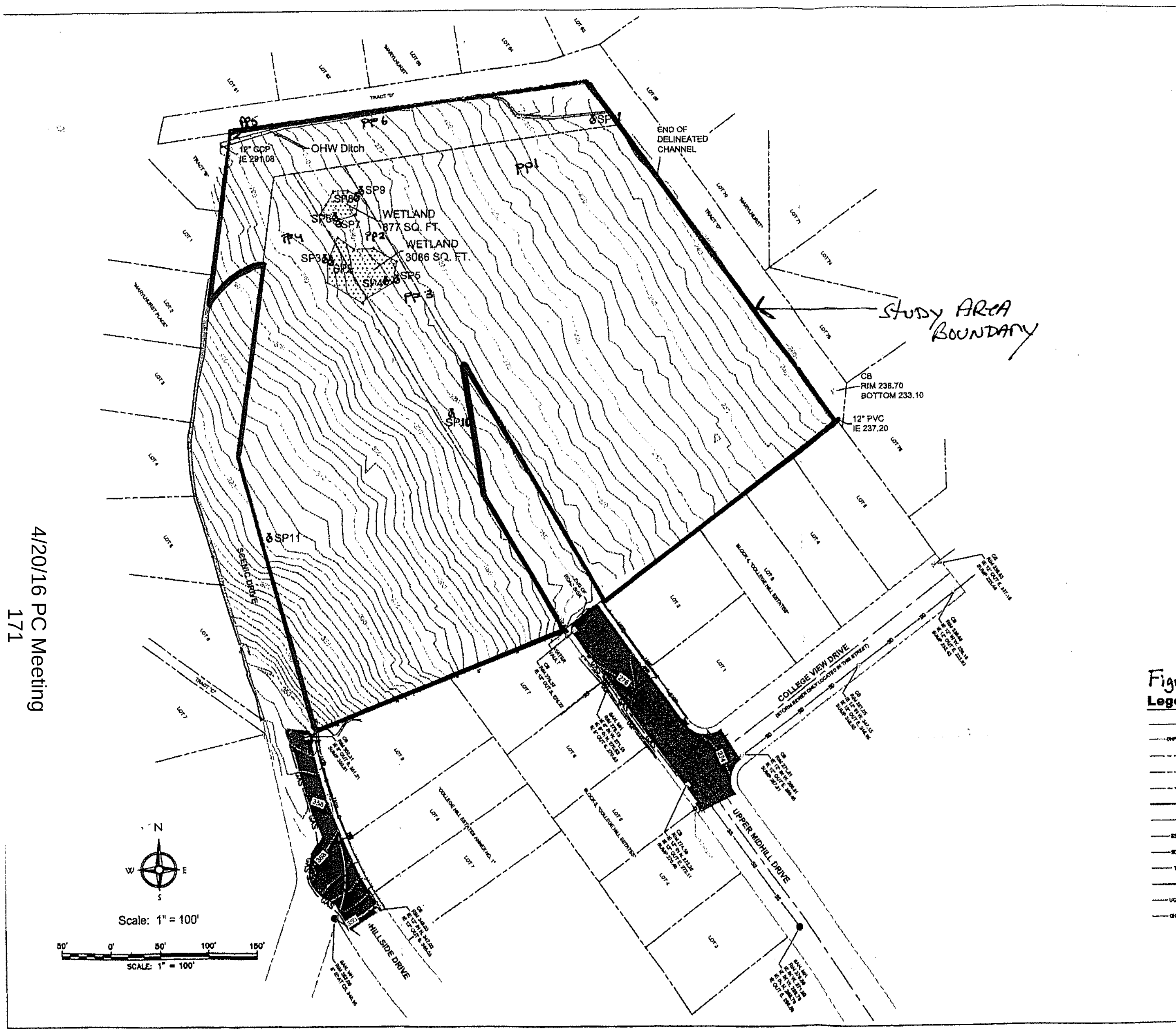


Figure 1: Location Map
Reeseman Property
S&A 2373

Schott & Associates
P.O. Box 589
Aurora, OR. 97002
503.678.6007


2 1E 14CA
WEST LINN
N.E.1/4 S.W.1/4 SEC.14 T.2S. R.1E. W.M.
CLACKAMAS COUNTY
1" = 100'
D. L. C.
GABRIEL WALLING NO. 63
THIS MAP IS FOR ASSESSMENT PURPOSES ONLY
WILLAMETTE DRIVE
MARYLCREEK DRIVE
MARYLBROOK DRIVE
MARYVIEW COURT
UPPER MIDHILL
COLLEGE VIEW DR
HILLSIDE DRIVE
SCENIC DRIVE
SKYE PARKWAY
COLLEGE HILL PLACE
ARBOR DRIVE
LOWER MIDHILL DRIVE
ROBINWOOD
3-02
7-03
R4.5
R10



Notes:

1. UTILITY INFORMATION SHOWN ON THIS MAP IS BASED UPON OBSERVED FEATURES, RECORD DATA AND TONE MARKS PROVIDED BY PUBLIC UTILITY LOCATION SERVICES. NO WARRANTIES ARE MADE REGARDING THE ACCURACY OR COMPLETENESS OF THE UTILITY INFORMATION SHOWN. ADDITIONAL UTILITIES MAY EXIST. INTERESTED PARTIES ARE HEREBY ADVISED THAT UTILITY LOCATIONS SHOULD BE VERIFIED PRIOR TO DESIGN OR CONSTRUCTION OF ANY CRITICAL ITEMS.

2. VERTICAL DATUM: NAVD'88 UTILIZING GPS POSITIONING TIED TO THE ORGN WITH REAL TIME CORRECTORS REFERENCED TO DATUM NAD 83(2011) EPOCH 2010.00. THIS DATUM REALIZATION WAS VERIFIED THROUGH DIRECT OBSERVATION TO NGS CONTROL POINT Q723 HAVING A POINT IDENTIFICATION OF RD1491. THIS POINT IS DESCRIBED AS A STAINLESS STEEL ROD W/ SLEEVE NEAR THE INTERSECTION OF STATE HIGHWAY 224 AND LAKE ROAD. THE ELEVATION OF THIS POINT IS PUBLISHED AS 31.131 AND WAS ESTABLISHED BY NGS THROUGH DIFFERENTIAL LEVELING AND ADJUSTED BY THE NATIONAL GEODETIC SURVEY IN JUNE 1991 AND HAS A VERTICAL ORDER OF FIRST CLASS II.

3. BASIS OF BEARINGS: CENTERLINE OF UPPER MIDHILL DRIVE AS PER THE PLAT OF "COLLEGE HILL ESTATES"

4. CONTOUR INTERVAL IS TWO FEET.

5. TOPOGRAPHIC FEATURES SHOWN ON THIS MAP WERE LOCATED USING STANDARD PRECISION TOPOGRAPHIC MAPPING PROCEDURES. THIRD PARTY USERS OF DATA FROM THIS MAP PROVIDED VIA AUTOCAD DRAWING FILES OR DATA EXCHANGE FILES SHOULD NOT RELY ON ANY AUTOCAD GENERATED INFORMATION WHICH IS BEYOND THE LIMITS OF PRECISION OF THIS MAP. THIRD PARTIES USING DATA FROM THIS MAP IN AN AUTOCAD FORMAT SHOULD VERIFY ANY ELEMENTS REQUIRING PRECISE LOCATIONS PRIOR TO COMMENCEMENT OF ANY CRITICAL DESIGN OR CONSTRUCTION. CONTACT COMPASS LAND SURVEYORS FOR FURTHER INFORMATION. FURTHERMORE, COMPASS LAND SURVEYORS WILL NOT BE RESPONSIBLE NOR HELD LIABLE FOR ANY DESIGN OR CONSTRUCTION RELATED PROBLEMS THAT ARISE OUT OF THIRD PARTY USAGE OF THIS MAP (IN AUTOCAD OR OTHER FORMAT) IN ANY MANNER INCONSISTENT WITH THIS STATEMENT.

6. UNDERGROUND PIPE SIZES AND MATERIAL TYPES ARE BASED UPON RECORD DRAWINGS, INFORMATION PROVIDED BY UTILITY LOCATORS AND FIELD OBSERVATIONS AT MANHOLES AND CATCH BASIN RIMS AND SHOULD BE VERIFIED.

7. WETLAND BOUNDARIES AND SAMPLE PLOTS LOCATED BY SCHOTT AND ASSOCIATES, AND SURVEYED BY COMPASS LAND SURVEYORS.

8. SEE SHEET 2 FOR TREE LIST.

DSL WD # 2015-0463

Approval Issued 12/7/2015

Approval Expires 12/7/2020

Figure 6. Wetland Map

Legend:

- EDGE OF PAVEMENT
- OVERHEAD POWER LINE
- RIGHT OF WAY LINE
- PROJECT BOUNDARY
- ADJACENT PROPERTY LINE
- CURB
- GAS LINE
- SANITARY SEWER LINE
- STORM DRAIN LINE
- TELECOMMUNICATION LINE
- WATER LINE
- UNDERGROUND POWER LINE
- OVERHEAD POWER LINE
- CONCRETE
- ASPHALT
- DL DRIP LINE (RADIUS)
- MAILBOX
- PHONE PEDESTAL
- LIGHT POLE
- WATER VALVE
- WATER METER
- TRAFFIC SIGN
- SP SAMPLE PLOT
- PP Photo Point

DRAWN	NMM
CHECK	DO
SCALE	1" = 50'
DATE	JUNE, 2015
PLAN	7379 topo.dwg

COMPASS Land Surveyors
4107 SE International Way, Suite 705
Milwaukie, Oregon 97222 503-653-9093

REESMAN PROPERTY EXISTING CONDITIONS MAP
TL 200 IN NE 1/4 OF SW 1/4 SEC. 14, T.2S., R.1E., W.M.
CITY OF WEST LINN, CLACKAMAS COUNTY, OREGON

1 / 2

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING
610 SW Alder Street, Suite 700, Portland, OR 97205 503.228.5230 503.273.8169

MEMORANDUM

Date: January 29, 2016

Project #: 18758.0

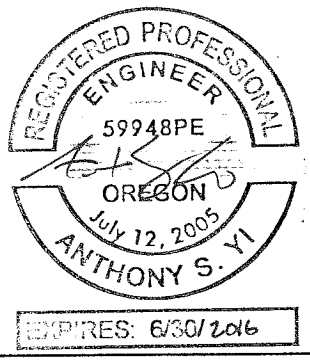
To: Khoi Le, City of West Linn
Avi Tayar, Oregon Department of Transportation, Region 1

CC: Ryan Zygar, Chene Blanc Estates, LLC

From: Matt Bell, Anthony Yi, and Alexander Kado

Project: Chene Blanc Estates Residential Development

Subject: Transportation Impact Analysis



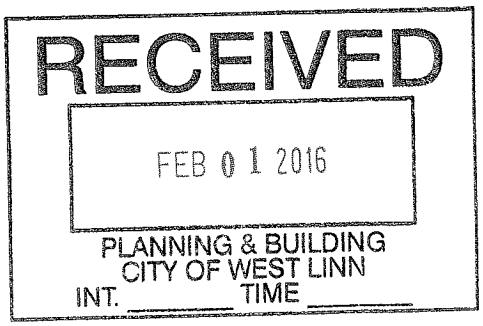
This memorandum summarizes the results of a transportation impact analysis prepared for the proposed Chene Blanc Estates residential development located at the northern terminus of Upper Midhill Drive in West Linn, Oregon. Figure 1 illustrates the site vicinity map. The proposed development plan includes 34 single-family residential homes located along an extension of Upper Midhill Drive that connects to Hillside Drive to the west. Figure 2 illustrates the conceptual site plan. Construction of the proposed development is expected to occur in 2015 with full build-out and occupancy in 2016.

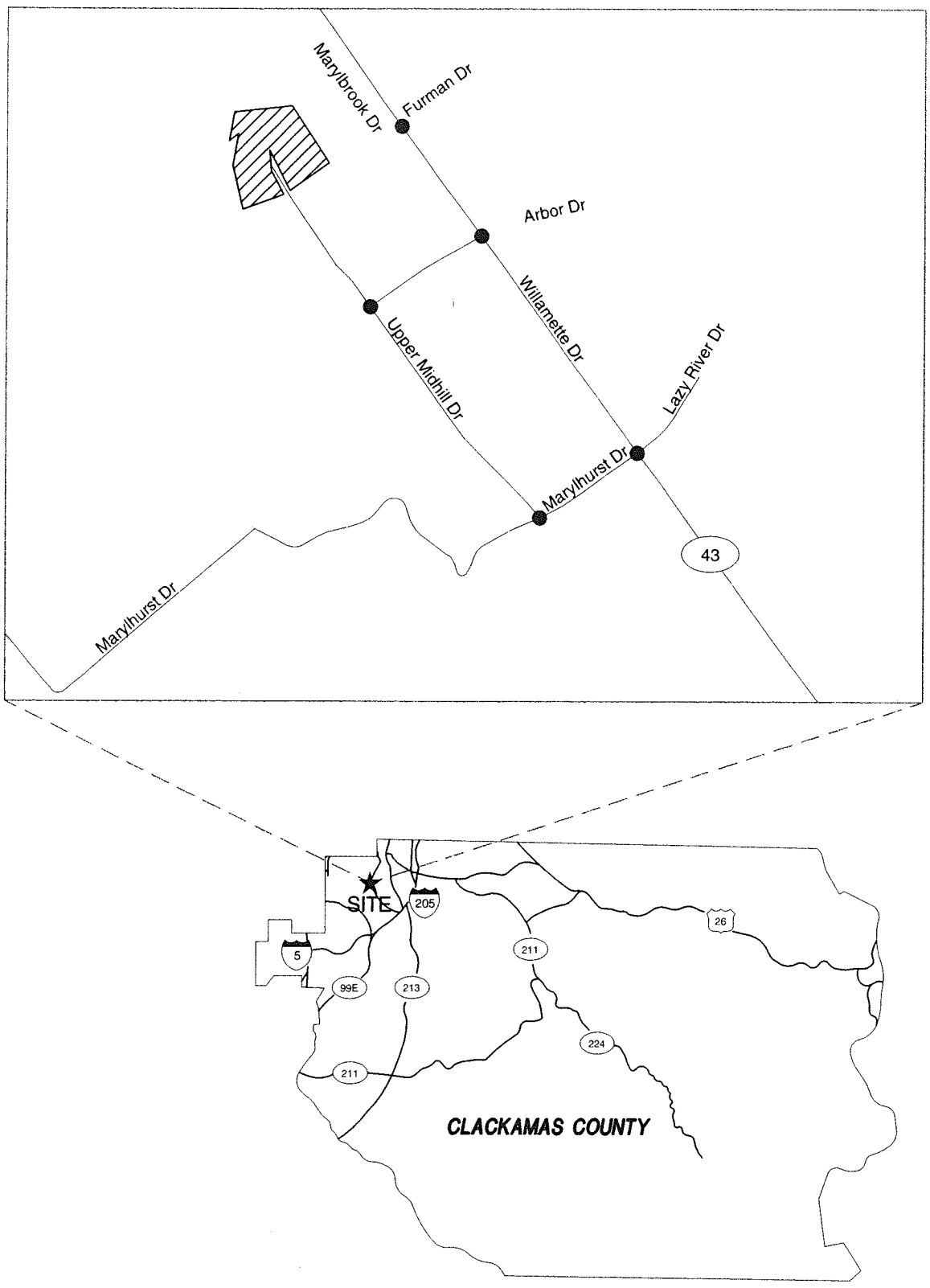
The results of this analysis indicate that the proposed development can be constructed while maintaining safe and acceptable traffic operations at the study intersections assuming provision of the recommended mitigation measures. Additional details of the study methodology, findings, and recommendations are provided herein.

SCOPE OF THE REPORT

This analysis determines the transportation-related impacts associated with the proposed Chene Blanc Estates residential development and was prepared in accordance with the City of West Linn and Oregon Department of Transportation Department (ODOT) requirements for transportation impact analyses. The study intersections and scope of this project were selected in coordination with City and ODOT staff. The operational analyses were performed at the following study intersections:

- Willamette Drive (OR 43)/Marylbrook Drive
- Willamette Drive (OR 43)/Arbor Drive
- Willamette Drive (OR 43)/Marylhurst Drive
- Upper Midhill Drive/Arbor Drive
- Upper Midhill Drive/Marylhurst Drive



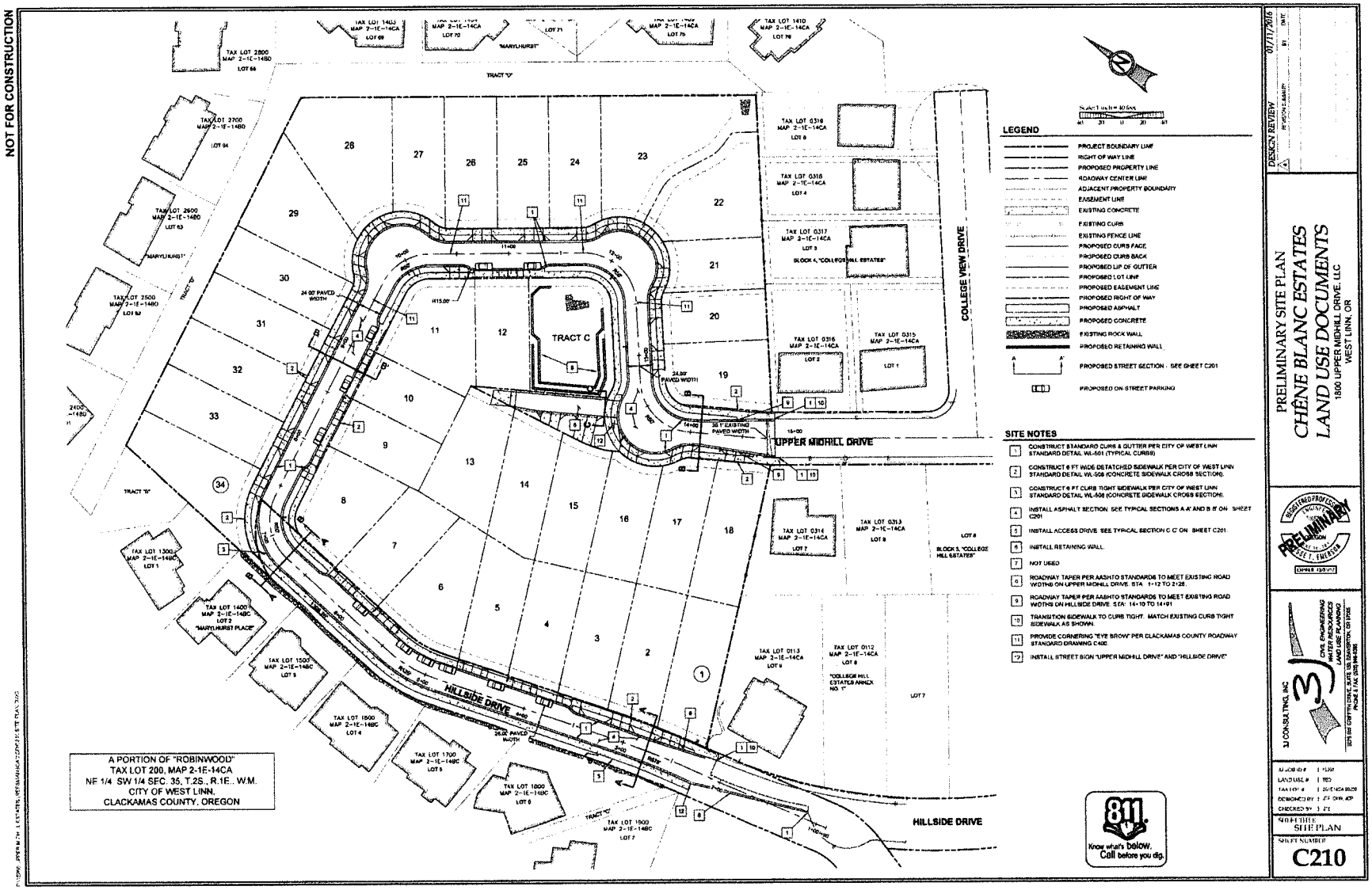


● - Study Intersections

Site Vicinity Map
West Linn, OR

Figure
1

H:\proj\file\18758 - West Linn Reesman Property Residential\dwgs\fig\18758_fig1.dwg Jan 15, 2016 - 8:55am mbell Layout Tab: Fig01



RECEIVED: 2016-01-13

Conceptual Site Plan
West Linn, OR

Figure
2

This report evaluates these transportation issues:

- Year 2015 existing land-use and transportation-system conditions within the site vicinity during the weekday a.m. and p.m. peak periods;
- Developments and transportation improvements planned in the study area;
- Year 2016 background traffic conditions (without the proposed development) during the weekday a.m. and p.m. peak periods;
- Trip generation and distribution estimates for the proposed development; and
- Year 2016 total traffic conditions (with full build-out and occupancy of the proposed development) during the weekday a.m. and p.m. peak periods.

EXISTING CONDITIONS

The existing conditions analysis identifies the site conditions and the current physical and operational characteristics of the roadways within the study area. These conditions will be compared with future conditions later in this report.

Kittelson & Associates, Inc. (KAI) staff visited and inventoried the proposed development site and surrounding study area in July 2015. At that time, KAI collected information regarding site conditions, adjacent land uses, existing traffic operations, and transportation facilities in the study area.

SITE CONDITIONS AND ADJACENT LAND USES

The proposed development site is located within the West Linn city limits, is currently vacant, and is zoned for medium density residential. The adjacent land uses include single family residential homes and a small city park located further south along Upper Midhill Drive.

TRANSPORTATION FACILITIES

Table 1 summarizes the characteristics of the transportation facilities within the site vicinity.

Table 1: Existing Transportation Facilities

Roadway	Functional Classification[1]	Number of Lanes	Posted Speed (mph)	Sidewalks	Bicycle Lanes	On-Street Parking
Willamette Drive (OR 43)	Principal Arterial	2	35	Partial	Yes	No
Upper Midhill Drive	Local Street	2	25	Partial	No	Yes
Arbor Drive	Local Street	2	25	No	No	No
Marylhurst Drive	Collector	2	25	No	No	No

1. City of West Linn Transportation System Plan (TSP – Reference 1).

Roadway Facilities

Willamette Drive is the major north-south arterial within the City of West Linn providing access to the cities of Lake Oswego and Portland to the north, and Oregon City to the south. Marylhurst Drive is an east-west collector, which provides access to Willamette Drive via a signalized intersection. Arbor Drive is an east-west local street that provides access to Willamette Drive via a two-way stop-control intersection. Upper Midhill Drive is a north-south local street that connects the proposed development to Arbor Drive and Marylhurst Drive. The segment of Upper Midhill Drive located south of Arbor Drive is relatively narrow; however, two vehicles can pass each other on the roadway. Also, should redevelopment occur along Upper Midhill Drive, it is assumed the roadway will be improved to the City's local street standard. Figure 3 illustrates the existing lane configurations and traffic control devices at the study intersections.

Pedestrian and Bicycle Facilities

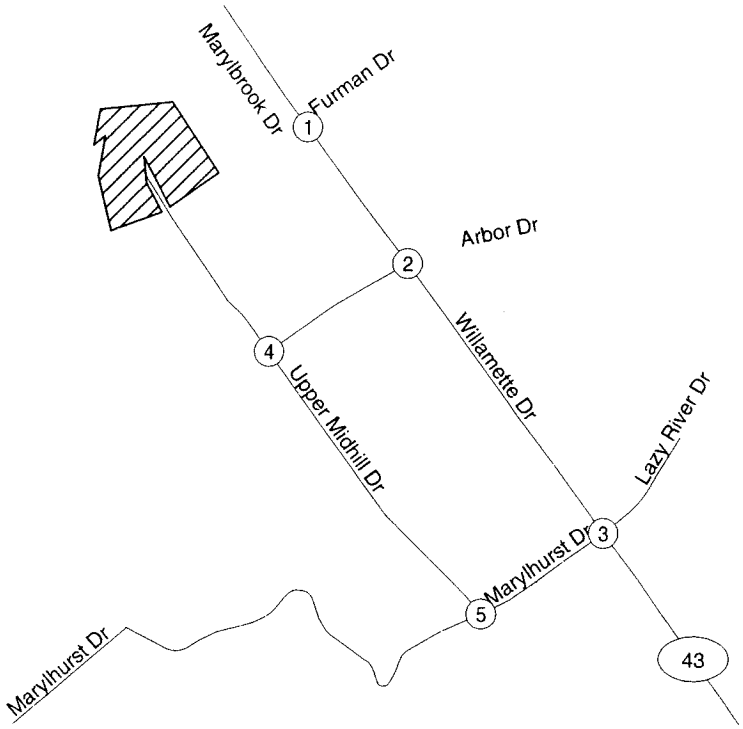
Sidewalks are limited within the site vicinity to segments of Upper Midhill Drive located north of Arbor Drive and segments of Willamette Drive located north and south of Marylhurst Drive. Crosswalks are provided at the Willamette Drive/Marylhurst Drive and Willamette Drive/Marylbrook intersections, which are signalized with pedestrian pushbuttons and countdown signal heads. Bike lanes are provided within the site vicinity to Willamette Drive, which provides continuous bike lanes north and south of the proposed development.

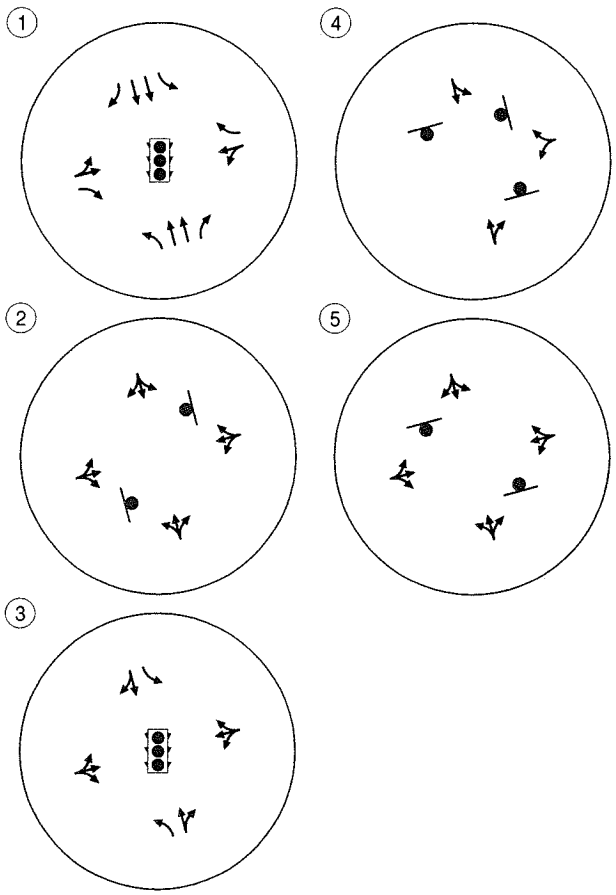
Transit Facilities

Local transit service is provided within the site vicinity by TriMet. TriMet Line 35 provides frequent service along Willamette Drive, Monday through Friday from 6:00 a.m. to 12:00 a.m. on 15-30 minute headways. Limited service is provided on Saturdays and Sundays. Line 35 serves two stops located adjacent to Arbor Drive (Stop 6301 and 6302) and two stops located adjacent to Marylhurst Drive (Stop 9216 and 6337). The stops located adjacent to Arbor Drive are not supported by sidewalks or crosswalks, while the stops located adjacent to Marylhurst Drive have sidewalks and a signalized crossing at the Willamette Drive/Marylhurst Drive intersection.

TRAFFIC VOLUMES AND PEAK HOUR OPERATIONS

Manual turning movement counts were conducted at the study intersections in June 2015. All the counts were conducted on a typical mid-week day during the morning (7:00 to 9:00 a.m.) and evening (4:00 to 6:00 p.m.) peak time periods. The system-wide morning and evening peak hours were found to occur between 7:00 and 8:00 a.m. and 4:40 and 5:40 p.m., respectively. Figure 4 provides a summary of the year 2015 turning-movement counts for the weekday a.m. and p.m. peak hours. The traffic counts shown in Figure 4 were seasonally adjusted to 30th Highest Hour Volumes (30HV) in accordance with the methodology outlined in the ODOT Analysis Procedures Manual (APM – Reference 2). *Appendix "A" contains the traffic count worksheets used in this study.*





Existing Lane Configurations & Traffic Control Devices
West Linn, OR

Figure 3

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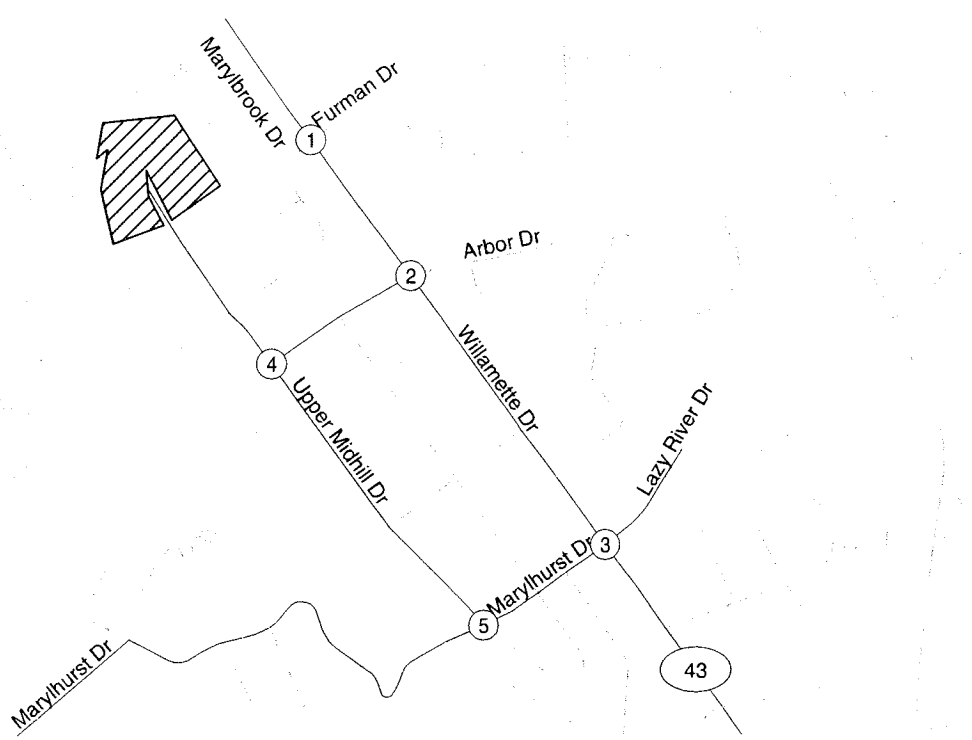

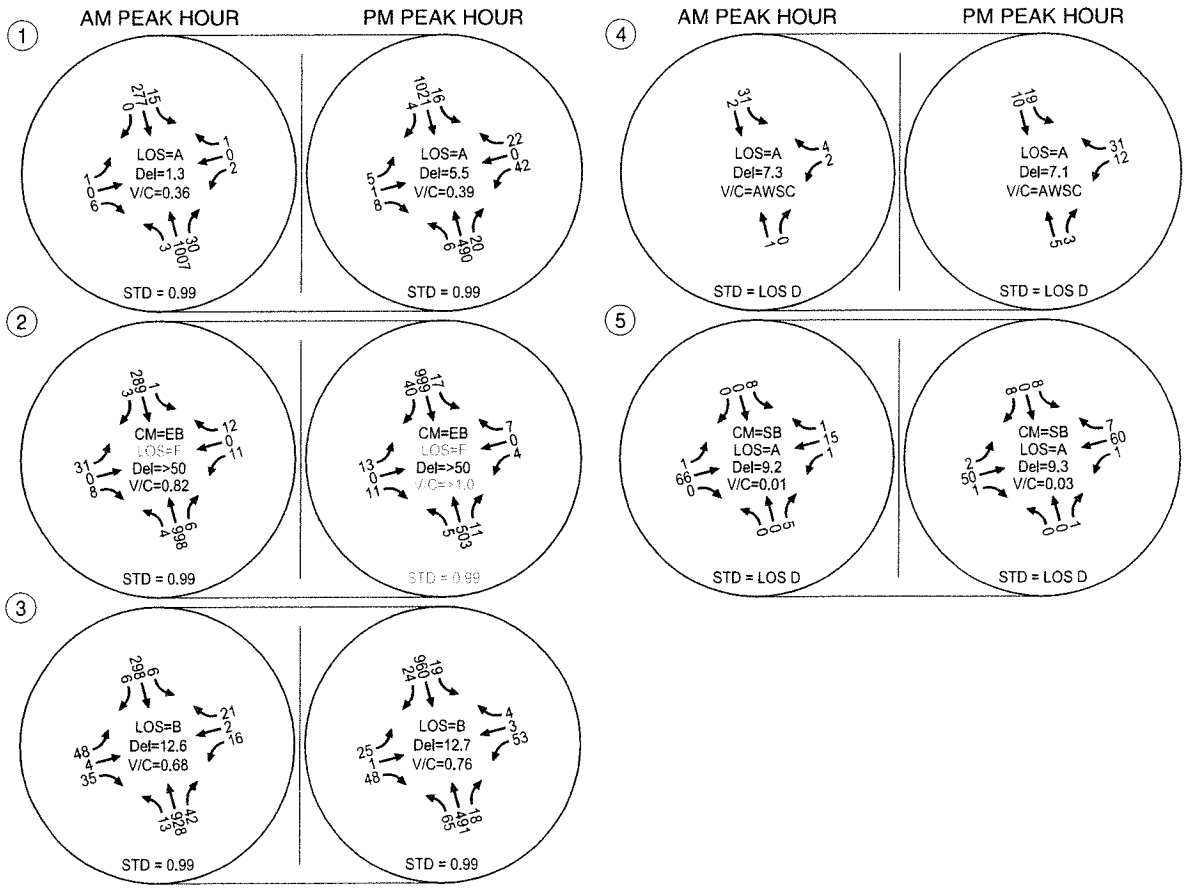

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Existing Traffic Conditions
Weekday AM & PM Peak Hour
West Linn, OR

Figure
4

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Current Levels of Service

All level-of-service analyses described in this report were performed in accordance with the procedures stated in the 2000 *Highway Capacity Manual* (HCM – Reference 3). *A description of level of service and the criteria by which they are determined is presented in Appendix "B".* Appendix "B" also indicates how level of service is measured and what is generally considered an acceptable range.

The City of West Linn requires all signalized and unsignalized intersections to maintain LOS D or better, while ODOT requires all signalized and unsignalized intersections to maintain a v/c ration of 0.99. The City controls the Upper Midhill Drive/Arbor Drive and Upper Midhill Drive/Marylhurst Drive intersections while the ODOT controls the intersections located along Willamette Drive.

All intersection level-of-service evaluations used the peak 15-minute flow rates that occurred during the weekday a.m. and p.m. peak hours. Using the peak 15-minute flow rates ensures that this analysis is based on a reasonable worst-case scenario. For this reason, the analysis reflects conditions that are only likely to occur for 15 minutes out of each average peak hour. The transportation system will likely operate under conditions better than those described in this report during all other time periods.

Figure 4 summarizes the results of the traffic operations analysis at the study intersections under existing traffic conditions. As shown, all of the study intersections currently operate acceptably during the weekday a.m. and p.m. peak hours with the exception of the Willamette Drive/Arbor Drive intersection. Additional information on the operational issues identified at the study intersection is provided below. *Appendix "C" includes the worksheets used to evaluate existing traffic conditions at the study intersections.*

Willamette Drive/Arbor Drive

The eastbound approach to the Willamette Drive/Arbor Drive intersection currently operates at LOS F and above capacity during the weekday p.m. peak hour. This is primarily due to the relatively low volume of eastbound traffic along Arbor Drive conflicting with the relatively high volume of northbound and southbound traffic along Willamette Drive. Potential mitigation measures are identified later in this report.

Traffic Safety

The crash history of the study intersections was reviewed in an effort to identify any potential safety issues. ODOT provided the five most recent years of crash data available for the study intersections, including January 1, 2009 through December 31, 2013. Table 2 summarizes the crash history of the study intersections over the five-year period.

Table 2: Study Intersection Crash Summary (January 1, 2009 – December 31, 2013)

Location	Crash Type						Severity			Total
	Angle	Turn	Rear-End	Side Swipe	Fixed Object	Ped/ Bike	PDO	Injury	Fatal	
Willamette Drive/Marylbrook Drive	0	1	1	0	0	1	0	3	0	3
Willamette Drive/Arbor Drive	0	4	5	0	0	0	4	5	0	9
Willamette Drive/Marylhurst Drive	0	1	2	0	0	0	1	2	0	3
Upper Midhill Drive/Arbor Drive	0	0	0	0	0	0	0	0	0	0
Upper Midhill Drive/Marylhurst Drive	0	0	0	0	0	0	0	0	0	0

PDO = Property Damage Only

As shown in Table 2, the Willamette Drive/Arbor Drive intersection experienced the highest number of crashes over the five year period. Further review of the crashes indicates that a majority of the rear-end crashes occurred in the northbound direction when a motorist failed to avoid another slowed or stopped motorist waiting to turn left onto Arbor Drive. Potential mitigation measures are identified later in this report. No other trends or patterns were identified in the crash data that requires mitigation associated with the proposed development. *Appendix "D" contains the crash data obtained from ODOT.*

TRANSPORTATION IMPACT ANALYSIS

The transportation impact analysis identifies how the study area's transportation system will operate in the year the proposed development is expected to be fully built, year 2016. The impact of traffic generated by the proposed development was examined as follows:

- Developments and transportation improvements planned in the site vicinity were identified.
- Year 2016 background traffic conditions (without the proposed development) were analyzed at the study intersections during the weekday a.m. and p.m. peak hours.
    - Background traffic conditions were developed by applying a 1-percent annual growth rate to the existing traffic volumes to account for regional growth in the site vicinity between years 2015 and 2016.
- Site-generated trips were estimated for build-out of the site.
- Site trip-distribution patterns were derived after the existing traffic patterns and the major trip origins and destinations in West Linn and the Metro area.
- Year 2016 total traffic conditions (with full build-out and occupancy of the proposed development) were analyzed at the study intersections during the weekday a.m. and p.m. peak hours.

YEAR 2016 BACKGROUND TRAFFIC CONDITIONS

The year 2016 background traffic conditions analysis identifies how the study area's transportation system will operate without the proposed development. This analysis includes traffic attributed to planned developments within the study area and to general growth in the region, but does not include traffic from the proposed development.

Planned Developments and Transportation Improvements

No planned developments or transportation improvements were identified within the site vicinity that will impact traffic operations under year 2016 traffic conditions.

Traffic Volumes

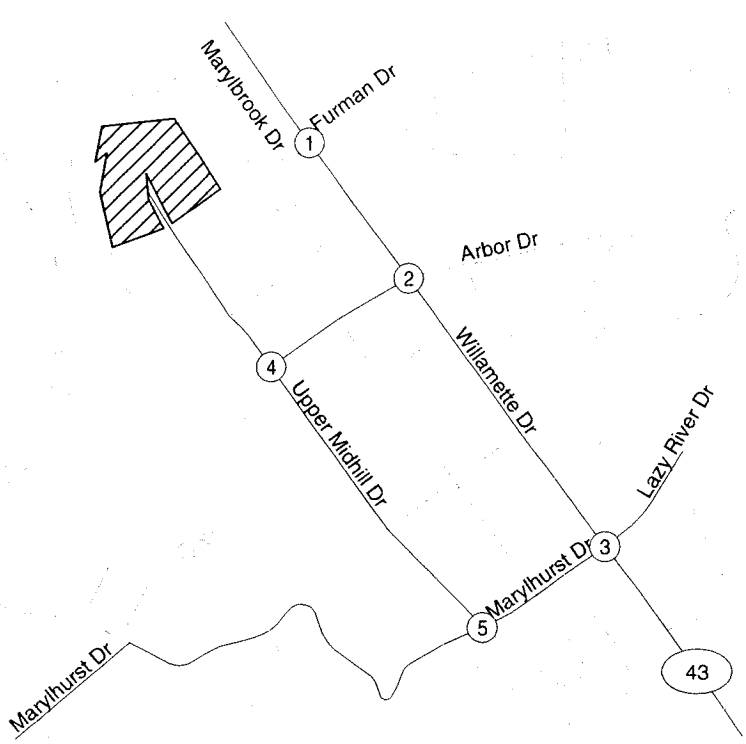
The growth rate used in this analysis was developed based on a review of historical traffic volumes along Willamette Drive and discussions with City staff. Based on the review and discussions, a 1-percent annual growth rate was applied to the existing traffic volumes to account for regional growth between 2015 and 2016. Figure 5 illustrates the resulting forecast year 2016 background traffic volumes during the weekday a.m. and p.m. peak hours.

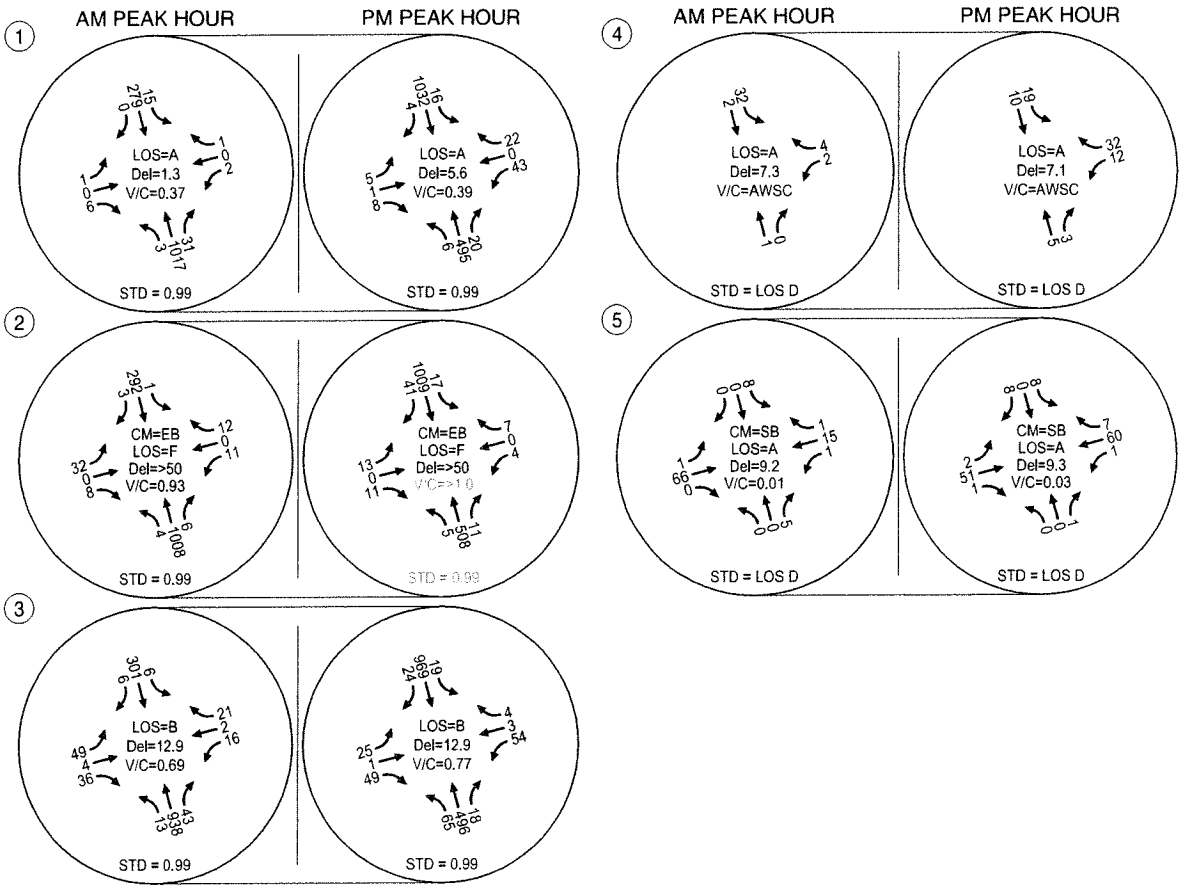
Intersection Level-of-Service

The traffic volumes shown in Figure 5 were used to conduct an operations analysis at the study intersections under year 2016 background traffic conditions. As shown, all of the study intersections are expected to operate acceptably during the weekday a.m. and p.m. peak hours with the exception of the Willamette Drive/Arbor Drive intersection. Additional information on the operational issues identified at the study intersection is provided below. *Appendix "E" includes the worksheets used to evaluate year 2016 background traffic conditions at the study intersections.*

Willamette Drive/Arbor Drive

The eastbound approach to the Willamette Drive/Arbor Drive intersection is expected to continue to operate at LOS F and above capacity during the weekday p.m. peak hour. Potential mitigation measures are identified later in this report.





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Year 2016 Background Traffic Conditions Weekday AM & PM Peak Hour West Linn, OR

Figure 5

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PROPOSED DEVELOPMENT PLAN

Chene Blanc Estates, LLC is proposing to develop the 6.14 acre site located at the northern terminus of Upper Midhill Drive. The proposed development plan consists of 34 single-family residential homes located along an extension of Upper Midhill Drive that will connect to Scenic Drive to the west. Construction of the proposed development is expected to occur in 2015 with full build-out and occupancy in 2016.

Trip Generation

A trip generation estimate was prepared for the proposed development based on information provided in the standard reference manual, *Trip Generation*, 9th Edition, published by the Institute of Transportation Engineers (ITE – Reference 4). Table 3 summarizes the trip generation estimate for the daily, weekday a.m. and weekday p.m. peak hours.

Table 3: Trip Generation Estimate

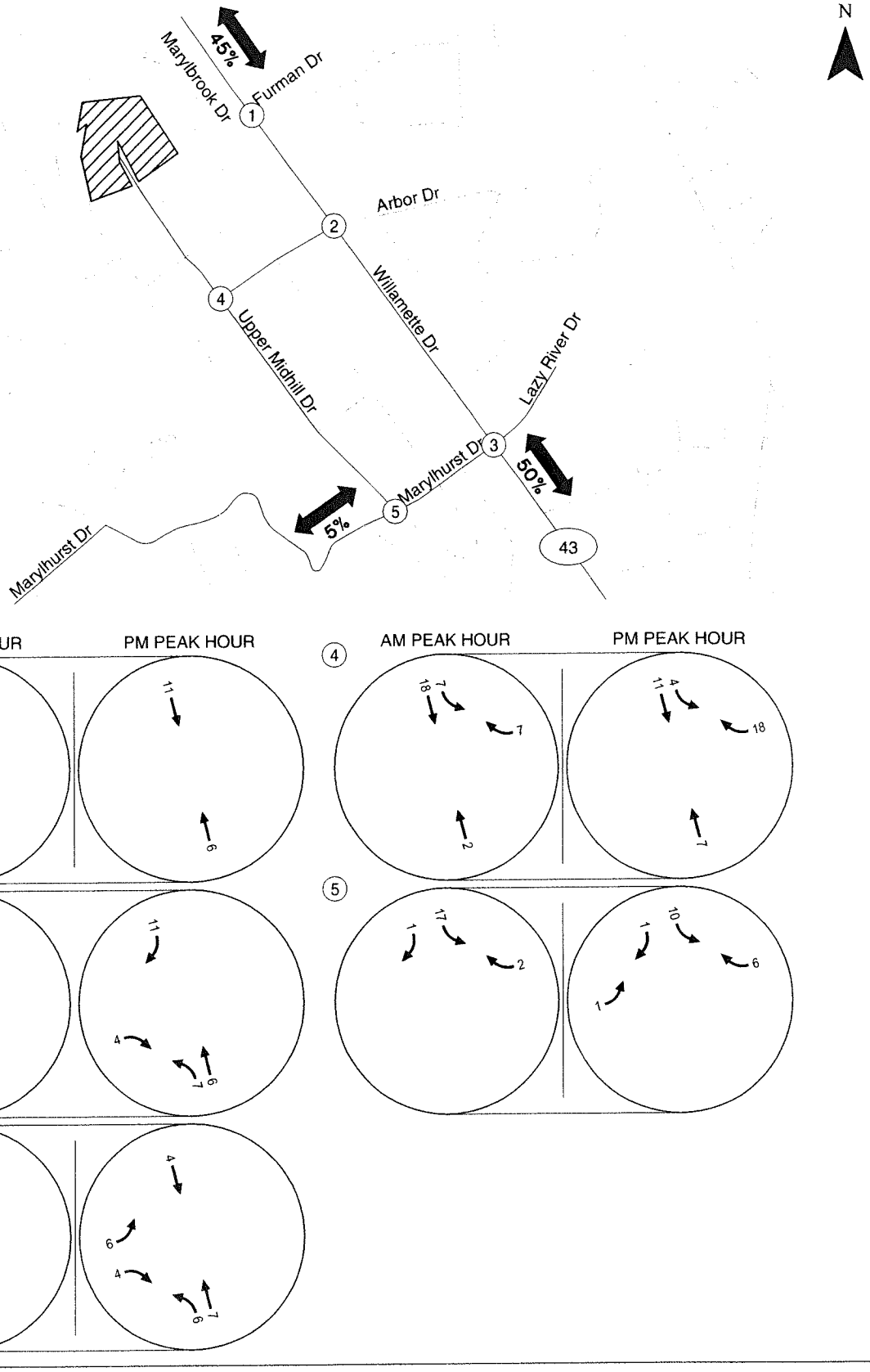
Land Use	ITE Code	Size	Daily Trips	Weekday AM Peak Hour Trips			Weekday PM Peak Hour Trips		
				Total	In	Out	Total	In	Out
Single-Family Homes	210	34 units	389	34	9	25	40	25	15

As shown in Table 3, the proposed development is estimated to generate approximately 389 daily trips, including 34 trips (9 inbound, 25 outbound) during the weekday a.m. peak hour and 40 trips (25 inbound, 15 outbound) during the weekday p.m. peak hour.

Site Trip Distribution/Trip Assignment

The site-generated trips were distributed onto the study area roadway system according to the existing traffic patterns, the location of major trip origins and destinations in West Linn and the Metro area. Figure 6 illustrates the estimated trip distribution pattern for the proposed development.

The site-generated trips were assigned to the network by distributing the trips shown in Table 3 according to the trip distribution pattern shown in Figure 6. Figure 6 also illustrates the site-generated trips that are expected to use the roadway system during the weekday a.m. and p.m. peak hours. As shown, no additional trips were added to the eastbound left-turn movement at the Willamette Drive/Arbor Drive intersection due to the existing and projected future operational issues associated with that movement. It is assumed that all trips from the site headed north on Willamette Drive will use the traffic signal at Willamette Drive/Marylhurst Drive.



Estimated Trip Distribution Pattern & Site Generated Trips
Weekday AM & PM Peak Hour
West Linn, OR

Figure 6

YEAR 2016 TOTAL TRAFFIC CONDITIONS

The total traffic conditions analysis forecasts how the study area's transportation system will operate with the traffic generated by the proposed development. The year 2016 background traffic volumes shown in Figure 5 were added to the site-generated traffic shown in Figure 6 to arrive at the total traffic volumes shown in Figure 7.

Intersection Level of Service

The traffic volumes shown in Figure 7 were used to conduct an operations analysis at the study intersections under year 2016 total traffic conditions. As shown, all of the study intersections are expected to operate acceptably during the weekday a.m. and p.m. peak hours with the exception of the Willamette Drive/Arbor Drive intersection. Additional information on the operational issues identified at the study intersection is provided below. *Appendix "F" includes the worksheets used to evaluate year 2016 total traffic conditions at the study intersections.*

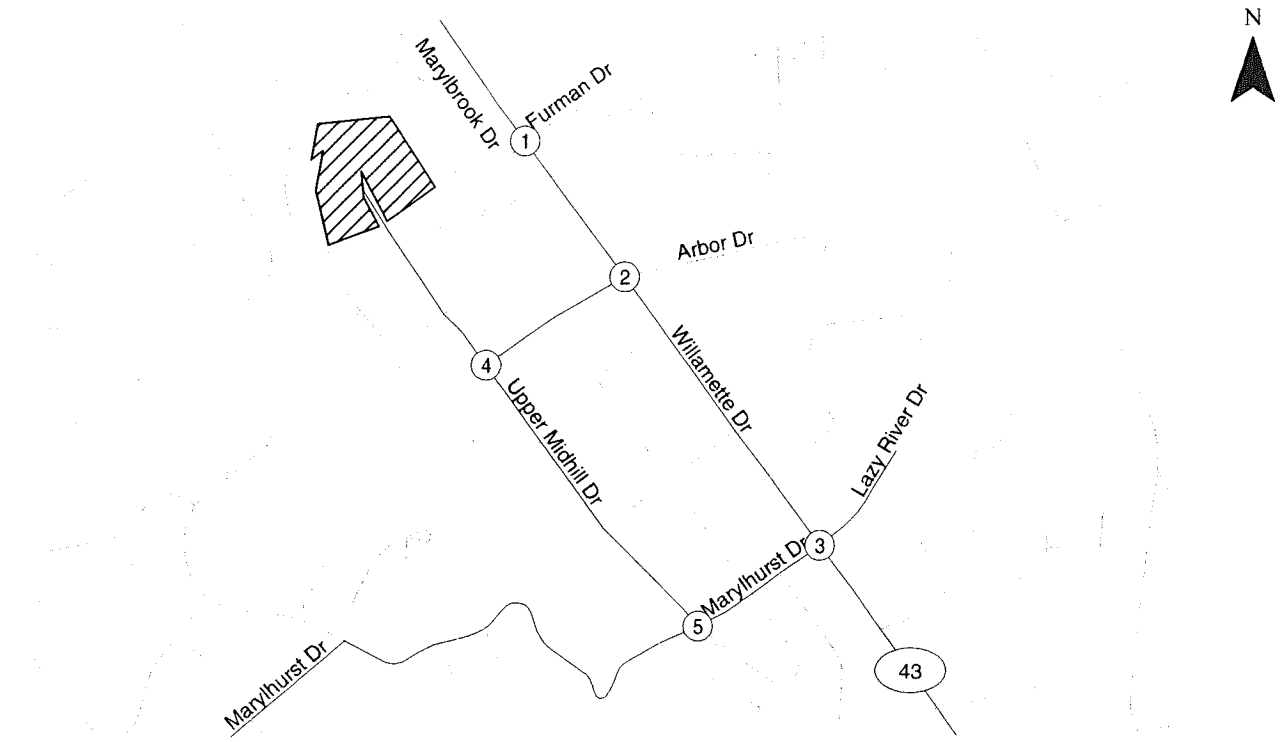
Willamette Drive/Arbor Drive

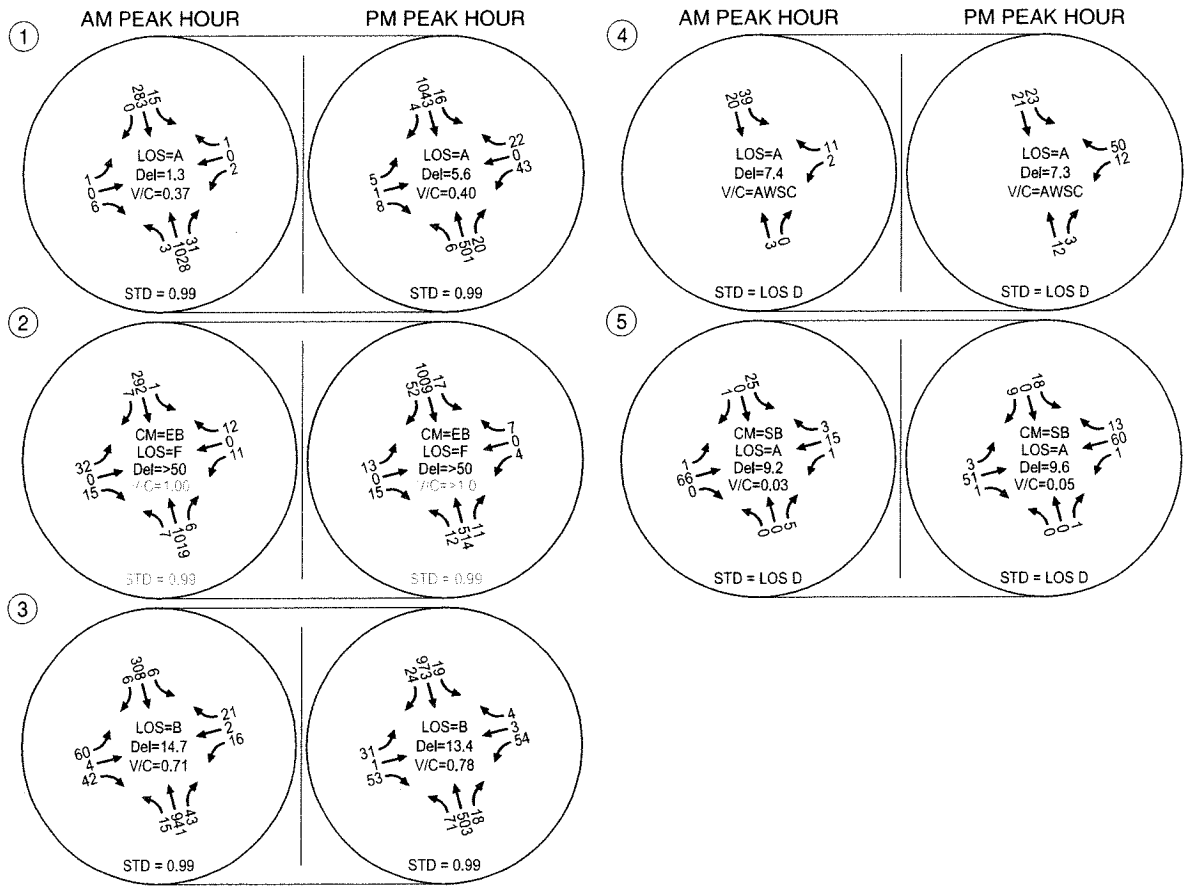
The eastbound approach to the Willamette Drive/Arbor Drive intersection is expected to operate at LOS F and above capacity during the weekday a.m. and p.m. peak hours under year 2016 total traffic conditions. Potential mitigation measures are identified below.

Mitigation

The provision of a separate northbound left-turn lane at the Willamette Drive/Arbor Drive intersection would provide an incremental improvement in traffic operations over total traffic conditions as well as improve safety by providing separation between the slowed or stopped northbound left-turning vehicles and northbound through vehicles; however, the intersection would continue to operate at LOS F and above capacity during the weekday p.m. peak hour. If, however, the north leg of the intersection were designed to accommodate two-stage left-turn movements from the eastbound approach, the intersection would operate at LOS C during the weekday a.m. and LOS D during the weekday p.m. peak hours and below capacity during both time periods.

Figure 8 summarizes the results of the traffic operations analysis at the study intersection under year 2016 total traffic conditions with the proposed mitigation (with and without the two-stage left-turn capability). Figure 9 illustrates a conceptual design of the proposed mitigation with the two-stage left-turn capability. *Appendix "G" includes the worksheets used to evaluate year 2016 total traffic conditions at the Willamette Drive/Arbor Drive intersection with the proposed mitigation.*





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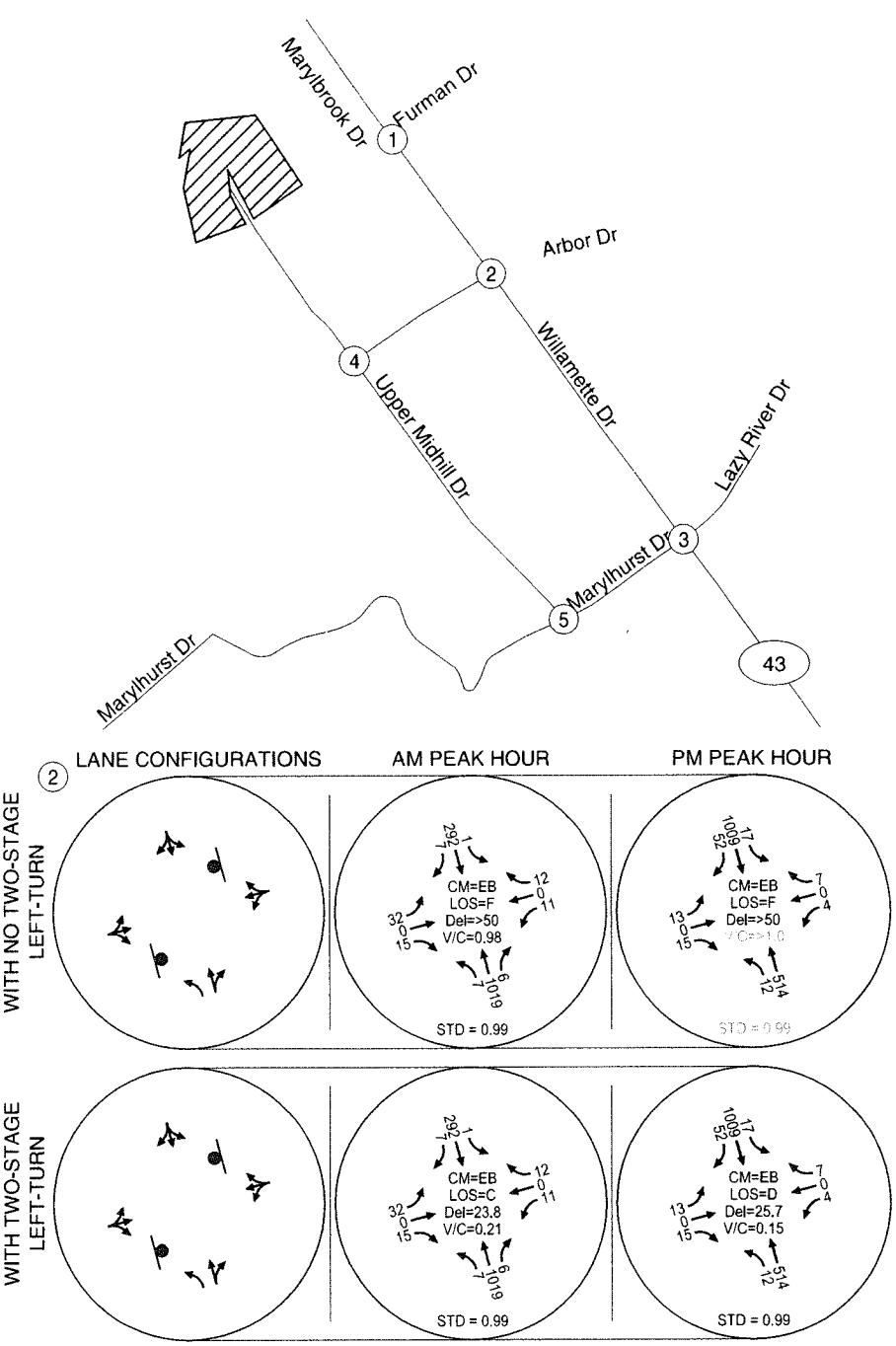
Year 2016 Total Traffic Conditions Weekday AM & PM Peak Hour West Linn, OR

Figure 7



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Year 2016 Total Traffic Conditions - Mitigated Weekday AM & PM Peak Hour West Linn, OR

Figure 8

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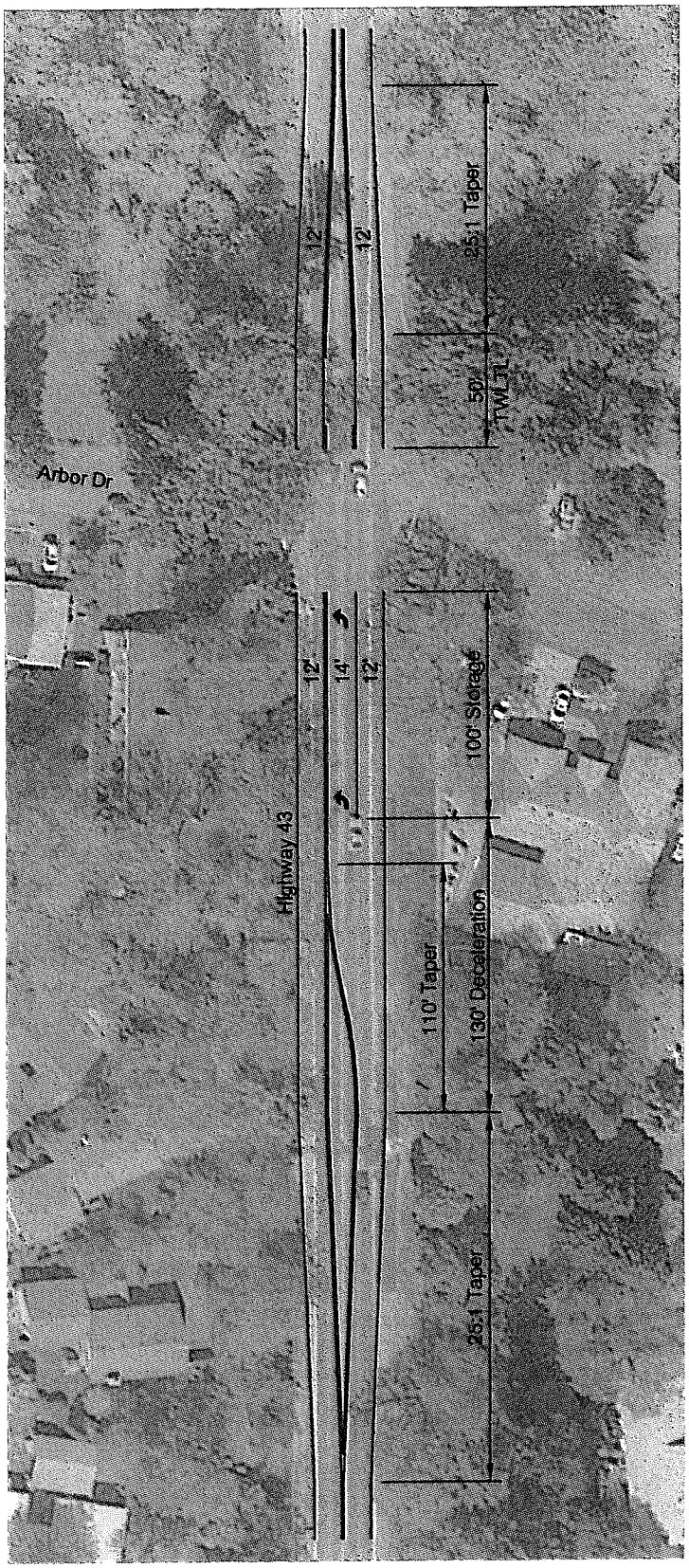
KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING PLANNING



Highway 43 at Arbor Drive Intersection Concept
West Linn, OR

Figure 9

Proportionate Share

The proposed development will result in a 1.9 percent increase in traffic volumes at the Willamette Drive/Arbor Drive intersection during the weekday a.m. peak hour and a 1.8 percent increase during the weekday p.m. peak hour. Therefore, the cost of the proposed mitigation will likely exceed the proportionate impacts of the proposed development. Section 55.125 of the West Linn Community Development Code (CDC) allows the City to condition mitigation that either addresses or minimizes the impacts of a proposed development. Section 55.100.I.1 allows the City to require construction or contribution of a proportionate share for necessary off-site improvements identified by the transportation analysis. Because the cost of the proposed mitigation will likely exceed the project's share of the impact, we recommend the City collect a proportionate share of the project's impact for use on the future project.

A preliminary cost estimate was developed for the proposed mitigation based unit costs for similar improvements. The cost estimate includes widening on both sides of Willamette Drive (OR 43) to accommodate the separate left turn lane as well as gravel shoulders and drainage, but does not include curb, gutter, and sidewalk. The cost estimate was submitted to the City and is currently in review.

CONCLUSIONS AND RECOMMENDATIONS

The results of the traffic impact analysis indicate that the proposed Chene Blanc Estates residential development can be constructed while maintaining safe and acceptable traffic operations at the study intersection and adjacent roadways assuming provision of the recommended mitigation measures. The findings of this analysis and our recommendations are discussed below.

FINDINGS

Existing Conditions

- All of the study intersections operate acceptably during the weekday a.m. and p.m. peak hours with the exception of the Willamette Drive/Arbor Drive intersection.
    - Mitigation measures have been identified as described below.
- The Willamette Drive/Arbor Drive intersection experienced the highest number of crashes over the five year study period, a majority of which involved vehicles turning to/from the minor street.
    - Mitigation measures have been identified as described below.
    - No other trends or patterns were identified in the crash data that require mitigation associated with this project.
- The segment of Upper Midhill Drive located south of Arbor Drive is relatively narrow; however, two vehicles can pass each other on the roadway. Also, should redevelopment

occur along Upper Midhill Drive, it is assumed the roadway will be improved to the City's local street standard.

Year 2016 Background Traffic Conditions

- No planned developments or transportation improvements were identified within the site vicinity that will impact traffic operations under 2016 traffic conditions.
- All of the study intersections are forecast to operate acceptably during the weekday a.m. and p.m. peak hours with the exception of the Willamette Drive/Arbor Drive intersection.
    - Mitigation measures have been identified as described below.

Proposed Development Plan

- The proposed development will include 34 single family residential homes located along an extension of Upper Midhill Drive.
- The proposed development is estimated to generate approximately 400 daily trips, including 34 trips (9 inbound, 25 outbound) during the weekday a.m. peak hour and 40 trips (25 inbound, 15 outbound) during the weekday p.m. peak hour.

Year 2016 Total Traffic Conditions

- All of the study intersections are forecast to operate acceptably during the weekday a.m. and p.m. peak hours with the exception of the Willamette Drive/Arbor Drive intersection.
    - Mitigation measures have been identified as described below.

RECOMMENDATIONS

The following list summarizes the mitigation measures recommended as part of this proposed development.

- Construct an extension of Upper Midhill Drive consistent with the City's local street standard.
- Shrubbery and landscaping near the internal intersections and site access points should be maintained to ensure adequate sight distance.
- Pay a proportionate share (1.9 percent) of the total cost to construct a separate left-turn lane at the Willamette Drive (OR 43)/Arbor Drive Intersection.

REFERENCES

1. City of West Linn. *Transportation System Plan*. 2008.
2. Oregon Department of Transportation. *Analysis Procedures Manual*. 2015.
3. Transportation Research Board. *Highway Capacity Manual*. 2000.
4. Institute of Transportation Engineers. *Trip Generation, 9th Edition*. 2012.

APPENDIX

A. Traffic Counts
B. Description of Level of Service
C. Existing Traffic Conditions Worksheets
D. Crash Data
E. Year 2016 Background Traffic Conditions Worksheets
F. Year 2016 Total Traffic Conditions Worksheets
G. Year 2016 Total Traffic Conditions Worksheets - Mitigated

Appendix A Traffic Counts

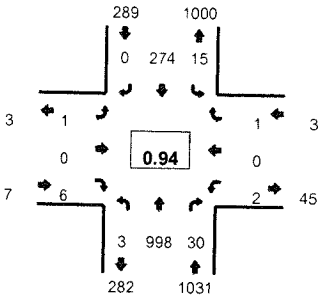
Type of peak hour being reported: Intersection Peak

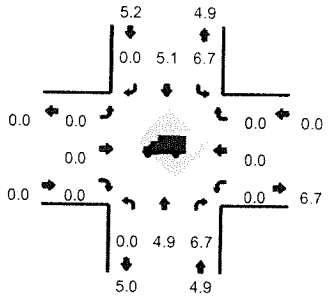
Method for determining peak hour: Total Entering Volume

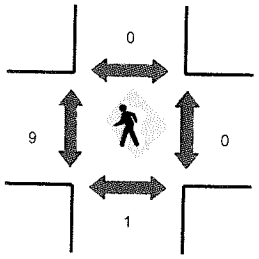
LOCATION: Willamette Dr (OR 43) -- Marylbrook Dr/Furman Dr
CITY/STATE: Lake Oswego, OR

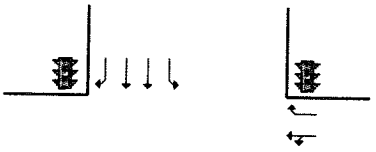
QC JOB #: 13423109
DATE: Wed, Jun 17 2015

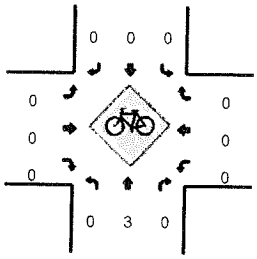
Peak-Hour: 7:00 AM -- 8:00 AM
Peak 15-Min: 7:20 AM -- 7:35 AM

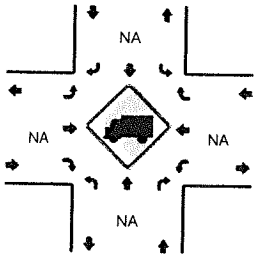


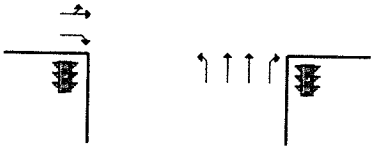


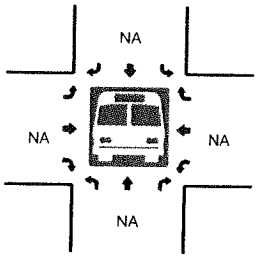












5-Min Count Period Beginning At	Willamette Dr (OR 43) (Northbound)				Willamette Dr (OR 43) (Southbound)				Marylbrook Dr/Furman Dr (Eastbound)				Marylbrook Dr/Furman Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	78	2	0	0	20	0	0	0	0	1	0	0	0	0	0	101	
7:05 AM	0	90	2	0	0	20	0	0	0	0	0	0	1	0	0	0	113	
7:10 AM	0	79	1	0	1	22	0	0	0	0	0	0	0	0	1	0	104	
7:15 AM	1	76	0	0	1	15	0	0	0	0	1	0	1	0	0	0	95	
7:20 AM	1	89	3	0	0	18	0	0	0	0	0	0	0	0	0	0	111	
7:25 AM	0	95	6	0	3	27	0	0	0	0	1	0	0	0	0	0	132	
7:30 AM	0	81	2	0	1	25	0	0	0	0	0	0	0	0	0	0	109	
7:35 AM	0	79	1	0	0	21	0	0	0	0	1	0	0	0	0	0	102	
7:40 AM	0	91	3	0	3	23	0	0	0	0	0	0	0	0	0	0	120	
7:45 AM	0	90	3	0	1	26	0	0	1	0	1	0	0	0	0	0	122	
7:50 AM	0	68	2	0	1	28	0	0	0	0	1	0	0	0	0	0	100	
7:55 AM	1	82	5	0	4	29	0	0	0	0	0	0	0	0	0	0	121	1330
8:00 AM	0	66	2	0	1	26	0	0	0	0	2	0	0	0	0	0	97	1326
8:05 AM	0	68	1	0	4	22	1	0	0	0	0	0	0	0	1	0	97	1310
8:10 AM	0	60	0	0	0	29	0	0	0	0	0	0	0	0	0	0	89	1295
8:15 AM	0	62	0	0	2	27	0	0	0	0	1	0	0	0	0	0	92	1292
8:20 AM	0	73	3	0	2	26	0	0	0	0	0	0	1	0	0	0	105	1286
8:25 AM	0	57	3	0	1	42	0	0	1	0	0	0	0	0	0	0	104	1258
8:30 AM	1	56	6	0	1	46	0	0	0	0	1	0	1	0	1	0	113	1262
8:35 AM	1	67	5	0	3	35	0	0	0	0	1	0	0	0	0	0	112	1272
8:40 AM	1	49	2	0	2	35	0	0	1	0	0	0	0	0	0	0	90	1242
8:45 AM	0	82	3	0	3	47	1	0	0	0	0	0	1	0	0	0	137	1257
8:50 AM	0	66	3	0	8	39	0	0	0	0	0	0	1	0	1	0	118	1275
8:55 AM	1	65	4	0	7	25	0	0	1	0	1	0	0	0	0	0	104	1258

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	4	1060	44	0	16	280	0	0	0	0	4	0	0	0	0	0	1408
Heavy Trucks	0	44	8		4	16	0		0	0	0		0	0	0		72
Pedestrians		0				0				4				0			4
Bicycles	0	1	0		0	0	0		0	0	0		0	0	0		1
Railroad Stopped Buses																	

Comments:

Report generated on 6/23/2015 10:21 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: Willamette Dr (OR 43) -- Marylbrook Dr/Furman Dr

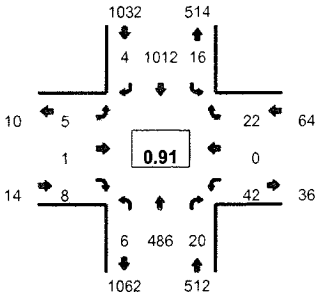
CITY/STATE: Lake Oswego, OR

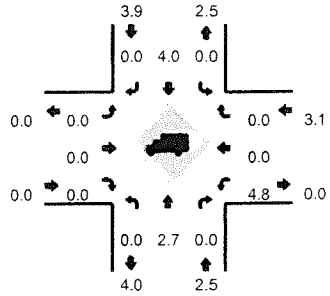
QC JOB #: 13423110

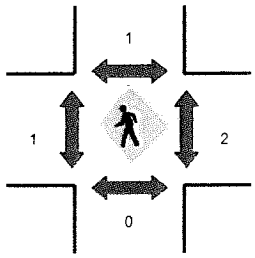
DATE: Wed, Jun 17 2015

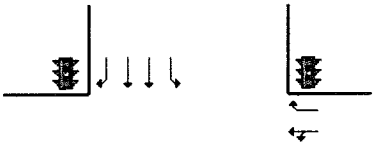
Peak-Hour: 4:40 PM -- 5:40 PM

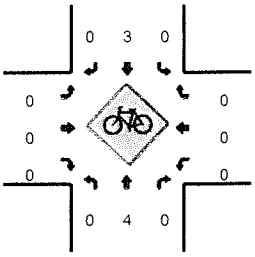
Peak 15-Min: 4:40 PM -- 4:55 PM

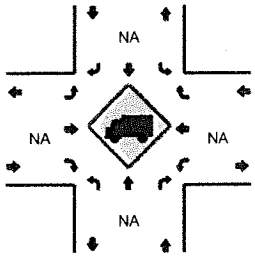


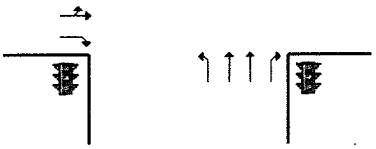


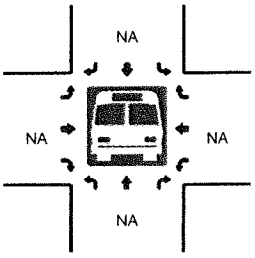












5-Min Count Period	Willamette Dr (OR 43) (Northbound)				Willamette Dr (OR 43) (Southbound)				Marylbrook Dr/Furman Dr (Eastbound)				Marylbrook Dr/Furman Dr (Westbound)				Total	Hourly Totals
Beginning At	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	34	1	0	2	43	0	0	0	0	0	0	1	0	1	0	82	
4:05 PM	0	26	2	0	0	47	0	0	0	0	0	0	5	0	4	0	84	
4:10 PM	1	39	0	0	0	39	0	0	0	0	0	0	2	0	1	0	82	
4:15 PM	0	58	2	0	1	32	0	0	0	0	0	0	1	0	2	0	96	
4:20 PM	0	60	3	0	0	35	1	0	0	0	0	0	3	0	2	0	104	
4:25 PM	1	55	1	0	0	32	0	0	0	0	1	0	2	0	1	0	93	
4:30 PM	0	50	1	0	2	57	0	0	1	0	0	0	2	0	0	0	113	
4:35 PM	1	53	1	0	2	46	0	0	0	0	0	0	3	0	3	0	109	
4:40 PM	0	43	1	0	1	92	1	0	0	1	0	0	3	0	2	0	144	
4:45 PM	0	47	3	0	2	96	1	0	0	0	0	0	0	0	2	0	151	
4:50 PM	0	45	6	0	0	94	0	0	0	0	0	0	2	0	2	0	149	
4:55 PM	2	33	2	0	2	92	1	0	1	0	0	0	6	0	1	0	140	1347
5:00 PM	1	43	1	0	1	80	0	1	0	0	1	0	6	0	1	0	135	1400
5:05 PM	0	36	1	0	3	85	0	0	0	0	0	0	9	0	4	0	138	1454
5:10 PM	0	37	2	0	2	69	0	0	1	0	1	0	5	0	4	0	121	1493
5:15 PM	0	41	0	0	0	60	0	0	1	0	2	0	4	0	1	0	109	1506
5:20 PM	2	42	0	0	1	91	0	0	0	0	1	0	2	0	3	0	142	1544
5:25 PM	0	35	3	0	0	84	0	0	0	0	0	0	1	0	0	0	123	1574
5:30 PM	0	47	1	0	3	81	1	0	2	0	1	0	2	0	1	0	139	1600
5:35 PM	1	37	0	0	0	88	0	0	0	0	2	0	2	0	1	0	131	1622
5:40 PM	0	37	2	0	3	83	1	0	0	0	1	0	1	0	5	0	133	1611
5:45 PM	0	33	1	0	2	88	2	0	0	0	0	0	0	0	3	0	129	1589
5:50 PM	0	45	1	0	0	69	0	0	0	0	1	0	2	0	2	0	120	1560
5:55 PM	1	28	3	0	3	71	0	0	0	0	0	0	1	0	3	0	110	1530

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	540	40	0	12	1128	8	0	0	4	0	0	20	0	24	0	1776
Heavy Trucks	0	8	0		0	48	0		0	0	0		4	0	0		60
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 6/23/2015 10:21 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

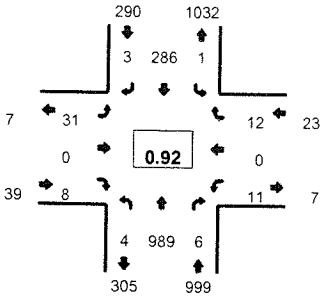
Type of peak hour being reported: Intersection Peak

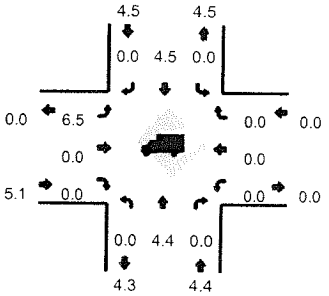
Method for determining peak hour: Total Entering Volume

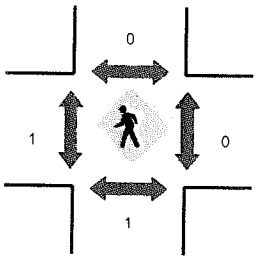
LOCATION: Willamette Dr (OR 43) -- Arbor Dr
CITY/STATE: West Linn, OR

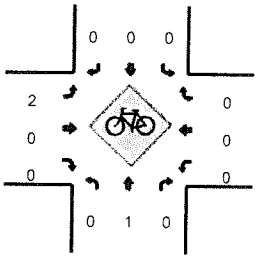
QC JOB #: 13423107
DATE: Wed, Jun 17 2015

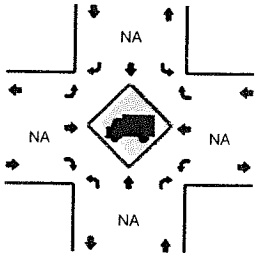
Peak-Hour: 7:00 AM -- 8:00 AM
Peak 15-Min: 7:20 AM -- 7:35 AM

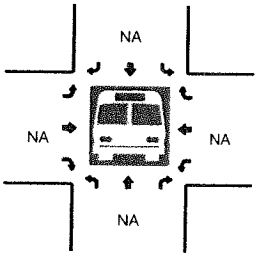












5-Min Count Period Beginning At	Willamette Dr (OR 43) (Northbound)				Willamette Dr (OR 43) (Southbound)				Arbor Dr (Eastbound)				Arbor Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	80	0	0	0	19	1	0	1	0	0	0	1	0	1	0	103	
7:05 AM	0	89	0	0	0	24	0	0	3	0	1	0	0	0	2	0	119	
7:10 AM	0	80	0	0	0	24	0	0	3	0	0	0	0	0	1	0	108	
7:15 AM	0	73	0	0	0	19	0	0	3	0	0	0	1	0	0	0	96	
7:20 AM	0	96	0	0	0	18	0	0	7	0	0	0	0	0	0	0	121	
7:25 AM	1	98	1	0	0	26	0	0	2	0	2	0	0	0	2	0	132	
7:30 AM	0	86	2	0	0	25	0	0	0	0	0	0	2	0	0	0	115	
7:35 AM	1	74	0	0	0	24	0	0	2	0	0	0	3	0	1	0	105	
7:40 AM	0	84	1	0	0	23	0	0	2	0	1	0	0	0	3	0	114	
7:45 AM	1	87	0	0	0	26	0	0	3	0	1	0	1	0	0	0	119	
7:50 AM	1	68	1	0	0	28	1	0	2	0	2	0	3	0	1	0	107	
7:55 AM	0	74	1	0	1	30	1	0	3	0	1	0	0	0	1	0	112	1351
8:00 AM	0	66	0	0	0	28	0	0	2	0	0	0	0	0	1	0	97	1345
8:05 AM	0	64	0	0	0	23	1	0	2	0	2	0	1	0	0	0	93	1319
8:10 AM	0	63	0	0	0	28	0	0	1	0	1	0	1	0	0	0	94	1305
8:15 AM	1	59	1	0	1	28	0	0	0	0	0	0	2	0	4	0	96	1305
8:20 AM	0	67	0	0	1	22	0	0	6	0	1	0	0	0	3	0	100	1284
8:25 AM	0	61	0	0	0	44	0	0	0	0	1	0	0	0	0	0	106	1258
8:30 AM	0	70	0	0	0	46	1	0	0	0	0	0	0	0	0	0	117	1260
8:35 AM	0	66	0	0	0	36	1	0	4	0	1	0	0	0	1	0	109	1264
8:40 AM	0	55	0	0	0	35	0	0	1	0	1	0	0	0	0	0	92	1242
8:45 AM	1	86	0	0	1	43	1	0	3	0	2	0	0	0	2	0	139	1262
8:50 AM	0	65	1	0	0	38	1	0	0	0	1	0	1	0	1	0	108	1263
8:55 AM	0	72	0	0	0	24	2	0	0	0	0	0	1	0	0	0	99	1250

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	4	1120	12	0	0	276	0	0	36	0	8	0	8	0	8	0	1472
Heavy Trucks	0	44	0		0	16	0		4	0	0		0	0	0		64
Pedestrians		4				0				0				0			4
Bicycles	0	0	0		0	0	0		1	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 6/23/2015 10:21 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

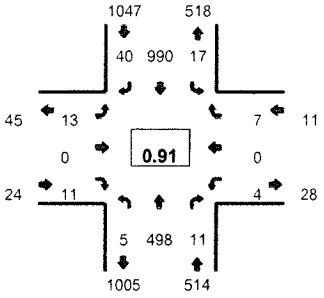
Type of peak hour being reported: Intersection Peak

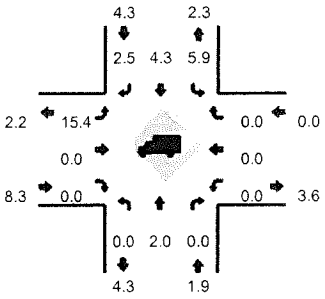
Method for determining peak hour: Total Entering Volume

LOCATION: Willamette Dr (OR 43) -- Arbor Dr
CITY/STATE: West Linn, OR

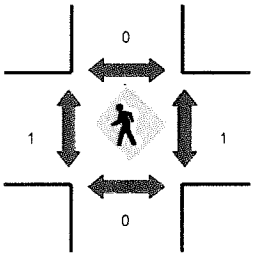
QC JOB #: 13423108
DATE: Wed, Jun 17 2015

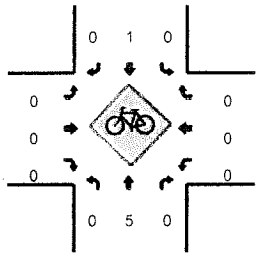
Peak-Hour: 4:40 PM -- 5:40 PM
Peak 15-Min: 4:40 PM -- 4:55 PM

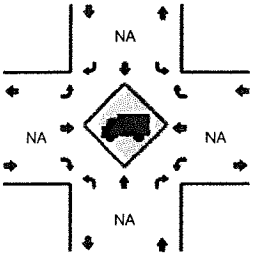


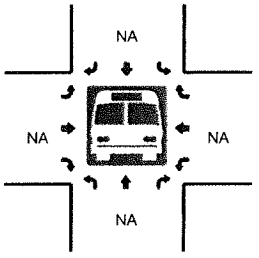


Quality Counts









5-Min Count Period	Willamette Dr (OR 43) (Northbound)				Willamette Dr (OR 43) (Southbound)				Arbor Dr (Eastbound)				Arbor Dr (Westbound)				Total	Hourly Totals
Beginning At	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	1	34	2	0	0	43	2	0	2	0	0	0	0	1	0	0	85	
4:05 PM	2	35	1	0	0	54	1	0	0	0	1	0	0	0	1	0	95	
4:10 PM	0	30	0	0	0	43	0	0	4	0	3	0	0	0	1	0	81	
4:15 PM	0	59	0	0	0	26	0	0	1	0	1	0	0	0	0	0	87	
4:20 PM	2	59	1	0	2	41	1	0	1	0	0	0	1	0	1	0	109	
4:25 PM	0	59	1	0	0	31	0	0	0	0	0	0	0	0	1	0	92	
4:30 PM	0	46	1	0	0	59	0	0	0	0	1	0	0	0	0	0	107	
4:35 PM	1	53	0	0	0	48	2	0	0	0	0	0	0	0	0	0	104	
4:40 PM	0	46	1	0	5	89	3	0	1	0	1	0	0	0	1	0	147	
4:45 PM	2	44	0	0	3	83	4	0	1	0	1	0	1	0	1	0	140	
4:50 PM	1	52	3	0	1	89	4	0	1	0	0	0	0	0	0	0	151	
4:55 PM	1	32	2	0	1	92	4	0	4	0	3	0	1	0	1	0	141	1339
5:00 PM	0	41	1	0	0	78	7	0	0	0	1	0	0	0	1	0	129	1383
5:05 PM	0	39	1	0	0	80	3	0	1	0	2	0	0	0	0	0	126	1414
5:10 PM	0	32	1	0	0	75	1	0	1	0	1	0	1	0	1	0	113	1446
5:15 PM	0	46	0	0	2	75	4	0	0	0	0	0	1	0	1	0	129	1488
5:20 PM	1	40	0	0	1	81	3	0	2	0	2	0	0	0	0	0	130	1509
5:25 PM	0	33	0	0	2	81	0	0	1	0	0	0	0	0	0	0	117	1534
5:30 PM	0	49	1	0	1	79	2	0	0	0	0	0	0	0	1	0	133	1560
5:35 PM	0	44	1	0	1	88	5	0	1	0	0	0	0	0	0	0	140	1596
5:40 PM	2	32	0	0	0	73	3	0	0	0	1	0	0	0	3	0	114	1563
5:45 PM	0	29	2	0	4	83	2	0	0	0	0	0	2	0	2	0	124	1547
5:50 PM	3	43	0	0	3	73	3	0	2	0	2	0	0	0	1	0	130	1526
5:55 PM	0	39	1	0	0	70	5	0	0	0	0	0	0	0	1	0	116	1501

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	12	568	16	0	36	1044	44	0	12	0	8	0	4	0	8	0	1752
Heavy Trucks	0	12	0		4	52	0		0	0	0		0	0	0		68
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 6/23/2015 10:21 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: Willamette Dr (OR 43) -- Marylhurst Dr/Lazy River Dr

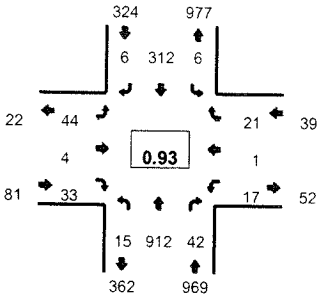
CITY/STATE: West Linn, OR

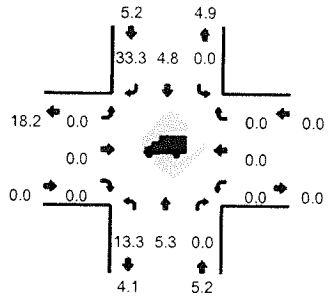
QC JOB #: 13423105

DATE: Wed, Jun 17 2015

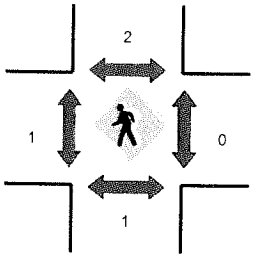
Peak-Hour: 7:05 AM -- 8:05 AM

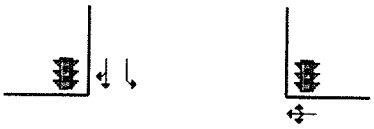
Peak 15-Min: 7:20 AM -- 7:35 AM

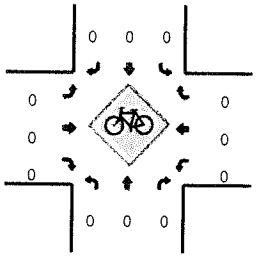


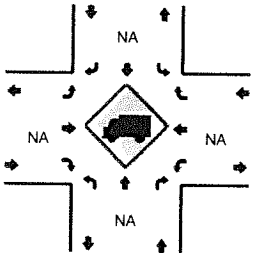


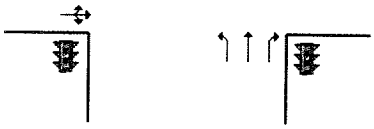
Quality Counts

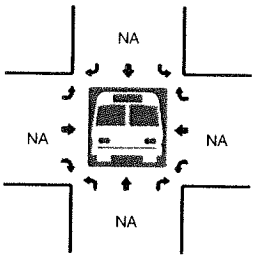












5-Min Count Period Beginning At	Willamette Dr (OR 43) (Northbound)				Willamette Dr (OR 43) (Southbound)				Marylhurst Dr/Lazy River Dr (Eastbound)				Marylhurst Dr/Lazy River Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	1	76	3	0	0	10	0	0	6	1	3	0	0	1	1	0	102	
7:05 AM	3	78	3	0	0	25	2	0	2	0	4	0	2	0	2	0	121	
7:10 AM	0	74	3	0	0	29	0	0	2	1	6	0	0	0	3	0	118	
7:15 AM	1	73	7	0	0	21	0	0	5	0	2	0	2	0	1	0	112	
7:20 AM	1	84	6	0	0	18	0	0	6	0	1	0	2	0	4	0	122	
7:25 AM	1	89	4	0	1	25	1	0	8	0	3	0	1	0	1	0	134	
7:30 AM	1	86	3	0	1	26	0	0	3	0	2	0	0	0	2	0	124	
7:35 AM	0	72	1	0	1	24	0	0	4	1	4	0	3	0	1	0	111	
7:40 AM	2	76	3	0	1	24	0	0	3	0	0	0	2	1	2	0	114	
7:45 AM	1	74	2	0	1	34	0	0	4	0	3	0	3	0	1	0	123	
7:50 AM	0	75	3	0	0	29	0	0	3	0	3	0	1	0	3	0	117	
7:55 AM	2	63	4	0	1	30	3	0	2	1	4	0	0	0	0	0	110	1408
8:00 AM	3	68	3	0	0	27	0	0	2	1	1	0	1	0	1	0	107	1413
8:05 AM	2	51	3	0	0	24	0	0	3	0	4	0	0	1	3	0	91	1383
8:10 AM	1	67	6	0	0	27	1	0	2	1	6	0	3	0	1	0	115	1380
8:15 AM	0	60	5	0	0	34	0	0	3	0	3	0	1	0	3	0	109	1377
8:20 AM	3	61	8	0	1	26	0	0	4	2	3	0	3	0	2	0	113	1368
8:25 AM	1	46	4	0	0	42	0	0	7	1	7	0	1	0	1	0	110	1344
8:30 AM	2	65	6	0	1	39	0	0	5	0	8	0	3	0	2	0	131	1351
8:35 AM	3	62	3	0	4	46	3	0	4	0	6	0	0	0	2	0	133	1373
8:40 AM	2	58	3	0	2	31	1	0	2	1	8	0	2	0	1	0	111	1370
8:45 AM	0	70	3	0	2	40	1	0	5	0	4	0	0	0	2	0	127	1374
8:50 AM	2	61	2	0	0	39	3	0	5	0	8	0	0	0	1	0	121	1378
8:55 AM	5	65	4	0	1	25	0	0	1	0	3	0	0	0	1	0	105	1373

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	12	1036	52	0	8	276	4	0	68	0	24	0	12	0	28	0	1520
Heavy Trucks	4	44	0		0	20	0		0	0	0		0	0	0		68
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 6/23/2015 10:21 AM

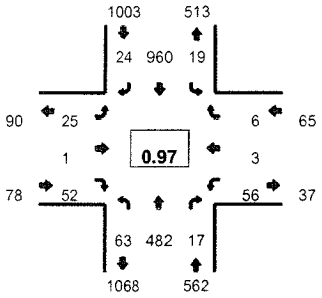
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

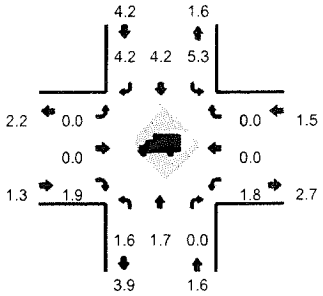
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

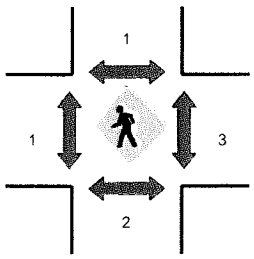
LOCATION: Willamette Dr (OR 43) -- Marylhurst Dr/Lazy River Dr | QC JOB #: 13423106

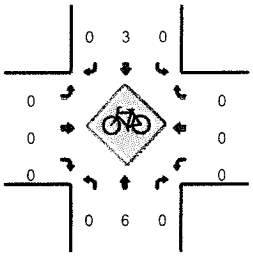
CITY/STATE: West Linn, OR | DATE: Wed, Jun 17 2015

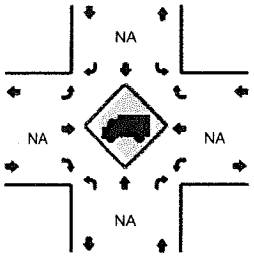
Peak-Hour: 4:45 PM -- 5:45 PM
Peak 15-Min: 4:45 PM -- 5:00 PM

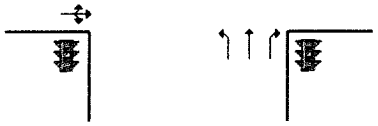


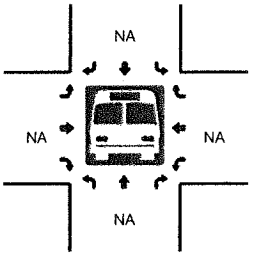












5-Min Count Period	Willamette Dr (OR 43) (Northbound)				Willamette Dr (OR 43) (Southbound)				Marylhurst Dr/Lazy River Dr (Eastbound)				Marylhurst Dr/Lazy River Dr (Westbound)				Total	Hourly Totals
Beginning At	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	10	33	3	0	0	57	3	0	1	0	1	0	4	0	0	0	112	
4:05 PM	9	35	0	0	2	49	0	0	2	1	1	0	5	0	1	0	105	
4:10 PM	6	42	2	0	0	49	2	0	2	0	4	0	4	0	0	0	111	
4:15 PM	1	56	2	0	0	26	1	0	0	0	3	0	1	0	0	0	90	
4:20 PM	10	63	3	0	0	47	1	0	1	0	3	0	0	0	1	0	129	
4:25 PM	4	61	1	0	0	10	0	0	3	0	1	0	5	0	1	0	86	
4:30 PM	9	48	0	0	2	74	2	0	2	0	4	0	4	0	1	0	146	
4:35 PM	3	43	1	0	0	49	3	0	4	0	1	0	2	0	1	0	107	
4:40 PM	6	45	1	0	1	62	1	0	2	0	3	0	1	0	0	0	122	
4:45 PM	7	52	2	0	1	91	2	0	2	0	3	0	1	0	2	0	163	
4:50 PM	4	48	2	0	1	87	2	0	2	0	5	0	3	0	1	0	155	
4:55 PM	3	27	1	0	1	76	0	0	0	0	6	0	6	0	0	0	120	1446
5:00 PM	3	43	2	0	2	84	3	0	0	0	3	0	3	0	0	0	143	1477
5:05 PM	8	45	2	0	2	76	3	0	3	0	4	0	8	0	0	0	151	1523
5:10 PM	8	34	3	0	3	77	2	0	2	0	2	0	6	0	0	0	137	1549
5:15 PM	8	37	1	0	1	73	4	0	2	1	4	0	5	0	0	0	136	1595
5:20 PM	8	44	1	0	3	76	0	0	5	0	10	0	6	3	0	0	156	1622
5:25 PM	3	35	0	0	2	85	1	0	1	0	4	0	8	0	0	0	139	1675
5:30 PM	3	36	3	0	0	81	3	0	4	0	2	0	4	0	1	0	137	1666
5:35 PM	3	41	0	0	2	83	3	0	2	0	2	0	2	0	0	0	138	1697
5:40 PM	5	40	0	0	1	71	1	0	2	0	7	0	4	0	2	0	133	1708
5:45 PM	4	24	1	0	2	80	2	0	1	0	4	0	4	0	0	0	122	1667
5:50 PM	6	43	1	0	0	73	5	0	2	0	3	0	0	0	1	0	134	1646
5:55 PM	7	39	0	0	1	64	2	0	4	0	10	0	3	0	1	0	131	1657

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	56	508	20	0	12	1016	16	0	16	0	56	0	40	0	12	0	1752
Heavy Trucks	4	8	0		0	48	0		0	0	0		0	0	0		60
Pedestrians		8				0				0				0			8
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 6/23/2015 10:21 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

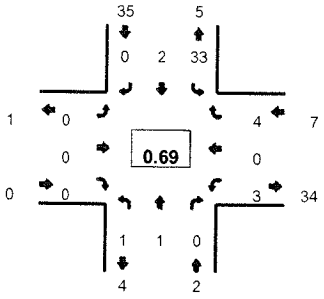
Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

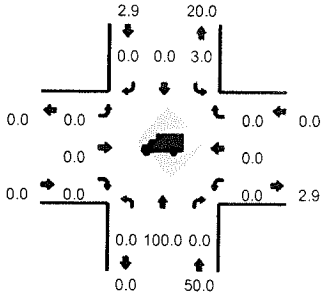
LOCATION: Upper Midhill Dr -- Arbor Dr
CITY/STATE: West Linn, OR

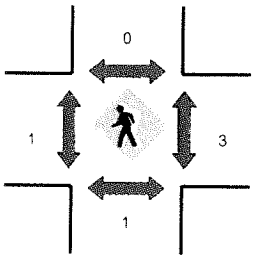
QC JOB #: 13423101
DATE: Wed, Jun 17 2015

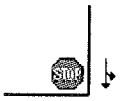
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:15 AM -- 7:30 AM

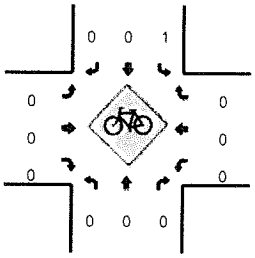


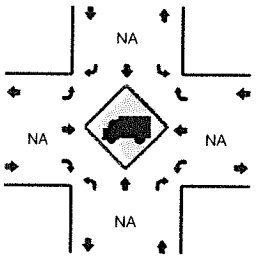
Quality Counts

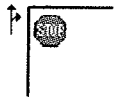


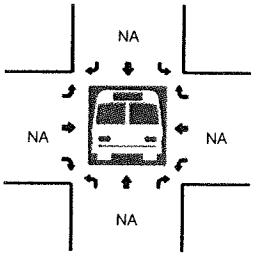












5-Min Count Period Beginning At	Upper Midhill Dr (Northbound)				Upper Midhill Dr (Southbound)				Arbor Dr (Eastbound)				Arbor Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	
7:05 AM	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	3	
7:10 AM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2	
7:15 AM	1	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	6	
7:20 AM	0	0	0	0	6	1	0	0	0	0	0	0	0	0	0	0	7	
7:25 AM	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	3	
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:35 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	2	
7:40 AM	0	1	0	0	4	0	0	0	0	0	0	0	0	0	0	0	5	
7:45 AM	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	3	
7:50 AM	0	0	0	0	4	1	0	0	0	0	0	0	0	0	1	1	7	
7:55 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	2	42
8:00 AM	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	3	43
8:05 AM	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	3	43
8:10 AM	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	3	44
8:15 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	2	40
8:20 AM	0	0	1	0	5	0	0	0	0	0	0	0	0	0	0	0	6	39
8:25 AM	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	2	38
8:30 AM	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	3	41
8:35 AM	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	3	42
8:40 AM	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	3	40
8:45 AM	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	3	40
8:50 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	2	0	4	37
8:55 AM	0	0	0	0	1	2	0	0	0	0	0	0	0	0	2	0	5	40

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	4	0	0	0	52	4	0	0	0	0	0	0	4	0	0	0	64
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	0	0		0
Pedestrians		0				0				0				4			4
Bicycles	0	0	0		1	0	0		0	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 6/23/2015 10:21 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: Upper Midhill Dr -- Arbor Dr

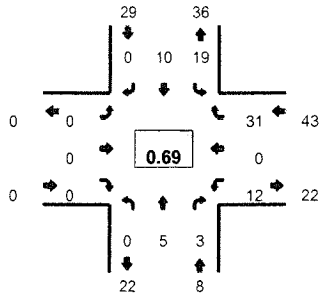
CITY/STATE: West Linn, OR

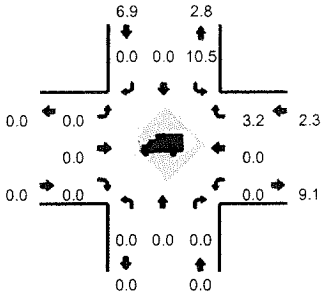
QC JOB #: 13423102

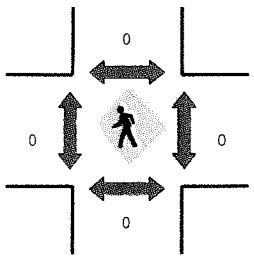
DATE: Wed, Jun 17 2015

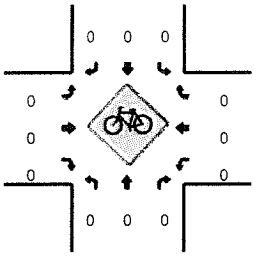
Peak-Hour: 4:40 PM -- 5:40 PM

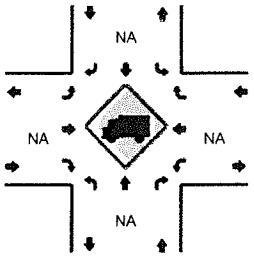
Peak 15-Min: 4:50 PM -- 5:05 PM

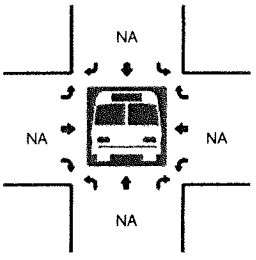












5-Min Count Period	Upper Midhill Dr (Northbound)				Upper Midhill Dr (Southbound)				Arbor Dr (Eastbound)				Arbor Dr (Westbound)				Total	Hourly Totals
Beginning At	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	4	0	6	
4:05 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	3	0	5	
4:10 PM	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	7	
4:15 PM	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	
4:20 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	3	
4:25 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:30 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	
4:35 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	
4:40 PM	0	0	1	0	1	1	0	0	0	0	0	0	2	0	0	0	5	
4:45 PM	0	0	0	0	2	0	0	0	0	0	0	0	1	0	5	0	8	
4:50 PM	0	0	0	0	3	1	0	0	0	0	0	0	1	0	3	0	8	
4:55 PM	0	0	1	0	4	2	0	0	0	0	0	0	0	0	4	0	11	58
5:00 PM	0	0	0	0	2	1	0	0	0	0	0	0	2	0	5	0	10	62
5:05 PM	0	0	0	0	2	1	0	0	0	0	0	0	0	0	4	0	7	64
5:10 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0	3	60
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	3	61
5:20 PM	0	1	0	0	2	2	0	0	0	0	0	0	2	0	3	0	10	68
5:25 PM	0	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	4	72
5:30 PM	0	0	0	0	0	1	0	0	0	0	0	0	1	0	1	0	3	73
5:35 PM	0	1	0	0	1	1	0	0	0	0	0	0	2	0	3	0	8	80
5:40 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	3	78
5:45 PM	0	0	0	0	1	1	0	0	0	0	0	0	3	0	0	0	5	75
5:50 PM	0	0	0	0	1	0	0	0	0	0	0	0	3	0	3	0	7	74
5:55 PM	0	1	0	1	0	1	0	0	0	0	0	0	2	0	1	0	6	69

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	4	0	36	16	0	0	0	0	0	0	12	0	48	0	116
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	0	0		0
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 6/23/2015 10:21 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

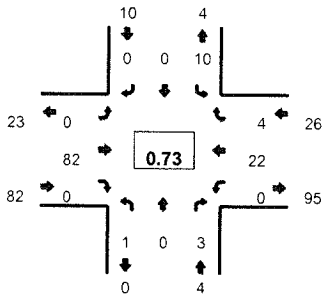
Type of peak hour being reported: Intersection Peak

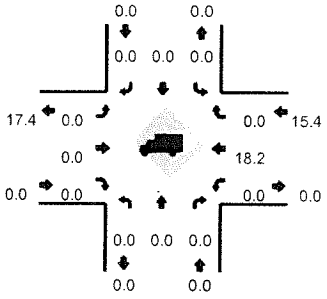
Method for determining peak hour: Total Entering Volume

LOCATION: Upper Midhill Dr/Midhill Cir -- Marylhurst Dr
CITY/STATE: West Linn, OR

QC JOB #: 13423103
DATE: Wed, Jun 17 2015

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





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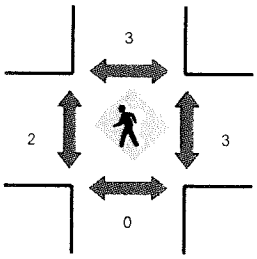
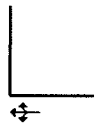
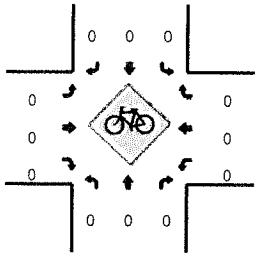
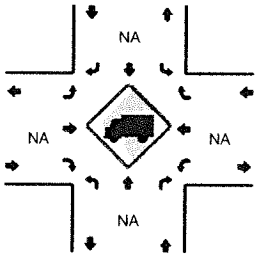
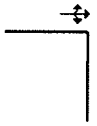
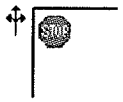


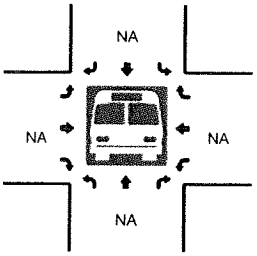












5-Min Count Period Beginning At	Upper Midhill Dr/Midhill Cir (Northbound)				Upper Midhill Dr/Midhill Cir (Southbound)				Marylhurst Dr (Eastbound)				Marylhurst Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	0	0	0	1	0	0	0	0	8	0	0	0	2	0	0	11	
7:05 AM	0	0	0	0	0	0	0	0	0	6	0	0	0	2	0	0	8	
7:10 AM	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	7	
7:15 AM	0	0	0	0	0	0	0	0	0	4	0	0	0	0	1	0	5	
7:20 AM	0	0	0	0	2	0	0	0	0	5	0	0	0	1	0	0	8	
7:25 AM	0	0	1	0	0	0	0	0	0	11	0	0	0	0	0	0	12	
7:30 AM	0	0	1	0	1	0	0	0	0	3	0	0	1	0	0	0	6	
7:35 AM	0	0	0	0	3	0	0	0	0	6	0	0	0	0	0	0	9	
7:40 AM	0	0	0	0	0	0	0	0	1	3	0	0	0	3	0	0	7	
7:45 AM	0	0	0	0	0	0	0	0	0	4	0	0	0	2	0	0	6	
7:50 AM	0	0	1	0	0	0	0	0	0	4	0	0	0	0	0	0	5	
7:55 AM	0	0	2	0	1	0	0	0	0	4	0	0	0	5	0	0	12	96
8:00 AM	0	0	0	0	0	0	0	0	0	3	0	0	0	1	0	0	4	89
8:05 AM	1	0	0	0	1	0	0	0	0	6	0	0	0	2	0	0	10	91
8:10 AM	0	0	0	0	0	0	0	0	0	5	0	0	0	1	1	0	7	91
8:15 AM	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	8	94
8:20 AM	0	0	0	0	2	0	0	0	0	7	0	0	0	3	0	0	12	98
8:25 AM	0	0	0	0	3	0	0	0	0	9	0	0	0	1	0	0	13	99
8:30 AM	0	0	0	0	1	0	0	0	0	9	0	0	0	0	1	0	11	104
8:35 AM	0	0	0	0	2	0	0	0	0	11	0	0	0	5	0	0	18	113
8:40 AM	0	0	0	0	0	0	0	0	0	6	0	0	0	2	0	0	8	114
8:45 AM	0	0	0	0	0	0	0	0	0	6	0	0	0	1	0	0	7	115
8:50 AM	0	0	1	0	0	0	0	0	0	8	0	0	0	1	2	0	12	122
8:55 AM	0	0	0	0	0	0	1	0	0	3	0	0	0	7	0	0	11	121

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	24	0	0	0	0	116	0	0	0	24	4	0	168
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	4	0		4
Pedestrians		0				0				0				4			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 6/23/2015 10:21 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: Upper Midhill Dr/Midhill Cir -- Marylhurst Dr

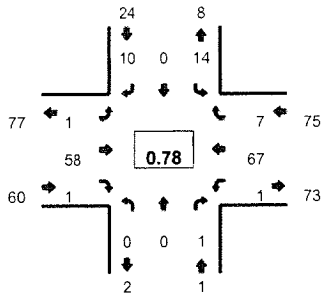
CITY/STATE: West Linn, OR

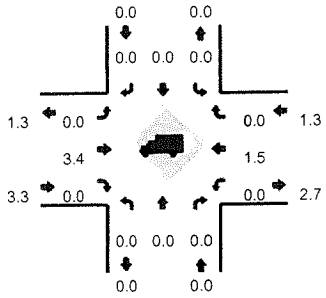
QC JOB #: 13423104

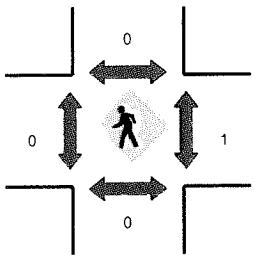
DATE: Wed, Jun 17 2015

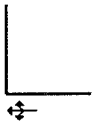
Peak-Hour: 5:00 PM -- 6:00 PM

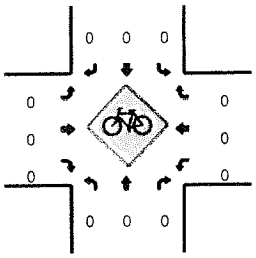
Peak 15-Min: 5:10 PM -- 5:25 PM

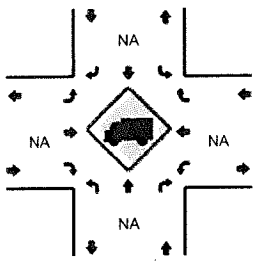


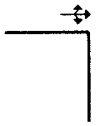


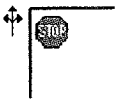


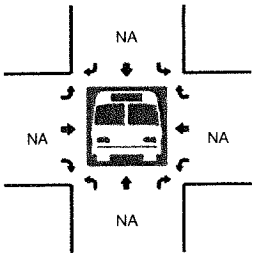












5-Min Count Period	Upper Midhill Dr/Midhill Cir (Northbound)				Upper Midhill Dr/Midhill Cir (Southbound)				Marylhurst Dr (Eastbound)				Marylhurst Dr (Westbound)				Total	Hourly Totals
Beginning At	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	0	0	0	0	0	0	1	0	0	0	1	9	2	0	13	
4:05 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	6	0	0	8	
4:10 PM	0	0	0	0	0	0	0	0	0	3	0	0	0	7	0	0	10	
4:15 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	4	
4:20 PM	0	0	0	0	1	0	0	0	0	3	0	0	0	8	2	0	14	
4:25 PM	0	0	0	0	1	0	0	0	0	4	0	0	0	2	0	0	7	
4:30 PM	0	0	0	0	0	0	0	0	1	5	0	0	0	8	1	0	15	
4:35 PM	0	0	0	0	0	0	0	0	0	3	0	0	0	3	1	0	7	
4:40 PM	0	0	0	0	1	0	1	0	1	2	0	0	1	4	1	0	11	
4:45 PM	0	0	0	0	0	0	0	0	0	5	0	0	0	5	0	0	10	
4:50 PM	0	0	1	0	1	0	1	0	0	3	0	0	0	2	1	0	9	
4:55 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	3	111
5:00 PM	0	0	0	0	1	0	1	0	0	3	0	0	0	5	0	0	10	108
5:05 PM	0	0	0	0	0	0	0	0	0	4	0	0	0	10	0	0	14	114
5:10 PM	0	0	0	0	0	0	0	0	0	5	0	0	0	6	0	0	11	115
5:15 PM	0	0	0	0	2	0	1	0	0	4	0	0	0	10	0	0	17	128
5:20 PM	0	0	0	0	1	0	1	0	0	12	0	0	0	6	3	0	23	137
5:25 PM	0	0	0	0	1	0	0	0	0	5	0	0	0	3	1	0	10	140
5:30 PM	0	0	0	0	1	0	1	0	0	3	1	0	0	5	0	0	11	136
5:35 PM	0	0	0	0	0	0	2	0	1	2	0	0	0	2	1	0	8	137
5:40 PM	0	0	1	0	2	0	1	0	0	6	0	0	0	3	0	0	13	139
5:45 PM	0	0	0	0	2	0	1	0	0	4	0	0	0	3	0	0	10	139
5:50 PM	0	0	0	0	1	0	0	0	0	4	0	0	1	9	0	0	15	145
5:55 PM	0	0	0	0	3	0	2	0	0	6	0	0	0	5	2	0	18	160

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	12	0	8	0	0	84	0	0	0	88	12	0	204
Heavy Trucks	0	0	0		0	0	0		0	4	0		0	0	0		4
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 6/23/2015 10:21 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Appendix B Description of Level of Service

DESCRIPTION OF LEVEL OF SERVICE

Level of service (LOS) is a concept developed to quantify the degree of comfort (including such elements as travel time, number of stops, total amount of stopped delay, and impediments caused by other vehicles) afforded to drivers as they travel through an intersection or roadway segment. Six grades are used to denote the various level of service from "A" to "F".1

Signalized Intersections

The six level-of-service grades are described qualitatively for signalized intersections in Table B1. Additionally, Table B2 identifies the relationship between level of service and average control delay per vehicle. Control delay is defined to include initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. Using this definition, Level of Service "D" is generally considered to represent the minimum acceptable design standard.

Table B1: Level-of-Service Definitions (Signalized Intersections)

Level of Service	Average Delay per Vehicle
A	Very low average control delay, less than 10 seconds per vehicle. This occurs when progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.
B	Average control delay is greater than 10 seconds per vehicle and less than or equal to 20 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for a level of service A, causing higher levels of average delay.
C	Average control delay is greater than 20 seconds per vehicle and less than or equal to 35 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.
D	Average control delay is greater than 35 seconds per vehicle and less than or equal to 55 seconds per vehicle. The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle length, or high volume/capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
E	Average control delay is greater than 55 seconds per vehicle and less than or equal to 80 seconds per vehicle. This is usually considered to be the limit of acceptable delay. These high delay values generally (but not always) indicate poor progression, long cycle lengths, and high volume/capacity ratios. Individual cycle failures are frequent occurrences.
F	Average control delay is in excess of 80 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with oversaturation. It may also occur at high volume/capacity ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also contribute to such high delay values.

1 Most of the material in this appendix is adapted from the Transportation Research Board, Highway Capacity Manual, (2000).

Table B2: Level-of-Service Criteria for Signalized Intersections

Level of Service	Average Control Delay per Vehicle (Seconds)
A	<10.0
B	>10 and ≤20
C	>20 and ≤35
D	>35 and ≤55
E	>55 and ≤80
F	>80

Unsignalized Intersections

Unsignalized intersections include two-way stop-controlled (TWSC) and all-way stop-controlled (AWSC) intersections. The 2000 Highway Capacity Manual (HCM) provides models for estimating control delay at both TWSC and AWSC intersections. A qualitative description of the various service levels associated with an unsignalized intersection is presented in Table B3. A quantitative definition of level of service for unsignalized intersections is presented in Table B4. Using this definition, Level of Service "E" is generally considered to represent the minimum acceptable design standard.

Table B3: Level-of-Service Criteria for Unsignalized Intersections

Level of Service	Average Delay per Vehicle to Minor Street
A	• Nearly all drivers find freedom of operation. • Very seldom is there more than one vehicle in queue.
B	• Some drivers begin to consider the delay an inconvenience. • Occasionally there is more than one vehicle in queue.
C	• Many times there is more than one vehicle in queue. • Most drivers feel restricted, but not objectionably so.
D	• Often there is more than one vehicle in queue. • Drivers feel quite restricted.
E	• Represents a condition in which the demand is near or equal to the probable maximum number of vehicles that can be accommodated by the movement. • There is almost always more than one vehicle in queue. • Drivers find the delays approaching intolerable levels.
F	• Forced flow. • Represents an intersection failure condition that is caused by geometric and/or operational constraints external to the intersection.

Table B4: Level-of-Service Criteria for Unsignalized Intersections

Level of Service	Average Control Delay per Vehicle (Seconds)
A	<10.0
B	>10.0 and ≤ 15.0
C	>15.0 and ≤ 25.0
D	>25.0 and ≤ 35.0
E	>35.0 and ≤ 50.0
F	>50.0

It should be noted that the level-of-service criteria for unsignalized intersections are somewhat different than the criteria used for signalized intersections. The primary reason for this difference is that drivers expect different levels of performance from different kinds of transportation facilities. The expectation is that a signalized intersection is designed to carry higher traffic volumes than an unsignalized intersection. Additionally, there are a number of driver behavior considerations that combine to make delays at signalized intersections less galling than at unsignalized intersections. For example, drivers at signalized intersections are able to relax during the red interval, while drivers on the minor street approaches to TWSC intersections must remain attentive to the task of identifying

acceptable gaps and vehicle conflicts. Also, there is often much more variability in the amount of delay experienced by individual drivers at unsignalized intersections than signalized intersections. For these reasons, it is considered that the control delay threshold for any given level of service is less for an unsignalized intersection than for a signalized intersection. While overall intersection level of service is calculated for AWSC intersections, level of service is only calculated for the minor approaches and the major street left turn movements at TWSC intersections. No delay is assumed to the major street through movements. For TWSC intersections, the overall intersection level of service remains undefined: level of service is only calculated for each minor street lane.

In the performance evaluation of TWSC intersections, it is important to consider other measures of effectiveness (MOEs) in addition to delay, such as v/c ratios for individual movements, average queue lengths, and 95th-percentile queue lengths. By focusing on a single MOE for the worst movement only, such as delay for the minor-street left turn, users may make inappropriate traffic control decisions. The potential for making such inappropriate decisions is likely to be particularly pronounced when the HCM level-of-service thresholds are adopted as legal standards, as is the case in many public agencies.

Appendix C Existing Traffic Conditions Worksheets

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	0	6	2	0	1	3	1007	30	15	277	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		1.00	0.99		1.00	1.00	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00	1.00	0.99	1.00	1.00	1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1805	1594		1803	1615	1789	3438	1477	1687	3438	
Flt Permitted		1.00	1.00		1.00	1.00	0.57	1.00	1.00	0.25	1.00	
Satd. Flow (perm)		1900	1594		1898	1615	1076	3438	1477	451	3438	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	1	0	6	2	0	1	3	1071	32	16	295	0
RTOR Reduction (vph)	0	0	6	0	0	1	0	0	4	0	0	0
Lane Group Flow (vph)	0	1	0	0	2	0	3	1071	28	16	295	0
Confl. Peds. (#/hr)			1	1			9					9
Confl. Bikes (#/hr)									3			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	5%	7%	7%	5%	0%
Turn Type	Perm		Perm	Perm		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		8	4	4	4	2		2	6		6
Actuated Green, G (s)		1.2	1.2		1.2	1.2	84.3	83.3	83.3	86.3	84.3	
Effective Green, g (s)		1.2	1.2		1.2	1.2	84.3	83.3	83.3	86.3	84.3	
Actuated g/C Ratio		0.01	0.01		0.01	0.01	0.84	0.83	0.83	0.86	0.84	
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.3	4.8	4.8	2.3	4.8	
Lane Grp Cap (vph)		23	19		23	19	914	2864	1230	414	2898	
v/s Ratio Prot							0.00	c0.31		c0.00	0.09	
v/s Ratio Perm		0.00	0.00		c0.00	0.00	0.00		0.02	0.03		
v/c Ratio		0.04	0.00		0.09	0.00	0.00	0.37	0.02	0.04	0.10	
Uniform Delay, d1		48.8	48.8		48.9	48.8	1.2	2.0	1.4	1.0	1.3	
Progression Factor		1.00	1.00		1.00	1.00	0.38	0.27	0.19	1.00	1.00	
Incremental Delay, d2		0.6	0.1		1.2	0.0	0.0	0.3	0.0	0.0	0.0	
Delay (s)		49.4	48.9		50.0	48.8	0.5	0.8	0.3	1.1	1.4	
Level of Service		D	D		D	D	A	A	A	A	A	
Approach Delay (s)		48.9			49.6			0.8			1.4	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM Average Control Delay	1.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	49.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	31	0	8	11	0	12	4	998	6	1	289	3
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	34	0	9	12	0	13	4	1085	7	1	314	3
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								992			884	
pX, platoon unblocked	0.31	0.31		0.31	0.31	0.31				0.31		
vC, conflicting volume	1429	1419	318	1424	1417	1088	318			1091		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1271	1239	318	1257	1234	176	318			186		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	19	100	99	74	100	95	100			100		
cM capacity (veh/h)	42	55	726	46	55	271	1252			436		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	42	25	1096	318
Volume Left	34	12	4	1
Volume Right	9	13	7	3
cSH	52	81	1252	436
Volume to Capacity	0.82	0.31	0.00	0.00
Queue Length 95th (ft)	86	29	0	0
Control Delay (s)	198.7	68.5	0.1	0.1
Lane LOS	F	F	A	A
Approach Delay (s)	198.7	68.5	0.1	0.1
Approach LOS	F	F		

Intersection Summary			
Average Delay	6.9		
Intersection Capacity Utilization	66.3%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	48	4	35	16	2	21	13	928	42	6	298	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.95			0.93		1.00	0.99		1.00	1.00	
Flt Protected		0.97			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1723			1701		1568	1802		1805	1812	
Flt Permitted		0.86			0.84		0.56	1.00		0.19	1.00	
Satd. Flow (perm)		1517			1452		926	1802		355	1812	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	52	4	38	17	2	23	14	998	45	6	320	6
RTOR Reduction (vph)	0	28	0	0	21	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	66	0	0	21	0	14	1042	0	6	326	0
Confl. Peds. (#/hr)	2					2	1					1
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	15%	5%	0%	0%	4%	33%
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)		8.4			8.4		77.7	76.6		77.5	76.5	
Effective Green, g (s)		8.4			8.4		77.7	76.6		77.5	76.5	
Actuated g/C Ratio		0.08			0.08		0.78	0.77		0.78	0.76	
Clearance Time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Vehicle Extension (s)		2.5			2.5		2.3	5.2		2.3	5.2	
Lane Grp Cap (vph)		127			122		727	1380		290	1386	
v/s Ratio Prot							c0.00	c0.58		0.00	0.18	
v/s Ratio Perm		c0.04			0.01		0.01			0.02		
v/c Ratio		0.52			0.17		0.02	0.76		0.02	0.23	
Uniform Delay, d1		43.9			42.6		2.5	6.5		6.3	3.4	
Progression Factor		1.00			1.00		1.00	1.00		1.90	1.79	
Incremental Delay, d2		2.6			0.5		0.0	3.9		0.0	0.4	
Delay (s)		46.5			43.1		2.5	10.4		11.9	6.4	
Level of Service		D			D		A	B		B	A	
Approach Delay (s)		46.5			43.1			10.3			6.5	
Approach LOS		D			D			B			A	

Intersection Summary			
HCM Average Control Delay	12.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	66.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Volume (vph)	2	4	1	0	31	2
Peak Hour Factor	0.66	0.66	0.66	0.66	0.66	0.66
Hourly flow rate (vph)	3	6	2	0	47	3

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	9	2	50
Volume Left (vph)	3	0	47
Volume Right (vph)	6	0	0
Hadj (s)	-0.33	1.70	0.19
Departure Headway (s)	3.7	5.7	4.1
Degree Utilization, x	0.01	0.00	0.06
Capacity (veh/h)	958	624	870
Control Delay (s)	6.7	8.7	7.4
Approach Delay (s)	6.7	8.7	7.4
Approach LOS	A	A	A

Intersection Summary			
Delay	7.3		
HCM Level of Service	A		
Intersection Capacity Utilization	18.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	1	66	0	1	15	1	0	0	5	8	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	1	74	0	1	17	1	0	0	6	9	0	0
Pedestrians		1			1							
Lane Width (ft)		12.0			12.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		0			0							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					868							
pX, platoon unblocked												
vC, conflicting volume	18			74			97	97	75	103	96	18
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	18			74			97	97	75	103	96	18
tC, single (s)	5.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	3.1			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	99	99	100	100
cM capacity (veh/h)	1141			1538			888	796	991	876	796	1065

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	75	19	6	9
Volume Left	1	1	0	9
Volume Right	0	1	6	0
cSH	1141	1538	991	876
Volume to Capacity	0.00	0.00	0.01	0.01
Queue Length 95th (ft)	0	0	0	1
Control Delay (s)	0.1	0.4	8.7	9.2
Lane LOS	A	A	A	A
Approach Delay (s)	0.1	0.4	8.7	9.2
Approach LOS			A	A

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	17.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	1	8	42	0	22	6	490	20	16	1021	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		1.00	1.00		1.00	0.99	1.00	1.00	0.97	1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1822	1615		1719	1594	1805	3505	1570	1803	3471	1576
Flt Permitted		0.78	1.00		0.75	1.00	0.24	1.00	1.00	0.45	1.00	1.00
Satd. Flow (perm)		1479	1615		1364	1594	453	3505	1570	846	3471	1576
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	5	1	9	46	0	24	7	538	22	18	1122	4
RTOR Reduction (vph)	0	0	8	0	0	22	0	0	5	0	0	1
Lane Group Flow (vph)	0	6	1	0	46	2	7	538	17	18	1122	3
Confl. Peds. (#/hr)	1					1	1		2	2		1
Confl. Bikes (#/hr)									4			3
Heavy Vehicles (%)	0%	0%	0%	5%	0%	0%	0%	3%	0%	0%	4%	0%
Turn Type	Perm		Perm	Perm		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		8	4	4	4	2		2	6		6
Actuated Green, G (s)		7.7	7.7		7.7	7.7	87.7	86.7	86.7	89.9	87.8	87.8
Effective Green, g (s)		7.7	7.7		7.7	7.7	87.7	86.7	86.7	89.9	87.8	87.8
Actuated g/C Ratio		0.07	0.07		0.07	0.07	0.80	0.79	0.79	0.82	0.80	0.80
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.3	4.8	4.8	2.3	4.8	4.8
Lane Grp Cap (vph)		104	113		95	112	373	2763	1237	710	2770	1258
v/s Ratio Prot							0.00	0.15		c0.00	c0.32	
v/s Ratio Perm		0.00	0.00		c0.03	0.00	0.01		0.01	0.02		0.00
v/c Ratio		0.06	0.01		0.48	0.01	0.02	0.19	0.01	0.03	0.41	0.00
Uniform Delay, d1		47.8	47.6		49.2	47.6	2.4	2.9	2.5	1.9	3.3	2.2
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.2	0.0		2.8	0.0	0.0	0.2	0.0	0.0	0.2	0.0
Delay (s)		47.9	47.6		52.1	47.7	2.4	3.1	2.5	1.9	3.5	2.2
Level of Service		D	D		D	D	A	A	A	A	A	A
Approach Delay (s)		47.7			50.5			3.0			3.5	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM Average Control Delay	5.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	13	0	11	4	0	7	5	503	11	17	999	40
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	14	0	12	4	0	8	5	553	12	19	1098	44
Pedestrians		1			1							
Lane Width (ft)		12.0			12.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		0			0							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								992			884	
pX, platoon unblocked	0.25	0.25	0.22	0.25	0.25	0.93	0.22			0.93		
vC, conflicting volume	1736	1735	1121	1740	1751	560	1143			566		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1783	1780	0	1800	1843	486	0			493		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	0	100	95	70	100	99	98			98		
cM capacity (veh/h)	14	20	237	15	19	542	356			973		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	26	12	570	1160
Volume Left	14	4	5	19
Volume Right	12	8	12	44
cSH	25	38	356	973
Volume to Capacity	1.05	0.31	0.02	0.02
Queue Length 95th (ft)	81	26	1	1
Control Delay (s)	418.5	136.7	0.5	0.6
Lane LOS	F	F	A	A
Approach Delay (s)	418.5	136.7	0.5	0.6
Approach LOS	F	F		

Intersection Summary				
Average Delay	7.8			
Intersection Capacity Utilization	75.7%	ICU Level of Service	D	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	25	1	48	53	3	4	65	491	18	19	960	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.98			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.91			0.99		1.00	0.99		1.00	1.00	
Flt Protected		0.98			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1654			1763		1770	1852		1716	1821	
Flt Permitted		0.90			0.69		0.17	1.00		0.45	1.00	
Satd. Flow (perm)		1512			1265		309	1852		815	1821	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	26	1	50	55	3	4	68	511	19	20	1000	25
RTOR Reduction (vph)	0	46	0	0	3	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	31	0	0	59	0	68	529	0	20	1024	0
Confl. Peds. (#/hr)	1		2	2		1	1		3	3		1
Confl. Bikes (#/hr)									5			3
Heavy Vehicles (%)	0%	0%	2%	2%	0%	0%	2%	2%	0%	5%	4%	0%
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)		8.1			8.1		80.5	75.8		75.3	73.2	
Effective Green, g (s)		8.1			8.1		80.5	75.8		75.3	73.2	
Actuated g/C Ratio		0.08			0.08		0.80	0.76		0.75	0.73	
Clearance Time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Vehicle Extension (s)		2.5			2.5		2.3	5.2		2.3	5.2	
Lane Grp Cap (vph)		122			102		317	1404		633	1333	
v/s Ratio Prot							c0.01	0.29		0.00	c0.56	
v/s Ratio Perm		0.02			c0.05		0.16			0.02		
v/c Ratio		0.25			0.58		0.21	0.38		0.03	0.77	
Uniform Delay, d1		43.1			44.3		8.2	4.1		3.1	8.2	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.8			6.8		0.2	0.8		0.0	4.3	
Delay (s)		43.9			51.1		8.4	4.9		3.1	12.5	
Level of Service		D			D		A	A		A	B	
Approach Delay (s)		43.9			51.1			5.3			12.3	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM Average Control Delay	12.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.5
Intersection Capacity Utilization	69.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Volume (vph)	12	31	5	3	19	10
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69
Hourly flow rate (vph)	17	45	7	4	28	14

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	62	12	42
Volume Left (vph)	17	0	28
Volume Right (vph)	45	4	0
Hadj (s)	-0.34	-0.22	0.25
Departure Headway (s)	3.7	3.8	4.3
Degree Utilization, x	0.06	0.01	0.05
Capacity (veh/h)	959	908	823
Control Delay (s)	6.9	6.9	7.5
Approach Delay (s)	6.9	6.9	7.5
Approach LOS	A	A	A

Intersection Summary			
Delay	7.1		
HCM Level of Service	A		
Intersection Capacity Utilization	18.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	2	50	1	1	60	7	0	0	1	8	0	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
Hourly flow rate (vph)	3	75	1	1	90	10	0	0	1	12	0	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					868							
pX, platoon unblocked												
vC, conflicting volume	100			76			191	184	75	181	180	95
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	100			76			191	184	75	181	180	95
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	98	100	99
cM capacity (veh/h)	1505			1536			762	711	992	782	715	967

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	79	101	1	24
Volume Left	3	1	0	12
Volume Right	1	10	1	12
cSH	1505	1536	992	865
Volume to Capacity	0.00	0.00	0.00	0.03
Queue Length 95th (ft)	0	0	0	2
Control Delay (s)	0.3	0.1	8.6	9.3
Lane LOS	A	A	A	A
Approach Delay (s)	0.3	0.1	8.6	9.3
Approach LOS			A	A

Intersection Summary				
Average Delay	1.3			
Intersection Capacity Utilization	18.2%	ICU Level of Service	A	
Analysis Period (min)	15			

Appendix D Crash Data

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

State Street /Oswego Hwy (003) & Marylbrook Drive/Furman Drive
January 1, 2009 through December 31, 2013

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2012														
PEDESTRIAN	0	1	0	1	0	1	0	1	0	1	0	1	0	0
REAR-END	0	1	0	1	0	3	0	0	1	1	0	1	0	0
TURNING MOVEMENTS	0	1	0	1	0	2	0	1	0	0	1	1	0	0
2012 TOTAL	0	3	0	3	0	6	0	2	1	2	1	3	0	0
FINAL TOTAL	0	3	0	3	0	6	0	2	1	2	1	3	0	0

Disclaimer: A higher number of crashes may be reported as of 2011 compared to prior years. This does not reflect an increase in annual crashes. The higher numbers result from a change to an internal departmental process that allows the Crash Analysis and Reporting Unit to add previously unavailable, non-fatal crash reports to the annual data file. Please be aware of this change when comparing pre-2011 crash statistics.

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

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State Street /Oswego Hwy (003) & Marylbrook Drive/Furman Drive
January 1, 2009 through December 31, 2013

R# VEST	S D / P R S W / E A U C O / E L G H R / D C S L K	DATE DAY TIME	COUNTY CITY URBAN AREA	RD# FC COMPNT MLG TYP MILEPNT	CONN # FIRST STREET SECOND STREET	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
841	N N N	12/15/2012	CLACKAMAS	1 14		INTER	CROSS	N	N	RAIN	S-1STOP	01	NONE 0	STRGHT										07
NE		Sat	LAKE OSWEGO	0 0	MARYLBROOK DR	SE		TRF SIGNAL	N	WET	REAR		PRVTE	SE NW									000	00
		2P	PORTLAND UA	7.91	STATE ST	06	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	65	M	OR-Y		026	000	07
																				OR<25				
												02	NONE 0	STOP										
													PRVTE	SE NW									011	00
													PSNGR CAR		01	DRVR	NONE	71	M	OR-Y		000	000	00
																				OR<25				
															02	PSNG	INJC	58	F			000	000	00
															03	PSNG	INJC	14	F			000	000	00
															04	PSNG	INJC	22	F			000	000	00
573	N N N N N	11/26/2012	CLACKAMAS	1 14		INTER	3-LEG	N	N	CLR	PED	01	NONE 0	TURN-L										02
TY		Mon	LAKE OSWEGO	0 0	MARYLBROOK DR	NW		TRF SIGNAL	N	DRY	PED		PRVTE	SW NW									000	00
		7A	PORTLAND UA	7.91	STATE ST	05	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	24	F	OTH-Y		029	000	02
																				N-RES				
														STRGHT	01	PED	INJB	72	M		01	000	035	00
														SW NE										
76?	N N N N N	10/10/2012	CLACKAMAS	1 14		INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE 0	STRGHT										02
TY		Wed	LAKE OSWEGO	0 0	MARYLBROOK DR	CN		TRF SIGNAL	N	DRY	TURN		PRVTE	SE NW									000	00
		8P	PORTLAND UA	7.91	STATE ST	02	0		N	DLIT	INJ		PSNGR CAR		01	DRVR	INJC	81	F	OR-Y		000	000	00
																				OR<25				
															02	PSNG	INJC	90	F			000	000	00
												02	NONE 0	TURN-R										
													PRVTE	NE NW									016	00
													PSNGR CAR		01	DRVR	NONE	64	M	OR-Y		028	000	02
																				OR<25				

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

Willamette Drive /Oswego Hwy (003) & Arbor Drive
January 1, 2009 through December 31, 2013

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2013														
TURNING MOVEMENTS	0	0	1	1	0	0	0	1	0	1	0	1	0	0
2013 TOTAL	0	0	1	1	0	0	0	1	0	1	0	1	0	0
YEAR: 2012														
REAR-END	0	0	1	1	0	0	0	1	0	1	0	1	0	0
2012 TOTAL	0	0	1	1	0	0	0	1	0	1	0	1	0	0
YEAR: 2011														
REAR-END	0	1	0	1	0	3	0	1	0	1	0	1	0	0
TURNING MOVEMENTS	0	2	0	2	0	2	0	0	2	2	0	2	0	0
2011 TOTAL	0	3	0	3	0	5	0	1	2	3	0	3	0	0
YEAR: 2010														
REAR-END	0	2	0	2	0	2	0	2	0	2	0	2	0	0
2010 TOTAL	0	2	0	2	0	2	0	2	0	2	0	2	0	0
YEAR: 2009														
REAR-END	0	0	1	1	0	0	0	1	0	1	0	1	0	0
TURNING MOVEMENTS	0	0	1	1	0	0	0	1	0	1	0	1	0	0
2009 TOTAL	0	0	2	2	0	0	0	2	0	2	0	2	0	0
FINAL TOTAL	0	5	4	9	0	7	0	7	2	9	0	9	0	0

Disclaimer: A higher number of crashes may be reported as of 2011 compared to prior years. This does not reflect an increase in annual crashes. The higher numbers result from a change to an internal departmental process that allows the Crash Analysis and Reporting Unit to add previously unavailable, non-fatal crash reports to the annual data file. Please be aware of this change when comparing pre-2011 crash statistics.

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

)3 OSWEGO

Willamette Drive /Oswego Hwy (003) & Arbor Drive
January 1, 2009 through December 31, 2013

SER# INVEST	S P E A U C O E L G H R D C S L K (SPR, D, R, S, W)	DATE DAY TIME	COUNTY CITY URBAN AREA	RD# FC COMPNT MLG TYP MILEPNT	CONN # FIRST STREET SECOND STREET	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
1276 ITY	N N N N N	04/09/2009 Thu 1P	CLACKAMAS WEST LINN PORTLAND UA	1 14 0 0 8.07	ARBOR DR WILLAMETTE DR	INTER SE 06	CROSS 0	N NONE	N N N	CLR DRY DAY	S-1STOP REAR PDO	01 NONE 0 PRVTE PSNGR CAR	STRGHT S N	01	DRVR	NONE	18	F	OR-Y OR<25		026	000 000		22,07 22 07
												02 NONE 0 PRVTE PSNGR CAR	STOP S N	01	DRVR	NONE	37	F	OR-Y OR<25		000	012 000		00 00
3239 ITY	N N N	09/10/2010 Fri 12P	CLACKAMAS WEST LINN PORTLAND UA	1 14 0 0 8.07	ARBOR DR WILLAMETTE DR	INTER SE 06	CROSS 0	N UNKNOWN	N N N	CLR DRY DAY	S-1STOP REAR INJ	01 NONE 0 PRVTE PSNGR CAR	STRGHT SE NW	01	DRVR	NONE	20	F	OR-Y OR<25		016,026	000 000		27,07 00 27,07
												02 NONE 0 PRVTE PSNGR CAR	STOP SE NW	01	DRVR	INJC	76	F	OR-Y OR<25		000	012 000		00 00
324[illegible] [illegible]TY	N N N N N	09/02/2011 Fri 4P	CLACKAMAS WEST LINN PORTLAND UA	1 14 0 0 8.07	ARBOR DR WILLAMETTE DR	INTER SE 06	CROSS 0	N UNKNOWN	N N N	CLR DRY DAY	S-1STOP REAR INJ	01 NONE 0 PRVTE PSNGR CAR	STRGHT SE NW	01	DRVR	INJC	19	M	OR-Y OR<25		052,016,026	000 000	013	32,27 00 32,27
												02 NONE 0 PRVTE PSNGR CAR	STOP SE NW	01	DRVR	INJC	51	F	OR-Y OR<25		000	011 000	013	00 00
												03 POLCE 0 PUBLC PSNGR CAR	STOP SE NW	01	DRVR	INJC	33	M	OR-Y OR<25		000	012 000		00 00
3374 ITY	N N N	09/11/2012 Tue 6P	CLACKAMAS WEST LINN PORTLAND UA	1 14 0 0 8.07	ARBOR DR WILLAMETTE DR	INTER SE 06	CROSS 0	N NONE	N N N	CLR DRY DAY	S-1STOP REAR PDO	01 NONE 0 PRVTE PSNGR CAR	STRGHT SE NW	01	DRVR	NONE	23	M	SUSP OR<25		043,026	000 000	013	07 00 07
												02 NONE 0 PRVTE PSNGR CAR	STOP SE NW	01	DRVR	NONE	41	M	OR-Y OR<25		000	011 000	013	00 00
												03 NONE 0 PRVTE PSNGR CAR	STOP SE NW	01	DRVR	NONE	45	M	OR-Y OR<25		000	022 000		00 00
0637 ONE	Y N N	02/23/2011 Wed 2P	CLACKAMAS WEST LINN PORTLAND UA	1 14 0 0 8.07	ARBOR DR WILLAMETTE DR	INTER SW 06	CROSS 0	N UNKNOWN	N N N	SNOW ICE DAY	ANGL-OTH TURN INJ	01 NONE 0 PRVTE PSNGR CAR	TURN-R NW SW	01	DRVR	NONE	22	F	OR-Y OR<25		047,001	000 000	124 124	01,08 00 01,08

03 OSWEGO

Willamette Drive /Oswego Hwy (003) & Arbor Drive
January 1, 2009 through December 31, 2013

ER# NVEST	S P E D C	A L S	U G L	C H K	W R	DATE DAY TIME	COUNTY CITY URBAN AREA	RD# FC COMPNT MLG TYP MILEPNT	CONN # FIRST STREET SECOND STREET	RD CHAR DIRECT LOCTN	INT-TYP (MEDIAN) LEGS (#LANES)	INT-REL TRAF- CNTL	OFFRD RNDBT DRVWY	WTHR SURF LIGHT	CRASH TYP COLL TYP SVRTY	V#	SPCL USE TRLR QTY OWNER VEH TYPE	MOVE FROM TO	P#	PRTC TYPE	INJ SVRTY	A G E	S E X	LICNS RES	PED LOC	ERROR	ACTN EVENT	CAUSE
																02	NONE 0 PRVTE PSNGR CAR	STOP SW NE	01	DRVR	INJC	62	M	OR-Y OR<25		000	011 000	00 00
1551 ITY	N	N	N	N	N	05/06/2011 Fri 5P	CLACKAMAS WEST LINN PORTLAND UA	1 14 0 0 8.07	ARBOR DR WILLAMETTE DR	INTER CN 02	CROSS 0	N STOP SIGN	N N N	RAIN WET DAY	ANGL-OTH TURN INJ	01	NONE 0 PRVTE PSNGR CAR	STRGHT SE NW	01	DRVR	NONE	25	M	OR-Y OR<25		000	000	02 00 00
																02	NONE 0 PRVTE PSNGR CAR	TURN-L NE SE	01	DRVR	INJB	18	F	NONE OR<25		028	015 000	00 02
3465 I	N	N	N	N	N	09/15/2009 Tue 4P	CLACKAMAS WEST LINN PORTLAND UA	1 14 0 0 8.07	ARBOR DR WILLAMETTE DR	INTER CN 03	CROSS 0	N STOP SIGN	N N N	CLR DRY DAY	ANGL-OTH TURN PDO	01	NONE 0 PRVTE PSNGR CAR	STRGHT W E	01	DRVR	NONE	84	M	OR-Y OR<25		028	000 000	03 00 02
																02	NONE 0 PRVTE PSNGR CAR	STRGHT N S	01	DRVR	NONE	35	F	OR-Y OR<25		000	000 000	00 00
1 I	N	N	N	N	N	04/25/2010 Sun 2P	CLACKAMAS WEST LINN PORTLAND UA	1 14 0 0 8.08	ARBOR DR WILLAMETTE DR	INTER SE 06	CROSS 0	N UNKNOWN	N N N	CLR DRY DAY	S-1STOP REAR INJ	01	NONE 0 PRVTE PSNGR CAR	STRGHT SE NW	01	DRVR	NONE	17	F	OR-Y OR<25		026	000 000	07 00 07
																02	NONE 0 PRVTE PSNGR CAR	STOP SE NW	01	DRVR	INJC	56	F	OR-Y OR<25		000	013 000	00 00
0682 OUNTY	N	N	N			02/26/2013 Tue 7A	CLACKAMAS WEST LINN PORTLAND UA	1 14 0 0 8.11	ARBOR DR WILLAMETTE DR	INTER CN 03	CROSS 0	N STOP SIGN	N N N	CLR DRY DAY	ANGL-OTH TURN PDO	01	NONE 0 PRVTE PSNGR CAR	STRGHT NW SE	01	DRVR	NONE	24	F	OR-Y OR<25		000	000 000	02 00 00
																02	NONE 0 UNKN PSNGR CAR	TURN-L SW NW	01	DRVR	NONE	00	U	UNK UNK		028	015 000	00 02

OREGON DEPARTMENT OF TRANSPORTATION ANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

Willamette Drive /Oswego Hwy (003) & Marylhurst Drive/Lazy River Drive
January 1, 2009 through December 31, 2013

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2012														
TURNING MOVEMENTS	0	0	1	1	0	0	0	0	1	1	0	1	0	0
2012 TOTAL	0	0	1	1	0	0	0	0	1	1	0	1	0	0
YEAR: 2010														
REAR-END	0	2	0	2	0	3	0	1	1	2	0	2	0	0
2010 TOTAL	0	2	0	2	0	3	0	1	1	2	0	2	0	0
FINAL TOTAL	0	2	1	3	0	3	0	1	2	3	0	3	0	0

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

03 OSWEGO

Willamette Drive /Oswego Hwy (003) & Marylhurst Drive/Lazy River Drive
January 1, 2009 through December 31, 2013

ER# / NVEST	S P E D / A L C	R S W U C O H R L K	DATE / DAY / TIME	COUNTY / CITY / URBAN AREA	RD# FC / COMPNT / MLG TYP / MILEPNT	CONN # / FIRST STREET / SECOND STREET	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
01333	N	N N N N N	04/21/2010	CLACKAMAS	1 14		INTER	CROSS	N	N	CLR	S-1STOP	01	NONE 0	STRGHT											07
CITY			Wed	WEST LINN	0 0	LAZY RIVER DR	SE		TRF SIGNAL	N	DRY	REAR		PRVTE	SE NW									001		00
			8A	PORTLAND UA	8.43	WILLAMETTE DR	06	0		N	DAY	INJ		PSNGR CAR		01	DRVR	INJB	55	F	OR-Y		043,026	000		07
																						OR<25				
													02	NONE 0	STOP									011		00
														PRVTE	SE NW									000		00
														PSNGR CAR		01	DRVR	NONE	41	M	OR-Y		000			
																						OR<25				
01650	N	N N N N N	05/17/2010	CLACKAMAS	1 14		INTER	CROSS	N	N	RAIN	S-1STOP	01	NONE 0	STRGHT										013	27,07
CITY			Mon	WEST LINN	0 0	LAZY RIVER DR	SE		TRF SIGNAL	N	WET	REAR		PRVTE	SE NW									000		00
			4P	PORTLAND UA	8.43	WILLAMETTE DR	06	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	21	M	OR-Y		016,043,026	000		27,07
																						OR<25				
													02	NONE 0	STOP									011	013	00
														PRVTE	SE NW											
														PSNGR CAR		01	DRVR	INJC	64	M	OR-Y		000	000		00
																						OR<25				
													03	NONE 0	STOP									022		00
														PRVTE	SE NW											
														PSNGR CAR		01	DRVR	INJC	53	F	OR-Y		000	000		00
																						OR<25				
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40[illegible]			Mon	WEST LINN	0 0	LAZY RIVER DR	CN		TRF SIGNAL	N	WET	TURN		UNKN	NW NE									000		00
			10A	PORTLAND UA	8.43	WILLAMETTE DR	04	0		N	DAY	PDO		UNKNOWN		01	DRVR	NONE	00	F	UNK		028,004	000		02
																						UNK				
													02	NONE 0	STRGHT									000		00
														PRVTE	SE NW											
														PSNGR CAR		01	DRVR	NONE	59	F	OTH-Y		000	000		00
																						N-RES				

OREGON DEPARTMENT OF TRANSPORTATIO TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

Upper Midhill Drive & Arbor Drive
January 1, 2009 through December 31, 2013

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR:														
TOTAL														
FINAL TOTAL														

Disclaimer: A higher number of crashes may be reported as of 2011 compared to prior years. This does not reflect an increase in annual crashes. The higher numbers result from a change to an internal departmental process that allows the Crash Analysis and Reporting Unit to add previously unavailable, non-fatal crash reports to the annual data file. Please be aware of this change when comparing pre-2011 crash statistics.

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

Upper Midhill Drive & Marylhurst Drive
January 1, 2009 through December 31, 2013

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR:														
TOTAL														
FINAL TOTAL														

Disclaimer: A higher number of crashes may be reported as of 2011 compared to prior years. This does not reflect an increase in annual crashes. The higher numbers result from a change to an internal departmental process that allows the Crash Analysis and Reporting Unit to add previously unavailable, non-fatal crash reports to the annual data file. Please be aware of this change when comparing pre-2011 crash statistics.

ACTION CODE TRANSLATION LIST

ACTION CODE	SHORT DESCRIPTION	LONG DESCRIPTION
000	NONE	NO ACTION OR NON-WARRANTED
001	SKIDDED	SKIDDED
002	ON/OFF V	GETTING ON OR OFF STOPPED OR PARKED VEHICLE
003	LOAD OVR	OVERHANGING LOAD STRUCK ANOTHER VEHICLE, ETC.
006	SLOW DN	SLOWED DOWN
007	AVOIDING	AVOIDING MANEUVER
008	PAR PARK	PARALLEL PARKING
009	ANG PARK	ANGLE PARKING
010	INTERFERE	PASSENGER INTERFERING WITH DRIVER
011	STOPPED	STOPPED IN TRAFFIC NOT WAITING TO MAKE A LEFT TURN
012	STP/L TRN	STOPPED BECAUSE OF LEFT TURN SIGNAL OR WAITING, ETC.
013	STP TURN	STOPPED WHILE EXECUTING A TURN
015	GO A/STOP	PROCEED AFTER STOPPING FOR A STOP SIGN/FLASHING RED.
016	TRN A/RED	TURNED ON RED AFTER STOPPING
017	LOSTCTRL	LOST CONTROL OF VEHICLE
018	EXIT DWY	ENTERING STREET OR HIGHWAY FROM ALLEY OR DRIVEWAY
019	ENTR DWY	ENTERING ALLEY OR DRIVEWAY FROM STREET OR HIGHWAY
020	STR ENTR	BEFORE ENTERING ROADWAY, STRUCK PEDESTRIAN, ETC. ON SIDEWALK OR SHOULDER
021	NO DRVR	CAR RAN AWAY - NO DRIVER
022	PREV COL	STRUCK, OR WAS STRUCK BY, VEHICLE OR PEDESTRIAN IN PRIOR COLLISION BEFORE ACC. STABILIZED
023	STALLED	VEHICLE STALLED
024	DRVR DEAD	DEAD BY UNASSOCIATED CAUSE
025	FATIGUE	FATIGUED, SLEEPY, ASLEEP
026	SUN	DRIVER BLINDED BY SUN
027	HDLGHTS	DRIVER BLINDED BY HEADLIGHTS
028	ILLNESS	PHYSICALLY ILL
029	THRU MED	VEHICLE CROSSED, PLUNGED OVER, OR THROUGH MEDIAN BARRIER
030	PURSUIT	PURSUING OR ATTEMPTING TO STOP A VEHICLE
031	PASSING	PASSING SITUATION
032	PRKOFFRD	VEHICLE PARKED BEYOND CURB OR SHOULDER
033	CROS MED	VEHICLE CROSSED EARTH OR GRASS MEDIAN
034	X N/SGNL	CROSSING AT INTERSECTION - NO TRAFFIC SIGNAL PRESENT
035	X W/ SGNL	CROSSING AT INTERSECTION - TRAFFIC SIGNAL PRESENT
036	DIAGONAL	CROSSING AT INTERSECTION - DIAGONALLY
037	BTWN INT	CROSSING BETWEEN INTERSECTIONS
038	DISTRACT	DRIVER'S ATTENTION DISTRACTED
039	W/TRAF-S	WALKING, RUNNING, RIDING, ETC., ON SHOULDER WITH TRAFFIC
040	A/TRAF-S	WALKING, RUNNING, RIDING, ETC., ON SHOULDER FACING TRAFFIC
041	W/TRAF-P	WALKING, RUNNING, RIDING, ETC., ON PAVEMENT WITH TRAFFIC
042	A/TRAF-P	WALKING, RUNNING, RIDING, ETC., ON PAVEMENT FACING TRAFFIC
043	PLAYINRD	PLAYING IN STREET OR ROAD
044	PUSH MV	PUSHING OR WORKING ON VEHICLE IN ROAD OR ON SHOULDER
045	WORK ON	WORKING IN ROADWAY OR ALONG SHOULDER
046	W/ TRAFIC	NON-MOTORIST WALKING, RUNNING, RIDING, ETC. WITH TRAFFIC
047	A/ TRAFIC	NON-MOTORIST WALKING, RUNNING, RIDING, ETC. FACING TRAFFIC
050	LAY ON RD	STANDING OR LYING IN ROADWAY
051	ENT OFFRD	ENTERING / STARTING IN TRAFFIC LANE FROM OFF ROAD
052	MERGING	MERGING
055	SPRAY	BLINDED BY WATER SPRAY
088	OTHER	OTHER ACTION

ACTION CODE TRANSLATION LIST

ACTION CODE	SHORT DESCRIPTION	LONG DESCRIPTION
099	UNK	UNKNOWN ACTION

CAUSE CODE TRANSLATION LIST

CAUSE CODE	SHORT DESCRIPTION	LONG DESCRIPTION
00	NO CODE	NO CAUSE ASSOCIATED AT THIS LEVEL
01	TOO-FAST	TOO FAST FOR CONDITIONS (NOT EXCEED POSTED SPEED
02	NO-YIELD	DID NOT YIELD RIGHT-OF-WAY
03	PAS-STOP	PASSED STOP SIGN OR RED FLASHER
04	DIS SIG	DISREGARDED TRAFFIC SIGNAL
05	LEFT-CTR	DROVE LEFT OF CENTER ON TWO-WAY ROAD; STRADDLING
06	IMP-OVER	IMPROPER OVERTAKING
07	TOO-CLOS	FOLLOWED TOO CLOSELY
08	IMP-TURN	MADE IMPROPER TURN
09	DRINKING	ALCOHOL OR DRUG INVOLVED
10	OTHR-IMP	OTHER IMPROPER DRIVING
11	MECH-DEF	MECHANICAL DEFECT
12	OTHER	OTHER (NOT IMPROPER DRIVING)
13	IMP LN C	IMPROPER CHANGE OF TRAFFIC LANES
14	DIS TCD	DISREGARDED OTHER TRAFFIC CONTROL DEVICE
15	WRNG WAY	WRONG WAY ON ONE-WAY ROAD; WRONG SIDE DIVIDED RO.
16	FATIGUE	DRIVER DROWSY/FATIGUED/SLEEPY
17	ILLNESS	PHYSICAL ILLNESS
24	IN RDWY	NON-MOTORIST ILLEGALLY IN ROADWAY
NT	VISBL	NOT VISIBLE: DARK / NON-REFLECTIVE CLOTHING
IMP	PKNG	VEHICLE IMPROPERLY PARKED
DEF	STER	DEFECTIVE STEERING MECHANISM
DEF	BRKE	INADEQUATE OR NO BRAKES
LOADSHFT		VEHICLE LOST LOAD OR LOAD SHIFTED
TIREFAIL		TIRE FAILURE
PHANTOM		PHANTOM / NON-CONTACT VEHICLE
INATTENT		INATTENTION
NM	INATT	NON-MOTORIST INATTENTION
F	AVOID	FAILED TO AVOID VEHICLE AHEAD
30	SPEED	DRIVING IN EXCESS OF POSTED SPEED
31	RACING	SPEED RACING (PER PAR)
32	CARELESS	CARELESS DRIVING (PER PAR)
33	RECKLESS	RECKLESS DRIVING (PER PAR)
34	AGGRESV	AGGRESSIVE DRIVING (PER PAR)
35	RD RAGE	ROAD RAGE (PER PAR)
40	VIEW OBS	VIEW OBSCURED
50	USED MDN	IMPROPER USE OF MEDIAN OR SHOULDER

COLLISION TYPE CODE TRANSLATION LIST

COLL CODE	SHORT DESCRIPTION	LONG DESCRIPTION
&	OTH	MISCELLANEOUS
-	BACK	BACKING
0	PED	PEDESTRIAN
1	ANGL	ANGLE
2	HEAD	HEAD-ON
3	REAR	REAR-END
4	SS-M	SIDESWIPE - MEETING
5	SS-O	SIDESWIPE - OVERTAKING
6	TURN	TURNING MOVEMENT
7	PARK	PARKING MANEUVER
8	NCOL	NON-COLLISION
9	FIX	FIXED OBJECT OR OTHER OBJECT

CRASH TYPE CODE TRANSLATION LIST

CRASH TYPE	SHORT DESCRIPTION	LONG DESCRIPTION
&	OVERTURN	OVERTURNED
0	NON-COLL	OTHER NON-COLLISION
1	OTH RDWY	MOTOR VEHICLE ON OTHER ROADWAY
2	PRKD MV	PARKED MOTOR VEHICLE
3	PED	PEDESTRIAN
4	TRAIN	RAILWAY TRAIN
6	BIKE	PEDALCYCLIST
7	ANIMAL	ANIMAL
8	FIX OBJ	FIXED OBJECT
9	OTH OBJ	OTHER OBJECT
A	ANGL-STP	ENTERING AT ANGLE - ONE VEHICLE STOPPED
B	ANGL-OTH	ENTERING AT ANGLE - ALL OTHERS
C	S-STRGHT	FROM SAME DIRECTION - BOTH GOING STRAIGHT
D	S-1TURN	FROM SAME DIRECTION - ONE TURN, ONE STRAIGHT
E	S-1STOP	FROM SAME DIRECTION - ONE STOPPED
F	S-OTHER	FROM SAME DIRECTION-ALL OTHERS, INCLUDING PARKING
G	O-STRGHT	FROM OPPOSITE DIRECTION - BOTH GOING STRAIGHT
H	O-1TURN	FROM OPPOSITE DIRECTION - ONE TURN, ONE STRAIGHT
I	O-1STOP	FROM OPPOSITE DIRECTION - ONE STOPPED
J	O-OTHER	FROM OPPOSITE DIRECTION-ALL OTHERS INCL. PARKING

DRIVER LICENSE CODE TRANSLATION LIST

LIC CODE	SHORT DESC	LONG DESCRIPTION
0	NONE	NOT LICENSED (HAD NEVER BEEN LICENSED)
1	OR-Y	VALID OREGON LICENSE
2	OTH-Y	VALID LICENSE, OTHER STATE OR COUNTRY
3	SUSP	SUSPENDED/REVOKED

DRIVER RESIDENCE CODE TRANSLATION LIST

RES CODE	SHORT DESC	LONG DESCRIPTION
1	OR<25	OREGON RESIDENT WITHIN 25 MILE OF HOME
2	OR>25	OREGON RESIDENT 25 OR MORE MILES FROM HOME
3	OR-?	OREGON RESIDENT - UNKNOWN DISTANCE FROM HOME
4	N-RES	NON-RESIDENT
9	UNK	UNKNOWN IF OREGON RESIDENT

ERROR CODE TRANSLATION LIST

ERROR CODE	SHORT DESCRIPTION	FULL DESCRIPTION
000	NONE	NO ERROR
001	WIDE TRN	WIDE TURN
002	CUT CORN	CUT CORNER ON TURN
003	FAIL TRN	FAILED TO OBEY MANDATORY TRAFFIC TURN SIGNAL, SIGN OR LANE MARKINGS
004	L IN TRF	LEFT TURN IN FRONT OF ONCOMING TRAFFIC
005	L PROHIB	LEFT TURN WHERE PROHIBITED
006	FRM WRNG	TURNED FROM WRONG LANE
007	TO WRONG	TURNED INTO WRONG LANE
008	ILLEG U	U-TURNED ILLEGALLY
009	IMP STOP	IMPROPERLY STOPPED IN TRAFFIC LANE
010	IMP SIG	IMPROPER SIGNAL OR FAILURE TO SIGNAL
011	IMP BACK	BACKING IMPROPERLY (NOT PARKING)
012	IMP PARK	IMPROPERLY PARKED
013	UNPARK	IMPROPER START LEAVING PARKED POSITION
014	IMP STRT	IMPROPER START FROM STOPPED POSITION
015	IMP LGHT	IMPROPER OR NO LIGHTS (VEHICLE IN TRAFFIC)
016	INATTENT	INATTENTION (FAILURE TO DIM LIGHTS PRIOR TO 4/1/97)
017	UNSF VEH	DRIVING UNSAFE VEHICLE (NO OTHER ERROR APPARENT)
018	OTH PARK	ENTERING/EXITING PARKED POSITION W/ INSUFFICIENT CLEARANCE; OTHER IMPROPER PARKING MANEUVER
019	DIS DRIV	DISREGARDED OTHER DRIVER'S SIGNAL
020	DIS SGNL	DISREGARDED TRAFFIC SIGNAL
021	RAN STOP	DISREGARDED STOP SIGN OR FLASHING RED
022	DIS SIGN	DISREGARDED WARNING SIGN, FLARES OR FLASHING AMBER
023	DIS OFCR	DISREGARDED POLICE OFFICER OR FLAGMAN
024	DIS EMER	DISREGARDED SIREN OR WARNING OF EMERGENCY VEHICLE
025	DIS RR	DISREGARDED RR SIGNAL, RR SIGN, OR RR FLAGMAN
026	REAR-END	FAILED TO AVOID STOPPED OR PARKED VEHICLE AHEAD OTHER THAN SCHOOL BUS
027	BIKE ROW	DID NOT HAVE RIGHT-OF-WAY OVER PEDALCYCLIST
028	NO ROW	DID NOT HAVE RIGHT-OF-WAY
029	PED ROW	FAILED TO YIELD RIGHT-OF-WAY TO PEDESTRIAN
030	PAS CURV	PASSING ON A CURVE
031	PAS WRNG	PASSING ON THE WRONG SIDE
032	PAS TANG	PASSING ON STRAIGHT ROAD UNDER UNSAFE CONDITIONS
033	PAS X-WK	PASSED VEHICLE STOPPED AT CROSSWALK FOR PEDESTRIAN
034	PAS INTR	PASSING AT INTERSECTION
035	PAS HILL	PASSING ON CREST OF HILL
036	N/PAS ZN	PASSING IN "NO PASSING" ZONE
037	PAS TRAF	PASSING IN FRONT OF ONCOMING TRAFFIC
038	CUT-IN	CUTTING IN (TWO LANES - TWO WAY ONLY)
039	WRNGSIDE	DRIVING ON WRONG SIDE OF THE ROAD (2-WAY UNDIVIDED ROADWAYS)
040	THRU MED	DRIVING THROUGH SAFETY ZONE OR OVER ISLAND
041	F/ST BUS	FAILED TO STOP FOR SCHOOL BUS

ERROR CODE TRANSLATION LIST

ERROR CODE	SHORT DESCRIPTION	FULL DESCRIPTION
042	F/SLO MV	FAILED TO DECREASE SPEED FOR SLOWER MOVING VEHICLE
043	TO CLOSE	FOLLOWING TOO CLOSELY (MUST BE ON OFFICER'S REPORT)
044	STRDL LN	STRADDLING OR DRIVING ON WRONG LANES
045	IMP CHG	IMPROPER CHANGE OF TRAFFIC LANES
046	WRNG WAY	WRONG WAY ON ONE-WAY ROADWAY; WRONG SIDE DIVIDED ROAD
047	BASCRULE	DRIVING TOO FAST FOR CONDITIONS (NOT EXCEEDING POSTED SPEED)
048	OPN DOOR	OPENED DOOR INTO ADJACENT TRAFFIC LANE
049	IMPEDING	IMPEDING TRAFFIC
050	SPEED	DRIVING IN EXCESS OF POSTED SPEED
051	RECKLESS	RECKLESS DRIVING (PER PAR)
052	CARELESS	CARELESS DRIVING (PER PAR)
053	RACING	SPEED RACING (PER PAR)
054	X N/SGNL	CROSSING AT INTERSECTION, NO TRAFFIC SIGNAL PRESENT
055	X W/SGNL	CROSSING AT INTERSECTION, TRAFFIC SIGNAL PRESENT
056	DIAGONAL	CROSSING AT INTERSECTION - DIAGONALLY
057	BTWN INT	CROSSING BETWEEN INTERSECTIONS
059	W/TRAF-S	WALKING, RUNNING, RIDING, ETC., ON SHOULDER WITH TRAFFIC
060	A/TRAF-S	WALKING, RUNNING, RIDING, ETC., ON SHOULDER FACING TRAFFIC
061	W/TRAF-P	WALKING, RUNNING, RIDING, ETC., ON PAVEMENT WITH TRAFFIC
062	A/TRAF-P	WALKING, RUNNING, RIDING, ETC., ON PAVEMENT FACING TRAFFIC
063	PLAYINRD	PLAYING IN STREET OR ROAD
064	PUSH MV	PUSHING OR WORKING ON VEHICLE IN ROAD OR ON SHOULDER
065	WK IN RD	WORKING IN ROADWAY OR ALONG SHOULDER
066	LAYON RD	STANDING OR LYING IN ROADWAY
067	NM IMP USE	IMPROPER USE OF TRAFFIC LANE BY NON-MOTORIST
068	ELUDING	ELUDING / ATTEMPT TO ELUDE
069	F NEG CURV	FAILED TO NEGOTIATE A CURVE
070	FAIL LN	FAILED TO MAINTAIN LANE
071	OFF RD	RAN OFF ROAD
083	NO CLEAR	DRIVER MISJUDGED CLEARANCE
084	OVRSTEER	OVER-CORRECTING
084	NOT USED	CODE NOT IN USE
085	OVRLOAD	OVERLOADING OR IMPROPER LOADING OF VEHICLE WITH CARGO OR PASSENGERS
097	UNA DIS TC	UNABLE TO DETERMINE WHICH DRIVER DISREGARDED TRAFFIC CONTROL DEVICE

EVENT CODE TRANSLATION LIST

EVENT CODE	SHORT DESCRIPTION	LONG DESCRIPTION
001	FEL/JUMP	OCCUPANT FELL, JUMPED OR WAS EJECTED FROM MOVING VEHICLE
002	INTERFER	PASSENGER INTERFERED WITH DRIVER
003	BUG INTF	ANIMAL OR INSECT IN VEHICLE INTERFERED WITH DRIVER
004	INDRCT PED	PEDESTRIAN INDIRECTLY INVOLVED (NOT STRUCK)
005	SUB-PED	"SUB-PED": PEDESTRIAN INJURED SUBSEQUENT TO COLLISION, ETC.
006	INDRCT BIK	PEDALCYCLIST INDIRECTLY INVOLVED (NOT STRUCK)
007	HITCHIKR	HITCHHIKER (SOLICITING A RIDE)
008	PSNGR TOW	PASSENGER OR NON-MOTORIST BEING TOWED OR PUSHED ON CONVEYANCE
009	ON/OFF V	GETTING ON/OFF STOPPED/PARKED VEHICLE (OCCUPANTS ONLY; MUST HAVE PHYSICAL CONTACT W/ VEHI
010	SUB OTRN	OVERTURNED AFTER FIRST HARMFUL EVENT
011	MV PUSHD	VEHICLE BEING PUSHED
012	MV TOWED	VEHICLE TOWED OR HAD BEEN TOWING ANOTHER VEHICLE
013	FORCED	VEHICLE FORCED BY IMPACT INTO ANOTHER VEHICLE, PEDALCYCLIST OR PEDESTRIAN
014	SET MOTN	VEHICLE SET IN MOTION BY NON-DRIVER (CHILD RELEASED BRAKES, ETC.)
015	RR ROW	AT OR ON RAILROAD RIGHT-OF-WAY (NOT LIGHT RAIL)
016	LT RL ROW	AT OR ON LIGHT-RAIL RIGHT-OF-WAY
017	RR HIT V	TRAIN STRUCK VEHICLE
018	V HIT RR	VEHICLE STRUCK TRAIN
019	HIT RR CAR	VEHICLE STRUCK RAILROAD CAR ON ROADWAY
020	JACKNIFE	JACKKNIFE; TRAILER OR TOWED VEHICLE STRUCK TOWING VEHICLE
021	TRL OTRN	TRAILER OR TOWED VEHICLE OVERTURNED
022	CN BROKE	TRAILER CONNECTION BROKE
023	DETACH TRL	DETACHED TRAILING OBJECT STRUCK OTHER VEHICLE, NON-MOTORIST, OR OBJECT
024	V DOOR OPN	VEHICLE DOOR OPENED INTO ADJACENT TRAFFIC LANE
025	WHEELOFF	WHEEL CAME OFF
026	HOOD UP	HOOD FLEW UP
028	LOAD SHIFT	LOST LOAD, LOAD MOVED OR SHIFTED
029	TIREFAIL	TIRE FAILURE
030	PET	PET: CAT, DOG AND SIMILAR
031	LVSTOCK	STOCK: COW, CALF, BULL, STEER, SHEEP, ETC.
032	HORSE	HORSE, MULE, OR DONKEY
033	HRSE&RID	HORSE AND RIDER
034	GAME	WILD ANIMAL, GAME (INCLUDES BIRDS; NOT DEER OR ELK)
035	DEER ELK	DEER OR ELK, WAPITI
036	ANML VEH	ANIMAL-DRAWN VEHICLE
037	CULVERT	CULVERT, OPEN LOW OR HIGH MANHOLE
038	ATENUATN	IMPACT ATTENUATOR
039	PK METER	PARKING METER
040	CURB	CURB (ALSO NARROW SIDEWALKS ON BRIDGES)
041	JIGGLE	JIGGLE BAR OR TRAFFIC SNAKE FOR CHANNELIZATION
042	GDRL END	LEADING EDGE OF GUARDRAIL
043	GARDRAIL	GUARD RAIL (NOT METAL MEDIAN BARRIER)
044	BARRIER	MEDIAN BARRIER (RAISED OR METAL)
045	WALL	RETAINING WALL OR TUNNEL WALL
046	BR RAIL	BRIDGE RAILING OR PARAPET (ON BRIDGE OR APPROACH)
047	BR ABUTMNT	BRIDGE ABUTMENT (INCLUDED "APPROACH END" THRU 2013)
048	BR COLMN	BRIDGE PILLAR OR COLUMN
049	BR GIRDR	BRIDGE GIRDER (HORIZONTAL BRIDGE STRUCTURE OVERHEAD)
050	ISLAND	TRAFFIC RAISED ISLAND
051	GORE	GORE
052	POLE UNK	POLE - TYPE UNKNOWN
053	POLE UTL	POLE - POWER OR TELEPHONE
054	ST LIGHT	POLE - STREET LIGHT ONLY
055	TRF SGNL	POLE - TRAFFIC SIGNAL AND PED SIGNAL ONLY
056	SGN BRDG	POLE - SIGN BRIDGE
057	STOPSIGN	STOP OR YIELD SIGN
058	OTH SIGN	OTHER SIGN, INCLUDING STREET SIGNS
059	HYDRANT	HYDRANT

EVENT CODE TRANSLATION LIST

EVENT CODE	SHORT DESCRIPTION	LONG DESCRIPTION
060	MARKER	DELINEATOR OR MARKER (REFLECTOR POSTS)
061	MAILBOX	MAILBOX
062	TREE	TREE, STUMP OR SHRUBS
063	VEG OHED	TREE BRANCH OR OTHER VEGETATION OVERHEAD, ETC.
064	WIRE/CBL	WIRE OR CABLE ACROSS OR OVER THE ROAD
065	TEMP SGN	TEMPORARY SIGN OR BARRICADE IN ROAD, ETC.
066	PERM SGN	PERMANENT SIGN OR BARRICADE IN/OFF ROAD
067	SLIDE	SLIDES, FALLEN OR FALLING ROCKS
068	FRGN OBJ	FOREIGN OBSTRUCTION/DEBRIS IN ROAD (NOT GRAVEL)
069	EQP WORK	EQUIPMENT WORKING IN/OFF ROAD
070	OTH EQP	OTHER EQUIPMENT IN OR OFF ROAD (INCLUDES PARKED TRAILER, BOAT)
071	MAIN EQP	WRECKER, STREET SWEEPER, SNOW PLOW OR SANDING EQUIPMENT
072	OTHER WALL	ROCK, BRICK OR OTHER SOLID WALL
073	IRRGL PVMT	OTHER BUMP (NOT SPEED BUMP), POTHOLE OR PAVEMENT IRREGULARITY (PER PAR)
074	OVERHD OBJ	OTHER OVERHEAD OBJECT (HIGHWAY SIGN, SIGNAL HEAD, ETC.); NOT BRIDGE
075	CAVE IN	BRIDGE OR ROAD CAVE IN
076	HI WATER	HIGH WATER
077	SNO BANK	SNOW BANK
078	LO-HI EDGE	LOW OR HIGH SHOULDER AT PAVEMENT EDGE
079	DITCH	CUT SLOPE OR DITCH EMBANKMENT
080	OBJ FRM MV	STRUCK BY ROCK OR OTHER OBJECT SET IN MOTION BY OTHER VEHICLE (INCL. LOST LOADS)
081	FLY-OBJ	STRUCK BY ROCK OR OTHER MOVING OR FLYING OBJECT (NOT SET IN MOTION BY VEHICLE)
082	VEH HID	VEHICLE OBSCURED VIEW
083	VEG HID	VEGETATION OBSCURED VIEW
084	BLDG HID	VIEW OBSCURED BY FENCE, SIGN, PHONE BOOTH, ETC.
085	WIND GUST	WIND GUST
086	IMMERSED	VEHICLE IMMERSED IN BODY OF WATER
087	FIRE/EXP	FIRE OR EXPLOSION
088	FENC/BLD	FENCE OR BUILDING, ETC.
089	OTHR CRASH	CRASH RELATED TO ANOTHER SEPARATE CRASH
090	TO 1 SIDE	TWO-WAY TRAFFIC ON DIVIDED ROADWAY ALL ROUTED TO ONE SIDE
091	BUILDING	BUILDING OR OTHER STRUCTURE
092	PHANTOM	OTHER (PHANTOM) NON-CONTACT VEHICLE
093	CELL PHONE	CELL PHONE (ON PAR OR DRIVER IN USE)
094	VIOL GDL	TEENAGE DRIVER IN VIOLATION OF GRADUATED LICENSE PGM
095	GUY WIRE	GUY WIRE
096	BERM	BERM (EARTHEN OR GRAVEL MOUND)
097	GRAVEL	GRAVEL IN ROADWAY
098	ABR EDGE	ABRUPT EDGE
099	CELL WTNSD	CELL PHONE USE WITNESSED BY OTHER PARTICIPANT
100	UNK FIXD	FIXED OBJECT, UNKNOWN TYPE.
101	OTHER OBJ	NON-FIXED OBJECT, OTHER OR UNKNOWN TYPE
102	TEXTING	TEXTING
103	WZ WORKER	WORK ZONE WORKER
104	ON VEHICLE	PASSENGER RIDING ON VEHICLE EXTERIOR
105	PEDAL PSGR	PASSENGER RIDING ON PEDALCYCLE
106	MAN WHLCHR	PEDESTRIAN IN NON-MOTORIZED WHEELCHAIR
107	MTR WHLCHR	PEDESTRIAN IN MOTORIZED WHEELCHAIR
108	OFFICER	LAW ENFORCEMENT / POLICE OFFICER
109	SUB-BIKE	"SUB-BIKE": PEDALCYCLIST INJURED SUBSEQUENT TO COLLISION, ETC.
110	N-MTR	NON-MOTORIST STRUCK VEHICLE
111	S CAR VS V	STREET CAR/TROLLEY (ON RAILS OR OVERHEAD WIRE SYSTEM) STRUCK VEHICLE
112	V VS S CAR	VEHICLE STRUCK STREET CAR/TROLLEY (ON RAILS OR OVERHEAD WIRE SYSTEM)
113	S CAR ROW	AT OR ON STREET CAR OR TROLLEY RIGHT-OF-WAY
114	RR EQUIP	VEHICLE STRUCK RAILROAD EQUIPMENT (NOT TRAIN) ON TRACKS
115	DSTRCT GPS	DISTRACTED BY NAVIGATION SYSTEM OR GPS DEVICE
116	DSTRCT OTH	DISTRACTED BY OTHER ELECTRONIC DEVICE
117	RR GATE	RAIL CROSSING DROP-ARM GATE

EVENT CODE TRANSLATION LIST

EVENT CODE	SHORT DESCRIPTION	LONG DESCRIPTION
118	EXPNSN JNT	EXPANSION JOINT
119	JERSEY BAR	JERSEY BARRIER
120	WIRE BAR	WIRE OR CABLE MEDIAN BARRIER
121	FENCE	FENCE
123	OBJ IN VEH	LOOSE OBJECT IN VEHICLE STRUCK OCCUPANT
124	SLIPPERY	SLIDING OR SWERVING DUE TO WET, ICY, SLIPPERY OR LOOSE SURFACE (NOT GRAVEL)
125	SHLDR	SHOULDER GAVE WAY
126	BOULDER	ROCK(S), BOULDER (NOT GRAVEL; NOT ROCK SLIDE)
127	LAND SLIDE	ROCK SLIDE OR LAND SLIDE
128	CURVE INV	CURVE PRESENT AT CRASH LOCATION
129	HILL INV	VERTICAL GRADE / HILL PRESENT AT CRASH LOCATION
130	CURVE HID	VIEW OBSCURED BY CURVE
131	HILL HID	VIEW OBSCURED BY VERTICAL GRADE / HILL
132	WINDOW HID	VIEW OBSCURED BY VEHICLE WINDOW CONDITIONS
133	SPRAY HID	VIEW OBSCURED BY WATER SPRAY

FUNCTIONAL CLASSIFICATION TRANSLATION LIST

FUNC CLASS	DESCRIPTION
01	RURAL PRINCIPAL ARTERIAL - INTERSTATE
02	RURAL PRINCIPAL ARTERIAL - OTHER
06	RURAL MINOR ARTERIAL
07	RURAL MAJOR COLLECTOR
08	RURAL MINOR COLLECTOR
09	RURAL LOCAL
11	URBAN PRINCIPAL ARTERIAL - INTERSTATE
12	URBAN PRINCIPAL ARTERIAL - OTHER FREEWAYS AND EXP
14	URBAN PRINCIPAL ARTERIAL - OTHER
16	URBAN MINOR ARTERIAL
17	URBAN COLLECTOR
19	URBAN LOCAL
78	UNKNOWN RURAL SYSTEM
79	UNKNOWN RURAL NON-SYSTEM
98	UNKNOWN URBAN SYSTEM
99	UNKNOWN URBAN NON-SYSTEM

HIGHWAY COMPONENT TRANSLATION LIST

CODE	DESCRIPTION
0	MAINLINE STATE HIGHWAY
1	COUPLET
3	FRONTAGE ROAD
6	CONNECTION
8	HIGHWAY - OTHER

INJURY SEVERITY CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
1	KILL	FATAL INJURY
2	INJA	INCAPACITATING INJURY - BLEEDING, BROKEN BONES
3	INJB	NON-INCAPACITATING INJURY
4	INJC	POSSIBLE INJURY - COMPLAINT OF PAIN
5	PRI	DIED PRIOR TO CRASH
7	NO<5	NO INJURY - 0 TO 4 YEARS OF AGE

LIGHT CONDITION CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	UNK	UNKNOWN
1	DAY	DAYLIGHT
2	DLIT	DARKNESS - WITH STREET LIGHTS
3	DARK	DARKNESS - NO STREET LIGHTS
4	DAWN	DAWN (TWILIGHT)
5	DUSK	DUSK (TWILIGHT)

MEDIAN TYPE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	NONE	NO MEDIAN
1	RSDMD	SOLID MEDIAN BARRIER
2	DIVMD	EARTH, GRASS OR PAVED MEDIAN

MILEAGE TYPE CODE TRANSLATION LIST

CODE	LONG DESCRIPTION
0	REGULAR MILEAGE
T	TEMPORARY
Y	SPUR
Z	OVERLAPPING

MOVEMENT TYPE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	UNK	UNKNOWN
1	STRGHT	STRAIGHT AHEAD
2	TURN-R	TURNING RIGHT
3	TURN-L	TURNING LEFT
4	U-TURN	MAKING A U-TURN
5	BACK	BACKING
6	STOP	STOPPED IN TRAFFIC
7	PRKD-P	PARKED - PROPERLY
8	PRKD-I	PARKED - IMPROPERLY

PARTICIPANT TYPE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	OCC	UNKNOWN OCCUPANT TYPE
1	DRVR	DRIVER
2	PSNG	PASSENGER
3	PED	PEDESTRIAN
4	CONV	PEDESTRIAN USING A PEDESTRIAN CONVEYA
5	PTOW	PEDESTRIAN TOWING OR TRAILERING AN OB
6	BIKE	PEDALCYCLIST
7	BTOW	PEDALCYCLIST TOWING OR TRAILERING AN
8	PRKD	OCCUPANT OF A PARKED MOTOR VEHICLE
9	UNK	UNKNOWN TYPE OF NON-MOTORIST

PEDESTRIAN LOCATION CODE TRANSLATION LIST

CODE	LONG DESCRIPTION
00	AT INTERSECTION - NOT IN ROADWAY
01	AT INTERSECTION - INSIDE CROSSWALK
02	AT INTERSECTION - IN ROADWAY, OUTSIDE CROSSWALK
03	AT INTERSECTION - IN ROADWAY, XWALK AVAIL UNKNWN
04	NOT AT INTERSECTION - IN ROADWAY
05	NOT AT INTERSECTION - ON SHOULDER
06	NOT AT INTERSECTION - ON MEDIAN
07	NOT AT INTERSECTION - WITHIN TRAFFIC RIGHT-OF-WAY
08	NOT AT INTERSECTION - IN BIKE PATH
09	NOT-AT INTERSECTION - ON SIDEWALK
10	OUTSIDE TRAFFICWAY BOUNDARIES
11	AT INTERSECTION - IN BIKE LANE
12	NOT AT INTERSECTION - INSIDE MID-BLOCK CROSSWALK
13	OTHER, NOT IN ROADWAY
99	UNKNOWN LOCATION

TRAFFIC CONTROL DEVICE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
000	NONE	NO CONTROL
001	TRF SIGNAL	TRAFFIC SIGNALS
002	FLASHBCN-R	FLASHING BEACON - RED (STOP)
003	FLASHBCN-A	FLASHING BEACON - AMBER (SLOW)
004	STOP SIGN	STOP SIGN
005	SLOW SIGN	SLOW SIGN
006	REG-SIGN	REGULATORY SIGN
007	YIELD	YIELD SIGN
008	WARNING	WARNING SIGN
009	CURVE	CURVE SIGN
010	SCHL X-ING	SCHOOL CROSSING SIGN OR SPECIAL SIGNAL
011	OFCR/FLAG	POLICE OFFICER, FLAGMAN - SCHOOL PATROL
012	BRDG-GATE	BRIDGE GATE - BARRIER
013	TEMP-BARR	TEMPORARY BARRIER
014	NO-PASS-ZN	NO PASSING ZONE
015	ONE-WAY	ONE-WAY STREET
016	CHANNEL	CHANNELIZATION
017	MEDIAN BAR	MEDIAN BARRIER
018	PILOT CAR	PILOT CAR
019	SP PED SIG	SPECIAL PEDESTRIAN SIGNAL
020	X-BUCK	CROSSBUCK
021	THR-GN-SIG	THROUGH GREEN ARROW OR SIGNAL
022	L-GRN-SIG	LEFT TURN GREEN ARROW, LANE MARKINGS, OR SIGNAL
023	R-GRN-SIG	RIGHT TURN GREEN ARROW, LANE MARKINGS, OR SIGNAL
024	WIGWAG	WIGWAG OR FLASHING LIGHTS W/O DROP-ARM GATE
025	X-BUCK WRN	CROSSBUCK AND ADVANCE WARNING
026	WW W/ GATE	FLASHING LIGHTS WITH DROP-ARM GATES
027	OVRHD SGNL	SUPPLEMENTAL OVERHEAD SIGNAL (RR XING ONLY)
028	SP RR STOP	SPECIAL RR STOP SIGN
029	ILUM GRD X	ILLUMINATED GRADE CROSSING
037	RAMP METER	METERED RAMPS
038	RUMBLE STR	RUMBLE STRIP
090	L-TURN REF	LEFT TURN REFUGE (WHEN REFUGE IS INVOLVED)
091	R-TURN ALL	RIGHT TURN AT ALL TIMES SIGN, ETC.
092	EMR SGN/FL	EMERGENCY SIGNS OR FLARES
093	ACCEL LANE	ACCELERATION OR DECELERATION LANES
094	R-TURN PRO	RIGHT TURN PROHIBITED ON RED AFTER STOPPING

ROAD CHARACTER CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	UNK	UNKNOWN
1	INTER	INTERSECTION
2	ALLEY	DRIVEWAY OR ALLEY
3	STRGHT	STRAIGHT ROADWAY
4	TRANS	TRANSITION
5	CURVE	CURVE (HORIZONTAL CURVE)
6	OPENAC	OPEN ACCESS OR TURNOUT
7	GRADE	GRADE (VERTICAL CURVE)
8	BRIDGE	BRIDGE STRUCTURE
9	TUNNEL	TUNNEL

VEHICLE TYPE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
01	PSNGR CAR	PASSENGER CAR, PICKUP, LIGHT DELIVERY, ETC.
02	BOBTAIL	TRUCK TRACTOR WITH NO TRAILERS (BOBTAIL)
03	FARM TRCTR	FARM TRACTOR OR SELF-PROPELLED FARM EQUIPMENT
04	SEMI TOW	TRUCK TRACTOR WITH TRAILER/MOBILE HOME IN TOW
05	TRUCK	TRUCK WITH NON-DETACHABLE BED, PANEL, ETC.
06	MOPED	MOPED, MINIBIKE, SEATED MOTOR SCOOTER, MOTOR BIKE
07	SCHL BUS	SCHOOL BUS (INCLUDES VAN)
08	OTH BUS	OTHER BUS
09	MTRCYCLE	MOTORCYCLE, DIRT BIKE
10	OTHER	OTHER: FORKLIFT, BACKHOE, ETC.
11	MOTRHOME	MOTORHOME
12	TROLLEY	MOTORIZED STREET CAR/TROLLEY (NO RAILS/WIRES)
13	ATV	ATV
14	MTRSCTR	MOTORIZED SCOOTER (STANDING)
15	SNOWMOBILE	SNOWMOBILE
97	UNKNOWN	UNKNOWN VEHICLE TYPE

095	BUS STPSGN	BUS STOP SIGN AND RED LIGHTS
099	UNKNOWN	UNKNOWN OR NOT DEFINITE

WEATHER CONDITION CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	UNK	UNKNOWN
1	CLR	CLEAR
2	CLD	CLOUDY
3	RAIN	RAIN
4	SLT	SLEET
5	FOG	FOG
6	SNOW	SNOW
7	DUST	DUST
8	SMOK	SMOKE
9	ASH	ASH

Appendix E Year 2016 Background Traffic Conditions Worksheets

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	0	6	2	0	1	3	1017	31	15	279	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		1.00	0.99		1.00	1.00	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00	1.00	0.99	1.00	1.00	1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1805	1594		1803	1615	1789	3438	1477	1687	3438	
Flt Permitted		1.00	1.00		1.00	1.00	0.57	1.00	1.00	0.25	1.00	
Satd. Flow (perm)		1900	1594		1898	1615	1074	3438	1477	445	3438	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	1	0	6	2	0	1	3	1082	33	16	297	0
RTOR Reduction (vph)	0	0	6	0	0	1	0	0	4	0	0	0
Lane Group Flow (vph)	0	1	0	0	2	0	3	1082	29	16	297	0
Confl. Peds. (#/hr)			1	1			9					9
Confl. Bikes (#/hr)									3			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	5%	7%	7%	5%	0%
Turn Type	Perm		Perm	Perm		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		8	4	4	4	2		2	6		6
Actuated Green, G (s)		1.2	1.2		1.2	1.2	84.3	83.3	83.3	86.3	84.3	
Effective Green, g (s)		1.2	1.2		1.2	1.2	84.3	83.3	83.3	86.3	84.3	
Actuated g/C Ratio		0.01	0.01		0.01	0.01	0.84	0.83	0.83	0.86	0.84	
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.3	4.8	4.8	2.3	4.8	
Lane Grp Cap (vph)		23	19		23	19	913	2864	1230	409	2898	
v/s Ratio Prot							0.00	c0.31		c0.00	0.09	
v/s Ratio Perm		0.00	0.00		c0.00	0.00	0.00		0.02	0.03		
v/c Ratio		0.04	0.00		0.09	0.00	0.00	0.38	0.02	0.04	0.10	
Uniform Delay, d1		48.8	48.8		48.9	48.8	1.2	2.0	1.4	1.0	1.3	
Progression Factor		1.00	1.00		1.00	1.00	0.33	0.27	0.18	1.00	1.00	
Incremental Delay, d2		0.6	0.1		1.2	0.0	0.0	0.3	0.0	0.0	0.0	
Delay (s)		49.4	48.9		50.0	48.8	0.4	0.8	0.3	1.1	1.4	
Level of Service		D	D		D	D	A	A	A	A	A	
Approach Delay (s)		48.9			49.6			0.8			1.4	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM Average Control Delay	1.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	49.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	32	0	8	11	0	12	4	1008	6	1	292	3
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	0	9	12	0	13	4	1096	7	1	317	3
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								992			884	
pX, platoon unblocked	0.30	0.30		0.30	0.30	0.30				0.30		
vC, conflicting volume	1443	1433	321	1438	1431	1099	322			1102		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1309	1276	321	1294	1271	158	322			169		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	8	100	99	71	100	95	100			100		
cM capacity (veh/h)	38	50	723	41	50	267	1249			425		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	43	25	1107	322
Volume Left	35	12	4	1
Volume Right	9	13	7	3
cSH	47	74	1249	425
Volume to Capacity	0.93	0.34	0.00	0.00
Queue Length 95th (ft)	96	32	0	0
Control Delay (s)	248.0	76.8	0.1	0.1
Lane LOS	F	F	A	A
Approach Delay (s)	248.0	76.8	0.1	0.1
Approach LOS	F	F		

Intersection Summary			
Average Delay	8.6		
Intersection Capacity Utilization	66.9%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (vph)	49	4	36	16	2	21	13	938	43	6	301	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.95			0.93		1.00	0.99		1.00	1.00	
Flt Protected		0.97			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1722			1701		1568	1801		1805	1812	
Flt Permitted		0.86			0.84		0.56	1.00		0.18	1.00	
Satd. Flow (perm)		1514			1454		922	1801		342	1812	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	53	4	39	17	2	23	14	1009	46	6	324	6
RTOR Reduction (vph)	0	28	0	0	21	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	68	0	0	21	0	14	1054	0	6	330	0
Confl. Peds. (#/hr)	2					2	1					1
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	15%	5%	0%	0%	4%	33%
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)		8.6			8.6		77.5	76.4		77.3	76.3	
Effective Green, g (s)		8.6			8.6		77.5	76.4		77.3	76.3	
Actuated g/C Ratio		0.09			0.09		0.78	0.76		0.77	0.76	
Clearance Time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Vehicle Extension (s)		2.5			2.5		2.3	5.2		2.3	5.2	
Lane Grp Cap (vph)		130			125		722	1376		279	1383	
v/s Ratio Prot							0.00	c0.59		c0.00	0.18	
v/s Ratio Perm		c0.04			0.01		0.01			0.02		
v/c Ratio		0.52			0.17		0.02	0.77		0.02	0.24	
Uniform Delay, d1		43.7			42.4		2.6	6.7		6.6	3.4	
Progression Factor		1.00			1.00		1.00	1.00		1.89	1.79	
Incremental Delay, d2		2.8			0.5		0.0	4.1		0.0	0.4	
Delay (s)		46.6			42.8		2.6	10.8		12.5	6.6	
Level of Service		D			D		A	B		B	A	
Approach Delay (s)		46.6			42.8			10.7			6.7	
Approach LOS		D			D			B			A	

Intersection Summary			
HCM Average Control Delay	12.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	67.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Volume (vph)	2	4	1	0	32	2
Peak Hour Factor	0.66	0.66	0.66	0.66	0.66	0.66
Hourly flow rate (vph)	3	6	2	0	48	3

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	9	2	52
Volume Left (vph)	3	0	48
Volume Right (vph)	6	0	0
Hadj (s)	-0.33	1.70	0.19
Departure Headway (s)	3.7	5.7	4.1
Degree Utilization, x	0.01	0.00	0.06
Capacity (veh/h)	957	623	869
Control Delay (s)	6.7	8.7	7.4
Approach Delay (s)	6.7	8.7	7.4
Approach LOS	A	A	A

Intersection Summary			
Delay	7.3		
HCM Level of Service	A		
Intersection Capacity Utilization	18.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	1	66	0	1	15	1	0	0	5	8	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	1	74	0	1	17	1	0	0	6	9	0	0
Pedestrians		1			1							
Lane Width (ft)		12.0			12.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		0			0							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					868							
pX, platoon unblocked												
vC, conflicting volume	18			74			97	97	75	103	96	18
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	18			74			97	97	75	103	96	18
tC, single (s)	5.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	3.1			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	99	99	100	100
cM capacity (veh/h)	1141			1538			888	796	991	876	796	1065

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	75	19	6	9
Volume Left	1	1	0	9
Volume Right	0	1	6	0
cSH	1141	1538	991	876
Volume to Capacity	0.00	0.00	0.01	0.01
Queue Length 95th (ft)	0	0	0	1
Control Delay (s)	0.1	0.4	8.7	9.2
Lane LOS	A	A	A	A
Approach Delay (s)	0.1	0.4	8.7	9.2
Approach LOS			A	A

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	17.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	1	8	43	0	22	6	495	20	16	1032	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		1.00	1.00		1.00	0.99	1.00	1.00	0.97	1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1822	1615		1719	1594	1805	3505	1570	1803	3471	1576
Flt Permitted		0.78	1.00		0.75	1.00	0.23	1.00	1.00	0.44	1.00	1.00
Satd. Flow (perm)		1482	1615		1364	1594	446	3505	1570	841	3471	1576
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	5	1	9	47	0	24	7	544	22	18	1134	4
RTOR Reduction (vph)	0	0	8	0	0	22	0	0	5	0	0	1
Lane Group Flow (vph)	0	6	1	0	47	2	7	544	17	18	1134	3
Confl. Peds. (#/hr)	1					1	1		2	2		1
Confl. Bikes (#/hr)									4			3
Heavy Vehicles (%)	0%	0%	0%	5%	0%	0%	0%	3%	0%	0%	4%	0%
Turn Type	Perm		Perm	Perm		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		8	4	4	4	2		2	6		6
Actuated Green, G (s)		7.8	7.8		7.8	7.8	87.6	86.6	86.6	89.8	87.7	87.7
Effective Green, g (s)		7.8	7.8		7.8	7.8	87.6	86.6	86.6	89.8	87.7	87.7
Actuated g/C Ratio		0.07	0.07		0.07	0.07	0.80	0.79	0.79	0.82	0.80	0.80
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.3	4.8	4.8	2.3	4.8	4.8
Lane Grp Cap (vph)		105	115		97	113	368	2759	1236	705	2767	1257
v/s Ratio Prot							0.00	0.16		c0.00	c0.33	
v/s Ratio Perm		0.00	0.00		c0.03	0.00	0.01		0.01	0.02		0.00
v/c Ratio		0.06	0.01		0.48	0.02	0.02	0.20	0.01	0.03	0.41	0.00
Uniform Delay, d1		47.7	47.5		49.2	47.5	2.4	2.9	2.5	1.9	3.4	2.3
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.2	0.0		2.8	0.0	0.0	0.2	0.0	0.0	0.2	0.0
Delay (s)		47.8	47.5		51.9	47.6	2.4	3.1	2.5	1.9	3.6	2.3
Level of Service		D	D		D	D	A	A	A	A	A	A
Approach Delay (s)		47.6			50.5			3.1			3.5	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM Average Control Delay	5.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	50.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	13	0	11	4	0	7	5	508	11	17	1009	41
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	14	0	12	4	0	8	5	558	12	19	1109	45
Pedestrians		1			1							
Lane Width (ft)		12.0			12.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		0			0							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								992			884	
pX, platoon unblocked	0.26	0.26	0.22	0.26	0.26	0.92	0.22			0.92		
vC, conflicting volume	1753	1752	1132	1757	1768	565	1155			571		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1822	1820	0	1839	1884	489	0			495		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	0	100	95	68	100	99	98			98		
cM capacity (veh/h)	14	19	238	14	18	539	356			968		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	26	12	576	1173
Volume Left	14	4	5	19
Volume Right	12	8	12	45
cSH	24	36	356	968
Volume to Capacity	1.11	0.33	0.02	0.02
Queue Length 95th (ft)	83	27	1	1
Control Delay (s)	455.8	146.7	0.5	0.7
Lane LOS	F	F	A	A
Approach Delay (s)	455.8	146.7	0.5	0.7
Approach LOS	F	F		

Intersection Summary				
Average Delay	8.3			
Intersection Capacity Utilization	76.3%	ICU Level of Service	D	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	25	1	49	54	3	4	65	496	18	19	969	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.98			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.91			0.99		1.00	0.99		1.00	1.00	
Flt Protected		0.98			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1653			1763		1770	1852		1716	1821	
Flt Permitted		0.90			0.68		0.16	1.00		0.45	1.00	
Satd. Flow (perm)		1513			1254		301	1852		809	1821	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	26	1	51	56	3	4	68	517	19	20	1009	25
RTOR Reduction (vph)	0	47	0	0	3	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	31	0	0	60	0	68	535	0	20	1033	0
Confl. Peds. (#/hr)	1		2	2		1	1		3	3		1
Confl. Bikes (#/hr)									5			3
Heavy Vehicles (%)	0%	0%	2%	2%	0%	0%	2%	2%	0%	5%	4%	0%
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)		8.1			8.1		80.5	75.8		75.3	73.2	
Effective Green, g (s)		8.1			8.1		80.5	75.8		75.3	73.2	
Actuated g/C Ratio		0.08			0.08		0.80	0.76		0.75	0.73	
Clearance Time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Vehicle Extension (s)		2.5			2.5		2.3	5.2		2.3	5.2	
Lane Grp Cap (vph)		123			102		311	1404		628	1333	
v/s Ratio Prot							c0.01	0.29		0.00	c0.57	
v/s Ratio Perm		0.02			c0.05		0.17			0.02		
v/c Ratio		0.25			0.59		0.22	0.38		0.03	0.78	
Uniform Delay, d1		43.1			44.3		8.5	4.1		3.1	8.3	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.8			7.4		0.2	0.8		0.0	4.5	
Delay (s)		43.9			51.8		8.7	4.9		3.1	12.8	
Level of Service		D			D		A	A		A	B	
Approach Delay (s)		43.9			51.8			5.3			12.6	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM Average Control Delay	12.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.5
Intersection Capacity Utilization	70.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Volume (vph)	12	32	5	3	19	10
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69
Hourly flow rate (vph)	17	46	7	4	28	14

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	64	12	42
Volume Left (vph)	17	0	28
Volume Right (vph)	46	4	0
Hadj (s)	-0.34	-0.22	0.25
Departure Headway (s)	3.7	3.8	4.3
Degree Utilization, x	0.07	0.01	0.05
Capacity (veh/h)	960	907	822
Control Delay (s)	6.9	6.9	7.5
Approach Delay (s)	6.9	6.9	7.5
Approach LOS	A	A	A

Intersection Summary			
Delay	7.1		
HCM Level of Service	A		
Intersection Capacity Utilization	18.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	2	51	1	1	60	7	0	0	1	8	0	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
Hourly flow rate (vph)	3	76	1	1	90	10	0	0	1	12	0	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					868							
pX, platoon unblocked												
vC, conflicting volume	100			78			193	186	77	182	181	95
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	100			78			193	186	77	182	181	95
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	98	100	99
cM capacity (veh/h)	1505			1534			760	710	990	781	714	967

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	81	101	1	24
Volume Left	3	1	0	12
Volume Right	1	10	1	12
cSH	1505	1534	990	864
Volume to Capacity	0.00	0.00	0.00	0.03
Queue Length 95th (ft)	0	0	0	2
Control Delay (s)	0.3	0.1	8.6	9.3
Lane LOS	A	A	A	A
Approach Delay (s)	0.3	0.1	8.6	9.3
Approach LOS			A	A

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	18.2%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix F Year 2016 Total Traffic Conditions Worksheets

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	0	6	2	0	1	3	1028	31	15	283	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		1.00	0.99		1.00	1.00	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00	1.00	0.99	1.00	1.00	1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1805	1594		1803	1615	1789	3438	1477	1687	3438	
Flt Permitted		1.00	1.00		1.00	1.00	0.57	1.00	1.00	0.25	1.00	
Satd. Flow (perm)		1900	1594		1898	1615	1070	3438	1477	439	3438	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	1	0	6	2	0	1	3	1094	33	16	301	0
RTOR Reduction (vph)	0	0	6	0	0	1	0	0	4	0	0	0
Lane Group Flow (vph)	0	1	0	0	2	0	3	1094	29	16	301	0
Confl. Peds. (#/hr)			1	1			9					9
Confl. Bikes (#/hr)									3			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	5%	7%	7%	5%	0%
Turn Type	Perm		Perm	Perm		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		8	4	4	4	2		2	6		6
Actuated Green, G (s)		1.2	1.2		1.2	1.2	84.3	83.3	83.3	86.3	84.3	
Effective Green, g (s)		1.2	1.2		1.2	1.2	84.3	83.3	83.3	86.3	84.3	
Actuated g/C Ratio		0.01	0.01		0.01	0.01	0.84	0.83	0.83	0.86	0.84	
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.3	4.8	4.8	2.3	4.8	
Lane Grp Cap (vph)		23	19		23	19	909	2864	1230	404	2898	
v/s Ratio Prot							0.00	c0.32		c0.00	0.09	
v/s Ratio Perm		0.00	0.00		c0.00	0.00	0.00		0.02	0.03		
v/c Ratio		0.04	0.00		0.09	0.00	0.00	0.38	0.02	0.04	0.10	
Uniform Delay, d1		48.8	48.8		48.9	48.8	1.2	2.0	1.4	1.0	1.4	
Progression Factor		1.00	1.00		1.00	1.00	0.42	0.29	0.22	1.00	1.00	
Incremental Delay, d2		0.6	0.1		1.2	0.0	0.0	0.3	0.0	0.0	0.0	
Delay (s)		49.4	48.9		50.0	48.8	0.5	0.9	0.3	1.1	1.4	
Level of Service		D	D		D	D	A	A	A	A	A	
Approach Delay (s)		48.9			49.6			0.9			1.4	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM Average Control Delay	1.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	50.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	32	0	15	11	0	12	7	1019	6	1	292	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	0	16	12	0	13	8	1108	7	1	317	8
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								992			884	
pX, platoon unblocked	0.32	0.32		0.32	0.32	0.32				0.32		
vC, conflicting volume	1464	1454	323	1467	1454	1111	326			1114		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1386	1356	323	1396	1357	286	326			296		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	2	100	98	68	100	95	99			100		
cM capacity (veh/h)	36	48	721	37	48	243	1244			409		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	51	25	1122	326
Volume Left	35	12	8	1
Volume Right	16	13	7	8
cSH	51	67	1244	409
Volume to Capacity	1.00	0.38	0.01	0.00
Queue Length 95th (ft)	110	35	0	0
Control Delay (s)	254.4	88.4	0.2	0.1
Lane LOS	F	F	A	A
Approach Delay (s)	254.4	88.4	0.2	0.1
Approach LOS	F	F		

Intersection Summary			
Average Delay	10.1		
Intersection Capacity Utilization	70.0%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	4	42	16	2	21	15	941	43	6	308	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.95			0.93		1.00	0.99		1.00	1.00	
Flt Protected		0.97			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1724			1701		1568	1801		1805	1812	
Flt Permitted		0.84			0.86		0.54	1.00		0.17	1.00	
Satd. Flow (perm)		1483			1489		892	1801		314	1812	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	65	4	45	17	2	23	16	1012	46	6	331	6
RTOR Reduction (vph)	0	27	0	0	21	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	87	0	0	21	0	16	1057	0	6	336	0
Confl. Peds. (#/hr)	2					2	1					1
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	15%	5%	0%	0%	4%	33%
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)		10.8			10.8		76.3	74.2		74.1	73.1	
Effective Green, g (s)		10.8			10.8		76.3	74.2		74.1	73.1	
Actuated g/C Ratio		0.11			0.11		0.76	0.74		0.74	0.73	
Clearance Time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Vehicle Extension (s)		2.5			2.5		2.3	5.2		2.3	5.2	
Lane Grp Cap (vph)		160			161		695	1336		248	1325	
v/s Ratio Prot							c0.00	c0.59		0.00	0.19	
v/s Ratio Perm		c0.06			0.01		0.02			0.02		
v/c Ratio		0.55			0.13		0.02	0.79		0.02	0.25	
Uniform Delay, d1		42.3			40.4		2.9	8.1		8.1	4.4	
Progression Factor		1.00			1.00		1.00	1.00		1.83	1.58	
Incremental Delay, d2		3.0			0.3		0.0	4.9		0.0	0.5	
Delay (s)		45.3			40.6		2.9	12.9		14.9	7.5	
Level of Service		D			D		A	B		B	A	
Approach Delay (s)		45.3			40.6			12.8			7.6	
Approach LOS		D			D			B			A	

Intersection Summary			
HCM Average Control Delay	14.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Volume (vph)	2	11	3	0	39	20
Peak Hour Factor	0.66	0.66	0.66	0.66	0.66	0.66
Hourly flow rate (vph)	3	17	5	0	59	30

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	20	5	89
Volume Left (vph)	3	0	59
Volume Right (vph)	17	0	0
Hadj (s)	-0.48	1.70	0.13
Departure Headway (s)	3.6	5.7	4.1
Degree Utilization, x	0.02	0.01	0.10
Capacity (veh/h)	961	616	874
Control Delay (s)	6.7	8.8	7.5
Approach Delay (s)	6.7	8.8	7.5
Approach LOS	A	A	A

Intersection Summary			
Delay	7.4		
HCM Level of Service	A		
Intersection Capacity Utilization	19.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	1	66	0	1	15	3	0	0	5	25	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	1	74	0	1	17	3	0	0	6	28	0	1
Pedestrians		1			1							
Lane Width (ft)		12.0			12.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		0			0							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					868							
pX, platoon unblocked												
vC, conflicting volume	20			74			99	99	75	104	97	20
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	20			74			99	99	75	104	97	20
tC, single (s)	5.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	3.1			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	99	97	100	100
cM capacity (veh/h)	1138			1538			884	794	991	874	795	1063

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	75	21	6	29
Volume Left	1	1	0	28
Volume Right	0	3	6	1
cSH	1138	1538	991	880
Volume to Capacity	0.00	0.00	0.01	0.03
Queue Length 95th (ft)	0	0	0	3
Control Delay (s)	0.1	0.4	8.7	9.2
Lane LOS	A	A	A	A
Approach Delay (s)	0.1	0.4	8.7	9.2
Approach LOS			A	A

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	18.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	1	8	43	0	22	6	501	20	16	1043	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		1.00	1.00		1.00	0.99	1.00	1.00	0.97	1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1822	1615		1719	1594	1805	3505	1570	1803	3471	1576
Flt Permitted		0.78	1.00		0.75	1.00	0.23	1.00	1.00	0.44	1.00	1.00
Satd. Flow (perm)		1482	1615		1364	1594	440	3505	1570	836	3471	1576
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	5	1	9	47	0	24	7	551	22	18	1146	4
RTOR Reduction (vph)	0	0	8	0	0	22	0	0	5	0	0	1
Lane Group Flow (vph)	0	6	1	0	47	2	7	551	17	18	1146	3
Confl. Peds. (#/hr)	1					1	1		2	2		1
Confl. Bikes (#/hr)									4			3
Heavy Vehicles (%)	0%	0%	0%	5%	0%	0%	0%	3%	0%	0%	4%	0%
Turn Type	Perm		Perm	Perm		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		8	4	4	4	2		2	6		6
Actuated Green, G (s)		7.8	7.8		7.8	7.8	87.6	86.6	86.6	89.8	87.7	87.7
Effective Green, g (s)		7.8	7.8		7.8	7.8	87.6	86.6	86.6	89.8	87.7	87.7
Actuated g/C Ratio		0.07	0.07		0.07	0.07	0.80	0.79	0.79	0.82	0.80	0.80
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.3	4.8	4.8	2.3	4.8	4.8
Lane Grp Cap (vph)		105	115		97	113	363	2759	1236	701	2767	1257
v/s Ratio Prot							0.00	0.16		c0.00	c0.33	
v/s Ratio Perm		0.00	0.00		c0.03	0.00	0.02		0.01	0.02		0.00
v/c Ratio		0.06	0.01		0.48	0.02	0.02	0.20	0.01	0.03	0.41	0.00
Uniform Delay, d1		47.7	47.5		49.2	47.5	2.4	3.0	2.5	1.9	3.4	2.3
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.2	0.0		2.8	0.0	0.0	0.2	0.0	0.0	0.2	0.0
Delay (s)		47.8	47.5		51.9	47.6	2.4	3.1	2.5	1.9	3.6	2.3
Level of Service		D	D		D	D	A	A	A	A	A	A
Approach Delay (s)		47.6			50.5			3.1			3.5	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM Average Control Delay	5.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	50.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	13	0	15	4	0	7	12	514	11	17	1009	52
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	14	0	16	4	0	8	13	565	12	19	1109	57
Pedestrians		1			1							
Lane Width (ft)		12.0			12.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		0			0							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								992			884	
pX, platoon unblocked	0.26	0.26	0.22	0.26	0.26	0.92	0.22			0.92		
vC, conflicting volume	1781	1780	1138	1789	1803	572	1167			578		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1894	1891	0	1928	1979	491	0			498		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	0	100	93	62	100	99	96			98		
cM capacity (veh/h)	12	17	237	12	15	534	355			961		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	31	12	590	1185
Volume Left	14	4	13	19
Volume Right	16	8	12	57
cSH	24	31	355	961
Volume to Capacity	1.27	0.39	0.04	0.02
Queue Length 95th (ft)	96	32	3	1
Control Delay (s)	514.3	183.8	1.2	0.7
Lane LOS	F	F	A	A
Approach Delay (s)	514.3	183.8	1.2	0.7
Approach LOS	F	F		

Intersection Summary			
Average Delay	10.8		
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	1	53	54	3	4	71	503	18	19	973	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.98			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.92			0.99		1.00	0.99		1.00	1.00	
Flt Protected		0.98			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1660			1763		1770	1852		1716	1821	
Flt Permitted		0.89			0.64		0.16	1.00		0.44	1.00	
Satd. Flow (perm)		1508			1184		294	1852		802	1821	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	32	1	55	56	3	4	74	524	19	20	1014	25
RTOR Reduction (vph)	0	50	0	0	3	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	38	0	0	60	0	74	542	0	20	1038	0
Confl. Peds. (#/hr)	1		2	2		1	1		3	3		1
Confl. Bikes (#/hr)									5			3
Heavy Vehicles (%)	0%	0%	2%	2%	0%	0%	2%	2%	0%	5%	4%	0%
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)		8.2			8.2		80.5	75.7		75.1	73.0	
Effective Green, g (s)		8.2			8.2		80.5	75.7		75.1	73.0	
Actuated g/C Ratio		0.08			0.08		0.80	0.76		0.75	0.73	
Clearance Time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Vehicle Extension (s)		2.5			2.5		2.3	5.2		2.3	5.2	
Lane Grp Cap (vph)		124			97		308	1402		621	1329	
v/s Ratio Prot							c0.01	0.29		0.00	c0.57	
v/s Ratio Perm		0.02			c0.05		0.18			0.02		
v/c Ratio		0.30			0.62		0.24	0.39		0.03	0.78	
Uniform Delay, d1		43.2			44.4		8.9	4.2		3.2	8.5	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.0			10.2		0.2	0.8		0.0	4.6	
Delay (s)		44.2			54.6		9.1	5.0		3.2	13.1	
Level of Service		D			D		A	A		A	B	
Approach Delay (s)		44.2			54.6			5.5			12.9	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM Average Control Delay	13.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.5
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Volume (vph)	12	50	12	3	23	21
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69
Hourly flow rate (vph)	17	72	17	4	33	30

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	90	22	64
Volume Left (vph)	17	0	33
Volume Right (vph)	72	4	0
Hadj (s)	-0.40	-0.12	0.20
Departure Headway (s)	3.7	4.0	4.3
Degree Utilization, x	0.09	0.02	0.08
Capacity (veh/h)	950	861	816
Control Delay (s)	7.1	7.1	7.7
Approach Delay (s)	7.1	7.1	7.7
Approach LOS	A	A	A

Intersection Summary			
Delay	7.3		
HCM Level of Service	A		
Intersection Capacity Utilization	19.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	51	1	1	60	13	0	0	1	18	0	9
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
Hourly flow rate (vph)	4	76	1	1	90	19	0	0	1	27	0	13
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					868							
pX, platoon unblocked												
vC, conflicting volume	109			78			201	198	77	190	189	99
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	109			78			201	198	77	190	189	99
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	97	100	99
cM capacity (veh/h)	1494			1534			748	699	990	771	707	962

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	82	110	1	40
Volume Left	4	1	0	27
Volume Right	1	19	1	13
cSH	1494	1534	990	826
Volume to Capacity	0.00	0.00	0.00	0.05
Queue Length 95th (ft)	0	0	0	4
Control Delay (s)	0.4	0.1	8.6	9.6
Lane LOS	A	A	A	A
Approach Delay (s)	0.4	0.1	8.6	9.6
Approach LOS			A	A

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	19.4%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix G Year 2016 Total Traffic Conditions Worksheets – Mitigated

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	32	0	15	11	0	12	7	1019	6	1	292	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	0	16	12	0	13	8	1108	7	1	317	8
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								992			883	
pX, platoon unblocked	0.32	0.32		0.32	0.32	0.32				0.32		
vC, conflicting volume	1460	1454	323	1467	1454	1111	326			1114		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1377	1356	323	1397	1358	292	326			302		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	4	100	98	68	100	95	99			100		
cM capacity (veh/h)	36	48	721	37	48	242	1244			409		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total	51	25	8	1114	326
Volume Left	35	12	8	0	1
Volume Right	16	13	0	7	8
cSH	52	67	1244	1700	409
Volume to Capacity	0.98	0.37	0.01	0.66	0.00
Queue Length 95th (ft)	108	35	0	0	0
Control Delay (s)	245.3	88.0	7.9	0.0	0.1
Lane LOS	F	F	A		A
Approach Delay (s)	245.3	88.0	0.1		0.1
Approach LOS	F	F			

Intersection Summary			
Average Delay	9.7		
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	13	0	15	4	0	7	12	514	11	17	1009	52
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	14	0	16	4	0	8	13	565	12	19	1109	57
Pedestrians		1			1							
Lane Width (ft)		12.0			12.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		0			0							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								992			883	
pX, platoon unblocked	0.25	0.25	0.22	0.25	0.25	0.93	0.22			0.93		
vC, conflicting volume	1775	1780	1138	1789	1803	572	1167			578		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1919	1940	0	1978	2029	497	0			504		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	0	100	93	59	100	99	96			98		
cM capacity (veh/h)	11	16	237	11	14	534	355			962		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total	31	12	9	581	1185
Volume Left	14	4	9	4	19
Volume Right	16	8	0	12	57
cSH	23	28	355	355	962
Volume to Capacity	1.34	0.43	0.04	0.04	0.02
Queue Length 95th (ft)	98	34	3	3	1
Control Delay (s)	554.1	207.2	15.5	1.0	0.7
Lane LOS	F	F	C	A	A
Approach Delay (s)	554.1	207.2	1.2		0.7
Approach LOS	F	F			

Intersection Summary			
Average Delay	11.6		
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	32	0	15	11	0	12	7	1019	6	1	292	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	0	16	12	0	13	8	1108	7	1	317	8
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type								None			TWLTL	
Median storage veh)											2	
Upstream signal (ft)								992			883	
pX, platoon unblocked	0.31	0.31		0.31	0.31	0.31				0.31		
vC, conflicting volume	1460	1454	323	1467	1454	1111	326			1114		
vC1, stage 1 conf vol	324	324		1126	1126							
vC2, stage 2 conf vol	1136	1129		341	328							
vCu, unblocked vol	1372	1351	323	1393	1353	247	326			258		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.2	5.5		6.1	5.5							
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	81	100	98	94	100	95	99			100		
cM capacity (veh/h)	185	191	721	204	194	247	1244			410		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total	51	25	8	1114	326
Volume Left	35	12	8	0	1
Volume Right	16	13	0	7	8
cSH	242	225	1244	1700	410
Volume to Capacity	0.21	0.11	0.01	0.66	0.00
Queue Length 95th (ft)	19	9	0	0	0
Control Delay (s)	23.8	23.0	7.9	0.0	0.1
Lane LOS	C	C	A		A
Approach Delay (s)	23.8	23.0	0.1		0.1
Approach LOS	C	C			

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	13	0	15	4	0	7	12	514	11	17	1009	52
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	14	0	16	4	0	8	13	565	12	19	1109	57
Pedestrians		1			1							
Lane Width (ft)		12.0			12.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		0			0							
Right turn flare (veh)												
Median type								None			TWLTL	
Median storage veh)											2	
Upstream signal (ft)								992			883	
pX, platoon unblocked	0.26	0.26	0.21	0.26	0.26	0.91	0.21			0.91		
vC, conflicting volume	1775	1780	1138	1789	1803	572	1167			578		
vC1, stage 1 conf vol	1176	1176		598	598							
vC2, stage 2 conf vol	599	604		1191	1204							
vCu, unblocked vol	1800	1821	0	1857	1908	483	0			489		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)	6.2	5.5		6.1	5.5							
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	92	100	93	97	100	99	96			98		
cM capacity (veh/h)	179	168	234	157	142	536	351			960		

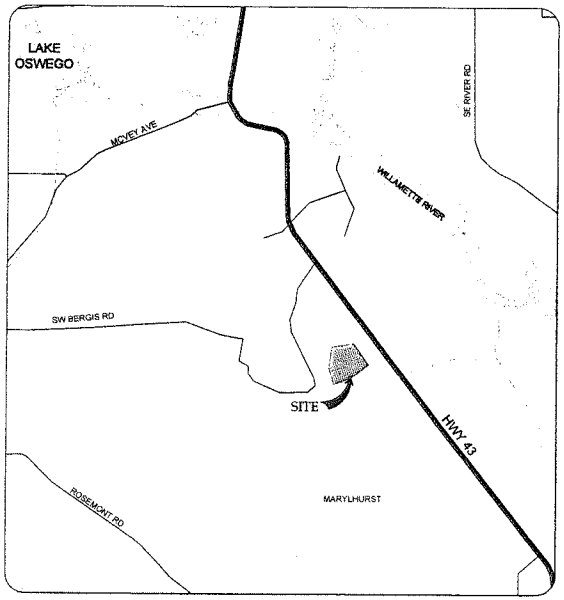
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total	31	12	9	581	1185
Volume Left	14	4	9	4	19
Volume Right	16	8	0	12	57
cSH	205	285	351	351	960
Volume to Capacity	0.15	0.04	0.04	0.04	0.02
Queue Length 95th (ft)	13	3	3	3	1
Control Delay (s)	25.7	18.2	15.7	1.0	0.7
Lane LOS	D	C	C	A	A
Approach Delay (s)	25.7	18.2	1.2		0.7
Approach LOS	D	C			

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		

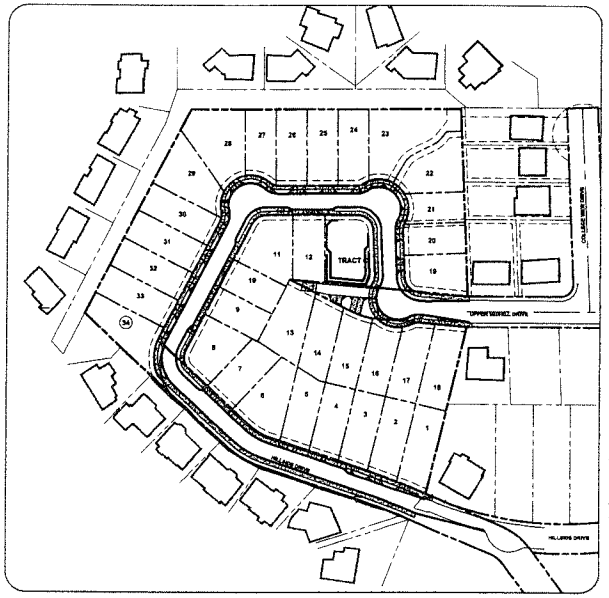
LAND USE DOCUMENTS
FOR
CHÊNE BLANC ESTATES
PREPARED FOR
1800 UPPER MIDHILL DRIVE, LLC

TAX LOT 200 LOCATED IN THE
NE 1/4 OF SW 1/4 SEC. 14, T.2S, R.1E., W.M.
CITY OF WEST LINN, CLACKAMAS COUNTY, OREGON

SHEET INDEX	
Sheet Number	Sheet Title
C000	COVER SHEET
C100	EXISTING CONDITIONS PLAN
C105	PHASE 1 DEMOLITION & EROSION CONTROL
C110	TREE PRESERVATION PLAN
C111	TREE PRESERVATION DETAILS I
C112	TREE PRESERVATION DETAILS II
C113	TREE PRESERVATION DETAILS III
C114	TREE PRESERVATION DETAILS IV
C130	SLOPE ANALYSIS PLAN
C200	PRELIMINARY PLAT
C201	TYPICAL SECTIONS
C210	PRELIMINARY SITE PLAN
C220	ROADWAY PROFILES
C230	PHASE 2 GRADING AND EROSION CONTROL
C280	PHOTOMETRICS PLAN
C300	COMPOSITE UTILITY PLAN
L1	LANDSCAPE PLAN



VICINITY MAP
NOT TO SCALE



SITE MAP
Scale: 1 inch = 100 feet
100 50 0 50 100

SITE INFORMATION

SITE ADDRESS
18000 UPPER MIDHILL DRIVE
WEST LINN OREGON

TAX LOT(S)
2S1E14CA 00200

JURSIDICTION
CITY OF WEST LINN

FLOOD HAZARD
MAP NUMBER: 41005C0019D
ZONE X (UNSHADED)

ZONING
R-4.5

GROSS SITE AREA
6.10 AC.

UTILITIES & SERVICES

WATER, STORM, SEWER
CITY OF WEST LINN
CONTACT: KHOI LE
PHONE: (503) 722-5517
EMAIL: kle@westlinnoregon.gov

CABLE
CENTURY LINK - REGIONAL ENGINEER
CONTACT: KENNETH SCIULLI
PHONE: (503) 242-0304
EMAIL: kenneth.sciulli@centurylink.com

GAS
NORTHWEST NATURAL - ENGINEERING
CONTACT: BRIAN KELLEY
PHONE: (503) 220-2427
EMAIL: brian.kelley@nwnatural.com

CABLE
CENTURY LINK - REGIONAL MANAGER
CONTACT: JEREMY MORRIS
PHONE: (503) 293-4567
EMAIL: jeremy.morris@centurylink.com

POWER
PGE
CONTACT: CHRIS JEWETT
PHONE: (503) 672-5481
EMAIL: chris.jewett@pgn.com

CABLE
COMCAST
CONTACT: KENNETH WILLS
PHONE: (503) 793-9881
EMAIL: kenneth_wills@cable.comcast.com

FIRE, POLICE, SCHOOLS, ROADS, PARKS
CITY OF WEST LINN

RECEIVED
FEB 0 1 2016
PLANNING & BUILDING
CITY OF WEST LINN
INT. ____ TIME ____

PROJECT TEAM

OWNER / APPLICANT
UPPER MIDHILL ESTATES, LLC
C/O: RYAN ZYGAR
981 SW KING AVENUE
PORTLAND, OR 97205
PHONE: (360) 798-4838
EMAIL: ryan@zygar.com

LAND SURVEYOR
COMPASS SURVEYING
4107 SE INTERNATIONAL WAY, SUITE 705
MILWAUKIE, OR 97222
CONTACT: DON DEVLAEMINCK, PLS
PHONE: 503-653-9093
EMAIL: dond@compass-engineering.com

CIVIL ENGINEER
3J CONSULTING, INC.
5075 SW GRIFFITH DRIVE, SUITE 150
BEAVERTON, OR 97005
CONTACTS:
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PHONE: (503) 946-9365 x202
EMAIL: jesse.emerson@3j-consulting.com
AARON MURPHY, PE
PHONE: (503) 946-9365 x 218
EMAIL: aaron.murphy@3j-consulting.com

PLANNING CONSULTANT
3J CONSULTING, INC
5075 SW GRIFFITH DRIVE, SUITE 150
BEAVERTON, OR 97005
CONTACT: ANDREW TULL
PHONE: 503-946-9365
EMAIL: andrew.tull@3j-consulting.com

GEOTECHNICAL CONSULTANT
GEOPACIFIC ENGINEERING, INC.
14835 SW 72ND AVENUE
PORTLAND, OR 97224
CONTACT: JIM IMBRIE
PHONE: (503) 625-4455
EMAIL: jimbrie@geopacificeng.com

A PORTION OF "ROBINWOOD"
TAX LOT 200, MAP 2-1E-14CA
NE 1/4 SW 1/4 SEC. 35, T.2S., R.1E., W.M.
CITY OF WEST LINN,
CLACKAMAS COUNTY, OREGON

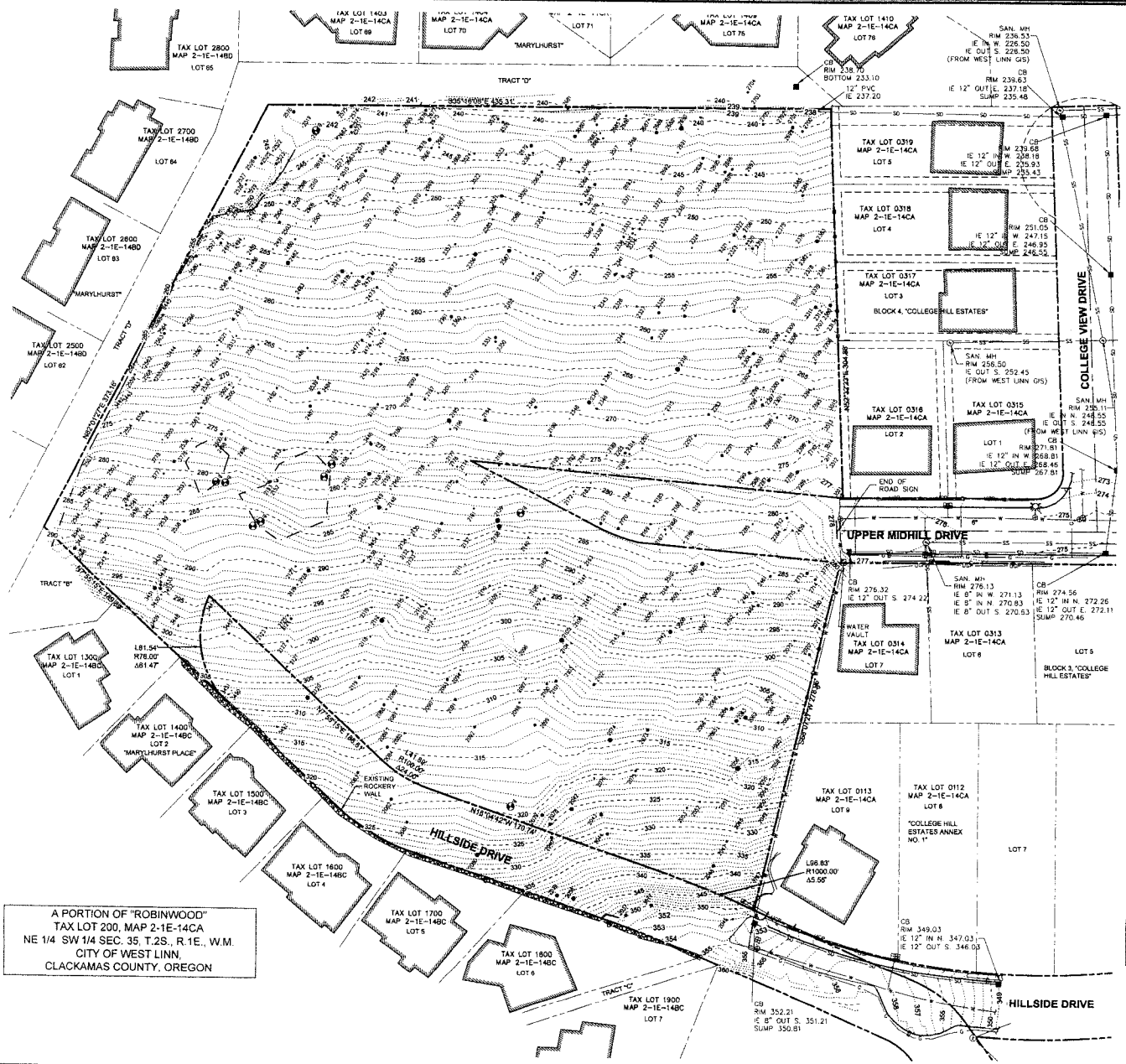
DESIGN REVIEW
	REVISION SUMMARY	BY	DATE
1			01/11/2016

COVER SHEET
CHÊNE BLANC ESTATES
LAND USE DOCUMENTS
1800 UPPER MIDHILL DRIVE, LLC
WEST LINN, OR

REGISTERED PROFESSIONAL ENGINEER
OREGON
JUNE 16, 1981
JESSE T. EMERSON
PRELIMINARY
EXPIRES: 12/31/17

3J CONSULTING, INC
CIVIL ENGINEERING
WATER RESOURCES
LAND USE PLANNING
5075 SW GRIFFITH DRIVE, SUITE 150, BEAVERTON, OR 97005
PHONE & FAX: (503) 946-9365

3J JOB ID #	15256
LAND USE #	TBD
TAX LOT #	2S1E14CA 00200
DESIGNED BY	JTE, CRW, JCP
CHECKED BY	JTE
SHEET TITLE	COVER SHEET
SHEET NUMBER	C000



Scale: 1 inch = 40 feet

40 20 0 20 40

LEGEND

- PROJECT BOUNDARY LINE
- RIGHT OF WAY LINE
- ROADWAY CENTER LINE
- ADJACENT PROPERTY BOUNDARY
- 110 EXISTING MAJOR CONTOUR
- 108 EXISTING MINOR CONTOUR
- EASEMENT LINE
- BUILDING
- CURB
- FENCE
- C TELECOM. LINE
- G GAS LINE
- UGP UNDERGROUND POWER
- VEGETATION LIMITS LINE
- SS SANITARY SEWER
- SD STORM DRAIN
- W WATER MAIN
- EXISTING MAPPED WETLAND
- EXISTING DRAINAGE SWALE
- TEST PIT
- FIRE HYDRANT
- WATER VALVE
- BLOW-OFF VALVE
- SIGN
- SANITARY MANHOLE
- SANITARY CLEANOUT
- STORM MANHOLE
- STORM CLEANOUT
- STORM INLET
- TELEPHONE PEDESTAL
- 3504 EXISTING TREE*

EXISTING CONDITIONS PLAN

THIS PLAN IS INTENDED FOR USE AS AN EXISTING CONDITIONS PLAN SHOWING THE CONDITIONS OF THE SITE PRIOR TO CONSTRUCTION. INFORMATION SHOWN ON THIS PLAN WAS DEVELOPED FROM THE TOPOGRAPHIC SURVEY, AERIAL PHOTOS, AND SITE OBSERVATIONS BY THE ENGINEER. NOT ALL SURFACE FEATURES OR UTILITIES MAY BE SHOWN. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO CONSTRUCTION TO DETERMINE WORK SPECIFIC DETAILS. TOPOGRAPHIC INFORMATION PROVIDED BY COMPASS LAND SURVEYING, DATED JUNE 2015.

ZONE X (UN-SHADED): THE SITE IS LOCATED WITHIN ZONE X (UN-SHADED) PER FLOOD INSURANCE RATE MAP (FIRM) COMMUNITY-PANEL NUMBER 41005C 0015 D. FEMA'S DEFINITION OF ZONE X (UN-SHADED) IS AN AREA OF MINIMAL FLOOD HAZARD, USUALLY DEPICTED ON FIRMS AS ABOVE THE 500-YEAR FLOOD LEVEL. ZONE X IS THE AREA DETERMINED TO BE OUTSIDE THE 500-YEAR FLOOD AND PROTECTED BY LEVEE FROM 100-YEAR FLOOD. IN COMMUNITIES THAT PARTICIPATE IN THE NFIP, FLOOD INSURANCE IS AVAILABLE TO ALL PROPERTY OWNERS AND RENTERS IN THESE ZONES.

SURVEYOR'S NOTE

1. UTILITY INFORMATION SHOWN ON THIS MAP IS BASED UPON OBSERVED FEATURES, RECORD DATA AND TONE MARKS PROVIDED BY PUBLIC UTILITY LOCATION SERVICES. NO WARRANTIES ARE MADE REGARDING THE ACCURACY OR COMPLETENESS OF THE UTILITY INFORMATION SHOWN. ADDITIONAL UTILITIES MAY EXIST. INTERESTED PARTIES ARE HEREBY ADVISED THAT UTILITY LOCATIONS SHOULD BE VERIFIED PRIOR TO DESIGN OR CONSTRUCTION OF ANY CRITICAL ITEMS.

2. VERTICAL DATUM: NAVD'88 UTILIZING GPS POSITIONING TIED TO THE ORGN WITH REAL TIME CORRECTORS REFERENCED TO DATUM NAD 83(2011) EPOCH 2010.00. THIS DATUM REALIZATION WAS VERIFIED THROUGH DIRECT OBSERVATION TO NGS CONTROL POINT Q723 HAVING A POINT IDENTIFICATION OF RD1491. THIS POINT IS DESCRIBED AS A STAINLESS STEEL ROD W/ SLEEVE NEAR THE INTERSECTION OF STATE HIGHWAY 224 AND LAKE ROAD. THE ELEVATION OF THIS POINT IS PUBLISHED AS 31.131 AND WAS ESTABLISHED BY NGS THROUGH DIFFERENTIAL LEVELING AND ADJUSTED BY THE NATIONAL GEODETIC SURVEY IN JUNE 1991 AND HAS A VERTICAL ORDER OF FIRST CLASS II.

3. BASIS OF BEARINGS: CENTERLINE OF UPPER MIDHILL DRIVE AS PER THE PLAT OF "COLLEGE HILL ESTATES"

4. TOPOGRAPHIC FEATURES SHOWN ON THIS MAP WERE LOCATED USING STANDARD PRECISION TOPOGRAPHIC MAPPING PROCEDURES. THIRD PARTY USERS OF DATA FROM THIS MAP PROVIDED VIA AUTOCAD DRAWING FILES OR DATA EXCHANGE FILES SHOULD NOT RELY ON ANY AUTOCAD GENERATED INFORMATION WHICH IS BEYOND THE LIMITS OF PRECISION OF THIS MAP. THIRD PARTIES USING DATA FROM THIS MAP IN AN AUTOCAD FORMAT SHOULD VERIFY ANY ELEMENTS REQUIRING PRECISE LOCATIONS PRIOR TO COMMENCEMENT OF ANY CRITICAL DESIGN OR CONSTRUCTION. CONTACT COMPASS LAND SURVEYORS FOR FURTHER INFORMATION. FURTHERMORE, COMPASS LAND SURVEYORS WILL NOT BE RESPONSIBLE NOR HELD LIABLE FOR ANY DESIGN OR CONSTRUCTION RELATED PROBLEMS THAT ARISE OUT OF THIRD PARTY USAGE OF THIS MAP (IN AUTOCAD OR OTHER FORMAT) IN ANY MANNER INCONSISTENT WITH THIS STATEMENT.

5. UNDERGROUND PIPE SIZES AND MATERIAL TYPES ARE BASED UPON RECORD DRAWINGS. INFORMATION PROVIDED BY UTILITY LOCATORS AND FIELD OBSERVATIONS AT MANHOLES AND CATCH BASIN RIMS AND SHOULD BE VERIFIED.

REESMAN PROPERTY EXISTING CONDITIONS MAP
TL 200 IN NE 1/4 OF SW 1/4 SEC. 14, T.2S, R.1E., W.M.
CITY OF WEST LINN, CLACKAMAS COUNTY, OREGON

811 Know what's below. Call before you dig.

DESIGN REVIEW	01/11/2016
REVISION SUMMARY	BY / DATE

EXISTING CONDITIONS PLAN
CHÊNE BLANC ESTATES
LAND USE DOCUMENTS
1800 UPPER MIDHILL DRIVE, LLC
WEST LINN, OR

REGISTERED PROFESSIONAL ENGINEER
OREGON
JULY 16, 1991
JEFFREY J. EMERSON
PRELIMINARY
EXPIRES: 12/31/17

3J CONSULTING, INC.
CIVIL ENGINEERING
WATER RESOURCES
LAND USE PLANNING
5075 SW GRIFFITH DRIVE, SUITE 150, BEAVERTON, OR 97005
PHONE & FAX: (503) 946-9365

3J JOB ID #	15268
LAND USE #	TBD
TAX LOT #	2S1E14CA 00200
DESIGNED BY	JTE, CKW, JCP
CHECKED BY	JTE

SHEET TITLE: EX. COND.

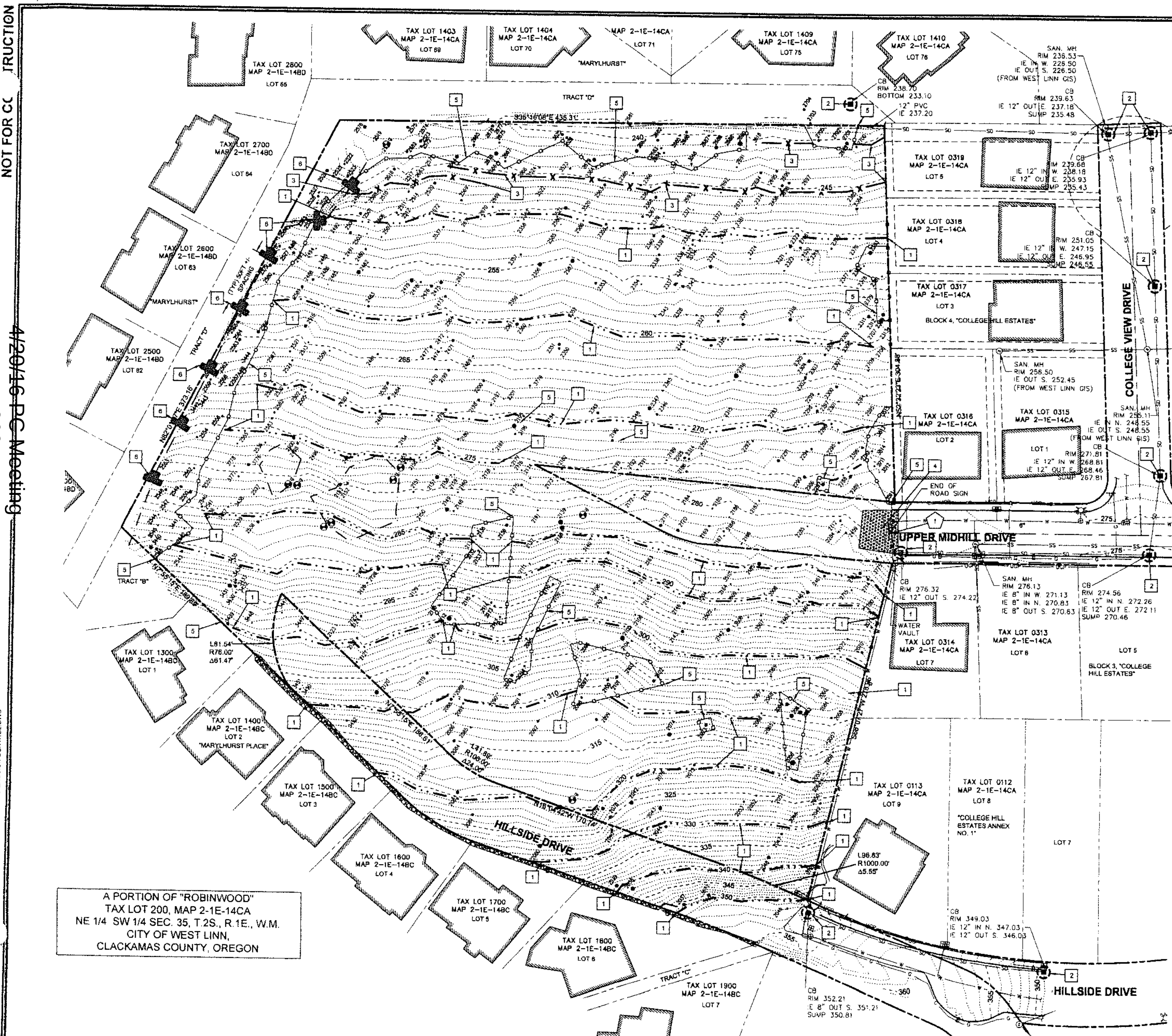
SHEET NUMBER: C100

NOT FOR CONSTRUCTION

4/20/16 PC Meeting

268

P:\15268-UPPER MIDHILL ESTATE_MAP\CAD\DETAILS\EXISTING CONDITIONS PLAN.DWG



A PORTION OF "ROBINWOOD"
TAX LOT 200, MAP 2-1E-14CA
NE 1/4 SW 1/4 SEC. 35, T.2S., R.1E., W.M.
CITY OF WEST LINN,
CLACKAMAS COUNTY, OREGON

Scale: 1 inch = 40 feet

LEGEND

- PROJECT BOUNDARY LINE
- RIGHT OF WAY LINE
- PROPOSED PROPERTY LINE
- ROADWAY CENTER LINE
- ADJACENT PROPERTY BOUNDARY
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- EASEMENT LINE
- STRAW WATTLE
- SILT FENCE
- TREE PROTECTION FENCING
- EXISTING MAPPED WETLAND
- EXISTING DRAINAGE SWALE
- CONSTRUCTION ENTRANCE
- INLET PROTECTION
- EROSION CONTROL: BIO BAG
- SURFACE RUNOFF FLOW ARROW
- TREE LOCATION AND TAG NUMBER
- TEST PIT

SEE SHEETS C110-C114 FOR TREE PRESERVATION AND REMOVAL INFORMATION

DEMOLITION KEY NOTES

1. REMOVE SIGN AND POST AND DISPOSE OF OFF-SITE.

EROSION CONTROL KEY NOTES

1. INSTALL STRAW WATTLE AS NEEDED FOR CONSTRUCTION PHASING. MAINTAIN EXISTING VEGETATION AS LONG AS POSSIBLE.
2. INSTALL INLET PROTECTION.
3. PLACE SILT FENCING AT LIMITS OF GRADING AND CONSTRUCTION WHERE SHOWN.
4. CONSTRUCT STABILIZED CONSTRUCTION ENTRANCE.
5. INSTALL TREE PROTECTION FENCING AT LIMITS SHOWN.
6. INSTALL EROSION CONTROL BIO BAG(S) AT LOCATION(S) SHOWN.

Know what's below. Call before you dig. 811

DESIGN REVIEW 01/11/2016

PHASE 1 DEMOLITION & EROSION CONTROL
CHÊNE BLANC ESTATES
LAND USE DOCUMENTS
1800 UPPER MIDHILL DRIVE, LLC
WEST LINN, OR

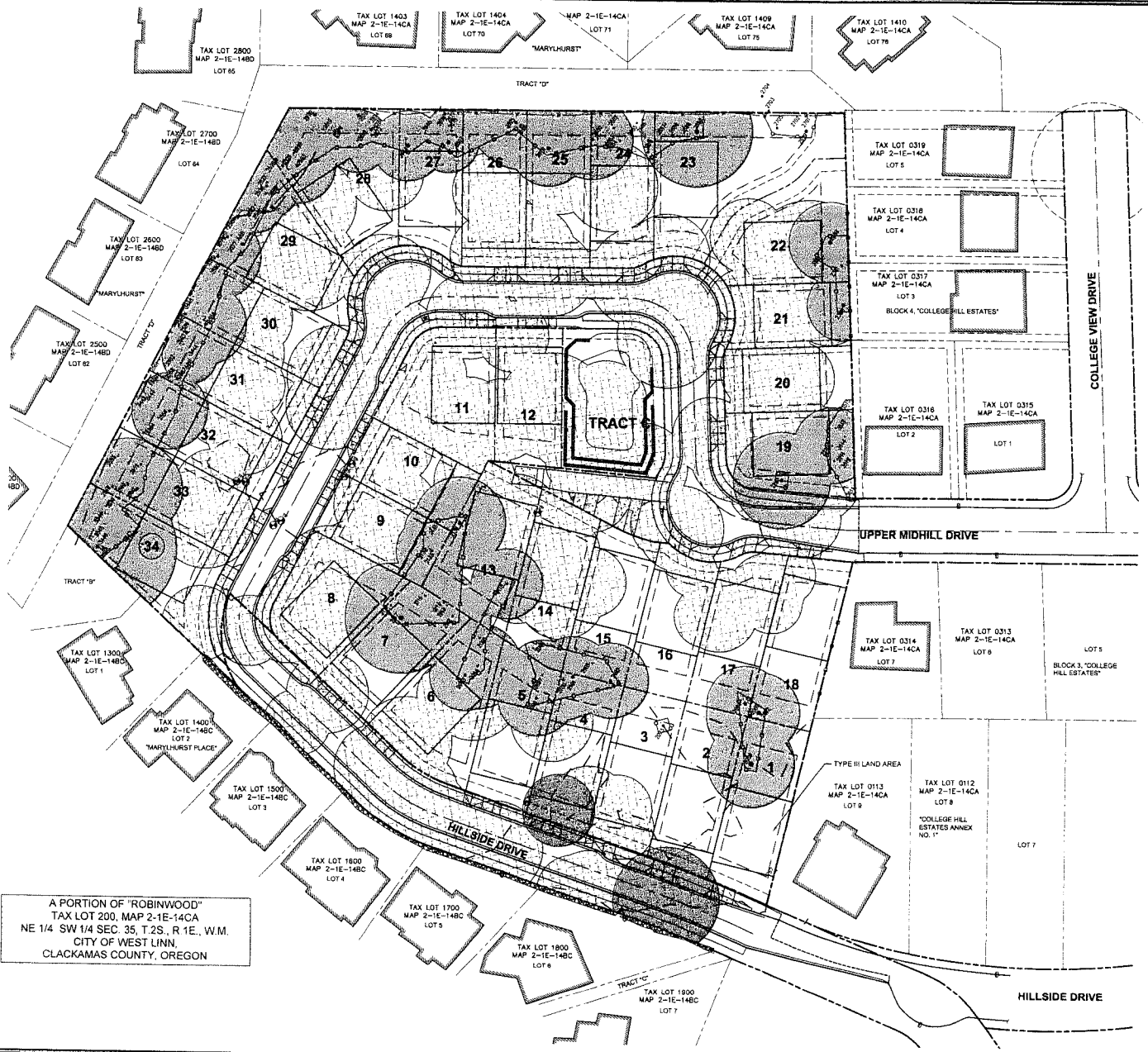
PRELIMINARY

3J CONSULTING, INC
CIVIL ENGINEERING
WATER RESOURCES
LAND USE PLANNING
5075 SW GRIFFITH DRIVE, SUITE 150, BEAVERTON, OR 97005
PHONE & FAX: (503) 946-9365

3J JOB ID #: 15266
LAND USE #: TBD
TAX LOT #: 2S1E14CA 00200
DESIGNED BY: JTE, CKW, JCP
CHECKED BY: JTE

SHEET TITLE: PH1 DEMO & E.C.
SHEET NUMBER: C105

NOT FOR CONSTRUCTION



GENERAL TREE INVENTORY STATISTICS

TOTAL PROPERTY AREA:	265,860 +/- SF (6.10 AC)
TOTAL TREE INVENTORY:	502
TOTAL TREES RETAINED:	114
TOTAL TREES REMOVED:	388
TOTAL TREE CALIPER INCHES:	8,906
TOTAL CALIPER INCHES RETAINED:	2,026
TOTAL CALIPER INCHES REMOVED:	6,880

SIGNIFICANT TREE STATISTICS

SIGNIFICANT TREE INVENTORY:	169
SIGNIFICANT TREES RETAINED:	50
SIGNIFICANT TREES REMOVED:	119
SIGNIFICANT TREE CALIPER INCHES:	3,891
SIGNIFICANT CALIPER INCHES RETAINED:	1,129
SIGNIFICANT CALIPER INCHES REMOVED:	2,762
EXISTING SIGNIFICANT TREE CANOPY COVERAGE	238,212 SF
SIGNIFICANT TREE CANOPY REMOVED DUE TO R.O.W. IMPROVEMENTS:	160,349 SF
TREE PRESERVATION AREA REQUIRED *(20% OF EXISTING CANOPY)*:	47,642 SF
TREE PRESERVATION AREA PROVIDED *(33% OF EXISTING CANOPY)*:	77,863 SF
SIGNIFICANT NON-TYPE I OR II AREA RETAINED (DRIPLINE +10'):	0 SF
TOTAL SIGNIFICANT NON-TYPE I OR II AREA (DRIPLINE +10'):	7,045 SF
TOTAL PERCENT NON-TYPE I OR II AREA RETAINED (DRIPLINE +10')	0%

DESIGN REVIEW

	BY	DATE
REVISION SUMMARY		

01/11/2016

TREE PRESERVATION PLAN
CHÊNE BLANC ESTATES
LAND USE DOCUMENTS
1800 UPPER MIDHILL DRIVE, LLC
WEST LINN, OR

REGISTERED PROFESSIONAL ENGINEER
OREGON
JESSE T. EMERSON
EXPIRES: 12/31/17
PRELIMINARY

3J CONSULTING, INC
CIVIL ENGINEERING
WATER RESOURCES
LAND USE PLANNING
5075 SW GRIFFITH DRIVE, SUITE 150, BEAVERTON, OR 97005
PHONE 503.946.9365

3J JOB ID #	15286
LAND USE #	TBD
TAX LOT #	2S1E14CA 00200
DESIGNED BY	JTE, CAW, JCP
CHECKED BY	JTE

SHEET TITLE
TREE PRES. PLAN

SHEET NUMBER
C110

TREE INVENTORY

SURVEY POINT NUMBER	TREE SPECIES	NOMINAL CALIPER SIZE	SIGNIFICANT DESIGNATION	PROPOSED ACTION	REMOVE DUE TO CONDITION
2037	DOUGLAS-FIR	30	SIGNIFICANT	REMOVE	ROW
2038	DOUGLAS-FIR	38	SIGNIFICANT	REMOVE	ROW
2039	DOUGLAS-FIR	32	SIGNIFICANT	REMOVE	ROW
2040	DOUGLAS-FIR	26	NON-SIGNIFICANT	REMOVE	ROW
2042	DOUGLAS-FIR	36	NON-SIGNIFICANT	REMOVE	BUILDING
2043	DOUGLAS-FIR	32	NON-SIGNIFICANT	REMOVE	BUILDING
2044	DOUGLAS-FIR	26	NON-SIGNIFICANT	REMOVE	GRADING
2045	PORT-ORFORD-CEDAR	18	NON-SIGNIFICANT	REMOVE	ROW
2046	DOUGLAS-FIR	6	NON-SIGNIFICANT	REMOVE	ROW
2047	BIG LEAF MAPLE	20	NON-SIGNIFICANT	REMOVE	BUILDING
2048	OREGON WHITE OAK	29	NON-SIGNIFICANT	REMOVE	BUILDING
2049	BIG LEAF MAPLE	18	NON-SIGNIFICANT	REMOVE	BUILDING
2050	BIG LEAF MAPLE	8	NON-SIGNIFICANT	REMOVE	CONDITION
2051	OREGON WHITE OAK	14	NON-SIGNIFICANT	REMOVE	BUILDING
2052	OREGON WHITE OAK	16	NON-SIGNIFICANT	REMOVE	BUILDING
2053	SCOULER'S WILLOW	18	NON-SIGNIFICANT	REMOVE	BUILDING
2054	RED ALDER	8	NON-SIGNIFICANT	REMOVE	CONDITION
2055	RED ALDER	10	NON-SIGNIFICANT	REMOVE	CONDITION
2056	DOUGLAS-FIR	42	SIGNIFICANT	RETAIN	N/A
2057	OREGON WHITE OAK	8, 12	NON-SIGNIFICANT	REMOVE	CONDITION
2058	BIG LEAF MAPLE	21	NON-SIGNIFICANT	REMOVE	CONDITION
2059	BIG LEAF MAPLE	14	NON-SIGNIFICANT	REMOVE	CONDITION
2060	BIG LEAF MAPLE	8	NON-SIGNIFICANT	REMOVE	CONDITION
2061	OREGON WHITE OAK	10, 12	NON-SIGNIFICANT	REMOVE	CONDITION
2062	DOUGLAS-FIR	34	SIGNIFICANT	RETAIN	N/A
2063	DOUGLAS-FIR	36	SIGNIFICANT	RETAIN	N/A
2064	DOUGLAS-FIR	28	SIGNIFICANT	RETAIN	N/A
2065	MADRONE	10	NON-SIGNIFICANT	REMOVE	CONDITION
2066	MADRONE	12	NON-SIGNIFICANT	REMOVE	CONDITION
2067	MADRONE	14	NON-SIGNIFICANT	REMOVE	CONDITION
2068	MADRONE	13	NON-SIGNIFICANT	REMOVE	CONDITION
2069	MADRONE	10, 16	NON-SIGNIFICANT	REMOVE	CONDITION
2070	DOUGLAS-FIR	24	NON-SIGNIFICANT	REMOVE	BUILDING
2071	DOUGLAS-FIR	18	NON-SIGNIFICANT	REMOVE	BUILDING
2072	BIG LEAF MAPLE	6x8, 16	NON-SIGNIFICANT	REMOVE	BUILDING
2073	OREGON WHITE OAK	24	NON-SIGNIFICANT	RETAIN	N/A
2074	DOUGLAS-FIR	38	NON-SIGNIFICANT	REMOVE	CONDITION
2075	RED ALDER	20	NON-SIGNIFICANT	REMOVE	BUILDING
2076	MADRONE	16	NON-SIGNIFICANT	REMOVE	BUILDING
2078	DOUGLAS-FIR	28	NON-SIGNIFICANT	REMOVE	GRADING
2079	DOUGLAS-FIR	30	SIGNIFICANT	REMOVE	GRADING
2080	OREGON WHITE OAK	36	SIGNIFICANT	REMOVE	ROW
2081	OREGON WHITE OAK	22	SIGNIFICANT	REMOVE	ROW
2082	OREGON WHITE OAK	30	SIGNIFICANT	REMOVE	ROW
2083	OREGON WHITE OAK	14, 20 24	SIGNIFICANT	REMOVE	ROW
2084	OREGON WHITE OAK	26	SIGNIFICANT	REMOVE	GRADING
2085	OREGON WHITE OAK	15	NON-SIGNIFICANT	REMOVE	BUILDING
2086	OREGON WHITE OAK	10	NON-SIGNIFICANT	REMOVE	BUILDING
2087	OREGON WHITE OAK	18	NON-SIGNIFICANT	REMOVE	BUILDING
2088	OREGON WHITE OAK	24	NON-SIGNIFICANT	REMOVE	BUILDING
2089	OREGON WHITE OAK	14	NON-SIGNIFICANT	REMOVE	BUILDING
2090	OREGON WHITE OAK	14	SIGNIFICANT	RETAIN	BUILDING
2091	OREGON WHITE OAK	28	SIGNIFICANT	RETAIN	BUILDING
2092	OREGON WHITE OAK	22	NON-SIGNIFICANT	REMOVE	BUILDING
2093	OREGON WHITE OAK	24	NON-SIGNIFICANT	RETAIN	N/A
2094	OREGON WHITE OAK	15	NON-SIGNIFICANT	RETAIN	N/A
2095	OREGON WHITE OAK	12	NON-SIGNIFICANT	RETAIN	N/A
2096	OREGON WHITE OAK	6	NON-SIGNIFICANT	RETAIN	N/A
2097	OREGON WHITE OAK	12	SIGNIFICANT	RETAIN	N/A
2098	OREGON WHITE OAK	10, 18	SIGNIFICANT	RETAIN	N/A
2099	OREGON WHITE OAK	24	SIGNIFICANT	REMOVE	BUILDING
2100	OREGON WHITE OAK	20	SIGNIFICANT	RETAIN	N/A
2101	OREGON WHITE OAK	26	SIGNIFICANT	RETAIN	N/A
2102	OREGON WHITE OAK	26	SIGNIFICANT	RETAIN	N/A
2103	OREGON WHITE OAK	6	NON-SIGNIFICANT	RETAIN	N/A
2104	OREGON WHITE OAK	13	NON-SIGNIFICANT	REMOVE	CONDITION
2105	DOUGLAS-FIR	42	NON-SIGNIFICANT	REMOVE	CONDITION
2106	OREGON WHITE OAK	12	NON-SIGNIFICANT	REMOVE	BUILDING
2107	OREGON WHITE OAK	16	SIGNIFICANT	REMOVE	BUILDING
2108	OREGON WHITE OAK	2x12	SIGNIFICANT	REMOVE	BUILDING
2109	OREGON WHITE OAK	6 12	SIGNIFICANT	REMOVE	BUILDING
2110	OREGON WHITE OAK	17	SIGNIFICANT	RETAIN	N/A
2111	SCOULER'S WILLOW	12	NON-SIGNIFICANT	REMOVE	BUILDING
2112	OREGON WHITE OAK	16	SIGNIFICANT	RETAIN	N/A
2113	OREGON WHITE OAK	10	SIGNIFICANT	RETAIN	N/A
2114	OREGON WHITE OAK	15	SIGNIFICANT	RETAIN	N/A
2115	OREGON WHITE OAK	12	SIGNIFICANT	RETAIN	N/A
2116	OREGON WHITE OAK	16	SIGNIFICANT	RETAIN	N/A
2117	DOUGLAS-FIR	40	SIGNIFICANT	RETAIN	N/A
2118	OREGON WHITE OAK	14	NON-SIGNIFICANT	REMOVE	BUILDING
2119	DOUGLAS-FIR	28	NON-SIGNIFICANT	REMOVE	BUILDING
2120	DOUGLAS-FIR	37	SIGNIFICANT	REMOVE	ROW
2121	BIG LEAF MAPLE	16	NON-SIGNIFICANT	REMOVE	GRADING
2122	OREGON WHITE OAK	16	NON-SIGNIFICANT	REMOVE	BUILDING
2123	OREGON WHITE OAK	13	SIGNIFICANT	REMOVE	GRADING
2124	OREGON WHITE OAK	20	SIGNIFICANT	REMOVE	BUILDING
2125	OREGON WHITE OAK	16	SIGNIFICANT	REMOVE	BUILDING
2126	OREGON WHITE OAK	16	SIGNIFICANT	REMOVE	BUILDING
2127	OREGON WHITE OAK	16	SIGNIFICANT	REMOVE	GRADING
2128	DOUGLAS-FIR	32	SIGNIFICANT	REMOVE	BUILDING
2129	OREGON WHITE OAK	7	NON-SIGNIFICANT	REMOVE	CONDITION
2130	OREGON WHITE OAK	16	SIGNIFICANT	REMOVE	BUILDING
2131	OREGON WHITE OAK	10	NON-SIGNIFICANT	REMOVE	BUILDING
2132	OREGON WHITE OAK	10	SIGNIFICANT	RETAIN	N/A
2133	OREGON WHITE OAK	14	SIGNIFICANT	RETAIN	N/A
2134	BIG LEAF MAPLE	2x9	NON-SIGNIFICANT	REMOVE	CONDITION
2135	OREGON WHITE OAK	12	SIGNIFICANT	RETAIN	N/A
2136	OREGON WHITE OAK	26	SIGNIFICANT	RETAIN	N/A
2137	OREGON WHITE OAK	8	NON-SIGNIFICANT	REMOVE	BUILDING
2138	DOUGLAS-FIR	42	SIGNIFICANT	REMOVE	BUILDING
2139	DOUGLAS-FIR	42	SIGNIFICANT	REMOVE	BUILDING
2140	DOUGLAS-FIR	15	NON-SIGNIFICANT	REMOVE	BUILDING
2142	DOUGLAS-FIR	36	NON-SIGNIFICANT	REMOVE	BUILDING
2143	DOUGLAS-FIR	28	NON-SIGNIFICANT	REMOVE	BUILDING
2145	OREGON WHITE OAK	10	NON-SIGNIFICANT	REMOVE	BUILDING
2146	BIG LEAF MAPLE	24	NON-SIGNIFICANT	REMOVE	BUILDING
2147	OREGON WHITE OAK	12, 18	SIGNIFICANT	REMOVE	BUILDING
2148	OREGON WHITE OAK	15	NON-SIGNIFICANT	REMOVE	BUILDING
2149	DOUGLAS-FIR	34	SIGNIFICANT	REMOVE	BUILDING
2150	OREGON WHITE OAK	14	SIGNIFICANT	REMOVE	BUILDING
2151	OREGON WHITE OAK	15	SIGNIFICANT	REMOVE	BUILDING
2152	OREGON ASH	21	NON-SIGNIFICANT	REMOVE	ROW
2153	OREGON ASH	26	NON-SIGNIFICANT	REMOVE	ROW
2154	OREGON WHITE OAK	16	NON-SIGNIFICANT	REMOVE	ROW
2155	OREGON WHITE OAK	12	NON-SIGNIFICANT	REMOVE	GRADING
2156	OREGON WHITE OAK	15	NON-SIGNIFICANT	REMOVE	GRADING
2157	DOUGLAS-FIR	36	NON-SIGNIFICANT	REMOVE	BUILDING
2158	OREGON WHITE OAK	12	NON-SIGNIFICANT	REMOVE	BUILDING
2159	OREGON WHITE OAK	2x10	NON-SIGNIFICANT	REMOVE	BUILDING
2160	OREGON WHITE OAK	12	NON-SIGNIFICANT	REMOVE	BUILDING
2161	OREGON WHITE OAK	15	NON-SIGNIFICANT	REMOVE	BUILDING
2162	DOUGLAS-FIR	22	SIGNIFICANT	REMOVE	BUILDING
2163	BIG LEAF MAPLE	15	NON-SIGNIFICANT	REMOVE	BUILDING
2164	OREGON WHITE OAK	12	NON-SIGNIFICANT	REMOVE	BUILDING
2165	DOUGLAS-FIR	34	NON-SIGNIFICANT	REMOVE	GRADING
2166	OREGON WHITE OAK	14	NON-SIGNIFICANT	REMOVE	ROW
2167	OREGON WHITE OAK	12	NON-SIGNIFICANT	REMOVE	ROW
2168	OREGON WHITE OAK	19	SIGNIFICANT	REMOVE	ROW
2169	OREGON WHITE OAK	16	SIGNIFICANT	REMOVE	ROW
2170	DOUGLAS-FIR	28	NON-SIGNIFICANT	REMOVE	ROW
2171	DOUGLAS-FIR	28	NON-SIGNIFICANT	REMOVE	ROW
2172	OREGON WHITE OAK	12, 16	SIGNIFICANT	REMOVE	ROW
2173	OREGON WHITE OAK	10	NON-SIGNIFICANT	REMOVE	GRADING
2174	OREGON WHITE OAK	14	NON-SIGNIFICANT	REMOVE	GRADING
2175	OREGON WHITE OAK	20	SIGNIFICANT	REMOVE	GRADING

DESIGN REVIEW 01/11/2016

	REVISION SUMMARY	BY	DATE

TREE PRESERVATION DETAILS I
CHÊNE BLANC ESTATES
LAND USE DOCUMENTS

1800 UPPER MIDHILL DRIVE, LLC
WEST LINN, OR

PRELIMINARY
REGISTERED PROFESSIONAL ENGINEER
OREGON
JESSE T. EMERSON
EXPIRES 12/31/17

3J CONSULTING, INC
CIVIL ENGINEERING
WATER RESOURCES
LAND USE PLANNING
5075 SW GRIFFITH DRIVE, SUITE 150, BEAVERTON, OR 97005
PHONE & FAX: (503) 946-9365

3J JOB ID # | 15266
LAND USE # | TBD
TAX LOT # | 21E14CA 00200
DESIGNED BY | JTE, CRW, JCP
CHECKED BY | JTE

SHEET TITLE
TREE DETAILS I
SHEET NUMBER
C111

NOT FOR CONSTRUCTION

P:\15266-UPPER MIDHILL EST\ESMAN\CAD\DDIC110 TREE PRESERVATION PLAN.DWG

TREE INVENTORY

SURVEY POINT NUMBER	TREE SPECIES	NOMINAL CALIPER SIZE	SIGNIFICANT DESIGNATION	PROPOSED ACTION	REMOVE DUE TO CONDITION
2176	OREGON ASH	14	NON-SIGNIFICANT	REMOVE	CONDITION
2177	OREGON WHITE OAK	10	NON-SIGNIFICANT	REMOVE	CONDITION
2178	OREGON WHITE OAK	12	NON-SIGNIFICANT	REMOVE	BUILDING
2179	DOUGLAS-FIR	24	SIGNIFICANT	REMOVE	GRADING
2180	BIG LEAF MAPLE	17	NON-SIGNIFICANT	REMOVE	GRADING
2181	OREGON WHITE OAK	11	NON-SIGNIFICANT	REMOVE	CONDITION
2182	OREGON ASH	18	NON-SIGNIFICANT	REMOVE	ROW
2183	OREGON WHITE OAK	10	NON-SIGNIFICANT	REMOVE	ROW
2184	OREGON WHITE OAK	10	NON-SIGNIFICANT	REMOVE	ROW
2185	OREGON WHITE OAK	15	NON-SIGNIFICANT	REMOVE	ROW
2186	OREGON WHITE OAK	12	NON-SIGNIFICANT	REMOVE	ROW
2187	OREGON ASH	12	NON-SIGNIFICANT	REMOVE	ROW
2188	OREGON WHITE OAK	8, 20	SIGNIFICANT	REMOVE	GRADING
2189	BIG LEAF MAPLE	14	NON-SIGNIFICANT	REMOVE	GRADING
2190	OREGON WHITE OAK	20	SIGNIFICANT	RETAIN	N/A
2191	OREGON WHITE OAK	10	NON-SIGNIFICANT	REMOVE	GRADING
2192	OREGON WHITE OAK	16	SIGNIFICANT	REMOVE	GRADING
2193	OREGON WHITE OAK	10	SIGNIFICANT	REMOVE	GRADING
2194	OREGON WHITE OAK	28	SIGNIFICANT	REMOVE	BUILDING
2195	OREGON WHITE OAK	36	SIGNIFICANT	REMOVE	BUILDING
2196	OREGON ASH	18	NON-SIGNIFICANT	REMOVE	CONDITION
2197	OREGON WHITE OAK	18	SIGNIFICANT	REMOVE	BUILDING
2198	GRAND FIR	24	SIGNIFICANT	REMOVE	GRADING
2199	DOUGLAS-FIR	24	NON-SIGNIFICANT	REMOVE	ROW
2200	DOUGLAS-FIR	24	SIGNIFICANT	REMOVE	BUILDING
2201	OREGON WHITE OAK	10	NON-SIGNIFICANT	REMOVE	BUILDING
2202	BIG LEAF MAPLE	10, 12, 2x14	NON-SIGNIFICANT	REMOVE	GRADING
2203	DOUGLAS-FIR	18, 26	NON-SIGNIFICANT	REMOVE	ROW
2284	DOUGLAS-FIR	14	NON-SIGNIFICANT	REMOVE	ROW
2285	OREGON WHITE OAK	13	NON-SIGNIFICANT	REMOVE	ROW
2286	OREGON WHITE OAK	16	SIGNIFICANT	REMOVE	GRADING
2287	OREGON WHITE OAK	28	SIGNIFICANT	RETAIN	N/A
2288	OREGON WHITE OAK	28	SIGNIFICANT	REMOVE	BUILDING
2289	OREGON ASH	13	NON-SIGNIFICANT	REMOVE	CONDITION
2290	OREGON WHITE OAK	24	SIGNIFICANT	REMOVE	BUILDING
2291	OREGON WHITE OAK	27	SIGNIFICANT	REMOVE	GRADING
2292	OREGON WHITE OAK	16	SIGNIFICANT	REMOVE	ROW
2293	OREGON WHITE OAK	23	NON-SIGNIFICANT	REMOVE	ROW
2294	OREGON WHITE OAK	20	NON-SIGNIFICANT	REMOVE	BUILDING
2295	OREGON WHITE OAK	18	NON-SIGNIFICANT	REMOVE	BUILDING
2296	DOUGLAS-FIR	18	NON-SIGNIFICANT	REMOVE	BUILDING
2297	OREGON WHITE OAK	24	SIGNIFICANT	REMOVE	BUILDING
2298	OREGON WHITE OAK	12	NON-SIGNIFICANT	REMOVE	BUILDING
2299	SWEET CHERRY	15	NON-SIGNIFICANT	REMOVE	BUILDING
2300	OREGON WHITE OAK	24	SIGNIFICANT	REMOVE	BUILDING
2301	BIG LEAF MAPLE	10	NON-SIGNIFICANT	REMOVE	BUILDING
2302	MADRONE	24	SIGNIFICANT	REMOVE	BUILDING
2303	OREGON WHITE OAK	12	NON-SIGNIFICANT	REMOVE	BUILDING
2304	OREGON WHITE OAK	25	SIGNIFICANT	REMOVE	BUILDING
2305	BIG LEAF MAPLE	14	NON-SIGNIFICANT	REMOVE	BUILDING
2306	OREGON WHITE OAK	21	NON-SIGNIFICANT	REMOVE	BUILDING
2307	BIG LEAF MAPLE	10	NON-SIGNIFICANT	REMOVE	BUILDING
2308	BIG LEAF MAPLE	12	NON-SIGNIFICANT	REMOVE	BUILDING
2309	BIG LEAF MAPLE	12	NON-SIGNIFICANT	REMOVE	BUILDING
2310	BIG LEAF MAPLE	8	NON-SIGNIFICANT	REMOVE	BUILDING
2311	DOUGLAS-FIR	30	SIGNIFICANT	REMOVE	BUILDING
2312	DOUGLAS-FIR	10	NON-SIGNIFICANT	REMOVE	CONDITION
2313	DOUGLAS-FIR	18	NON-SIGNIFICANT	REMOVE	CONDITION
2314	DOUGLAS-FIR	18	NON-SIGNIFICANT	REMOVE	GRADING
2314	DOUGLAS-FIR	17	NON-SIGNIFICANT	REMOVE	GRADING
2315	BIG LEAF MAPLE	3x9	NON-SIGNIFICANT	REMOVE	ROW
2316	DOUGLAS-FIR	42	NON-SIGNIFICANT	REMOVE	ROW
2317	DOUGLAS-FIR	28	NON-SIGNIFICANT	REMOVE	ROW
2318	OREGON WHITE OAK	26	SIGNIFICANT	REMOVE	GRADING
2319	DOUGLAS-FIR	24	NON-SIGNIFICANT	REMOVE	BUILDING
2320	DOUGLAS-FIR	10	NON-SIGNIFICANT	REMOVE	BUILDING
2321	WESTERN RED CEDAR	12	NON-SIGNIFICANT	REMOVE	GRADING
2322	DOUGLAS-FIR	28	SIGNIFICANT	REMOVE	BUILDING
2323	BIG LEAF MAPLE	16	NON-SIGNIFICANT	REMOVE	GRADING
2324	RED ALDER	14	NON-SIGNIFICANT	REMOVE	GRADING
2325	OREGON WHITE OAK	26	SIGNIFICANT	REMOVE	ROW
2326	OREGON WHITE OAK	25	SIGNIFICANT	REMOVE	ROW
2327	DOUGLAS-FIR	16	NON-SIGNIFICANT	REMOVE	ROW
2328	OREGON WHITE OAK	12	NON-SIGNIFICANT	REMOVE	ROW
2329	DOUGLAS-FIR	30	SIGNIFICANT	REMOVE	ROW
2330	OREGON ASH	12	NON-SIGNIFICANT	REMOVE	GRADING
2331	OREGON ASH	8, 12	NON-SIGNIFICANT	REMOVE	GRADING
2332	WESTERN RED CEDAR	20	NON-SIGNIFICANT	REMOVE	GRADING
2333	WESTERN RED CEDAR	15	NON-SIGNIFICANT	REMOVE	BUILDING
2334	WESTERN RED CEDAR	10	NON-SIGNIFICANT	REMOVE	BUILDING
2335	DOUGLAS-FIR	18	NON-SIGNIFICANT	REMOVE	BUILDING
2336	DOUGLAS-FIR	21	NON-SIGNIFICANT	REMOVE	BUILDING
2337	DOUGLAS-FIR	26	NON-SIGNIFICANT	REMOVE	ROW
2338	DOUGLAS-FIR	24	NON-SIGNIFICANT	REMOVE	GRADING
2339	GRAND FIR	26	NON-SIGNIFICANT	REMOVE	BUILDING
2340	DOUGLAS-FIR	24	NON-SIGNIFICANT	REMOVE	BUILDING
2341	GRAND FIR	16	NON-SIGNIFICANT	REMOVE	ROW
2342	OREGON WHITE OAK	26	SIGNIFICANT	REMOVE	ROW
2343	OREGON ASH	11, 15	NON-SIGNIFICANT	REMOVE	ROW
2344	OREGON WHITE OAK	14	NON-SIGNIFICANT	REMOVE	GRADING
2345	OREGON WHITE OAK	12	NON-SIGNIFICANT	REMOVE	GRADING
2346	DOUGLAS-FIR	20	NON-SIGNIFICANT	REMOVE	GRADING
2347	DOUGLAS-FIR	36	SIGNIFICANT	REMOVE	GRADING
2348	OREGON WHITE OAK	2x8	NON-SIGNIFICANT	REMOVE	GRADING
2349	OREGON WHITE OAK	28	SIGNIFICANT	REMOVE	BUILDING
2350	OREGON ASH	20	NON-SIGNIFICANT	REMOVE	GRADING
2351	OREGON WHITE OAK	26	SIGNIFICANT	REMOVE	GRADING
2352	OREGON ASH	10	NON-SIGNIFICANT	REMOVE	ROW
2353	OREGON WHITE OAK	22	SIGNIFICANT	REMOVE	ROW
2354	OREGON WHITE OAK	11	SIGNIFICANT	REMOVE	ROW
2355	DOUGLAS-FIR	24	NON-SIGNIFICANT	REMOVE	BUILDING
2356	DOUGLAS-FIR	36	SIGNIFICANT	REMOVE	GRADING
2357	OREGON WHITE OAK	19	NON-SIGNIFICANT	REMOVE	BUILDING
2358	OREGON ASH	8	NON-SIGNIFICANT	REMOVE	BUILDING
2359	OREGON WHITE OAK	12	NON-SIGNIFICANT	REMOVE	ROW
2360	BIG LEAF MAPLE	13	NON-SIGNIFICANT	REMOVE	ROW
2361	OREGON WHITE OAK	29	SIGNIFICANT	REMOVE	ROW
2362	DEC	10	NON-SIGNIFICANT	REMOVE	BUILDING
2363	OREGON WHITE OAK	24	SIGNIFICANT	REMOVE	BUILDING
2364	OREGON WHITE OAK	20	NON-SIGNIFICANT	REMOVE	CONDITION
2365	DOUGLAS-FIR	18	NON-SIGNIFICANT	REMOVE	CONDITION
2366	OREGON WHITE OAK	16	SIGNIFICANT	REMOVE	BUILDING
2367	DOUGLAS-FIR	24	NON-SIGNIFICANT	REMOVE	BUILDING
2368	OREGON WHITE OAK	28	SIGNIFICANT	REMOVE	BUILDING
2369	DOUGLAS-FIR	12	NON-SIGNIFICANT	REMOVE	BUILDING
2370	BIG LEAF MAPLE	10	NON-SIGNIFICANT	REMOVE	BUILDING
2371	BIG LEAF MAPLE	10	NON-SIGNIFICANT	REMOVE	BUILDING
2372	BIG LEAF MAPLE	6	NON-SIGNIFICANT	REMOVE	BUILDING
2373	BIG LEAF MAPLE	10	NON-SIGNIFICANT	REMOVE	BUILDING
2374	BIG LEAF MAPLE	12	NON-SIGNIFICANT	REMOVE	BUILDING
2375	BIG LEAF MAPLE	18	NON-SIGNIFICANT	REMOVE	BUILDING
2376	BIG LEAF MAPLE	10	NON-SIGNIFICANT	REMOVE	BUILDING
2377	OREGON WHITE OAK	20, 26	SIGNIFICANT	REMOVE	BUILDING
2378	BIG LEAF MAPLE	8	NON-SIGNIFICANT	REMOVE	CONDITION
2379	BIG LEAF MAPLE	8	NON-SIGNIFICANT	REMOVE	BUILDING
2380	DOUGLAS FIR	29	SIGNIFICANT	RETAIN	N/A
2381	BIG LEAF MAPLE	12	NON-SIGNIFICANT	RETAIN	N/A
2382	BIG LEAF MAPLE	11	NON-SIGNIFICANT	RETAIN	N/A
2383	DOUGLAS FIR	32	SIGNIFICANT	RETAIN	N/A
2384	BIG LEAF MAPLE	10, 14, 18, 22	NON-SIGNIFICANT	REMOVE	CONDITION
2385	BIG LEAF MAPLE	6, 8	NON-SIGNIFICANT	REMOVE	BUILDING
2394	SWEET CHERRY	10	NON-SIGNIFICANT	REMOVE	BUILDING
2395	BIG LEAF MAPLE	8	NON-SIGNIFICANT	REMOVE	BUILDING
2396	OREGON WHITE OAK	17	SIGNIFICANT	REMOVE	GRADING
2458	BIG LEAF MAPLE	7	NON-SIGNIFICANT	REMOVE	ROW
2459	DOUGLAS FIR	16	NON-SIGNIFICANT	REMOVE	GRADING

DESIGN REVIEW 01/11/2016

	REVISION SUMMARY	BY	DATE
1			

TREE PRESERVATION DETAILS II
CHÊNE BLANC ESTATES
LAND USE DOCUMENTS
1800 UPPER MIDHILL DRIVE, LLC
WEST LINN, OR

REGISTERED PROFESSIONAL ENGINEER
OREGON
JESSE T. EMERSON
EXPIRES: 12/31/17

PRELIMINARY

3J CONSULTING, INC.
CIVIL ENGINEERING
WATER RESOURCES
LAND USE PLANNING
5075 SW GRIFFITH DRIVE, SUITE 150, BEAVERTON, OR 97005
PHONE & FAX: (503) 946-9365

3J JOB ID #	15266
LAND USE #	TBD
TAX LOT #	3S1E14CA 00200
DESIGNED BY	JTE, CKW, JCP
CHECKED BY	JTE

SHEET TITLE
TREE DETAILS II

SHEET NUMBER
C112

TREE INVENTORY

SURVEY POINT NUMBER	TREE SPECIES	NOMINAL CALIPER SIZE	SIGNIFICANT DESIGNATION	PROPOSED ACTION	REMOVE DUE TO CONDITION
2461	DOUGLAS FIR	24	SIGNIFICANT	REMOVE	GRADING
2462	OREGON WHITE OAK	12	NON-SIGNIFICANT	REMOVE	BUILDING
2463	DOUGLAS FIR	30	SIGNIFICANT	REMOVE	BUILDING
2464	DOUGLAS FIR	26	SIGNIFICANT	REMOVE	BUILDING
2469	SWEET CHERRY	15	NON-SIGNIFICANT	REMOVE	GRADING
2470	OREGON WHITE OAK	14	NON-SIGNIFICANT	REMOVE	ROW
2471	DOUGLAS FIR	28	SIGNIFICANT	REMOVE	ROW
2472	OREGON WHITE OAK	10	NON-SIGNIFICANT	REMOVE	ROW
2473	GRAND FIR	23	SIGNIFICANT	REMOVE	ROW
2474	BIG LEAF MAPLE	10	NON-SIGNIFICANT	REMOVE	ROW
2475	DOUGLAS FIR	30	SIGNIFICANT	REMOVE	ROW
2476	DOUGLAS FIR	26	SIGNIFICANT	REMOVE	ROW
2477	DOUGLAS FIR	22	SIGNIFICANT	REMOVE	ROW
2478	DOUGLAS FIR	15	NON-SIGNIFICANT	REMOVE	ROW
2479	DOUGLAS FIR	32	NON-SIGNIFICANT	REMOVE	GRADING
2480	OREGON WHITE OAK	18	NON-SIGNIFICANT	REMOVE	GRADING
2481	OREGON ASH	18	NON-SIGNIFICANT	REMOVE	GRADING
2482	OREGON WHITE OAK	36	SIGNIFICANT	REMOVE	BUILDING
2483	OREGON ASH	20	NON-SIGNIFICANT	REMOVE	BUILDING
2484	OREGON WHITE OAK	27	SIGNIFICANT	REMOVE	ROW
2485	OREGON ASH	8	NON-SIGNIFICANT	REMOVE	BUILDING
2486	MADRONE	7	NON-SIGNIFICANT	REMOVE	BUILDING
2487	OREGON WHITE OAK	28	SIGNIFICANT	REMOVE	ROW
2488	OREGON WHITE OAK	14	SIGNIFICANT	RETAIN	BUILDING
2489	OREGON WHITE OAK	12	SIGNIFICANT	RETAIN	BUILDING
2490	OREGON WHITE OAK	12, 18	NON-SIGNIFICANT	REMOVE	BUILDING
2491	OREGON ASH	13	NON-SIGNIFICANT	REMOVE	BUILDING
2492	OREGON ASH	6	NON-SIGNIFICANT	REMOVE	BUILDING
2493	OREGON WHITE OAK	19	NON-SIGNIFICANT	REMOVE	ROW
2494	OREGON ASH	2x8, 9	NON-SIGNIFICANT	REMOVE	CONDITION
2495	ENGLISH HOLLY	6	NON-SIGNIFICANT	REMOVE	CONDITION
2496	OREGON WHITE OAK	10	NON-SIGNIFICANT	REMOVE	BUILDING
2497	DOUGLAS FIR	10	NON-SIGNIFICANT	REMOVE	CONDITION
2498	OREGON WHITE OAK	20	SIGNIFICANT	REMOVE	BUILDING
2499	OREGON ASH	10	NON-SIGNIFICANT	REMOVE	BUILDING
2500	OREGON WHITE OAK	24	SIGNIFICANT	REMOVE	BUILDING
2501	OREGON WHITE OAK	28	SIGNIFICANT	REMOVE	BUILDING
2502	OREGON WHITE OAK	18	SIGNIFICANT	REMOVE	BUILDING
2503	OREGON ASH	10	NON-SIGNIFICANT	REMOVE	GRADING
2504	OREGON WHITE OAK	24	SIGNIFICANT	REMOVE	GRADING
2505	OREGON WHITE OAK	12	SIGNIFICANT	REMOVE	BUILDING
2506	OREGON ASH	6	NON-SIGNIFICANT	REMOVE	BUILDING
2507	BIG LEAF MAPLE	12	NON-SIGNIFICANT	REMOVE	BUILDING
2508	SWEET CHERRY	8	NON-SIGNIFICANT	REMOVE	GRADING
2509	OREGON WHITE OAK	10, 12	NON-SIGNIFICANT	REMOVE	BUILDING
2510	SWEET CHERRY	6	NON-SIGNIFICANT	REMOVE	BUILDING
2511	OREGON WHITE OAK	12	NON-SIGNIFICANT	REMOVE	BUILDING
2512	OREGON WHITE OAK	14	NON-SIGNIFICANT	REMOVE	BUILDING
2513	DOUGLAS FIR	14	NON-SIGNIFICANT	REMOVE	BUILDING
2514	OREGON WHITE OAK	10	NON-SIGNIFICANT	REMOVE	BUILDING
2515	DOUGLAS FIR	15	NON-SIGNIFICANT	REMOVE	BUILDING
2516	MADRONE	23	SIGNIFICANT	REMOVE	BUILDING
2517	OREGON WHITE OAK	10	NON-SIGNIFICANT	REMOVE	GRADING
2518	DOUGLAS FIR	24	NON-SIGNIFICANT	REMOVE	CONDITION
2519	OREGON ASH	8	NON-SIGNIFICANT	RETAIN	N/A
2520	ENGLISH HAWTHORN	6	NON-SIGNIFICANT	REMOVE	CONDITION
2521	OREGON WHITE OAK	13, 20	SIGNIFICANT	REMOVE	BUILDING
2522	OREGON ASH	12	NON-SIGNIFICANT	RETAIN	N/A
2523	OREGON WHITE OAK	20, 24	SIGNIFICANT	RETAIN	N/A
2524	OREGON WHITE OAK	10, 16	SIGNIFICANT	REMOVE	BUILDING
2525	OREGON ASH	20	NON-SIGNIFICANT	RETAIN	N/A
2526	DOUGLAS FIR	29	SIGNIFICANT	RETAIN	N/A
2527	OREGON ASH	12	NON-SIGNIFICANT	RETAIN	N/A
2528	DOUGLAS FIR	19	SIGNIFICANT	RETAIN	N/A
2529	OREGON ASH	15	NON-SIGNIFICANT	RETAIN	N/A
2530	DOUGLAS FIR	20	NON-SIGNIFICANT	REMOVE	BUILDING
2531	OREGON ASH	7	NON-SIGNIFICANT	RETAIN	N/A
2532	MADRONE	8	SIGNIFICANT	RETAIN	N/A
2533	DOUGLAS FIR	24	SIGNIFICANT	REMOVE	BUILDING
2534	OREGON WHITE OAK	13	NON-SIGNIFICANT	RETAIN	N/A
2536	OREGON ASH	14	NON-SIGNIFICANT	REMOVE	BUILDING
2537	OREGON WHITE OAK	16	SIGNIFICANT	REMOVE	BUILDING
2538	OREGON WHITE OAK	24	SIGNIFICANT	REMOVE	BUILDING
2539	OREGON ASH	2x10	NON-SIGNIFICANT	REMOVE	BUILDING
2540	OREGON ASH	16	NON-SIGNIFICANT	REMOVE	BUILDING
2541	OREGON WHITE OAK	9	NON-SIGNIFICANT	REMOVE	BUILDING
2542	OREGON ASH	10	NON-SIGNIFICANT	RETAIN	N/A
2543	OREGON ASH	12, 16, 18, 24	NON-SIGNIFICANT	REMOVE	BUILDING
2544	OREGON ASH	10	NON-SIGNIFICANT	RETAIN	N/A
2545	DOUGLAS FIR	8	NON-SIGNIFICANT	RETAIN	N/A
2546	OREGON WHITE OAK	26	SIGNIFICANT	RETAIN	N/A
2547	DOUGLAS FIR	8	NON-SIGNIFICANT	RETAIN	N/A
2548	OREGON WHITE OAK	20	SIGNIFICANT	RETAIN	N/A
2549	OREGON WHITE OAK	20	SIGNIFICANT	RETAIN	N/A
2550	OREGON WHITE OAK	24	SIGNIFICANT	RETAIN	N/A
2551	ENGLISH HAWTHORN	6	NON-SIGNIFICANT	REMOVE	CONDITION
2552	OREGON ASH	2x12	NON-SIGNIFICANT	RETAIN	N/A
2553	OREGON WHITE OAK	2x8	NON-SIGNIFICANT	RETAIN	N/A
2554	OREGON ASH	2x16	NON-SIGNIFICANT	RETAIN	N/A
2555	OREGON ASH	6, 8, 12	NON-SIGNIFICANT	REMOVE	BUILDING
2556	OREGON WHITE OAK	18	SIGNIFICANT	RETAIN	N/A
2557 A&B	OREGON ASH	18	NON-SIGNIFICANT	RETAIN	N/A
2558	OREGON ASH	8	NON-SIGNIFICANT	RETAIN	N/A
2559	OREGON ASH	15	NON-SIGNIFICANT	RETAIN	N/A
2561	DOUGLAS FIR	9	NON-SIGNIFICANT	RETAIN	N/A
2562	OREGON ASH	2x8	NON-SIGNIFICANT	RETAIN	N/A
2563	OREGON ASH	12	NON-SIGNIFICANT	RETAIN	N/A
2564	OREGON ASH	24	NON-SIGNIFICANT	RETAIN	N/A
2565	DOUGLAS FIR	24	NON-SIGNIFICANT	RETAIN	N/A
2566	OREGON WHITE OAK	24	SIGNIFICANT	RETAIN	N/A
2567	SWEET CHERRY	8	NON-SIGNIFICANT	REMOVE	CONDITION
2569	OREGON WHITE OAK	10, 20	NON-SIGNIFICANT	REMOVE	BUILDING
2570	DOUGLAS FIR	28	SIGNIFICANT	REMOVE	GRADING
2571	OREGON WHITE OAK	9	NON-SIGNIFICANT	REMOVE	CONDITION
2572	OREGON WHITE OAK	16	NON-SIGNIFICANT	RETAIN	N/A
2573	OREGON WHITE OAK	24	NON-SIGNIFICANT	RETAIN	N/A
2574	OREGON WHITE OAK	9	NON-SIGNIFICANT	RETAIN	N/A
2575	OREGON ASH	14, 22, 24	NON-SIGNIFICANT	RETAIN	N/A
2576	OREGON WHITE OAK	30	SIGNIFICANT	RETAIN	N/A
2577a	OREGON ASH	16, 20, 22	NON-SIGNIFICANT	RETAIN	N/A
2577b	OREGON WHITE OAK	10, 16	NON-SIGNIFICANT	RETAIN	N/A
2578	OREGON ASH	20	NON-SIGNIFICANT	RETAIN	N/A
2579	OREGON WHITE OAK	26	SIGNIFICANT	RETAIN	N/A
2580	OREGON ASH	10, 16	NON-SIGNIFICANT	RETAIN	N/A
2581	OREGON WHITE OAK	25	SIGNIFICANT	REMOVE	BUILDING
2582	OREGON WHITE OAK	18	SIGNIFICANT	REMOVE	BUILDING
2583	OREGON WHITE OAK	20	SIGNIFICANT	REMOVE	BUILDING
2584	BIG LEAF MAPLE	8	NON-SIGNIFICANT	REMOVE	ROW
2585	BIG LEAF MAPLE	14	NON-SIGNIFICANT	REMOVE	BUILDING
2586	DOUGLAS FIR	9	NON-SIGNIFICANT	REMOVE	BUILDING
2587	DOUGLAS FIR	36	SIGNIFICANT	REMOVE	GRADING
2588	OREGON ASH	8	NON-SIGNIFICANT	REMOVE	BUILDING
2662	OREGON WHITE OAK	18	SIGNIFICANT	RETAIN	N/A
2663	DOUGLAS FIR	10	NON-SIGNIFICANT	REMOVE	GRADING
2664	DOUGLAS FIR	30	SIGNIFICANT	RETAIN	N/A
2665	OREGON ASH	18	NON-SIGNIFICANT	RETAIN	N/A
2666	OREGON WHITE OAK	16	NON-SIGNIFICANT	REMOVE	BUILDING
2667	OREGON WHITE OAK	15	NON-SIGNIFICANT	RETAIN	N/A
2668	OREGON ASH	16	NON-SIGNIFICANT	REMOVE	GRADING
2669	OREGON ASH	14	NON-SIGNIFICANT	REMOVE	BUILDING
2670	OREGON ASH	8	NON-SIGNIFICANT	REMOVE	BUILDING
2671	OREGON ASH	7, 12	NON-SIGNIFICANT	REMOVE	BUILDING
2672	OREGON ASH	16	NON-SIGNIFICANT	REMOVE	BUILDING

DESIGN REVIEW 01/11/2016
REVISION SUMMARY | BY | DATE

TREE PRESERVATION DETAILS III
CHÊNE BLANC ESTATES
LAND USE DOCUMENTS
1800 UPPER MIDHILL DRIVE, LLC
WEST LINN, OR

REGISTERED PROFESSIONAL ENGINEER
OREGON
JESSE T. EMERSON
PRELIMINARY
EXPIRES 12/31/17

3J CONSULTING, INC
CIVIL ENGINEERING
WATER RESOURCES
LAND USE PLANNING
5075 SW GRIFFITH DRIVE, SUITE 150, BEAVERTON, OR 97005
PHONE & FAX: (503) 946-9365

3J JOB ID # | 15286
LAND USE # | TBD
TAX LOT # | 2S1E14CA 00200
DESIGNED BY | JTE, CKW, JCP
CHECKED BY | JTE

SHEET TITLE
TREE DETAILS III
SHEET NUMBER
C113

NOT FOR CONSTRUCTION

TREE INVENTORY

SURVEY POINT NUMBER	TREE SPECIES	NOMINAL CALIPER SIZE	SIGNIFICANT DESIGNATION	PROPOSED ACTION	REMOVE DUE TO CONDITION
2673	OREGON WHITE OAK	13	NON-SIGNIFICANT	REMOVE	ROW
2675	OREGON WHITE OAK	16	SIGNIFICANT	RETAIN	N/A
2676	OREGON ASH	20, 24	NON-SIGNIFICANT	RETAIN	N/A
2677	OREGON WHITE OAK	16	SIGNIFICANT	RETAIN	N/A
2678	DOUGLAS FIR	30	SIGNIFICANT	RETAIN	N/A
2679	DOUGLAS FIR	30	SIGNIFICANT	RETAIN	N/A
2680	OREGON WHITE OAK	30	SIGNIFICANT	RETAIN	N/A
2681	OREGON ASH	24	NON-SIGNIFICANT	REMOVE	CONDITION
2682	OREGON ASH	20	NON-SIGNIFICANT	RETAIN	N/A
2683	DOUGLAS FIR	16	NON-SIGNIFICANT	RETAIN	N/A
2684	DOUGLAS FIR	16	NON-SIGNIFICANT	RETAIN	N/A
2685	OREGON ASH	10, 14	NON-SIGNIFICANT	RETAIN	N/A
2686	OREGON ASH	20	NON-SIGNIFICANT	RETAIN	N/A
2687	BIG LEAF MAPLE	7, 12	NON-SIGNIFICANT	RETAIN	N/A
2688	OREGON ASH	8	NON-SIGNIFICANT	RETAIN	N/A
2689	OREGON ASH	30	NON-SIGNIFICANT	RETAIN	N/A
2690	OREGON WHITE OAK	40	SIGNIFICANT	RETAIN	N/A
2691	BIG LEAF MAPLE	12	NON-SIGNIFICANT	REMOVE	BUILDING
2692	OREGON ASH	14	NON-SIGNIFICANT	REMOVE	BUILDING
2693	BIG LEAF MAPLE	3x12	NON-SIGNIFICANT	REMOVE	BUILDING
2694	WESTERN RED CEDAR	24	NON-SIGNIFICANT	REMOVE	BUILDING
2695	DOUGLAS FIR	24	NON-SIGNIFICANT	REMOVE	GRADING
2696	OREGON WHITE OAK	24	NON-SIGNIFICANT	REMOVE	GRADING
2697	BIG LEAF MAPLE	8, 14, 16	NON-SIGNIFICANT	REMOVE	GRADING
2698	DOUGLAS FIR	24	NON-SIGNIFICANT	REMOVE	GRADING
2699	OREGON WHITE OAK	30	NON-SIGNIFICANT	RETAIN	N/A
2700	OREGON WHITE OAK	20	NON-SIGNIFICANT	REMOVE	GRADING
2701	BIG LEAF MAPLE	2x8	NON-SIGNIFICANT	RETAIN	N/A
2702	BIG LEAF MAPLE	6	NON-SIGNIFICANT	RETAIN	N/A
2703	ENGLISH HAWTHORN	18	NON-SIGNIFICANT	RETAIN	N/A
2704	DOUGLAS FIR	12	NON-SIGNIFICANT	OFF-SITE	N/A
2705	DECIDUOUS	20	NON-SIGNIFICANT	OFF-SITE	N/A
2706	WESTERN RED CEDAR	24	SIGNIFICANT	REMOVE	BUILDING
2707	SWEET CHERRY	12	NON-SIGNIFICANT	REMOVE	BUILDING
2708	SWEET CHERRY	8	NON-SIGNIFICANT	REMOVE	CONDITION
2709	SWEET CHERRY	12	NON-SIGNIFICANT	REMOVE	CONDITION
2710	OREGON WHITE OAK	14	SIGNIFICANT	RETAIN	N/A
2711	OREGON WHITE OAK	14	NON-SIGNIFICANT	RETAIN	N/A
2712	OREGON WHITE OAK	20	SIGNIFICANT	REMOVE	ROW
2713	DOUGLAS FIR	28	NON-SIGNIFICANT	REMOVE	GRADING
2714	DOUGLAS FIR	24	NON-SIGNIFICANT	REMOVE	GRADING
2715	DOUGLAS FIR	18	NON-SIGNIFICANT	REMOVE	BUILDING
3430	DOUGLAS FIR	16	NON-SIGNIFICANT	REMOVE	BUILDING
3431	DOUGLAS FIR	36	NON-SIGNIFICANT	REMOVE	BUILDING
3432	DOUGLAS FIR	26	NON-SIGNIFICANT	REMOVE	BUILDING
3433	DOUGLAS FIR	20	NON-SIGNIFICANT	REMOVE	BUILDING
3434	DOUGLAS FIR	18	NON-SIGNIFICANT	REMOVE	BUILDING
3435	OREGON WHITE OAK	7	NON-SIGNIFICANT	REMOVE	BUILDING
3436	OREGON WHITE OAK	9	NON-SIGNIFICANT	REMOVE	BUILDING
3437	OREGON ASH	12	NON-SIGNIFICANT	REMOVE	BUILDING
3438	OREGON ASH	8	NON-SIGNIFICANT	REMOVE	BUILDING
3439	BIG LEAF MAPLE	10, 20, 24	NON-SIGNIFICANT	REMOVE	GRADING
3440	OREGON WHITE OAK	30	SIGNIFICANT	RETAIN	N/A
3441	OREGON ASH	12	NON-SIGNIFICANT	REMOVE	CONDITION
3442	OREGON ASH	7	NON-SIGNIFICANT	RETAIN	N/A
3443	OREGON ASH	7	NON-SIGNIFICANT	RETAIN	N/A
3444	YEW	7	SIGNIFICANT	RETAIN	N/A
3445	SWEET CHERRY	10	NON-SIGNIFICANT	RETAIN	N/A
3446	DOUGLAS FIR	30	SIGNIFICANT	REMOVE	BUILDING
3447	BLACK HAWTHORN	12	NON-SIGNIFICANT	REMOVE	ROW
3448	OREGON WHITE OAK	20	SIGNIFICANT	REMOVE	GRADING
3449	OREGON WHITE OAK	17	SIGNIFICANT	REMOVE	ROW
3450	OREGON WHITE OAK	9	NON-SIGNIFICANT	REMOVE	ROW
3451	BIG LEAF MAPLE	13	NON-SIGNIFICANT	REMOVE	ROW
3452	OREGON WHITE OAK	15	SIGNIFICANT	REMOVE	ROW
3453	OREGON WHITE OAK	2x18	SIGNIFICANT	REMOVE	BUILDING
3454	OREGON WHITE OAK	15	NON-SIGNIFICANT	REMOVE	BUILDING
3504	OREGON WHITE OAK	9	NON-SIGNIFICANT	REMOVE	BUILDING
3505	OREGON WHITE OAK	10	NON-SIGNIFICANT	REMOVE	BUILDING
3506	OREGON WHITE OAK	12	SIGNIFICANT	REMOVE	BUILDING
3507	OREGON WHITE OAK	16	SIGNIFICANT	REMOVE	BUILDING
3508	OREGON WHITE OAK	10	SIGNIFICANT	REMOVE	BUILDING
3509	BIG LEAF MAPLE	10	NON-SIGNIFICANT	REMOVE	BUILDING
3510	OREGON WHITE OAK	9	SIGNIFICANT	REMOVE	GRADING
3511	PINE	11	NON-SIGNIFICANT	RETAIN	N/A
3512	WESTERN RED CEDAR	5, 8	NON-SIGNIFICANT	RETAIN	N/A
3513	BIG LEAF MAPLE	2x8	NON-SIGNIFICANT	RETAIN	N/A
3514	WESTERN RED CEDAR	7	NON-SIGNIFICANT	RETAIN	N/A
3515	WESTERN RED CEDAR	8	NON-SIGNIFICANT	RETAIN	N/A
3516	OREGON ASH	17	NON-SIGNIFICANT	RETAIN	N/A
3517	EUROPEAN WHITE BIRCH	9	NON-SIGNIFICANT	REMOVE	CONDITION
3518	DECIDUOUS	4, 8	NON-SIGNIFICANT	REMOVE	CONDITION
3520	BIG LEAF MAPLE	10	NON-SIGNIFICANT	REMOVE	BUILDING
3521	DOUGLAS FIR	30	NON-SIGNIFICANT	REMOVE	BUILDING
3522	OREGON WHITE OAK	16	SIGNIFICANT	REMOVE	BUILDING
3523	OREGON WHITE OAK	16	NON-SIGNIFICANT	REMOVE	CONDITION
3524	DOUGLAS FIR	15	NON-SIGNIFICANT	REMOVE	CONDITION
3525	OREGON WHITE OAK	22	SIGNIFICANT	RETAIN	N/A
3526	OREGON WHITE OAK	20	SIGNIFICANT	RETAIN	N/A
3537	OREGON WHITE OAK	18	NON-SIGNIFICANT	REMOVE	BUILDING
3539	OREGON WHITE OAK	22	SIGNIFICANT	REMOVE	ROW
3677	DOUGLAS FIR	30	SIGNIFICANT	REMOVE	ROW
3775	SCOULER'S WILLOW	18	NON-SIGNIFICANT	REMOVE	ROW
3776	DOUGLAS FIR	28	NON-SIGNIFICANT	REMOVE	BUILDING
3777	OREGON WHITE OAK	15	NON-SIGNIFICANT	REMOVE	BUILDING
3778	OREGON ASH	10	NON-SIGNIFICANT	REMOVE	BUILDING
3779	DOUGLAS FIR	18	NON-SIGNIFICANT	REMOVE	BUILDING
3780	DOUGLAS FIR	15	NON-SIGNIFICANT	REMOVE	BUILDING

DESIGN REVIEW 01/11/2016

REVISION SUMMARY | BY | DATE

TREE PRESERVATION DETAILS IV
CHÊNE BLANC ESTATES
LAND USE DOCUMENTS
1800 UPPER MIDHILL DRIVE, LLC
WEST LINN, OR

PRELIMINARY
REGISTERED PROFESSIONAL ENGINEER 70557 OREGON JUNE 16, 2011 JESSE T. EMERSON
EXPIRES: 12/31/17

3J CONSULTING, INC
CIVIL ENGINEERING
WATER RESOURCES
LAND USE PLANNING
5075 SW GRIFFITH DRIVE, SUITE 150, BEAVERTON, OR 97005
PHONE & FAX: (503) 946-9365

3J JOB ID # 15266
LAND USE # TBD
TAX LOT # 2S1E14CA 00200
DESIGNED BY JTE, CKW, JCP
CHECKED BY JTE

SHEET TITLE
TREE DETAILS IV
SHEET NUMBER
C114

NOT FOR CONSTRUCTION

NOT FOR CONSTRUCTION

4/20/16 PC Meeting
275

DESIGN REVIEW 01/11/2016

REVISION SUMMARY	BY	DATE
A		

SLOPE ANALYSIS PLAN
CHÊNE BLANC ESTATES
LAND USE DOCUMENTS
1800 UPPER MIDHILL DRIVE, LLC
WEST LINN, OR

REGISTERED PROFESSIONAL ENGINEER
OREGON
JESSE T. EMERSON
EXPIRES: 12/31/17
PRELIMINARY

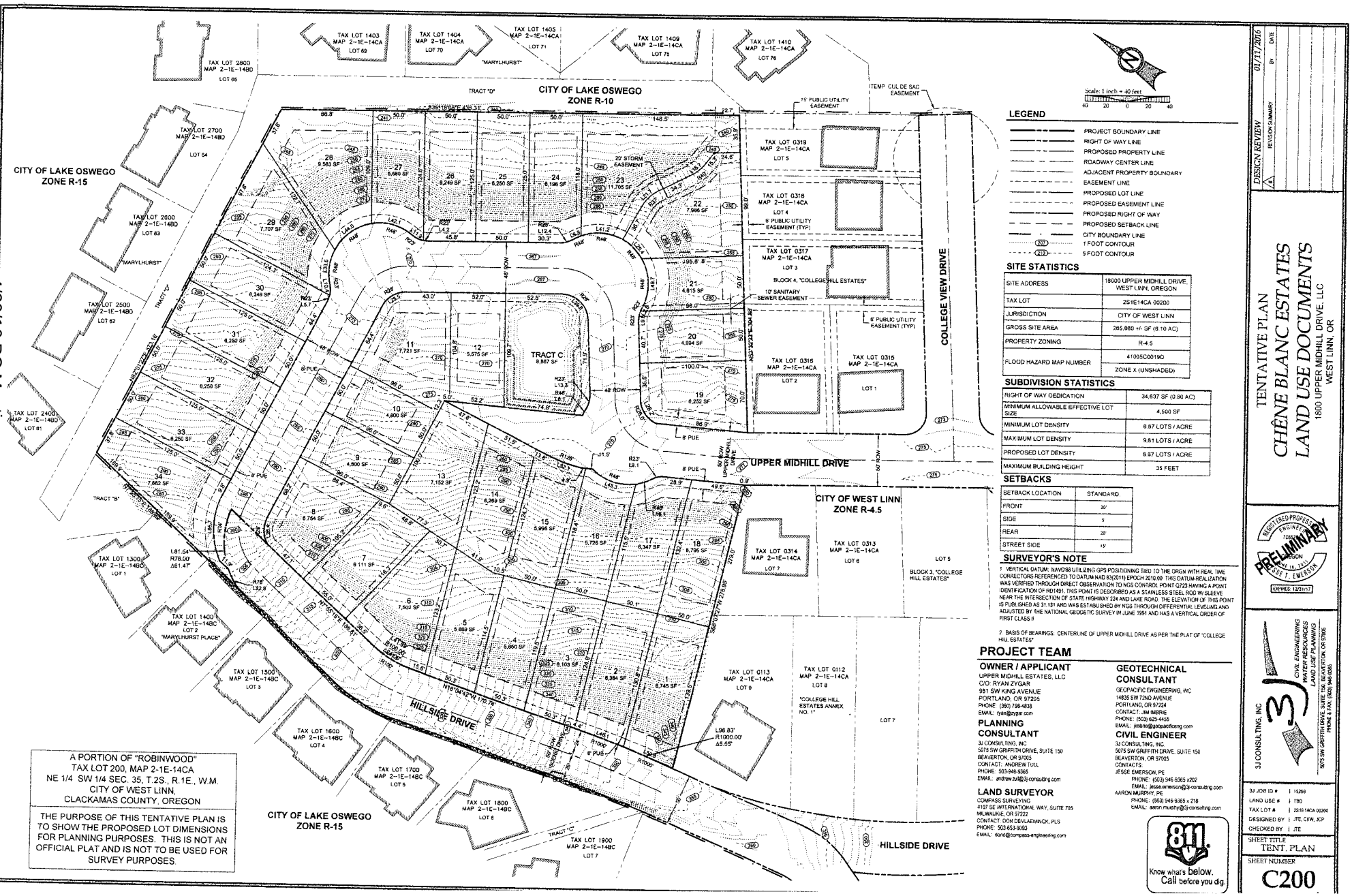
3J CONSULTING, INC.
CIVIL ENGINEERING
WATER RESOURCES
LAND USE PLANNING
5075 SW GRIFFITH DRIVE, SUITE 150, BEAVERTON, OR 97005
PHONE & FAX: (503) 946-9365

3J JOB ID #	15266
LAND USE #	TBD
TAX LOT #	2S1E14CA 00200
DESIGNED BY	JTE, CKW, JCP
CHECKED BY	JTE

SHEET TITLE
SLOPE ANALYSIS

SHEET NUMBER
C130

I:\15266-UPPER MIDHILL ESTATES (REESMAN)\CAD\DGN\C130 SLOPE ANALYSIS PLAN.DWG



A PORTION OF "ROBINWOOD"
TAX LOT 200, MAP 2-1E-14CA
NE 1/4 SW 1/4 SEC. 35, T.2S., R.1E., W.M.
CITY OF WEST LINN,
CLACKAMAS COUNTY, OREGON

THE PURPOSE OF THIS TENTATIVE PLAN IS TO SHOW THE PROPOSED LOT DIMENSIONS FOR PLANNING PURPOSES. THIS IS NOT AN OFFICIAL PLAT AND IS NOT TO BE USED FOR SURVEY PURPOSES.

LEGEND

- PROJECT BOUNDARY LINE
- RIGHT OF WAY LINE
- PROPOSED PROPERTY LINE
- ROADWAY CENTER LINE
- ADJACENT PROPERTY BOUNDARY
- EASEMENT LINE
- PROPOSED LOT LINE
- PROPOSED EASEMENT LINE
- PROPOSED RIGHT OF WAY
- PROPOSED SETBACK LINE
- CITY BOUNDARY LINE
- 207 1 FOOT CONTOUR
- 210 5 FOOT CONTOUR

SITE STATISTICS

SITE ADDRESS	18000 UPPER MIDHILL DRIVE, WEST LINN, OREGON
TAX LOT	2S1E14CA 00200
JURISDICTION	CITY OF WEST LINN
GROSS SITE AREA	285,880 +/- SF (6.10 AC)
PROPERTY ZONING	R-4.5
FLOOD HAZARD MAP NUMBER	41005C0019D ZONE X (UNSHADED)

SUBDIVISION STATISTICS

RIGHT OF WAY DEDICATION	34,637 SF (0.80 AC)
MINIMUM ALLOWABLE EFFECTIVE LOT SIZE	4,500 SF
MINIMUM LOT DENSITY	6.67 LOTS / ACRE
MAXIMUM LOT DENSITY	9.61 LOTS / ACRE
PROPOSED LOT DENSITY	8.97 LOTS / ACRE
MAXIMUM BUILDING HEIGHT	35 FEET

SETBACKS

SETBACK LOCATION	STANDARD
FRONT	20'
SIDE	5
REAR	20'
STREET SIDE	15'

SURVEYOR'S NOTE

1. VERTICAL DATUM: NAVD88 UTILIZING GPS POSITIONING TIED TO THE ORGN WITH REAL TIME CORRECTORS REFERENCED TO DATUM NAD 83(2011) EPOCH 2010.00. THIS DATUM REALIZATION WAS VERIFIED THROUGH DIRECT OBSERVATION TO NGS CONTROL POINT Q723 HAVING A POINT IDENTIFICATION OF RD1491. THIS POINT IS DESCRIBED AS A STAINLESS STEEL ROD W/ SLEEVE NEAR THE INTERSECTION OF STATE HIGHWAY 224 AND LAKE ROAD. THE ELEVATION OF THIS POINT IS PUBLISHED AS 31.131 AND WAS ESTABLISHED BY NGS THROUGH DIFFERENTIAL LEVELING AND ADJUSTED BY THE NATIONAL GEODETIC SURVEY IN JUNE 1991 AND HAS A VERTICAL ORDER OF FIRST CLASS II

2. BASIS OF BEARINGS: CENTERLINE OF UPPER MIDHILL DRIVE AS PER THE PLAT OF "COLLEGE HILL ESTATES"

PROJECT TEAM

OWNER / APPLICANT
UPPER MIDHILL ESTATES, LLC
C/O: RYAN ZYGAR
981 SW KING AVENUE
PORTLAND, OR 97205
PHONE: (360) 798-4838
EMAIL: ryan@zygar.com

PLANNING CONSULTANT
3J CONSULTING, INC
5075 SW GRIFFITH DRIVE, SUITE 150
BEAVERTON, OR 97005
CONTACT: ANDREW TULL
PHONE: 503-946-9365
EMAIL: andrew.tull@3j-consulting.com

LAND SURVEYOR
COMPASS SURVEYING
4107 SE INTERNATIONAL WAY, SUITE 705
MILWAUKIE, OR 97222
CONTACT: DON DEVLAEMINCK, PLS
PHONE: 503-653-8093
EMAIL: dond@compass-engineering.com

GEOTECHNICAL CONSULTANT
GEOPACIFIC ENGINEERING, INC
14835 SW 72ND AVENUE
PORTLAND, OR 97224
CONTACT: JIM IMBRIE
PHONE: (503) 625-4456
EMAIL: jimbrie@geopacificeng.com

CIVIL ENGINEER
3J CONSULTING, INC
5075 SW GRIFFITH DRIVE, SUITE 150
BEAVERTON, OR 97005
CONTACTS:
JESSE EMERSON, PE
PHONE: (503) 946-9365 x202
EMAIL: jesse.emerson@3j-consulting.com
AARON MURPHY, PE
PHONE: (503) 946-9365 x 218
EMAIL: aaron.murphy@3j-consulting.com

811 Know what's below. Call before you dig.

DESIGN REVIEW	BY	DATE
REVISION SUMMARY		01/17/2016

TENTATIVE PLAN
CHÊNE BLANC ESTATES
LAND USE DOCUMENTS
1800 UPPER MIDHILL DRIVE, LLC
WEST LINN, OR

REGISTERED PROFESSIONAL ENGINEER OREGON JESSE T. EMERSON
PRELIMINARY
EXPIRES: 12/31/17

3J CONSULTING, INC
CIVIL ENGINEERING
WATER RESOURCES
LAND USE PLANNING
5075 SW GRIFFITH DRIVE, SUITE 150, BEAVERTON, OR 97005
PHONE & FAX: (503) 946-9365

3J JOB ID #	15266
LAND USE #	TBD
TAX LOT #	2S1E14CA 00200
DESIGNED BY	JTE, GKW, JCP
CHECKED BY	JTE
SHEET TITLE	TENT. PLAN
SHEET NUMBER	C200

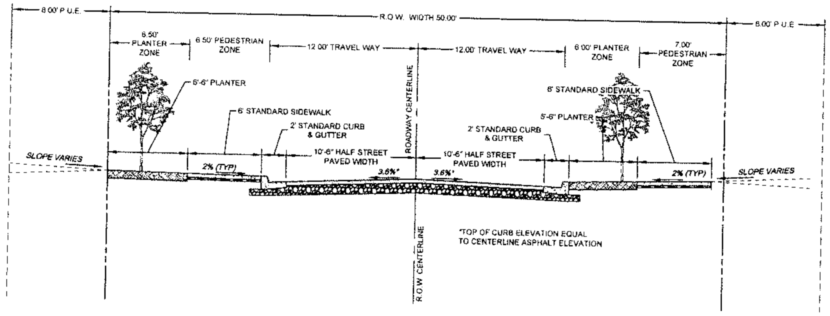
NOT FOR CONSTRUCTION

4/20/16 PC Meeting

276

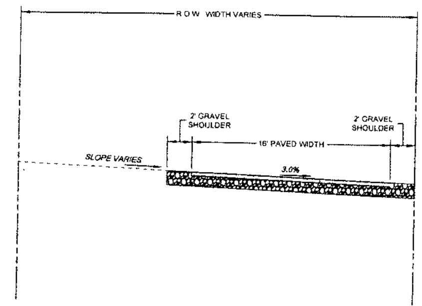
P:\15266-UPPER MIDHILL ESTATE\ SMANICAD\DGN\C200 PRELIMINARY PLAT.DWG

NOT FOR CONSTRUCTION



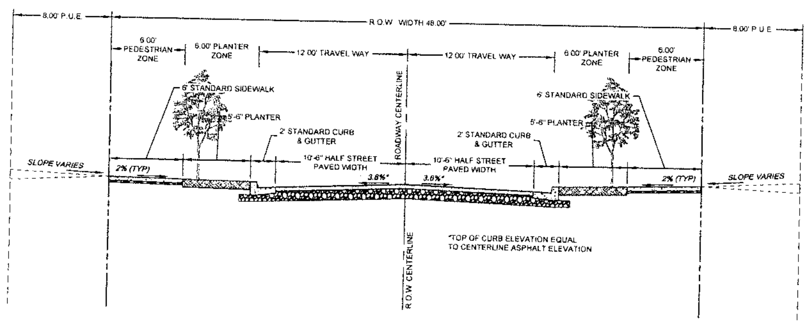
SECTION A-A: LOCAL ROAD W/ CURB TIGHT SIDEWALK (LEFT)

N.T.S.



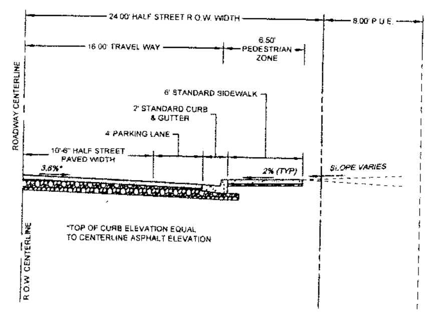
SECTION C-C: COMMON LOT ACCESS DRIVE SECTION

N.T.S.



SECTION B-B: LOCAL ROAD W/ DETACHED SIDEWALK

N.T.S.



SECTION D-D: LOCAL ROAD W/ ON-STREET PARKING

N.T.S.

DESIGN REVIEW		01/11/2016
REVISION SUMMARY	BY	DATE

TYPICAL SECTIONS

CHÊNE BLANC ESTATES
LAND USE DOCUMENTS

1800 UPPER MIDHILL DRIVE, LLC
WEST LINN, OR

REGISTERED PROFESSIONAL ENGINEER
OREGON
JESSE T. EMERSON
PRELIMINARY
EXPIRES: 12/31/17

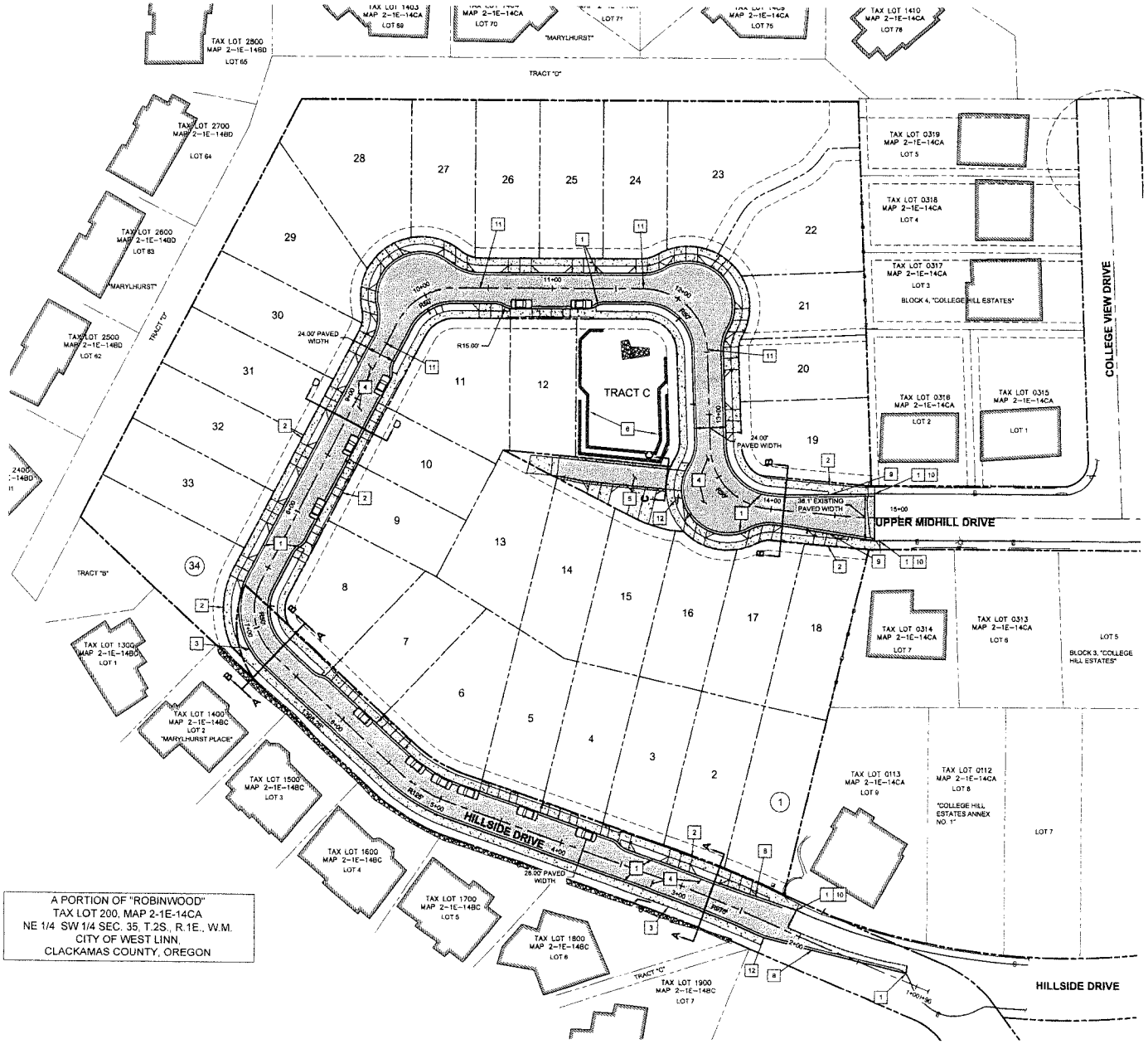
3J CONSULTING, INC
CIVIL ENGINEERING
WATER RESOURCES
LAND USE PLANNING
5075 SW GRIFFITH DRIVE, SUITE 150, BEAVERTON, OR 97005
PHONE & FAX: (503) 946-9365

3J JOB ID #	15298
LAND USE #	TBD
TAX LOT #	2S1E14CA 00200
DESIGNED BY	JTE, CKW, JCP
CHECKED BY	JTE

SHEET TITLE
TYPICAL SECTIONS

SHEET NUMBER
C201

P:\15298-UPPER MIDHILL ESTA...\CADD\C201 TYPICAL SECTIONS.DWG



A PORTION OF "ROBINWOOD"
TAX LOT 200, MAP 2-1E-14CA
NE 1/4 SW 1/4 SEC. 35, T.2S., R.1E., W.M.
CITY OF WEST LINN,
CLACKAMAS COUNTY, OREGON

LEGEND

- PROJECT BOUNDARY LINE
- RIGHT OF WAY LINE
- PROPOSED PROPERTY LINE
- ROADWAY CENTER LINE
- ADJACENT PROPERTY BOUNDARY
- EASEMENT LINE
- EXISTING CONCRETE
- EXISTING CURB
- EXISTING FENCE LINE
- PROPOSED CURB FACE
- PROPOSED CURB BACK
- PROPOSED LIP OF GUTTER
- PROPOSED LOT LINE
- PROPOSED EASEMENT LINE
- PROPOSED RIGHT OF WAY
- PROPOSED ASPHALT
- PROPOSED CONCRETE
- EXISTING ROCK WALL
- PROPOSED RETAINING WALL
- PROPOSED STREET SECTION - SEE SHEET C201
- PROPOSED ON-STREET PARKING

SITE NOTES

1. CONSTRUCT STANDARD CURB & GUTTER PER CITY OF WEST LINN STANDARD DETAIL WL-501 (TYPICAL CURBS).
2. CONSTRUCT 6 FT WIDE DETATCHED SIDEWALK PER CITY OF WEST LINN STANDARD DETAIL WL-508 (CONCRETE SIDEWALK CROSS SECTION).
3. CONSTRUCT 8 FT CURB TIGHT SIDEWALK PER CITY OF WEST LINN STANDARD DETAIL WL-508 (CONCRETE SIDEWALK CROSS SECTION).
4. INSTALL ASPHALT SECTION. SEE TYPICAL SECTIONS A-A' AND B-B' ON SHEET C201
5. INSTALL ACCESS DRIVE. SEE TYPICAL SECTION C-C' ON SHEET C201
6. INSTALL RETAINING WALL
7. NOT USED.
8. ROADWAY TAPER PER AASHTO STANDARDS TO MEET EXISTING ROAD WIDTHS ON UPPER MIDHILL DRIVE, STA: 1+12 TO 2+28.
9. ROADWAY TAPER PER AASHTO STANDARDS TO MEET EXISTING ROAD WIDTHS ON HILLSIDE DRIVE, STA: 14+10 TO 14+91.
10. TRANSITION SIDEWALK TO CURB TIGHT. MATCH EXISTING CURB TIGHT SIDEWALK AS SHOWN.
11. PROVIDE CORNERING "EYE BROW" PER CLACKAMAS COUNTY ROADWAY STANDARD DRAWING C400.
12. INSTALL STREET SIGN "UPPER MIDHILL DRIVE" AND "HILLSIDE DRIVE".

811 Know what's below. Call before you dig.

DESIGN REVIEW

	REVISION SUMMARY	BY	DATE
A			01/11/2016

PRELIMINARY SITE PLAN
CHÉNE BLANC ESTATES
LAND USE DOCUMENTS
1800 UPPER MIDHILL DRIVE, LLC
WEST LINN, OR

REGISTERED PROFESSIONAL ENGINEER
OREGON
JULY 19, 1977
JESSE T. EMERSON
PRELIMINARY
EXPIRES: 12/31/17

3J CONSULTING, INC.
CIVIL ENGINEERING
WATER RESOURCES
LAND USE PLANNING
5075 SW GRIFFITH DRIVE, SUITE 150, BEAVERTON, OR 97005
PHONE & FAX: (503) 946-9365

3J JOB ID #	15256
LAND USE #	TBD
TAX LOT #	2S1E14CA 00200
DESIGNED BY	JTE, CKW, JCP
CHECKED BY	JTE

SHEET TITLE
SITE PLAN

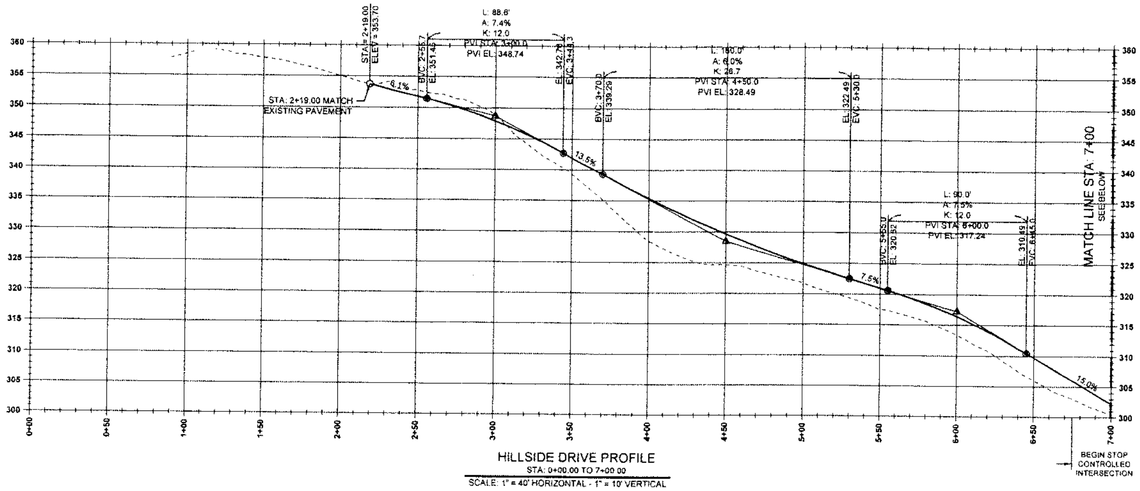
SHEET NUMBER
C210

NOT FOR CONSTRUCTION

4/20/16 PC Meeting

278

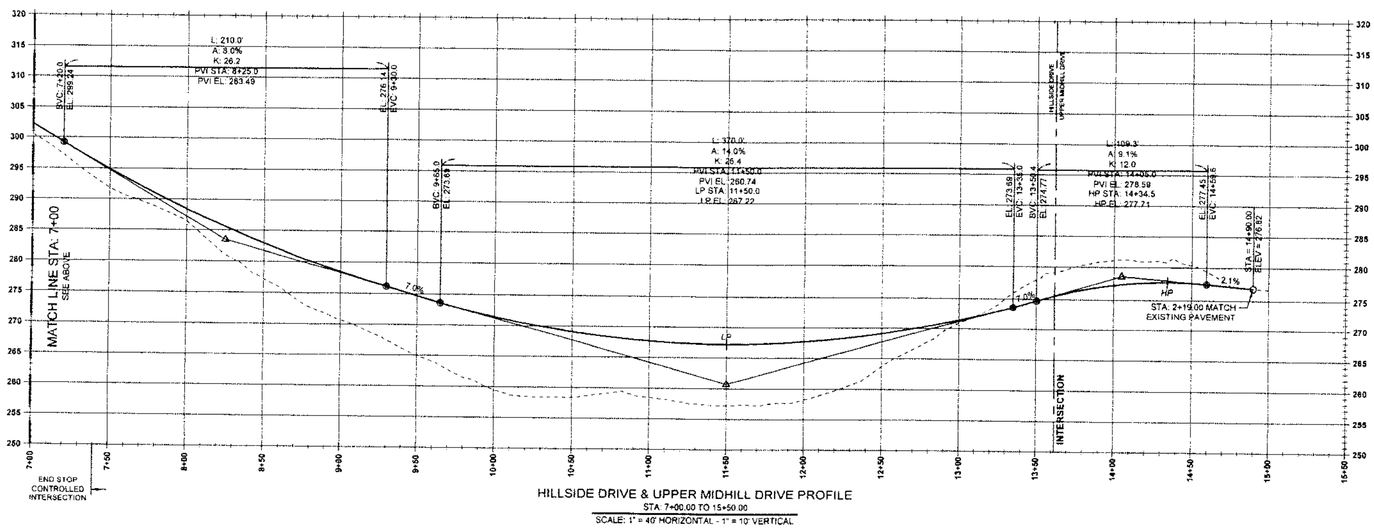
P:\15256-UPPER MIDHILL ESTA...\SMA\NCAD\DWG\C210 SITE PLAN.DWG



HILLSIDE DRIVE PROFILE
STA: 0+00.00 TO 7+00.00
SCALE: 1" = 40' HORIZONTAL - 1" = 10' VERTICAL

STREET DESIGN REQUIREMENTS

DESIGN SPEED	25 MPH
HORIZONTAL CURVES RADIUS (MIN. @ CL.)	165'
STOPPING SIGHT DISTANCE (MIN. K VALUE)	
CREST	12
SAG	26
VERTICAL GRADES (MAX)	15%
VERTICAL GRADE CHANGE (MAX)	1%
INTERIOR CURB RADIUS (MIN)	25'



HILLSIDE DRIVE & UPPER MIDHILL DRIVE PROFILE
STA: 7+00.00 TO 15+50.00
SCALE: 1" = 40' HORIZONTAL - 1" = 10' VERTICAL

DESIGN REVIEW 01/11/2016

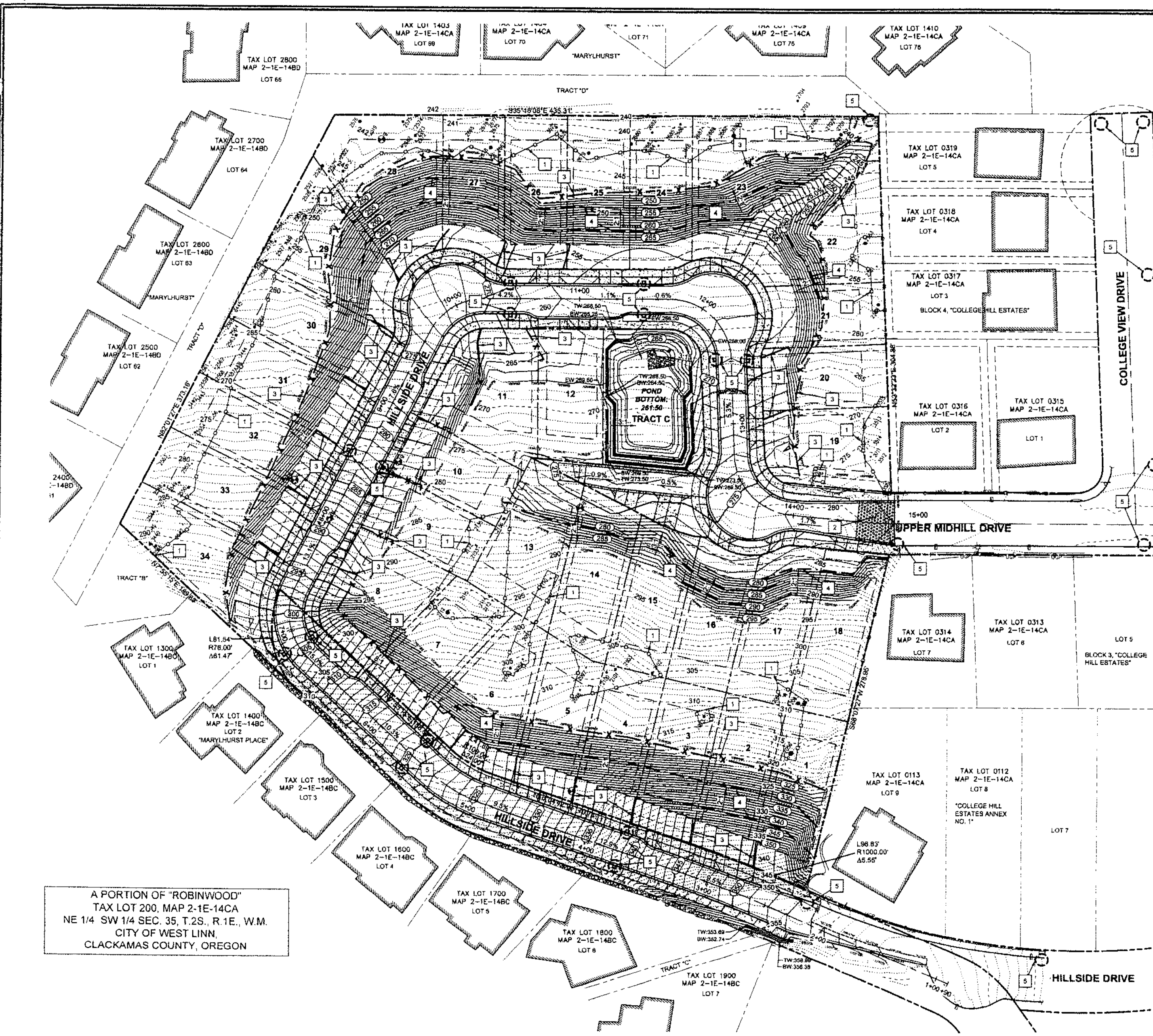
ROADWAY PROFILES
CHÊNE BLANC ESTATES
LAND USE DOCUMENTS
1800 UPPER MIDHILL DRIVE, LLC
WEST LINN, OR

PRELIMINARY
EXPIRES: 12/31/17

3J CONSULTING, INC
CIVIL ENGINEERING
WATER RESOURCES
LAND USE PLANNING
5075 SW GRIFFITH DRIVE, SUITE 150, BEAVERTON, OR 97005
PHONE & FAX: (503) 946-9365

3J JOB ID # | 15266
LAND USE # | TBD
TAX LOT # | 2S1E14CA 00200
DESIGNED BY | JTE, CKW, JCP
CHECKED BY | JTE

SHEET TITLE: ROADWAY PROF.
SHEET NUMBER: C220



Scale: 1 inch = 40 feet

LEGEND

	PROJECT BOUNDARY LINE
	RIGHT OF WAY LINE
	PROPOSED PROPERTY LINE
	ROADWAY CENTER LINE
	ADJACENT PROPERTY BOUNDARY
110	EXISTING MAJOR CONTOUR
108	EXISTING MINOR CONTOUR
110	PROPOSED MAJOR CONTOUR
108	PROPOSED MINOR CONTOUR
	EASEMENT LINE
	PROPOSED RETAINING WALL
	STRAW WATTLE
X	SILT FENCE
	LIMITS OF DISTURBANCE
	CONSTRUCTION ENTRANCE
	INLET PROTECTION
	SURFACE RUNOFF FLOW ARROW
TW:XXX.XX	TOP OF WALL SURFACE ELEVATION
BW:XXX.XX	BOTTOM OF WALL SURFACE ELEVATION

GRADING KEY NOTES

1. MAINTAIN TREE PROTECTION FENCING THROUGHOUT CONSTRUCTION.
2. CONSTRUCT STABILIZED CONSTRUCTION ENTRANCE AT LOCATION SHOWN.
3. PLACE SILT FENCING AT LIMITS OF GRADING AND CONSTRUCTION WHERE SHOWN.
4. INSTALL STRAW WATTLE AT LOCATIONS SHOWN.
5. INSTALL INLET PROTECTION AT LOCATIONS SHOWN.
6. INSTALL RETAINING WALL FOR EXISTING GRADE TRANSITION. DESIGN BY OTHERS.

SITE GRADING INFORMATION

SITE STRIPPING*	10,037 CY
NEAT LINE CUT	5,880 CY
NEAT LINE FILL	35,480 CY
NEAT LINE NET BALANCE	29,600 CY (FILL)
MAXIMUM CUT DEPTH	12.2 FT
MAXIMUM FILL DEPTH	20.5 FT
MAXIMUM PROPOSED SLOPE	2H:1V
TOTAL AREA OF DISTURBANCE	4.15 ACRES

*STRIPPINGS:
ASSUMED REPLACEMENT / STOCKPILE ON SITE OUTSIDE BUILDING ENVELOPE
ASSUMED 18 INCHES REMOVAL OVER TOTAL AREA OF DISTURBANCE

GRADING GENERAL NOTES

1. REFER TO *"PRELIMINARY GEOTECHNICAL ENGINEERING REPORT AND LANDSLIDE HAZARD STUDY"* BY GEOPACIFIC ENGINEERING, DATED AUGUST 6, 2015. ALL SITE EARTHWORK PREPARATION AND EXECUTION SHALL CONFORM IN ALL RESPECTS TO THE RECOMMENDATIONS AND DESIGN REQUIREMENTS OF THIS DOCUMENT.
2. ALL PROPOSED GRADING SHOWN IS REFERENCED TO FINISHED GRADE.
3. ALL PROPOSED GRADING SHALL CONFORM TO THE REQUIREMENTS OF THE BUILDING CODE (CURRENT EDITION), INCLUDING APPENDIX J

811. Know what's below. Call before you dig.

DESIGN REVIEW 01/11/2016
REVISION SUMMARY | BY | DATE

PHASE 2 GRADING AND EROSION CONTROL
CHÊNE BLANC ESTATES
LAND USE DOCUMENTS
1800 UPPER MIDHILL DRIVE, LLC
WEST LINN, OR

REGISTERED PROFESSIONAL ENGINEER — OREGON — JESSE T. EMERSON — PRELIMINARY — EXPIRES: 12/31/17

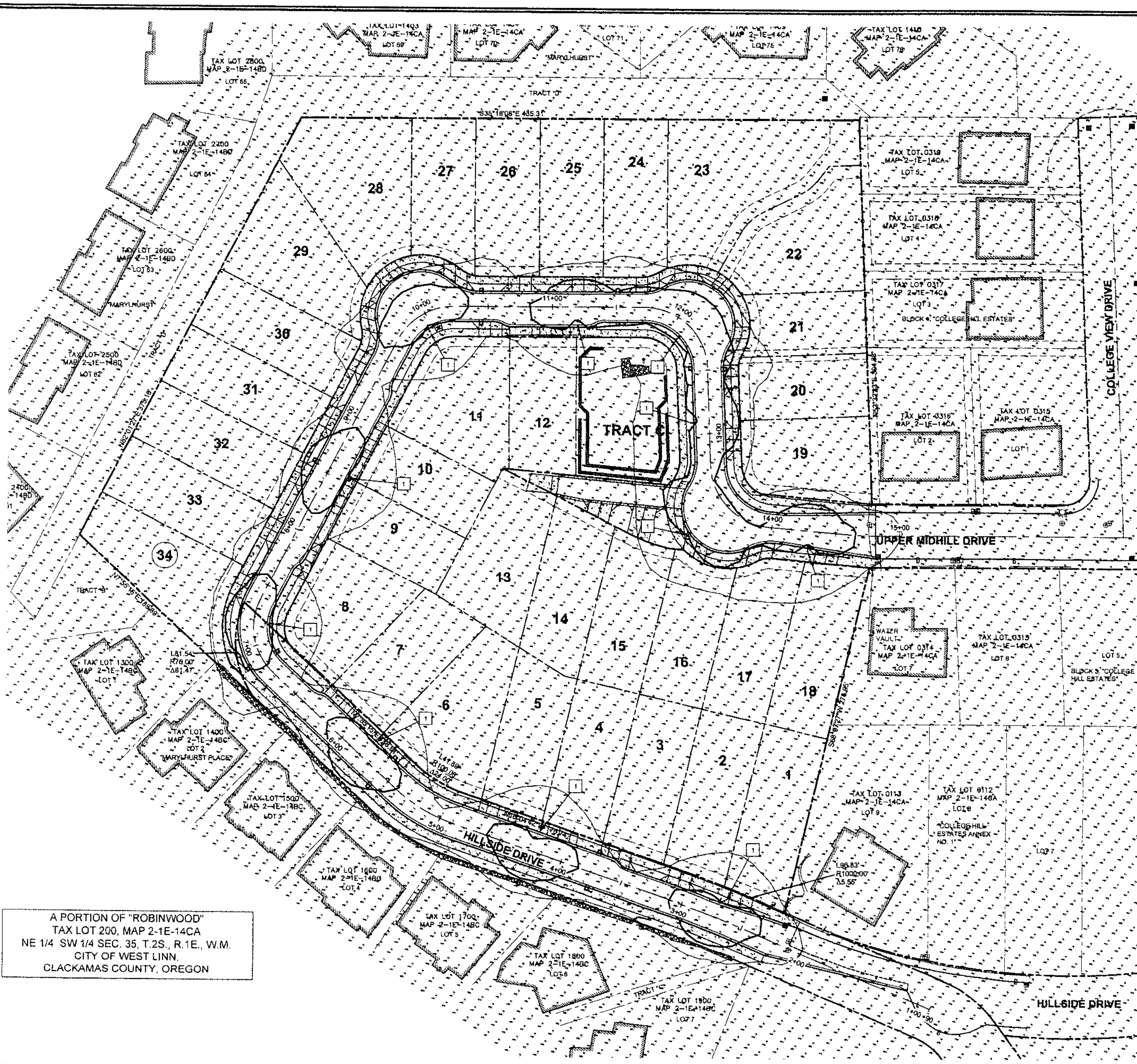
3J CONSULTING, INC
CIVIL ENGINEERING
WATER RESOURCES
LAND USE PLANNING
5075 SW GRIFFITH DRIVE, SUITE 150, BEAVERTON, OR 97005
PHONE & FAX: (503) 946-9365

3J JOB ID #	15266
LAND USE #	TBD
TAX LOT #	2S1E14CA 00200
DESIGNED BY	JTE, CKW, JCP
CHECKED BY	JTE

SHEET TITLE
PH2 GRADE & E.C.
SHEET NUMBER
C230

NOT FOR CONSTRUCTION

NOT FOR C… TRUCTION



A PORTION OF "ROBINWOOD"
TAX LOT 200, MAP 2-1E-14CA
NE 1/4 SW 1/4 SEC. 35, T.2S., R.1E., W.M.
CITY OF WEST LINN,
CLACKAMAS COUNTY, OREGON

Scale: 1 inch = 40 feet

LEGEND

- 0.5 FOOT CANDLE ISO-ILLUMINATION CONTOUR
- 0.1 FOOT CANDLE ISO-ILLUMINATION CONTOUR
- 0.7 – ILLUMINATION ANALYSIS POINT (FC)
- FC – FOOT CANDLE UNIT
- PROPOSED LUMINAIRE

SCENIC DRIVE	PROPOSED	REQUIRED*
EXISTING LIGHT(S) INCLUDED	0 EA	
NEW LIGHTS PROPOSED	11 EA	
MAX. ILLUMINATION	1.1 FC	
MIN. ILLUMINATION	0.1 FC	
AVERAGE ILLUMINATION	0.8 FC	0.40 FC (MIN)
UNIFORMITY (AVG/MIN)	5.5	6.00 (MAX)

*PER CITY OF WEST LINN PUBLIC WORKS DESIGN STANDARDS

LUMINAIRE

CREE LEDWAY IP66 STREET LIGHT - TYPE 2 MEDIUM
STR-LWY-2M-HT-02-E-UL-BZ-700-40K-R-UTL-SPX

POST AND ARM

30 FT BRONZE POLE / 25 FT MOUNTING HEIGHT
6' BRONZE MAST ARM

SITE NOTES

1. INSTALL NEW BRONZE POLE, 6-FT MAST ARM, AND LED BETA FIXTURE.

811. Know what's below. Call before you dig.

DESIGN REVIEW 01/11/2016
REVISION SUMMARY | BY | DATE

PHOTOMETRICS PLAN
CHÊNE BLANC ESTATES
LAND USE DOCUMENTS
1800 UPPER MIDHILL DRIVE, LLC
WEST LINN, OR

PRELIMINARY
REGISTERED PROFESSIONAL ENGINEER
OREGON
JESSE T. EMERSON
EXPIRES: 12/31/17

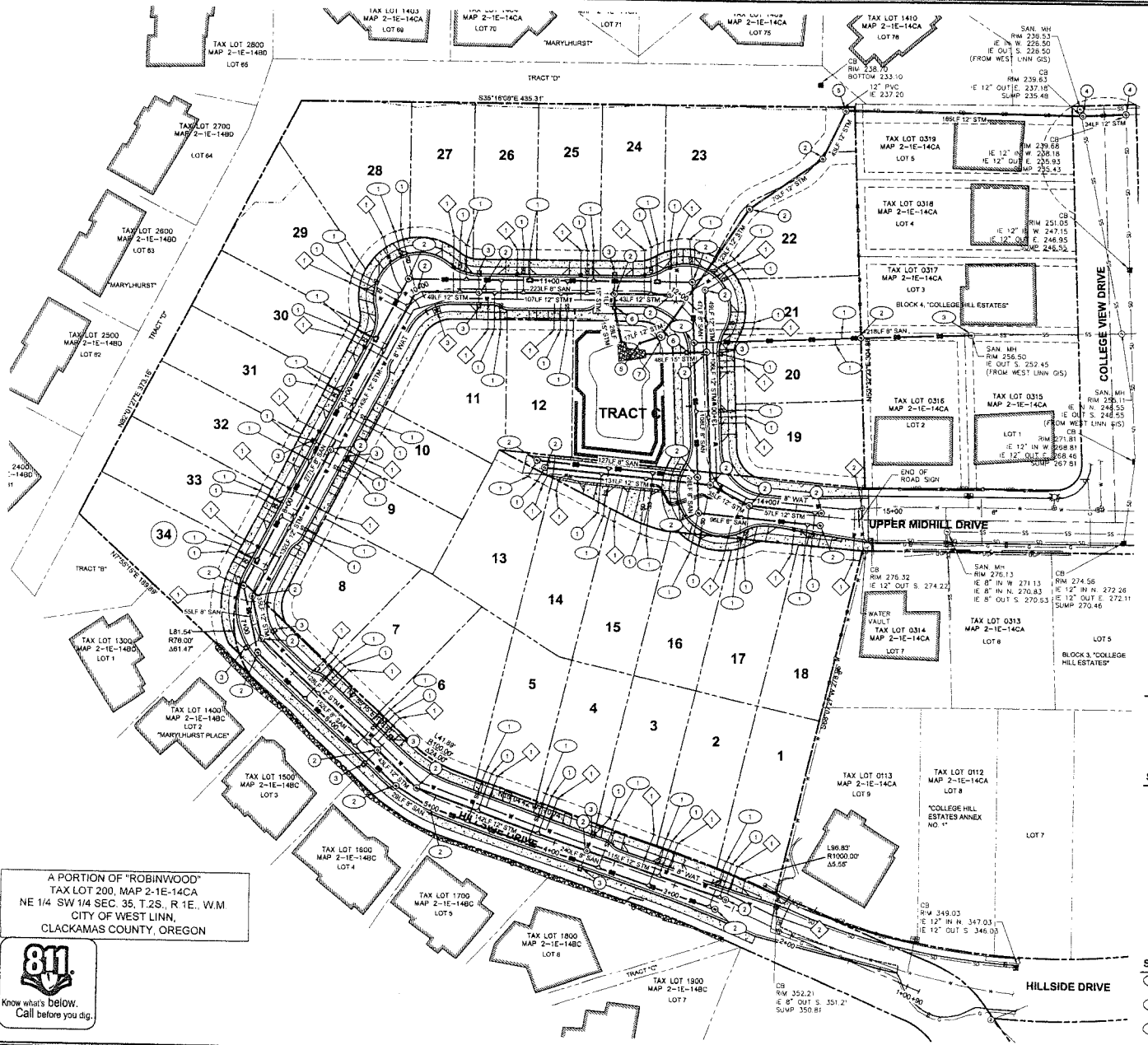
3J CONSULTING, INC
CIVIL ENGINEERING
WATER RESOURCES
LAND USE PLANNING
5075 SW GRIFFITH DRIVE, SUITE 150, BEAVERTON, OR 97005
PHONE & FAX: (503) 946-9365

3J JOB ID # | 15266
LAND USE # | TBD
TAX LOT # | 21E14CA 00200
DESIGNED BY | JTE, CKW, JCP
CHECKED BY | JTE

SHEET TITLE
PHOTOMETRICS

SHEET NUMBER
C280

…UPPER MIDHILL ESTA… …\MANICAD\DOC\C280 PHOTOMETRICS PLAN.DWG



A PORTION OF "ROBINWOOD"
TAX LOT 200, MAP 2-1E-14CA
NE 1/4 SW 1/4 SEC. 35, T.2S., R.1E., W.M.
CITY OF WEST LINN,
CLACKAMAS COUNTY, OREGON

811 Know what's below. Call before you dig.

LEGEND

- PROJECT BOUNDARY LINE
- RIGHT OF WAY LINE
- PROPOSED PROPERTY LINE
- ROADWAY CENTER LINE
- ADJACENT PROPERTY BOUNDARY
- PROP. EASEMENT LINE
- PROP. BUILDING SETBACK LINE
- EXIST. DRAINAGE DITCH
- PROP. STORM MAIN
- PROP. STORM LATERAL / LEAD
- PROP. SANITARY MAIN
- PROP. SANITARY LATERAL
- PROP. WATER MAIN
- PROP. WATER SERVICE
- EXIST. SANITARY SEWER
- EXIST. STORM DRAIN
- EXIST. WATER MAIN
- PROP. TEE FITTING, STORM / SANITARY
- PROP. COMBINATION CURB INLET
- PROP. CG-48 MANHOLE
- PIPE CAP / STUB
- LINE CONTINUATION
- PROP. SEWER MANHOLE
- PROP. SEWER CLEANOUT
- PROP. STORM MANHOLE
- PROP. STORM CLEANOUT
- FIRE HYDRANT
- EXIST. WATER VALVE
- EXIST. BLOW-OFF VALVE
- EXIST. SANITARY MANHOLE
- EXIST. SANITARY CLEANOUT
- EXIST. STORM MANHOLE
- EXIST. STORM CLEANOUT
- EXIST. STORM INLET

WATER KEY NOTES

1. INSTALL SINGLE WATER METER FOR INDIVIDUAL LOT SERVICE. EXTEND 1" SERVICE LATERAL 3' BEYOND PUE.
2. INSTALL / CONNECT TO EXISTING.
3. INSTALL FIRE HYDRANT AT LOCATIONS SHOWN.

STORM KEY NOTES

1. PROVIDE NEW 4" PRIVATE STORM DRAIN LATERAL CONNECTION FOR INDIVIDUAL LOT SERVICE. EXTEND SERVICE LATERAL 3' BEYOND PUE.
2. CONSTRUCT STANDARD 48" STORM SEWER MANHOLE
3. CONSTRUCT COMBINATION CURB INLET WITH 10" STORM LINE.
4. CONSTRUCT 48" STORM SEWER MANHOLE WITH GRATE LID.
5. CONSTRUCT 48" INLET MANHOLE
6. CONSTRUCT CG-48 CURB INLET MANHOLE.
7. CONSTRUCT FLOW CONTROL MANHOLE.

SANITARY SEWER KEY NOTES

1. PROVIDE NEW 4" SANITARY SEWER LATERAL FOR INDIVIDUAL LOT SERVICE. EXTEND SERVICE LATERAL 3' BEYOND PUE.
2. CONSTRUCT STANDARD 48" SANITARY SEWER MANHOLE
3. CORE DRILL NEW 8" CONNECTION ON EXISTING MANHOLE. CONNECT TO EXISTING MANHOLE.

DESIGN REVIEW	01/11/2016
REVISION SUMMARY	BY DATE

COMPOSITE UTILITY PLAN
CHÊNE BLANC ESTATES
LAND USE DOCUMENTS

1800 UPPER MIDHILL DRIVE, LLC
WEST LINN, OR

REGISTERED PROFESSIONAL ENGINEER
OREGON
JULY 14, 1981
JESSE T. EMERSON
PRELIMINARY
EXPIRES: 12/31/17

3J CONSULTING, INC
CIVIL ENGINEERING
WATER RESOURCES
LAND USE PLANNING
5075 SW GRIFFITH DRIVE, SUITE 150, BEAVERTON, OR 97005
PHONE # / FAX: (503) 946-9365

3J JOB ID #	15268
LAND USE #	TBD
TAX LOT #	2S1E14CA 00200
DESIGNED BY	JTE, DKW, JCP
CHECKED BY	JTE

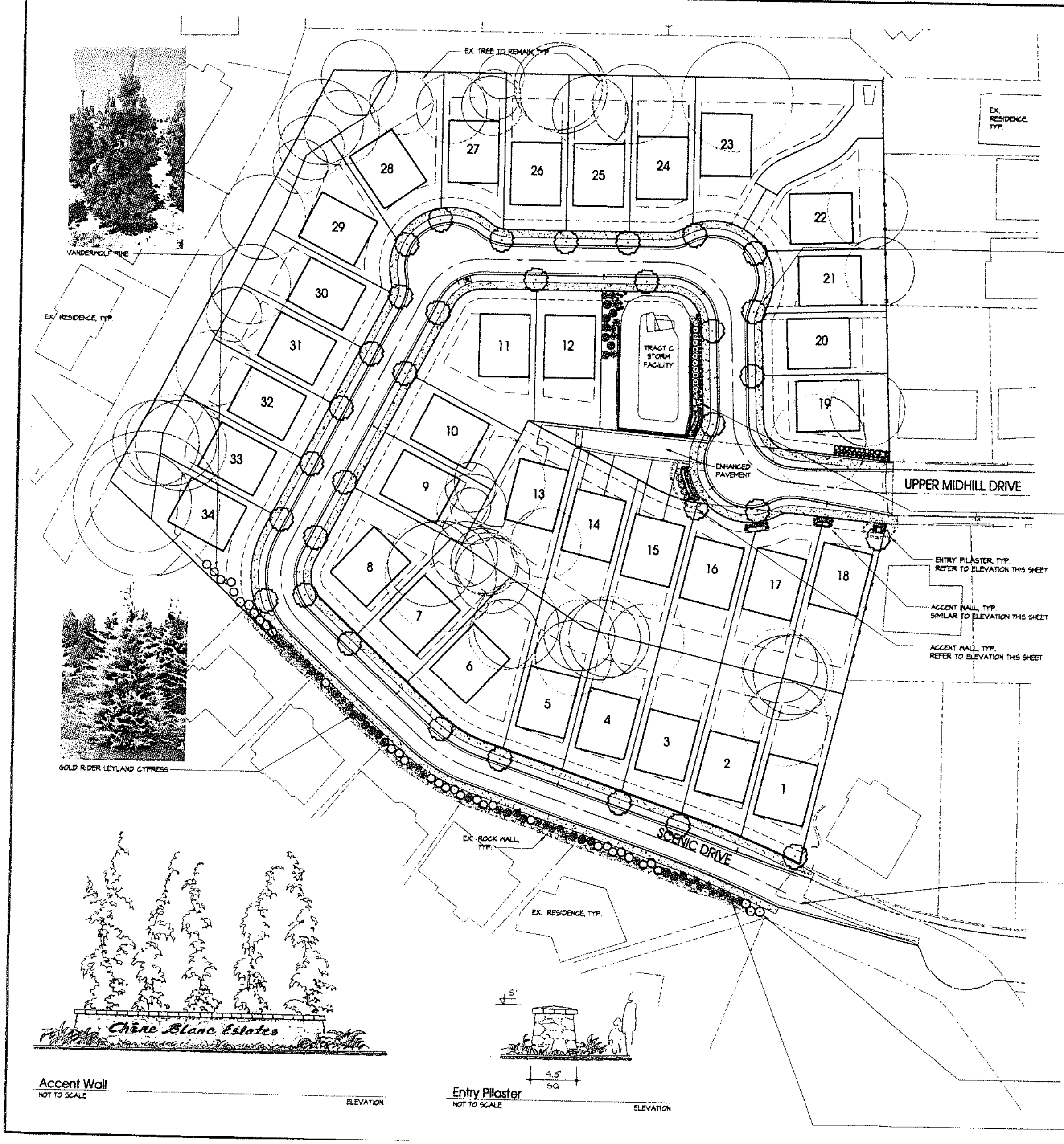
SHEET TITLE
COMP. UTIL.

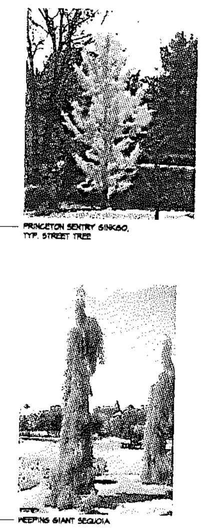
SHEET NUMBER
C300

NOT FOR CONSTRUCTION

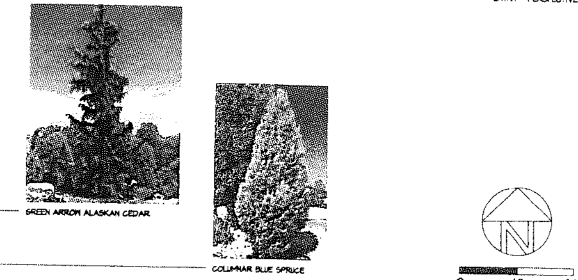
4/20/16 PC Meeting
282

P:\15268-UPPER MIDHILL EST_ ES\MAIN\CAD\DGN\C300 COMPOSITE UTILITY PLAN.DWG





PLANT LEGEND			
SYMBOL	BOTANICAL / COMMON NAME	SIZE	QUANTITY
TREES			
⊙	CHAMAECYPARIS NOOTKATENSIS 'GREEN ARROW' / GREEN ARROW ALASKAN CEDAR	6' HT. MIN.	4
●	CUPRESSUS LEYLANDII 'GOLD RIDER' / GOLD RIDER LEYLAND CYPRESS	6' HT. MIN.	28
○	GINKGO BILOBA 'PRINCETON SENTRY' / PRINCETON SENTRY GINKGO	2" CAL.	33
✻	PICEA PUNGENS 'GLAUCA FASTIGIATA' / COLUMNAR BLUE SPRUCE	6' HT. MIN.	33
○	PINUS FLEXILLIS 'VANDERWOLF' / VANDERWOLF PINE	6' HT. MIN.	26
✻	SEQUOIADENDRON GIGANTEUM 'PENDULUM' / WEEPING GIANT SEQUOIA	6' HT. MIN.	9
SHRUBS			
•	CAREX BUCHANANII 'RED ROOSTER' / RED ROOSTER SEDGE	1 GAL.	68
⊙	ILEX X MESERVEAE 'BLUE BOY' / BLUE BOY HOLLY	5 GAL.	6
⊙	ILEX X MESERVEAE 'BLUE GIRL' / BLUE GIRL HOLLY	5 GAL.	6
○	PICEA PUNGENS 'GLAUCA' / BLUE SPRUCE (LOW GRAFT)	24" HT. MIN.	9
GROUNDCOVER			
SYMBOL NOT SHOWN	ARCTOSTAPHYLOS UVA URSI 'MASS.' MASSACHUSETTS KINNICKINNICK (all planter strips - between walk and curb)	1 GAL.	36" O.C.
(hatched)	OPHIOPOGON PLANISCAPUS 'NIGRESCENS' / BLACK MONDO GRASS	1 GAL.	12" O.C.
SYMBOL NOT SHOWN	BARK MULCH (ALL PLANTER BEDS)		



GRO Outdoor Living
3601 NE 74TH STREET
VANCOUVER, WA 98665
OFFICE: 360.727.5975
CCB# 193266 | LCB # 8977
WA #GROOUOL883MQ
www.grooutdoorliving.com

REGISTERED 354
Christopher A. Baumann
OREGON 07/26/96
LANDSCAPE ARCHITECT

GRO™ OUTDOOR LIVING

PROJECT NAME:
Chêne Blanc Estates
Land Use Documents
Upper Midhill Estates, LLC
West Linn, Oregon

Landscape Plan

DRAWN:	CHECKED:
CB	CB
SCALE:	DATE:
1"=20'-0"	10/14/15

JOB #:
Upper Midhill Estates
REVISIONS:

SHEET NAME:
Landscape Plan

L1

INSCALABLE

rec'd Nov. 11, 2015

Morgan Holen & Associates, LLC
Consulting Arborists and Urban Forest Management

971.409.9354
3 Monroe Parkway, Suite P 220
Lake Oswego, Oregon 97035
morgan.holen@comcast.net

November 8, 2015

Planning and Building
City of West Linn
22500 Salamo Road #1000
West Linn, Oregon 97068

Re: Arborist Report and Tree Preservation Plan for Chêne Blanc Estates
West Linn, Oregon
Project No. MHA15012 Upper Midhill Drive

Please find enclosed the Arborist Report and Tree Preservation Plan for the Chêne Blanc Estates project located at 18000-18001 Upper Midhill Drive in West Linn, Oregon. Please contact us if you have questions or need any additional information.

Respectfully,
Morgan Holen & Associates, LLC

Morgan E. Holen

Morgan E. Holen, Owner
ISA Certified Arborist, PN-6145A
ISA Tree Risk Assessment Qualified
Forest Biologist

Morgan Holen & Associates, LLC
Consulting Arborists and Urban Forest Management
971.409.9354
3 Monroe Parkway, Suite P 220
Lake Oswego, Oregon 97035
morgan.holen@comcast.net

Arborist Report and Tree Preservation Plan

Chêne Blanc Estates
West Linn, Oregon

November 8, 2015

Morgan Holen & Associates LLC
Consulting Arborists and Urban Forest Management
971.409.9354
3 Monroe Parkway, Suite P 220
Lake Oswego, Oregon 97035
morgan.holen@comcast.net

Table of Contents

Morgan Holen & Associates, LLC
Consulting Arborists and Urban Forest Management
971.409.9354
3 Monroe Parkway, Suite P 220
Lake Oswego, Oregon 97035
morgan.holen@comcast.net

Chêne Blanc Estates – West Linn, Oregon
Arborist Report and Tree Preservation Plan
November 8, 2015

MHA15012

Purpose

This Arborist Report and Tree Preservation Plan for the Chêne Blanc Estates project in West Linn, Oregon, is provided pursuant to City of West Linn Community Development Code Chapter 55, Municipal Code Sections 8.500 and 8.600, and the West Linn Tree Technical Manual. This report describes the existing trees located on the project site, as well as recommendations for tree removal, retention and protection. This report is based on observations made by International Society of Arboriculture (ISA) Certified Arborist (PN-6145A) and Qualified Tree Risk Assessor Morgan Holen during site visits conducted on July 23 and 24, 2015, a subsequent site meeting with the City Arborist Mike Perkins on October 7, 2015, and site plan coordination with 3J Consulting.

Scope of Work and Limitations

Morgan Holen & Associates, LLC, was contracted by Upper Midhill Estates, LLC, to collect tree inventory data for individual trees measuring six inches and larger in diameter and to develop an arborist report and tree preservation plan for the project. The site is planned for residential development with new streets, 34 building lots, and water quality facilities. Site plans were provided by 3J Consulting illustrating the location of existing trees and potential construction impacts.

Visual Tree Assessment (VTA) was performed on individual trees located across the site. The enclosed tree inventory data and sheet C110 in the Land Use Plan Set demonstrate that all trees on the site were physically identified. VTA is the standard process whereby the inspector visually assesses the tree from a distance and up close, looking for defect symptoms and evaluating overall condition and vitality of individual trees. Trees were evaluated in terms of general condition and potential construction impacts. Following the inventory fieldwork, we coordinated with 3J Consulting to discuss tree protection recommendations.

The client may choose to accept or disregard the recommendations contained herein, or seek additional advice. Neither this author nor Morgan Holen & Associates, LLC, have assumed any responsibility for liability associated with the trees on or adjacent to this site.

General Description

The Chêne Blanc Estates project site is located at 18000-18001 Upper Midhill Drive in West Linn, Oregon. The site is undeveloped and heavily treed with a forested stand of mixed species in variable condition. The trees are undergoing natural stand dynamics, whereby trees are competing with one another; over time, some trees become dominant or codominant while others are suppressed beneath the dominant overstory. The stand is generally in good condition as an intact and undisturbed group. However, the stand has not been managed and invasive Himalayan blackberry (*Rubus armeniacus*) and English ivy (*Hedera helix*) are prolific throughout the understory. The blackberry was recently cleared to allow for better site access and VTA, but English ivy is growing up tree trunks in some areas and overtopping trees which will lead to their demise. In general, native Oregon white oak (*Quercus garryana*) and Douglas-fir (*Pseudotsuga menziesii*) are the dominant tree species in the stand and relatively in the best condition; bigleaf maple (*Acer macrophyllum*) and Oregon ash (*Fraxinus latifolia*) are the next most common tree species but are relatively in poorer condition. The location of individual trees is shown on site plan drawings and tree numbers correspond with the enclosed tree data.

Tree Inventory

In all, 502 existing trees were inventoried, including 18 different species. Table 1 provides a summary of the number of inventoried trees by species and general condition rating. The enclosed tree data provides a complete description of the individual trees.

Table 1. Number of Trees by Species and Condition – Chêne Blanc Estates.

Common Name	Species Name	Dead	Poor	Fair	Good	Total	Percent*
bigleaf maple	*Acer macrophyllum*	2	27	22	3	**54**	**11%**
black hawthorn	*Crataegus douglasii*		1			**1**	0.2%
deciduous	unknown		2			**2**	0.4%
Douglas-fir	*Pseudotsuga menziesii*	2	28	52	32	**114**	**23%**
English hawthorn	*Crataegus monogyna*		2	2		**4**	1%
English holly	*Ilex aquifolium*		1			**1**	0.2%
European white birch	*Betula pendula*		1			**1**	0.2%
grand fir	*Abies grandis*		1	1	2	**4**	1%
madrone	*Arbutus menziesii*		2	7	1	**10**	2%
Oregon ash	*Fraxinus latifolia*	1	27	39	2	**69**	**14%**
Oregon white oak	*Quercus garryana*	2	33	108	70	**213**	**42%**
Port-Orford-cedar	*Chamaecyparis lawsoniana*				1	**1**	0.2%
red alder	*Alnus rubra*		1	3		**4**	1%
Scouler's willow	*Salix scouleriana*		2	1		**3**	0.6%
sweet cherry	*Prunus avium*		3	7		**10**	2%
western redcedar	*Thuja plicata*		2	6	1	**9**	2%
yew	*Taxus brevifolia*			1		**1**	0.2%
pine	*Pinus* spp.				1	**1**	0.2%
Total		**7** (1%)	**133** (26%)	**249** (50%)	**113** (23%)	**502**	**100%**

*Total percent actually exceeds 100% due to rounding.

Oregon white oak and Douglas-fir account for 65% of the inventoried trees and 90% of the trees classified as being in generally good condition. These trees are scattered across the site. Where these two species are growing in close proximity to one another, the Douglas-firs are crowding the oaks because they grow faster; both species are intolerant of shade. The Douglas-firs classified as being in fair or poor condition include trees with reduced vigor, dieback, old broken tops, a history of branch failure, high live crowns, and other structural defects. The Oregon white oaks classified as being in fair or poor condition include trees that have reduced vigor, small live crowns, structural defects, ivy infestation, and those that have been overtopped by adjacent Douglas-firs. Overall, these two species have the best potential for retention with development on this site.

Bigleaf maple and Oregon ash account for 25% of the inventoried trees, but only five of these trees were classified as being in good condition. In general, these trees are relatively smaller than the Oregon white oaks and Douglas-firs. Common defects include poor structure, ivy infestation, small crowns, high live crowns and crowns with major asymmetry, dead and broken branches, and decay. On this site, these two species are less suitable for retention with development.

The remaining 10% of the inventoried trees include a mix of species:

- One black hawthorn (*Crataegus douglasii*) in poor condition with an old broken top, multiple leaders, advanced decay, and ivy infestation.
- Two deciduous trees of unknown species, one of which is in poor condition and heavily infested with ivy and the other which is mostly dead, with dead and broken branches and severe ivy infestation.
- Sixteen non-native and invasive trees, including four English hawthorn (*Crataegus monogyna*), one English holly (*Ilex aquifolium*), one European white birch (*Betula pendula*), and 10 sweet cherry (*Prunus avium*).
- Four grand fir (*Abies grandis*) including two in good condition and one each in fair condition with an old broken top and high live crown and in poor condition being overtopped by an adjacent Douglas-fir.
- Ten madrone (*Arbutus menziesii*), including one in good condition, seven in fair condition with dieback and structural defects, and two in poor condition with severe dieback and decay.
- One Port-Orford-cedar (*Chamaecyparis lawsoniana*) in good condition with no major defects.
- Four red alder (*Alnus rubra*) including three in fair condition with moderate defects and one in poor condition with basal and trunk decay.
- Three Scouler's willow (*Salix scouleriana*) including one in fair condition with codominant stems and ivy infestation and two in poor condition with dieback and decay.
- Nine western redcedar (*Thuja plicata*) including one in good condition with minor crown asymmetry, six in fair condition with moderate defects and minor decay, and two in poor condition with dead tops and trunk decay.
- One yew (*Arbutus menziesii*) in fair condition with moderate structure.
- One pine of unknown species in good condition with a forked top, but no major defects.

Significant trees will be determined by the City Arborist. Based on our evaluation of the size, type, location, health, and long term survivability of the individual trees, 169 (34%) trees were identified as potentially being significant.

Tree Preservation Plan

We coordinated with the project team to discuss trees suitable for preservation in terms of potential construction impacts. Table 2 provides a summary of the number of non-significant and potentially significant trees by treatment recommendation. Note that two of the inventoried trees are located off-site and will be protected during construction (trees 2703 and 2704, an invasive English hawthorn in poor condition and a Douglas-fir in fair condition with a one-sided crown, respectively).

Table 2. Number of Inventoried Trees by Treatment Recommendation and Significance.

Treatment	Remove	Retain	Total
Non-Significant Trees	269	62	**331**
Potentially Significant Trees	119	50	**169**
Off-Site Tree to Protect	0	2	**2**
Total	**388**	**114**	**502**

Of the 502 inventoried trees, two are located off-site and will be protected during construction, while 112 on-site trees are planned for retention and 388 on-site trees are planned for removal either for construction or because of poor or non-viable condition.

The 112 trees planned for retention include 50 potentially significant trees (36 Oregon white oak, 12 Douglas-fir, one madrone, and one yew). These trees are primarily located in the rear of proposed building lots. During the tree inventory fieldwork and again during the on-site meeting with the City's Arborist, we evaluated these trees in terms of potential impacts from adjacent tree removal. Generally, trees located within the interior of a forested stand could be negatively impacted by adjacent tree removal and present increased potential for windthrow; the interior trees are adapted to the shelter provided by dominant and edge grown trees and are likely to have smaller live crowns and relatively poor height to diameter ratios that may predispose them to failure. Only those significant trees most suitable for preservation and considered safe to retain with adjacent tree removal were considered for retention. These trees will require special consideration to assure their protection during construction.

The other 62 trees planned for retention are not likely to be considered significant, but their retention will help to keep the stand relatively intact along the north and east property boundaries and maintain some screening benefits. These trees include a mix of species in highly variable condition, which could benefit from general maintenance including removal of ivy growing up tree trunks and pruning to remove dead and defective branches. They are generally located among significant trees planned for retention and will not be impacted by the proposed construction. It is important to note that these trees should be re-evaluated during construction, at the time of site clearing, to verify that they are suitable for preservation and will not present hazard risk potential to the adjacent homes planned for development due to condition, structural defects, and exposure from nearby tree removal. We discussed this approach with the City's Arborist during our on-site meeting and he agreed that a re-evaluation at the time of clearing should be recommended and is a reasonable approach in order to help minimize tree removal to the greatest extent possible.

The 388 trees planned for removal include 119 potentially significant trees and 269 trees that are not likely to be considered significant due to size, type, location, health, and viability. Treatment recommendations provided in the enclosed tree data note the reason that removal is necessary. Of the 119 potentially significant trees, removal is planned for: 64 trees because of proposed building, 31 trees for street construction within the right of way, and 24 trees because of grading that is necessary for other site improvements. Of the 269 trees that are not likely to be considered significant, removal is planned for: 46 trees because of poor or non-viable condition, 137 trees because of proposed building, 45 trees for street construction within the right of way, and 41 trees because of grading for other site improvements. Table 3 provides a summary of the number of trees planned for removal by reason and potential for significance.

Table 3. Number of Trees Planned for Removal by Reason and Potential Significance.

Reason for Removal	Not Significant	Potentially Significant	Total	Percent*
Condition	46	0	**46**	**12%**
Building	137	64	**201**	**52%**
Street (ROW improvements)	45	31	**76**	**20%**
Other Grading	41	24	**65**	**17%**
Total	**269**	**119**	**388**	**100%**

*Total percent actually exceeds 100% due to rounding.

Trees to be retained should be protected with tree protection fencing established at the dripline at a minimum for non-significant trees and at the dripline plus 10-feet for significant trees. In addition to the tree protection standards provided in the next section, we also recommended re-evaluation of trees

planned for retention at the time of clearing, removal of English ivy from tree trunks, and minor pruning to remove dead and defective branches for safety (to be performed by a Qualified Tree Service).

In some cases, the proposed development is likely to encroach within tree protection zones and alternative tree protection measures will be needed. In particular, standard tree protection zones overlap with allowable building footprints in the rear of lots 1-10, 13-19, and 21-34. Tree protection fencing initially installed at the dripline or dripline plus 10-feet for significant trees should only be adjusted based on coordination with the project arborist. Exploratory excavation is recommended during the site improvement phase of construction in order to locate roots of protected trees and assess potential impacts to critical roots. The contractor should coordinate with the project arborist to adjust tree protection fencing, monitor exploratory excavation, and evaluate potential root impacts. The arborist should then prepare a supplemental memorandum containing recommendations to minimize root impacts at specific trees on these lots. If critical roots are encountered, customized home plans may be needed to avoid critical root impacts and/or modified foundations may be necessary to allow encroachment into the critical root zone while avoiding excavation and root pruning by using pier and beam designs to span foundations across root zones. Tree protection recommendations specific to each lot should be required at the time of plat based on what is learned during exploratory excavation and evaluation of potential impacts in terms of lot specific building plans.

Work beneath the dripline of protected trees should be supervised by the project arborist in coordination with the City's Arborist.

Tree Protection Standards
Trees to be protected will need special consideration to assure their protection during construction. Any work that is necessary within the standard tree protection zone should be performed under the guidance of a qualified arborist. It is the Client's responsibility to implement this plan and to monitor the construction process. Tree protection measures include:

Before Construction

1. **Tree Protection Zone.** The project arborist shall designate the Tree Protection Zone (TPZ) for each tree to be protected. Where feasible, the size of the TPZ shall be established at the dripline of the tree plus 10-feet. Alternatively, the TPZ shall be established at the dripline of protected trees. Where infrastructure (driveways, buildings, and utilities) must be installed closer to the tree(s), the TPZ may be established within the dripline area if the project arborist, in coordination with the City Arborist, determines that the tree(s) will not be unduly damaged. The location of TPZs shall be shown on construction drawings.
2. **Protection Fencing.** Protection fencing shall serve as the tree protection zone and shall be erected before demolition, grubbing, grading, or construction begins. All trees to be retained shall be protected by six-foot-high chain link fences installed at the edge of the TPZ. Protection fencing shall be secured to two-inch diameter galvanized iron posts, driven to a depth of a least two feet, placed no further than 10-feet apart. If fencing is located on pavement, posts may be supported by an appropriate grade level concrete base. Protection fencing shall remain in place until final inspection of the project permit, or in consultation with the project arborist.
3. **Signage.** An 8.5x11 –inch sign stating, "WARNING: Tree Protection Zone," shall be displayed on each protection fence at all times.
4. **Designation of Cut Trees.** Trees to be removed shall be clearly marked with construction flagging, tree-marking paint, or other methods approved in advanced by the project arborist. Trees shall be carefully removed so as to avoid either above or below ground damage to those

trees to be preserved. Roots of stumps that are adjacent to retained trees shall be carefully severed prior to stump extraction.

5. **Preconstruction Conference.** The project arborist shall be on site to discuss methods of tree removal and tree protection prior to any construction.
6. **Verification of Tree Protection Measures.** Prior to commencement of construction, the project arborist shall verify in writing to the City Arborist that tree protection fencing has been satisfactorily installed.

During Construction

7. **Tree Protection Zone Maintenance.** The protection fencing shall not be moved, removed, or entered by equipment except under direction of the project arborist, in coordination with the City Arborist.
8. **Storage of Material or Equipment.** The contractor shall not store materials or equipment within the TPZ.
9. **Excavation within the TPZ.** Excavation with the TPZ shall be avoided if alternatives are available. If excavation within the TPZ is unavoidable, the project arborist shall evaluate the proposed excavation to determine methods to minimize impacts to trees. This can include tunneling, hand digging or other approaches. All construction within the TPZ shall be under the on-site technical supervision of the project arborist, in coordination with the City Arborist.
10. **Tree Protection Zone.** The project arborist shall monitor construction activities and progress, and provide written reports to the developer and the City at regular intervals. Tree protection inspections shall occur monthly or more frequently if needed.
11. **Quality Assurance.** The project arborist shall supervise proper execution of this plan during construction activities that could encroach on retained trees. Tree protection site inspection monitoring reports shall be provided to the Client and City on a regular basis throughout construction.

Post Construction

12. **Final Report.** After the project has been completed, the project arborist shall provide a final report to the developer and the City. The final report shall include concerns about any trees negatively impacted during construction, and describe the measures needed to maintain and protect the remaining trees for a minimum of two years after project completion.

Please contact us if you have questions or need any additional information. Thank you for choosing Morgan Holen & Associates, LLC, to provide consulting arborist services for the Chêne Blanc Estates project in West Linn.

Thank you,
Morgan Holen & Associates, LLC

Morgan E. Holen

Morgan E. Holen, Owner
ISA Certified Arborist, PN-6145A
ISA Tree Risk Assessment Qualified
Forest Biologist

Enclosures: MHA15012 Chêne Blanc Estates – Tree Data 7-24-15

No.	Common Name	Species Name	DBH*	C-Rad^	Cond#	Comments	Sig?	Treatment	Reason
2037	Douglas-fir	*Pseudotsuga menziesii*	30	20	G	no major defects, twig dieback	Yes	Remove	ROW
2038	Douglas-fir	*Pseudotsuga menziesii*	38	24	G	resin flow S side of trunk	Yes	Remove	ROW
2039	Douglas-fir	*Pseudotsuga menziesii*	32	18	G	no major defects, some ivy	Yes	Remove	ROW
2040	Douglas-fir	*Pseudotsuga menziesii*	26	12	P	windsnap	No	Remove	ROW
2042	Douglas-fir	*Pseudotsuga menziesii*	36	20	F	forked leaders, some ivy	Yes	Remove	Building
2043	Douglas-fir	*Pseudotsuga menziesii*	32	17	F	old broken top, ivy	Yes	Remove	Building
2044	Douglas-fir	*Pseudotsuga menziesii*	26	14	G	no major defects	Yes	Remove	Grading
2045	Port-Orford-cedar	*Chamaecyparis lawsoniana*	18	12	G	no major defects	No	Remove	ROW
2046	Douglas-fir	*Pseudotsuga menziesii*	6	8	F	growing into oak canopy	No	Remove	ROW
2047	bigleaf maple	*Acer macrophyllum*	20	24	F	trunk decay 0-6'	No	Remove	Building
2048	Oregon white oak	*Quercus garryana*	29	30	F	one-sided crown, poor scaffold branch structure, poor branch distribution	No	Remove	Building
2049	bigleaf maple	*Acer macrophyllum*	18	0	D	mostly dead, not viable	No	Remove	Building
2050	bigleaf maple	*Acer macrophyllum*	8	0	D	dead	No	Remove	Condition
2051	Oregon white oak	*Quercus garryana*	14	14	F	trunk decay 0-3', epicormics	No	Remove	Building
2052	Oregon white oak	*Quercus garryana*	16	14	F	small live crown, suppressed	No	Remove	Building
2053	Scouler's willow	*Salix scouleriana*	18	12	P	basal and trunk decay	No	Remove	Building
2054	red alder	*Alnus rubra*	8	8	P	poor structure, basal and trunk decay	No	Remove	Condition
2055	red alder	*Alnus rubra*	10	8	F	one-sided crown, not suitable for retention with adjacent removal	No	Remove	Condition
2056	Douglas-fir	*Pseudotsuga menziesii*	42	24	G	no major defects	Yes	Retain	n/a
2057	Oregon white oak	*Quercus garryana*	8,12	20	P	codominant stems, dead and broken branches, branch decay, ivy	No	Remove	Condition
2058	bigleaf maple	*Acer macrophyllum*	21	10	P	poor structure, severe ivy infestation	No	Remove	Condition
2059	bigleaf maple	*Acer macrophyllum*	14	18	P	poor rooting, drainage at base	No	Remove	Condition
2060	bigleaf maple	*Acer macrophyllum*	8	12	P	dead branches, severe ivy infestation	No	Remove	Condition

No.	Common Name	Species Name	DBH*	C-Rad^	Cond#	Comments	Sig?	Treatment	Reason
2061	Oregon white oak	*Quercus garryana*	10,12	10	P	overtopped with ivy	No	Remove	Condition
2062	Douglas-fir	*Pseudotsuga menziesii*	34	22	F	old broken top, codom with 2063	Yes	Retain	n/a
2063	Douglas-fir	*Pseudotsuga menziesii*	36	24	G	forked leaders, some ivy	Yes	Retain	n/a
2064	Douglas-fir	*Pseudotsuga menziesii*	28	20	F	broken top, below dominant canopy	Yes	Retain	n/a
2065	madrone	*Arbutus menziesii*	10	9	F	small live crown, lower trunk wound, below Douglas-fir canopy	No	Remove	Condition
2066	madrone	*Arbutus menziesii*	12	10	F	dieback	No	Remove	Condition
2067	madrone	*Arbutus menziesii*	14	12	F	dieback	No	Remove	Condition
2068	madrone	*Arbutus menziesii*	13	12	P	trunk wound, forked top, crown decay	No	Remove	Condition
2069	madrone	*Arbutus menziesii*	10,16	20	P	severe dieback	No	Remove	Condition
2070	Douglas-fir	*Pseudotsuga menziesii*	24	18	F	forked top, one-sided crown	No	Remove	Building
2071	Douglas-fir	*Pseudotsuga menziesii*	18	18	F	basal wounds, resin flow, one-sided crown	No	Remove	Building
2072	bigleaf maple	*Acer macrophyllum*	6x8,16	22	F	7 codom stems, ivy into crown	No	Remove	Building
2073	Oregon white oak	*Quercus garryana*	24	20	F	forked leaders, some included bark, one-sided to S	No	Retain	n/a
2074	Douglas-fir	*Pseudotsuga menziesii*	38	18	F	poor structure, new leaders at old broken top, high live crown, ivy	No	Remove	Condition
2075	red alder	*Alnus rubra*	20	20	F	moderate vigor, some decay	No	Remove	Building
2076	madrone	*Arbutus menziesii*	16	20	F	32-degree self-correcting lean to S, basal decay with hollow	No	Remove	Building
2078	Douglas-fir	*Pseudotsuga menziesii*	28	17	F	basal swelling, insects	No	Remove	Grading
2079	Douglas-fir	*Pseudotsuga menziesii*	30	18	F	forked leaders, ivy on lower trunk	Yes	Remove	Grading
2080	Oregon white oak	*Quercus garryana*	36	28	F	moderate vigor, ivy	Yes	Remove	ROW
2081	Oregon white oak	*Quercus garryana*	22	26	G	codominant leaders, one-sided crown	Yes	Remove	ROW
2082	Oregon white oak	*Quercus garryana*	30	28	G	wound NE face 1-5'	Yes	Remove	ROW

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No.	Common Name	Species Name	DBH*	C-Rad^	Cond#	Comments	Sig?	Treatment	Reason
2083	Oregon white oak	*Quercus garryana*	14,20,24	24	G	moderate structure, ivy	Yes	Remove	ROW
2084	Oregon white oak	*Quercus garryana*	26	26	G	moderate structure, ivy	Yes	Remove	Grading
2085	Oregon white oak	*Quercus garryana*	15	26	F	natural but excessive lean to S, ivy	No	Remove	Building
2086	Oregon white oak	*Quercus garryana*	10	16	F	small live crown, poor lateral branch distribution	No	Remove	Building
2087	Oregon white oak	*Quercus garryana*	18	25	F	moderate vigor, some dieback, one-sided crown to SE, ivy	No	Remove	Building
2088	Oregon white oak	*Quercus garryana*	24	28	F	poor structure, history of major branch failure	No	Remove	Building
2089	Oregon white oak	*Quercus garryana*	14	26	F	excessive lean to E, few dead branches, ivy	No	Remove	Building
2090	Oregon white oak	*Quercus garryana*	14	16	G	one-sided crown to W, ivy up trunk	Yes	Remove	Building
2091	Oregon white oak	*Quercus garryana*	26	26	G	codominant leaders, appears stable	Yes	Remove	Building
2092	Oregon white oak	*Quercus garryana*	22	25	P	very poor structure, failing scaffold branch (only live branch)	No	Remove	Building
2093	Oregon white oak	*Quercus garryana*	24	18	F	moderate vigor, ivy	Yes	Retain	n/a
2094	Oregon white oak	*Quercus garryana*	15	24	F	natural lean to east, ivy	Yes	Retain	n/a
2095	Oregon white oak	*Quercus garryana*	12	14	F	poor lateral branch distribution, small live crown, ivy, only suitable for retention with 2094	No	Retain	n/a
2096	Oregon white oak	*Quercus garryana*	8	20	F	excessive lean to NW, small live crown, ivy	No	Retain	n/a
2097	Oregon white oak	*Quercus garryana*	12	18	F	one-sided crown to N, ivy	Yes	Retain	n/a
2098	Oregon white oak	*Quercus garryana*	10,18	20	F	codominant stems, ivy inhibits complete evaluation	Yes	Retain	n/a
2099	Oregon white oak	*Quercus garryana*	24	22	G	old wound on S face, some decay	Yes	Remove	Building

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No.	Common Name	Species Name	DBH*	C-Rad^	Cond#	Comments	Sig?	Treatment	Reason
2100	Oregon white oak	*Quercus garryana*	20	22	G	natural lean to building lot, only suitable for retention with 2101	Yes	Retain	n/a
2101	Oregon white oak	*Quercus garryana*	26	22	G	ivy up trunk, only suitable for retention with 2100	Yes	Retain	n/a
2102	Oregon white oak	*Quercus garryana*	26	20	G	old wound N face of lower trunk, no major defects, needs pruning	Yes	Retain	n/a
2103	Oregon white oak	*Quercus garryana*	8	14	F	poor structure, suitable for retention with 2102, needs pruning	No	Retain	n/a
2104	Oregon white oak	*Quercus garryana*	13	16	F	one-sided crown due to fir competition, not suitable for retention with removal of tree 2105	No	Remove	Condition
2105	Douglas-fir	*Pseudotsuga menziesii*	42	20	F	hollow with basal decay NW side	No	Remove	Condition
2106	Oregon white oak	*Quercus garryana*	12	10	P	poor structure, suppressed	No	Remove	Building
2107	Oregon white oak	*Quercus garryana*	16	24	G	upright crown structure	Yes	Remove	Building
2108	Oregon white oak	*Quercus garryana*	2x12	20	F	codominant stems, one-sided crown to NNW, some ivy	Yes	Remove	Building
2109	Oregon white oak	*Quercus garryana*	6,12	15	F	upright crown, only suitable for retention with 2110	Yes	Remove	Building
2110	Oregon white oak	*Quercus garryana*	17	18	G	one-sided to NW, lower trunk wounds	Yes	Retain	n/a
2111	Scouler's willow	*Salix scouleriana*	12	10	P	dieback, decay, poor structure	No	Remove	Building
2112	Oregon white oak	*Quercus garryana*	16	20	F	moderate structure, only suitable for retention in group	Yes	Retain	n/a
2113	Oregon white oak	*Quercus garryana*	10	15	F	small live crown, one-sided to east, only suitable for retention in group	Yes	Retain	n/a
2114	Oregon white oak	*Quercus garryana*	15	16	F	numerous upright leaders, only suitable for retention in group	Yes	Retain	n/a

No.	Common Name	Species Name	DBH*	C-Rad^	Cond#	Comments	Sig?	Treatment	Reason
2115	Oregon white oak	*Quercus garryana*	12	16	F	moderate structure, few dead branches, ivy, only suitable for retention in group	Yes	Retain	n/a
2116	Oregon white oak	*Quercus garryana*	16	24	F	natural lean to NE	Yes	Retain	n/a
2117	Douglas-fir	*Pseudotsuga menziesii*	40	34	G	no major defects, some ivy at base	Yes	Retain	n/a
2118	Oregon white oak	*Quercus garryana*	14	20	F	crowded by adjacent firs	No	Remove	Building
2119	Douglas-fir	*Pseudotsuga menziesii*	26	26	F	heavy sweep, root uplift	No	Remove	Building
2120	Douglas-fir	*Pseudotsuga menziesii*	37	22	G	no major defects, old buttress wound, root damage, ivy on lower trunk	Yes	Remove	ROW
2121	bigleaf maple	*Acer macrophyllum*	16	18	F	moderate structure, some ivy	No	Remove	Grading
2122	Oregon white oak	*Quercus garryana*	18	20	P	poor structure, small live crown	No	Remove	Building
2123	Oregon white oak	*Quercus garryana*	13	20	F	natural lead, one-sided crown to E, old trunk wound	Yes	Remove	Grading
2124	Oregon white oak	*Quercus garryana*	20	30	G	natural lean to S, one-sided crown, some ivy	Yes	Remove	Building
2125	Oregon white oak	*Quercus garryana*	16	30	G	natural lean to N, one-sided crown, ivy	Yes	Remove	Building
2126	Oregon white oak	*Quercus garryana*	16	20	G	one-sided to S, ivy	Yes	Remove	Building
2127	Oregon white oak	*Quercus garryana*	16	16	G	one-sided to N	Yes	Remove	Grading
2128	Douglas-fir	*Pseudotsuga menziesii*	32	24	G	dominant tree, ivy up lower trunk	Yes	Remove	Building
2129	Oregon white oak	*Quercus garryana*	7	10	F	suppressed, small live crown	No	Remove	Condition
2130	Oregon white oak	*Quercus garryana*	16	24	F	moderate structure, one-sided to W	Yes	Remove	Building
2131	Oregon white oak	*Quercus garryana*	10	10	P	poor structure, small high live crown	No	Remove	Building
2132	Oregon white oak	*Quercus garryana*	10	6	F	small live crown, only suitable for retention in group	Yes	Retain	n/a
2133	Oregon white oak	*Quercus garryana*	14	18	G	one-sided crown to S, only suitable for retention in group	Yes	Retain	n/a
2134	bigleaf maple	*Acer macrophyllum*	2x9	6	P	mostly dead, not viable	No	Remove	Condition

No.	Common Name	Species Name	DBH*	C-Rad^	Cond#	Comments	Sig?	Treatment	Reason
2135	Oregon white oak	*Quercus garryana*	12	10	F	very upright small live crown, only suitable for retention in group	Yes	Retain	n/a
2136	Oregon white oak	*Quercus garryana*	26	26	G	some branch decay, only suitable for retention in group	Yes	Retain	n/a
2137	Oregon white oak	*Quercus garryana*	8	6	P	very small live crown	No	Remove	Building
2138	Douglas-fir	*Pseudotsuga menziesii*	42	26	G	codom with 2139	Yes	Remove	Building
2139	Douglas-fir	*Pseudotsuga menziesii*	42	26	G	codom with 2138	Yes	Remove	Building
2140	Douglas-fir	*Pseudotsuga menziesii*	15	16	F	intermediate crown class	No	Remove	Building
2142	Douglas-fir	*Pseudotsuga menziesii*	36	18	F	moderate structure	No	Remove	Building
2143	Douglas-fir	*Pseudotsuga menziesii*	28	18	F	broken top, ivy	No	Remove	Building
2145	Oregon white oak	*Quercus garryana*	10	10	F	small upright crown, mostly to NNW	No	Remove	Building
2146	bigleaf maple	*Acer macrophyllum*	24	20	F	hollow with basal decay	No	Remove	Building
2147	Oregon white oak	*Quercus garryana*	12,18	18	G	codominant stems, crown asymmetry to NNW	Yes	Remove	Building
2148	Oregon white oak	*Quercus garryana*	15	16	F	moderate vigor, high live crown	No	Remove	Building
2149	Douglas-fir	*Pseudotsuga menziesii*	34	20	G	dominant tree	Yes	Remove	Building
2150	Oregon white oak	*Quercus garryana*	14	18	G	few dead branches	Yes	Remove	Building
2151	Oregon white oak	*Quercus garryana*	15	14	G	forked leaders	Yes	Remove	Building
2152	Oregon ash	*Fraxinus latifolia*	21	12	P	dead top, decay	No	Remove	ROW
2153	Oregon ash	*Fraxinus latifolia*	26	12	P	advanced trunk decay, broken top	No	Remove	ROW
2154	Oregon white oak	*Quercus garryana*	16	18	F	moderate structure, crown decay	No	Remove	ROW
2155	Oregon white oak	*Quercus garryana*	12	10	F	moderate structure	No	Remove	Grading
2156	Oregon white oak	*Quercus garryana*	15	11	F	forked leaders	No	Remove	Grading
2157	Douglas-fir	*Pseudotsuga menziesii*	36	20	F	broken top, very high live crown	No	Remove	Building
2158	Oregon white oak	*Quercus garryana*	12	11	F	overtopped, old trunk wound	No	Remove	Building

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No.	Common Name	Species Name	DBH*	C-Rad^	Cond#	Comments	Sig?	Treatment	Reason
2159	Oregon white oak	*Quercus garryana*	2x10	11	F	old broken top, poor structure, old trunk wound	No	Remove	Building
2160	Oregon white oak	*Quercus garryana*	12	11	F	overtopped by adjacent trees	No	Remove	Building
2161	Oregon white oak	*Quercus garryana*	15	16	F	below dominant fir canopy	No	Remove	Building
2162	Douglas-fir	*Pseudotsuga menziesii*	22	18	G	no major defects	Yes	Remove	Building
2163	bigleaf maple	*Acer macrophyllum*	15	12	P	trunk decay, excessive lean	No	Remove	Building
2164	Oregon white oak	*Quercus garryana*	12	12	F	below dominant canopy, moderate structure	No	Remove	Building
2165	Douglas-fir	*Pseudotsuga menziesii*	34	23	P	decline, dead and broken branches, epicormics	No	Remove	Grading
2166	Oregon white oak	*Quercus garryana*	14	16	F	basal decay	No	Remove	ROW
2167	Oregon white oak	*Quercus garryana*	12	24	F	one-sided crown with lean to W	No	Remove	ROW
2168	Oregon white oak	*Quercus garryana*	19	24	G	few dead branches	Yes	Remove	ROW
2169	Oregon white oak	*Quercus garryana*	16	18	G	high live crown	Yes	Remove	ROW
2170	Douglas-fir	*Pseudotsuga menziesii*	28	24	P	dead and broken branches, poor structure	No	Remove	ROW
2171	Douglas-fir	*Pseudotsuga menziesii*	28	20	P	dead and broken branches, poor structure	No	Remove	ROW
2172	Oregon white oak	*Quercus garryana*	12,16	22	G	codominant stems, upright crown	Yes	Remove	ROW
2173	Oregon white oak	*Quercus garryana*	10	10	F	small live crown	No	Remove	Grading
2174	Oregon white oak	*Quercus garryana*	14	10	P	advanced trunk decay with conks	No	Remove	Grading
2175	Oregon white oak	*Quercus garryana*	20	22	F	moderate structure, old basal wound, some branch decay	Yes	Remove	Grading
2176	Oregon ash	*Fraxinus latifolia*	14	20	F	moderate structure, not suitable for retention with adjacent removal	No	Remove	Condition
2177	Oregon white oak	*Quercus garryana*	10	6	P	poor structure, very small live crown	No	Remove	Condition

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No.	Common Name	Species Name	DBH*	C-Rad^	Cond#	Comments	Sig?	Treatment	Reason
2178	Oregon white oak	*Quercus garryana*	12	10	P	trunk wound on S face with slim flux	No	Remove	Building
2179	Douglas-fir	*Pseudotsuga menziesii*	24	16	F	dominant tree, ivy up lower trunk	Yes	Remove	Grading
2180	bigleaf maple	*Acer macrophyllum*	17	18	G	basal wound, some decay	No	Remove	Grading
2181	Oregon white oak	*Quercus garryana*	11	10	F	small live crown, epicormics, not suitable for retention with adjacent removal	No	Remove	Condition
2182	Oregon ash	*Fraxinus latifolia*	18	16	F	moderate structure	No	Remove	ROW
2183	Oregon white oak	*Quercus garryana*	10	6	P	broken top, advanced decay at leader juncture	No	Remove	ROW
2184	Oregon white oak	*Quercus garryana*	10	10	F	small live crown	No	Remove	ROW
2185	Oregon white oak	*Quercus garryana*	15	16	F	one-sided crown, branch decay, old basal wound	No	Remove	ROW
2186	Oregon white oak	*Quercus garryana*	12	14	F	moderate structure, one-sided crown to E	No	Remove	ROW
2187	Oregon ash	*Fraxinus latifolia*	12	15	F	basal decay	No	Remove	ROW
2188	Oregon white oak	*Quercus garryana*	8,20	25	F	moderate structure, ivy up trunk	Yes	Remove	Grading
2189	bigleaf maple	*Acer macrophyllum*	14	12	F	moderate structure, ivy up trunk	No	Remove	Grading
2190	Oregon white oak	*Quercus garryana*	20	18	F	moderate structure	Yes	Remove	Grading
2191	Oregon white oak	*Quercus garryana*	10	8	P	very small live crown	No	Remove	Grading
2192	Oregon white oak	*Quercus garryana*	16	16	G	upright crown structure, some ivy	Yes	Remove	Grading
2193	Oregon white oak	*Quercus garryana*	10	14	F	below dominant canopy	Yes	Remove	Grading
2194	Oregon white oak	*Quercus garryana*	28	22	G	moderate structure	Yes	Remove	Building
2195	Oregon white oak	*Quercus garryana*	36	24	G	some basal decay	Yes	Remove	Building
2196	Oregon ash	*Fraxinus latifolia*	16	15	F	growing into oak canopy, not suitable for retention with adjacent removal	No	Remove	Condition
2197	Oregon white oak	*Quercus garryana*	18	14	F	upright crown, one-sided to E	Yes	Remove	Building

No.	Common Name	Species Name	DBH*	C-Rad^	Cond#	Comments	Sig?	Treatment	Reason
2198	grand fir	*Abies grandis*	24	14	G	trunk sweep at ~10'	Yes	Remove	Grading
2199	Douglas-fir	*Pseudotsuga menziesii*	24	12	F	old broken top, crook in trunk, ivy on lower trunk	No	Remove	ROW
2200	Douglas-fir	*Pseudotsuga menziesii*	24	14	G	codominant crown class	Yes	Remove	Building
2201	Oregon white oak	*Quercus garryana*	10	6	P	poor structure, trunk wound	No	Remove	Building
2202	bigleaf maple	*Acer macrophyllum*	10,12,2x14	20	F	moderate structure, hollow with trunk decay	No	Remove	Grading
2203	Douglas-fir	*Pseudotsuga menziesii*	18,26	16	F	large and numerous *P. pini* conks horizontally and laterally along trunk	No	Remove	ROW
2284	Douglas-fir	*Pseudotsuga menziesii*	14	13	F	small high live crown, ivy	No	Remove	ROW
2285	Oregon white oak	*Quercus garryana*	13	15	G	ivy and blackberry inhibited complete visual assessment	No	Remove	ROW
2286	Oregon white oak	*Quercus garryana*	16	16	G	moderate structure, ivy on lower trunk inhibited complete visual assessment	Yes	Remove	Grading
2287	Oregon white oak	*Quercus garryana*	28	28	G	some branch decay, ivy on lower trunk inhibited complete visual assessment	Yes	Retain	n/a
2288	Oregon white oak	*Quercus garryana*	28	32	G	somewhat one-sided to S	Yes	Remove	Building
2289	Oregon ash	*Fraxinus latifolia*	13	18	F	in crown of oak, not suitable for retention with adjacent removal	No	Remove	Condition
2290	Oregon white oak	*Quercus garryana*	24	20	G	moderate crown structure, ivy up trunk	Yes	Remove	Building
2291	Oregon white oak	*Quercus garryana*	27	26	F	one-sided to W, few dead and broken branches	Yes	Remove	Grading
2292	Oregon white oak	*Quercus garryana*	16	20	G	moderate structure	Yes	Remove	ROW
2293	Oregon white oak	*Quercus garryana*	23	20	F	branch dieback, epicormics	No	Remove	ROW
2294	Oregon white oak	*Quercus garryana*	20	14	F	hollow with advanced decay 30-40' just below main crown weight	No	Remove	Building

No.	Common Name	Species Name	DBH*	C-Rad^	Cond#	Comments	Sig?	Treatment	Reason
2295	Oregon white oak	*Quercus garryana*	18	12	P	very poor crown structure, extensive ivy on lower trunk	No	Remove	Building
2296	Douglas-fir	*Pseudotsuga menziesii*	18	14	F	competing with oaks	No	Remove	Building
2297	Oregon white oak	*Quercus garryana*	24	26	G	some branch decay	Yes	Remove	Building
2298	Oregon white oak	*Quercus garryana*	12	8	P	very poor structure, small live crown	No	Remove	Building
2299	sweet cherry	*Prunus avium*	15	12	F	invasive species	No	Remove	Building
2300	Oregon white oak	*Quercus garryana*	24	20	F	some branch decay, one-sided to S	Yes	Remove	Building
2301	bigleaf maple	*Acer macrophyllum*	10	10	F	small one-sided crown to S	No	Remove	Building
2302	madrone	*Arbutus menziesii*	24	24	F	basal decay on N and S sides, some branch decay	Yes	Remove	Building
2303	Oregon white oak	*Quercus garryana*	12	10	F	in crown of madrone	No	Remove	Building
2304	Oregon white oak	*Quercus garryana*	25	24	G	moderate crown structure	Yes	Remove	Building
2305	bigleaf maple	*Acer macrophyllum*	14	16	F	poor structure, hollow with decay	No	Remove	Building
2306	Oregon white oak	*Quercus garryana*	21	16	F	very upright crown, crown decay	No	Remove	Building
2307	bigleaf maple	*Acer macrophyllum*	10	8	P	overtopped by adjacent trees	No	Remove	Building
2308	bigleaf maple	*Acer macrophyllum*	12	16	P	poor structure, dead and broken branches, branch decay	No	Remove	Building
2309	bigleaf maple	*Acer macrophyllum*	12	16	P	broken top, decay	No	Remove	Building
2310	bigleaf maple	*Acer macrophyllum*	8	12	P	below dominant canopy, high live crown	No	Remove	Building
2311	Douglas-fir	*Pseudotsuga menziesii*	30	20	G	few dead branches, ivy on lower trunk, unable to see top	Yes	Remove	Building
2312	Douglas-fir	*Pseudotsuga menziesii*	10	0	D	dead	No	Remove	Condition
2313	Douglas-fir	*Pseudotsuga menziesii*	18	16	P	broken top, below dominant canopy, ivy on lower trunk	No	Remove	Condition
2314	Douglas-fir	*Pseudotsuga menziesii*	17	0	D	dead	No	Remove	Grading
2315	bigleaf maple	*Acer macrophyllum*	3x9	20	F	poor structure, ivy infestation	No	Remove	ROW

No.	Common Name	Species Name	DBH*	C-Rad^	Cond#	Comments	Sig?	Treatment	Reason
2316	Douglas-fir	*Pseudotsuga menziesii*	42	24	F	suspect lower trunk decay, hollow sounding, bird/insect activity	No	Remove	ROW
2317	Douglas-fir	*Pseudotsuga menziesii*	26	15	P	decline, dead and broken branches	No	Remove	ROW
2318	Oregon white oak	*Quercus garryana*	26	24	G	good crown structure, ivy inhibited complete visual assessment	Yes	Remove	Grading
2319	Douglas-fir	*Pseudotsuga menziesii*	24	16	F	dead and broken branches, codominant crown class, some ivy	No	Remove	Building
2320	Douglas-fir	*Pseudotsuga menziesii*	10	8	P	suppressed	No	Remove	Building
2321	western redcedar	*Thuja plicata*	12	10	F	one-sided crown	No	Remove	Grading
2322	Douglas-fir	*Pseudotsuga menziesii*	28	20	G	dominant tree, unable to see top	Yes	Remove	Building
2323	bigleaf maple	*Acer macrophyllum*	16	22	F	moderate structure, some branch decay, ivy	No	Remove	Grading
2324	red alder	*Alnus rubra*	14	16	F	moderate structure, some ivy	No	Remove	Grading
2325	Oregon white oak	*Quercus garryana*	26	20	G	some branch decay, crown asymmetry	Yes	Remove	ROW
2326	Oregon white oak	*Quercus garryana*	25	30	G	small hollow with some decay at 30', also some branch decay	Yes	Remove	ROW
2327	Douglas-fir	*Pseudotsuga menziesii*	16	12	P	intermediate crown class, poor structure, competing with oaks	No	Remove	ROW
2328	Oregon white oak	*Quercus garryana*	12	8	F	small live crown in direction of lean to N	No	Remove	ROW
2329	Douglas-fir	*Pseudotsuga menziesii*	30	24	G	few dead branches, unable to see top	Yes	Remove	ROW
2330	Oregon ash	*Fraxinus latifolia*	12	12	P	poor structure, small live crown, excessive lean	No	Remove	Grading
2331	Oregon ash	*Fraxinus latifolia*	8,12	16	P	poor structure, excessive lean to SE, dead branches	No	Remove	Grading
2332	western redcedar	*Thuja plicata*	20	14	F	one-sided crown, small hollow near base	No	Remove	Grading
2333	western redcedar	*Thuja plicata*	15	10	F	one-sided crown, basal decay	No	Remove	Building

No.	Common Name	Species Name	DBH*	C-Rad^	Cond#	Comments	Sig?	Treatment	Reason
2334	western redcedar	*Thuja plicata*	10	8	P	dead top, trunk decay	No	Remove	Building
2335	Douglas-fir	*Pseudotsuga menziesii*	18	14	P	old broken top, very poor crown structure	No	Remove	Building
2336	Douglas-fir	*Pseudotsuga menziesii*	21	16	P	old broken top, very poor crown structure	No	Remove	Building
2337	Douglas-fir	*Pseudotsuga menziesii*	26	18	F	moderate structure, high live crown	No	Remove	ROW
2338	Douglas-fir	*Pseudotsuga menziesii*	24	18	F	basal swelling	No	Remove	Grading
2339	grand fir	*Abies grandis*	26	18	F	old broken top, high live crown	No	Remove	Building
2340	Douglas-fir	*Pseudotsuga menziesii*	24	18	F	moderate crown structure, dead and broken branches	No	Remove	Building
2341	grand fir	*Abies grandis*	16	12	P	overtopped by fir	No	Remove	ROW
2342	Oregon white oak	*Quercus garryana*	26	30	G	natural lean away from fir, one-sided crown to E	Yes	Remove	ROW
2343	Oregon ash	*Fraxinus latifolia*	11,15	25	P	poor structure, branch decay	No	Remove	ROW
2344	Oregon white oak	*Quercus garryana*	14	18	F	small one-sided crown to W	No	Remove	Grading
2345	Oregon white oak	*Quercus garryana*	12	12	P	old broken top, advanced decay in juncture of leader	No	Remove	Grading
2346	Douglas-fir	*Pseudotsuga menziesii*	20	20	F	moderate structure, one-sided crown	No	Remove	Grading
2347	Douglas-fir	*Pseudotsuga menziesii*	36	22	G	dominant tree, unable to see top	Yes	Remove	Grading
2348	Oregon white oak	*Quercus garryana*	2x8	18	F	poor structure, extensive ivy	No	Remove	Grading
2349	Oregon white oak	*Quercus garryana*	26	32	G	some crown decay	Yes	Remove	Building
2350	Oregon ash	*Fraxinus latifolia*	20	17	F	moderate structure	No	Remove	Grading
2351	Oregon white oak	*Quercus garryana*	26	18	G	one-sided crown to E	Yes	Remove	Grading
2352	Oregon ash	*Fraxinus latifolia*	10	14	F	dead branches, below dominant canopy	No	Remove	ROW
2353	Oregon white oak	*Quercus garryana*	22	24	G	mostly one-side to SE	Yes	Remove	ROW
2354	Oregon white oak	*Quercus garryana*	11	10	G	no major defects	Yes	Remove	ROW

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No.	Common Name	Species Name	DBH*	C-Rad^	Cond#	Comments	Sig?	Treatment	Reason
2355	Douglas-fir	*Pseudotsuga menziesii*	24	16	F	poor structure, history of lateral branch failure, dead and broken branches	No	Remove	Building
2356	Douglas-fir	*Pseudotsuga menziesii*	35	24	G	codominant crown class	Yes	Remove	Grading
2357	Oregon white oak	*Quercus garryana*	19	22	P	poor structure, dead and broken branches, branch decay	No	Remove	Building
2358	Oregon ash	*Fraxinus latifolia*	8	8	P	poor structure, extensive ivy	No	Remove	Building
2359	Oregon white oak	*Quercus garryana*	12	15	F	small live crown	No	Remove	ROW
2360	bigleaf maple	*Acer macrophyllum*	13	17	F	below dominant canopy, basal decay	No	Remove	ROW
2361	Oregon white oak	*Quercus garryana*	29	24	G	moderate structure	Yes	Remove	ROW
2362	bigleaf maple	*Acer macrophyllum*	10	12	P	high live crown, extensive ivy	No	Remove	Building
2363	Oregon white oak	*Quercus garryana*	24	22	G	good crown structure, some ivy at base	Yes	Remove	Building
2364	Oregon white oak	*Quercus garryana*	20	14	P	small live crown, extensive ivy into crown	No	Remove	Condition
2365	Douglas-fir	*Pseudotsuga menziesii*	18	10	F	intermediate crown class, competing with oaks, ivy	No	Remove	Condition
2366	Oregon white oak	*Quercus garryana*	18	12	F	high upright crown, some ivy	Yes	Remove	Building
2367	Douglas-fir	*Pseudotsuga menziesii*	24	18	F	moderate structure, competing with oaks	No	Remove	Building
2368	Oregon white oak	*Quercus garryana*	28	26	G	dead spur branch, ivy up lower trunk	Yes	Remove	Building
2369	Douglas-fir	*Pseudotsuga menziesii*	12	10	P	suppressed	No	Remove	Building
2370	bigleaf maple	*Acer macrophyllum*	10	11	F	below dominant canopy	No	Remove	Building
2371	bigleaf maple	*Acer macrophyllum*	10	10	P	poor basal structure, small live crown	No	Remove	Building
2372	bigleaf maple	*Acer macrophyllum*	6	14	P	dead and broken branches, small live crown, suppressed	No	Remove	Building
2373	bigleaf maple	*Acer macrophyllum*	10	12	P	poor structure, small live crown, dieback	No	Remove	Building
2374	bigleaf maple	*Acer macrophyllum*	12	15	F	moderate structure	No	Remove	Building

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No.	Common Name	Species Name	DBH*	C-Rad^	Cond#	Comments	Sig?	Treatment	Reason
2375	bigleaf maple	*Acer macrophyllum*	18	18	F	moderate structure, dead and broken branches, some branch decay	No	Remove	Building
2376	bigleaf maple	*Acer macrophyllum*	10	16	P	very small one-sided crown, below dominant canopy	No	Remove	Building
2377	Oregon white oak	*Quercus garryana*	20,26	38	G	some crown asymmetry, some branch decay	Yes	Remove	Building
2378	bigleaf maple	*Acer macrophyllum*	8	16	P	very small one-sided live crown, below dominant canopy	No	Remove	Condition
2379	bigleaf maple	*Acer macrophyllum*	8	13	P	high live crown, below dominant canopy	No	Remove	Building
2380	Douglas-fir	*Pseudotsuga menziesii*	29	18	G	dominant tree, unable to see top, ivy on lower trunk	Yes	Retain	n/a
2381	bigleaf maple	*Acer macrophyllum*	12	20	F	moderate structure, ivy up trunk	No	Retain	n/a
2382	bigleaf maple	*Acer macrophyllum*	11	16	F	below dominant canopy	No	Retain	n/a
2383	Douglas-fir	*Pseudotsuga menziesii*	32	22	G	dominant tree, unable to see top, ivy at base	Yes	Retain	n/a
2384	bigleaf maple	*Acer macrophyllum*	10,14,18,22	30	P	poor structure, advanced basal and trunk decay, high risk to S	No	Remove	Condition
2385	bigleaf maple	*Acer macrophyllum*	6,8	15	P	extensive ivy, severe lean to N	No	Remove	Condition
2394	sweet cherry	*Prunus avium*	10	15	F	invasive species	No	Remove	Building
2395	bigleaf maple	*Acer macrophyllum*	8	15	P	growing on decay log	No	Remove	Building
2396	Oregon white oak	*Quercus garryana*	17	18	F	codominant crown class, moderate crown structure, fill at base	Yes	Remove	Building
2458	bigleaf maple	*Acer macrophyllum*	7	12	P	poor structure, small live crown	No	Remove	Grading
2459	Douglas-fir	*Pseudotsuga menziesii*	16	15	F	moderate trunk sweep, ivy	No	Remove	ROW
2461	Douglas-fir	*Pseudotsuga menziesii*	24	15	F	extensive ivy up trunk, codominant crown class	Yes	Remove	Grading

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No.	Common Name	Species Name	DBH*	C-Rad^	Cond#	Comments	Sig?	Treatment	Reason
2462	Oregon white oak	*Quercus garryana*	12	14	F	below dominant canopy	No	Remove	Building
2463	Douglas-fir	*Pseudotsuga menziesii*	30	20	G	codominant crown class	Yes	Remove	Building
2464	Douglas-fir	*Pseudotsuga menziesii*	26	14	G	codominant crown class	Yes	Remove	Building
2469	sweet cherry	*Prunus avium*	15	16	F	invasive species	No	Remove	Grading
2470	Oregon white oak	*Quercus garryana*	14	10	P	broken top, basal decay	No	Remove	ROW
2471	Douglas-fir	*Pseudotsuga menziesii*	26	15	G	codominant crown class, ivy	Yes	Remove	ROW
2472	Oregon white oak	*Quercus garryana*	10	6	P	suppressed by fir	No	Remove	ROW
2473	grand fir	*Abies grandis*	23	12	G	codominant crown class	Yes	Remove	ROW
2474	bigleaf maple	*Acer macrophyllum*	10	16	P	poor structure, below dominant canopy	No	Remove	ROW
2475	Douglas-fir	*Pseudotsuga menziesii*	30	20	G	codominant crown class	Yes	Remove	ROW
2476	Douglas-fir	*Pseudotsuga menziesii*	26	24	G	codominant crown class, ivy	Yes	Remove	ROW
2477	Douglas-fir	*Pseudotsuga menziesii*	22	18	F	codominant crown class	Yes	Remove	ROW
2478	Douglas-fir	*Pseudotsuga menziesii*	15	14	F	intermediate crown class, poor structure	No	Remove	ROW
2479	Douglas-fir	*Pseudotsuga menziesii*	32	24	F	codominant crown class, twig dieback, dead and broken branches	No	Remove	ROW
2480	Oregon white oak	*Quercus garryana*	18	20	P	very poor structure, decay	No	Remove	Grading
2481	Oregon ash	*Fraxinus latifolia*	18	13	F	moderate structure, few dead and broken branches	No	Remove	Grading
2482	Oregon white oak	*Quercus garryana*	36	28	G	moderate structure	Yes	Remove	Building
2483	Oregon ash	*Fraxinus latifolia*	20	20	P	failed, hung up in 2482, new leaders	No	Remove	Building
2484	Oregon white oak	*Quercus garryana*	27	30	G	some branch decay	Yes	Remove	ROW
2485	Oregon ash	*Fraxinus latifolia*	8	10	F	moderate structure	No	Remove	Building
2486	madrone	*Arbutus menziesii*	7	10	F	moderate structure	No	Remove	Building
2487	Oregon white oak	*Quercus garryana*	28	25	G	old basal wound	Yes	Remove	ROW
2488	Oregon white oak	*Quercus garryana*	14	10	F	moderate structure	Yes	Remove	Building
2489	Oregon white oak	*Quercus garryana*	12	10	F	moderate structure	Yes	Remove	Building

No.	Common Name	Species Name	DBH*	C-Rad^	Cond#	Comments	Sig?	Treatment	Reason
2490	Oregon white oak	*Quercus garryana*	12,18	20	F	poor structure, trunk decay	No	Remove	Building
2491	Oregon ash	*Fraxinus latifolia*	13	10	F	moderate structure	No	Remove	Building
2492	Oregon ash	*Fraxinus latifolia*	6	10	F	high live crown	No	Remove	Building
2493	Oregon white oak	*Quercus garryana*	19	20	F	poor structure, dead scaffold branch, decay	No	Remove	ROW
2494	Oregon ash	*Fraxinus latifolia*	2x6,9	10	P	dead and broken branches branch decay	No	Remove	Condition
2495	English holly	*Ilex aquifolium*	6	10	P	very poor structure, invasive species	No	Remove	Condition
2496	Oregon white oak	*Quercus garryana*	10	10	F	moderate structure, small live crown	No	Remove	Building
2497	Douglas-fir	*Pseudotsuga menziesii*	10	10	P	suppressed, extensive ivy	No	Remove	Condition
2498	Oregon white oak	*Quercus garryana*	20	18	G	some crown decay, dead branches	Yes	Remove	Building
2499	Oregon ash	*Fraxinus latifolia*	10	10	P	poor structure, extensive ivy	No	Remove	Building
2500	Oregon white oak	*Quercus garryana*	24	18	G	some branch and trunk decay, ivy	Yes	Remove	Building
2501	Oregon white oak	*Quercus garryana*	28	26	F	codom with 2498	Yes	Remove	Building
2502	Oregon white oak	*Quercus garryana*	18	16	F	moderate structure	Yes	Remove	Building
2503	Oregon ash	*Fraxinus latifolia*	10	12	P	very poor structure, ivy	No	Remove	Grading
2504	Oregon white oak	*Quercus garryana*	24	22	G	some branch decay	Yes	Remove	Grading
2505	Oregon white oak	*Quercus garryana*	12	14	F	moderate structure, small live crown	Yes	Remove	Building
2506	Oregon ash	*Fraxinus latifolia*	6	10	P	very poor structure, ivy	No	Remove	Building
2507	bigleaf maple	*Acer macrophyllum*	12	16	G	moderate structure, ivy	No	Remove	Building
2508	sweet cherry	*Prunus avium*	8	10	P	invasive species, extensive ivy	No	Remove	Grading
2509	Oregon white oak	*Quercus garryana*	10,12	16	G	very narrow one-sided crown to N	No	Remove	Building
2510	sweet cherry	*Prunus avium*	6	15	P	invasive species, poor structure	No	Remove	Building
2511	Oregon white oak	*Quercus garryana*	12	10	G	moderate structure, some branch decay	No	Remove	Building
2512	Oregon white oak	*Quercus garryana*	14	10	G	moderate structure, some branch decay	No	Remove	Building
2513	Douglas-fir	*Pseudotsuga menziesii*	14	8	P	poor structure	No	Remove	Building
2514	Oregon white oak	*Quercus garryana*	10	0	D	mostly dead, not viable	No	Remove	Building

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No.	Common Name	Species Name	DBH*	C-Rad^	Cond#	Comments	Sig?	Treatment	Reason
2515	Douglas-fir	*Pseudotsuga menziesii*	15	14	F	old broken top, high live crown	No	Remove	Building
2516	madrone	*Arbutus menziesii*	23	20	G	mostly one-sided to N	Yes	Remove	Building
2517	Oregon white oak	*Quercus garryana*	10	0	D	dead	No	Remove	Grading
2518	Douglas-fir	*Pseudotsuga menziesii*	24	16	F	extensive ivy up trunk	No	Remove	Condition
2519	Oregon ash	*Fraxinus latifolia*	8	10	P	poor structure, small live crown, ivy	No	Retain	n/a
2520	English hawthorn	*Crataegus monogyna*	6	10	P	invasive species, very poor structure	No	Remove	Condition
2521	Oregon white oak	*Quercus garryana*	13,20	16	F	3 codom stems, 1 dead, moderate structure	Yes	Remove	Building
2522	Oregon ash	*Fraxinus latifolia*	12	20	F	moderate structure	No	Retain	n/a
2523	Oregon white oak	*Quercus garryana*	20,24	20	F	moderate structure, some decay, ivy	Yes	Retain	n/a
2524	Oregon white oak	*Quercus garryana*	10,16	24	F	3 codom stems, 1 dead, very one-sided to S, moderate structure	Yes	Remove	Building
2525	Oregon ash	*Fraxinus latifolia*	20	20	F	moderate structure	No	Retain	n/a
2526	Douglas-fir	*Pseudotsuga menziesii*	29	24	F	moderate structure	Yes	Retain	n/a
2527	Oregon ash	*Fraxinus latifolia*	12	20	F	leans with crown weight to N	No	Retain	n/a
2528	Douglas-fir	*Pseudotsuga menziesii*	19	16	G	dominant tree	Yes	Retain	n/a
2529	Oregon ash	*Fraxinus latifolia*	15	16	F	moderate structure, some basal decay	No	Retain	n/a
2530	Douglas-fir	*Pseudotsuga menziesii*	20	16	F	codominant crown class, small *P. pini* conks	No	Remove	Building
2531	Oregon ash	*Fraxinus latifolia*	7	10	D	mostly dead, not viable	No	Retain	n/a
2532	madrone	*Arbutus menziesii*	8	12	F	moderate structure	Yes	Retain	n/a
2533	Douglas-fir	*Pseudotsuga menziesii*	24	18	F	codominant crown class	Yes	Remove	Building
2534	Oregon white oak	*Quercus garryana*	13	6	P	dead top	No	Retain	n/a
2536	Oregon ash	*Fraxinus latifolia*	14	16	F	moderate structure	No	Remove	Building
2537	Oregon white oak	*Quercus garryana*	16	18	G	old trunk wounds, one-sided to E	Yes	Remove	Building
2538	Oregon white oak	*Quercus garryana*	24	28	G	few dead branches	Yes	Remove	Building

No.	Common Name	Species Name	DBH*	C-Rad^	Cond#	Comments	Sig?	Treatment	Reason
2539	Oregon ash	*Fraxinus latifolia*	2x10	16	P	decline, dead and broken branches	No	Remove	Building
2540	Oregon ash	*Fraxinus latifolia*	16	12	F	moderate structure, branch dieback, only suitable for retention in group	No	Remove	Building
2541	Oregon white oak	*Quercus garryana*	9	10	F	one-sided crown to NW, only suitable for retention in group	No	Remove	Building
2542	Oregon ash	*Fraxinus latifolia*	10	11	F	moderate structure	No	Retain	n/a
2543	Oregon ash	*Fraxinus latifolia*	12,16,18,24	15	P	severe decline, dead and broken branches, branch decay	No	Remove	Building
2544	Oregon ash	*Fraxinus latifolia*	10	8	P	poor structure, ivy infestation	No	Retain	n/a
2545	Douglas-fir	*Pseudotsuga menziesii*	8	9	P	suppressed	No	Retain	n/a
2546	Oregon white oak	*Quercus garryana*	26	24	G	ivy inhibited complete visual assessment	Yes	Retain	n/a
2547	Douglas-fir	*Pseudotsuga menziesii*	8	8	P	suppressed	No	Retain	n/a
2548	Oregon white oak	*Quercus garryana*	20	24	F	moderate structure, one-sided to N	Yes	Retain	n/a
2549	Oregon white oak	*Quercus garryana*	20	26	F	moderate structure, ivy	Yes	Retain	n/a
2550	Oregon white oak	*Quercus garryana*	24	26	F	moderate structure, one-sided to E, ivy	Yes	Retain	n/a
2551	English hawthorn	*Crataegus monogyna*	8	12	F	invasive species, poor structure	No	Remove	Condition
2552	Oregon ash	*Fraxinus latifolia*	2x12	18	F	moderate structure, some decay	No	Retain	n/a
2553	English hawthorn	*Crataegus monogyna*	2x8	8	F	invasive species, ivy	No	Retain	n/a
2554	Oregon ash	*Fraxinus latifolia*	2x16	20	F	moderate structure, dead branches	No	Retain	n/a
2555	Oregon ash	*Fraxinus latifolia*	6,8,12	18	F	moderate structure	No	Remove	Building
2556	Oregon white oak	*Quercus garryana*	18	20	G	ivy	Yes	Retain	n/a
2557	Oregon ash	*Fraxinus latifolia*	18	20	G	moderate structure	No	Retain	n/a
2558	Oregon ash	*Fraxinus latifolia*	8	10	F	poor structure	No	Retain	n/a
2559	Oregon ash	*Fraxinus latifolia*	15	20	G	few dead branches	No	Retain	n/a
2561	Douglas-fir	*Pseudotsuga menziesii*	9	14	P	suppressed	No	Retain	n/a
2562	Oregon ash	*Fraxinus latifolia*	2x8	10	F	poor structure	No	Retain	n/a

No.	Common Name	Species Name	DBH*	C-Rad^	Cond#	Comments	Sig?	Treatment	Reason
2563	Oregon ash	*Fraxinus latifolia*	12	14	F	poor structure	No	Retain	n/a
2564	Oregon ash	*Fraxinus latifolia*	24	16	F	moderate structure, dead branches	No	Retain	n/a
2565	Douglas-fir	*Pseudotsuga menziesii*	24	24	F	ivy inhibited complete visual assessment	No	Retain	n/a
2566	Oregon white oak	*Quercus garryana*	24	22	F	moderate structure	Yes	Retain	n/a
2567	sweet cherry	*Prunus avium*	6	10	F	invasive species	No	Remove	Condition
2569	Oregon white oak	*Quercus garryana*	10,20	16	F	moderate structure, extensive ivy, codominant leaders, crown decay	No	Remove	Building
2570	Douglas-fir	*Pseudotsuga menziesii*	26	20	G	dominant tree, ivy up lower trunk	Yes	Remove	Grading
2571	Oregon white oak	*Quercus garryana*	9	6	P	very poor structure, mostly dead	No	Remove	Condition
2572	Oregon white oak	*Quercus garryana*	16	10	F	poor structure, ivy	No	Retain	n/a
2573	Oregon white oak	*Quercus garryana*	24	20	F	moderate structure, ivy	No	Retain	n/a
2574	Oregon white oak	*Quercus garryana*	9	10	P	mostly dead, ivy	No	Retain	n/a
2575	Oregon ash	*Fraxinus latifolia*	14,22,24	20	F	moderate structure, dead and broken branches, ivy	No	Retain	n/a
2576	Oregon white oak	*Quercus garryana*	30	20	F	moderate structure, ivy	Yes	Retain	n/a
2577a	Oregon ash	*Fraxinus latifolia*	16,20,22	18	P	very poor structure, decline	No	Retain	n/a
2577b	Oregon white oak	*Quercus garryana*	10,16	18	P	very poor structure, decline	No	Retain	n/a
2578	Oregon ash	*Fraxinus latifolia*	20	24	P	moderate structure, chlorotic foliage	No	Retain	n/a
2579	Oregon white oak	*Quercus garryana*	26	24	F	moderate structure, ivy	Yes	Retain	n/a
2580	Oregon ash	*Fraxinus latifolia*	10,16	18	F	moderate structure, some decay, ivy	No	Retain	n/a
2581	Oregon white oak	*Quercus garryana*	25	20	F	moderate structure	Yes	Remove	Building
2582	Oregon white oak	*Quercus garryana*	18	16	F	moderate structure, okay in group	Yes	Remove	Building
2583	Oregon white oak	*Quercus garryana*	20	16	F	moderate structure, okay in group	Yes	Remove	Building
2584	bigleaf maple	*Acer macrophyllum*	8	12	P	suppressed	No	Remove	ROW
2585	bigleaf maple	*Acer macrophyllum*	14	16	F	moderate structure	No	Remove	Building
2586	Douglas-fir	*Pseudotsuga menziesii*	9	10	P	suppressed	No	Remove	Building

No.	Common Name	Species Name	DBH*	C-Rad^	Cond#	Comments	Sig?	Treatment	Reason
2587	Douglas-fir	*Pseudotsuga menziesii*	36	28	G	codominant crown class, some resin on lower trunk	Yes	Remove	Grading
2588	Oregon ash	*Fraxinus latifolia*	8	8	P	poor structure, small live crown	No	Remove	Building
2662	Oregon white oak	*Quercus garryana*	18	15	F	moderate structure	Yes	Retain	n/a
2663	Douglas-fir	*Pseudotsuga menziesii*	10	10	P	suppressed	No	Remove	Grading
2664	Douglas-fir	*Pseudotsuga menziesii*	30	18	F	moderate structure, ivy	Yes	Retain	n/a
2665	Oregon ash	*Fraxinus latifolia*	18	16	F	poor structure, extensive ivy	No	Retain	n/a
2666	Oregon white oak	*Quercus garryana*	16	15	F	moderate crown structure, extensive ivy	No	Remove	Building
2667	Oregon white oak	*Quercus garryana*	15	15	F	moderate structure, dead branches, extensive ivy	No	Retain	n/a
2668	Oregon ash	*Fraxinus latifolia*	16	18	F	moderate structure, ivy up trunk	No	Remove	Grading
2669	Oregon ash	*Fraxinus latifolia*	14	10	P	very poor structure, decay	No	Remove	Building
2670	Oregon ash	*Fraxinus latifolia*	8	10	F	poor structure, small live crown, ivy	No	Remove	Building
2671	Oregon ash	*Fraxinus latifolia*	7,12	8	P	very poor structure, dead and broken branches, decay	No	Remove	Building
2672	Oregon ash	*Fraxinus latifolia*	16	15	P	excessive lean to S, hung up in adjacent crowns	No	Remove	Building
2673	Oregon white oak	*Quercus garryana*	13	16	P	overtopped by fir	No	Remove	ROW
2675	Oregon white oak	*Quercus garryana*	16	10	P	severe ivy, poor structure, crown decay	Yes	Retain	n/a
2676	Oregon ash	*Fraxinus latifolia*	20,24	20	P	advanced trunk decay, extensive ivy	No	Retain	n/a
2677	Oregon white oak	*Quercus garryana*	16	8	P	extensive ivy infestation	Yes	Retain	n/a
2678	Douglas-fir	*Pseudotsuga menziesii*	30	14	F	extensive ivy up lower trunk, codominant crown class	Yes	Retain	n/a
2679	Douglas-fir	*Pseudotsuga menziesii*	30	20	F	dominant tree, ivy up trunk	Yes	Retain	n/a
2680	Oregon white oak	*Quercus garryana*	30	22	G	some crown decay, ivy inhibited complete visual assessment	Yes	Retain	n/a

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No.	Common Name	Species Name	DBH*	C-Rad^	Cond#	Comments	Sig?	Treatment	Reason
2681	Oregon ash	*Fraxinus latifolia*	24	20	P	one-sided crown to E, ivy up trunk, increased risk potential	No	Remove	Condition
2682	Oregon ash	*Fraxinus latifolia*	20	20	F	poor crown structure, one-sided to E, ivy up trunk	No	Retain	n/a
2683	Douglas-fir	*Pseudotsuga menziesii*	16	12	P	suppressed	No	Retain	n/a
2684	Douglas-fir	*Pseudotsuga menziesii*	16	8	P	suppressed	No	Retain	n/a
2685	Oregon ash	*Fraxinus latifolia*	10,14	12	P	poor structure, dead branches, extensive ivy	No	Retain	n/a
2686	Oregon ash	*Fraxinus latifolia*	20	20	P	poor structure, dead branches, extensive ivy	No	Retain	n/a
2687	bigleaf maple	*Acer macrophyllum*	7,12	12	P	broken top, poor structure, severe ivy	No	Retain	n/a
2688	Oregon ash	*Fraxinus latifolia*	8	14	P	dead branches, small live crown, below dominant canopy	No	Retain	n/a
2689	Oregon ash	*Fraxinus latifolia*	30	24	F	dead and broken branches, moderate structure, severe ivy infestation	No	Retain	n/a
2690	Oregon white oak	*Quercus garryana*	40	34	G	some broken branches, branch decay, ivy inhibited complete assessment	Yes	Retain	n/a
2691	bigleaf maple	*Acer macrophyllum*	12	20	P	broken tops, very poor structure, severe ivy infestation	No	Remove	Building
2692	Oregon ash	*Fraxinus latifolia*	14	12	F	moderate structure, high live crown, some ivy	No	Remove	Building
2693	bigleaf maple	*Acer macrophyllum*	3x12	16	F	high live crown, trunk and branch decay	No	Remove	Building
2694	western redcedar	*Thuja plicata*	24	14	P	dead top, trunk decay with hollows	No	Remove	Building
2695	Douglas-fir	*Pseudotsuga menziesii*	24	16	P	poor structure, severe ivy infestation	No	Remove	Grading
2696	Oregon white oak	*Quercus garryana*	24	30	F	poor structure, rubs against 2698, ivy	No	Remove	Grading
2697	bigleaf maple	*Acer macrophyllum*	8,14,16	16	P	poor structure, severe ivy infestation	No	Remove	Grading

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No.	Common Name	Species Name	DBH*	C-Rad^	Cond#	Comments	Sig?	Treatment	Reason
2698	Douglas-fir	*Pseudotsuga menziesii*	24	15	F	poor stem structure, forked top, rubs against 2696	No	Remove	Grading
2699	Oregon white oak	*Quercus garryana*	30	20	P	severe ivy up trunk into crown, branch dieback	No	Retain	n/a
2700	Oregon white oak	*Quercus garryana*	20	20	P	severe ivy up trunk into crown, crown decay	No	Remove	Grading
2701	bigleaf maple	*Acer macrophyllum*	2x8	10	P	poor structure, one dead leader	No	Retain	n/a
2702	bigleaf maple	*Acer macrophyllum*	8	10	F	moderate structure, some crown decay, ivy	No	Retain	n/a
2703	English hawthorn	*Crataegus monogyna*	18	15	P	invasive species	No	Off-site	n/a
2704	Douglas-fir	*Pseudotsuga menziesii*	12	12	F	one-sided crown	No	Off-site	n/a
2705	deciduous	unknown	20	10	P	very poor structure, over taken with ivy	No	Retain	n/a
2706	western redcedar	*Thuja plicata*	24	15	G	some crown asymmetry	Yes	Remove	Building
2707	sweet cherry	*Prunus avium*	12	14	F	invasive species	No	Remove	Building
2708	sweet cherry	*Prunus avium*	8	10	F	invasive species	No	Remove	Condition
2709	sweet cherry	*Prunus avium*	12	18	F	invasive species	No	Remove	Condition
2710	Oregon white oak	*Quercus garryana*	14	20	F	high live crown, fill at base	Yes	Retain	n/a
2711	Oregon white oak	*Quercus garryana*	14	28	F	very one-sided with crown weight to S	No	Retain	n/a
2712	Oregon white oak	*Quercus garryana*	20	22	G	one-sided crown to S, ivy	Yes	Remove	ROW
2713	Douglas-fir	*Pseudotsuga menziesii*	28	20	F	codominant crown class, some ivy, broken top, decay	No	Remove	Grading
2714	Douglas-fir	*Pseudotsuga menziesii*	24	15	G	codominant crown class, some ivy	No	Remove	Grading
2715	Douglas-fir	*Pseudotsuga menziesii*	18	10	P	broken top, decline, extensive ivy	No	Remove	Building
3430	Douglas-fir	*Pseudotsuga menziesii*	16	16	P	suppressed	No	Remove	Building
3431	Douglas-fir	*Pseudotsuga menziesii*	36	24	F	codominant, okay in group	No	Remove	Building
3432	Douglas-fir	*Pseudotsuga menziesii*	26	20	F	codominant, okay in group	No	Remove	Building

No.	Common Name	Species Name	DBH*	C-Rad^	Cond#	Comments	Sig?	Treatment	Reason
3433	Douglas-fir	*Pseudotsuga menziesii*	20	20	F	codominant, okay in group	No	Remove	Building
3434	Douglas-fir	*Pseudotsuga menziesii*	18	20	P	suppressed	No	Remove	Building
3435	Oregon white oak	*Quercus garryana*	7	10	F	overtopped by firs	No	Remove	Building
3436	Oregon white oak	*Quercus garryana*	9	7	P	suppressed, advanced decay, mostly dead	No	Remove	Building
3437	Oregon ash	*Fraxinus latifolia*	12	12	F	small high live crown, ivy	No	Remove	Building
3438	Oregon ash	*Fraxinus latifolia*	8	10	F	small high live crown, ivy	No	Remove	Building
3439	bigleaf maple	*Acer macrophyllum*	10,20,24	22	F	extensive ivy inhibited complete visual assessment	No	Remove	Grading
3440	Oregon white oak	*Quercus garryana*	30	30	G	ivy inhibited complete visual assessment	Yes	Retain	n/a
3441	Oregon ash	*Fraxinus latifolia*	12	11	P	poor structure, advanced trunk decay	No	Remove	Condition
3442	Oregon ash	*Fraxinus latifolia*	7	10	F	small high live crown	No	Retain	n/a
3443	Oregon ash	*Fraxinus latifolia*	7	15	F	small high live crown	No	Retain	n/a
3444	yew	*Taxus brevifolia*	7	12	F	moderate structure	Yes	Retain	n/a
3445	sweet cherry	*Prunus avium*	10	12	P	poor structure, invasive species	No	Retain	n/a
3446	Douglas-fir	*Pseudotsuga menziesii*	30	24	G	dominant tree, ivy at base	Yes	Remove	Building
3447	black hawthorn	*Crataegus douglasii*	12	13	P	old broken top, multiple leaders, advanced decay, ivy	No	Remove	ROW
3448	Oregon white oak	*Quercus garryana*	20	20	F	moderate structure, codominant leaders	Yes	Remove	Grading
3449	Oregon white oak	*Quercus garryana*	17	18	G	20-degree lean to N, good foliage density	Yes	Remove	ROW
3450	Oregon white oak	*Quercus garryana*	9	14	G	one-sided crown to E	No	Remove	ROW
3451	bigleaf maple	*Acer macrophyllum*	13	14	G	one-sided crown to W	No	Remove	ROW
3452	Oregon white oak	*Quercus garryana*	15	16	G	ivy	Yes	Remove	ROW

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3453	Oregon white oak	*Quercus garryana*	2x16	24	G	moderate structure, one-sided crown to SSW	Yes	Remove	Building
3454	Oregon white oak	*Quercus garryana*	15	14	F	one-sided crown with lean to S	No	Remove	Building
3504	Oregon white oak	*Quercus garryana*	9	10	F	below dominant canopy	No	Remove	Building
3505	Oregon white oak	*Quercus garryana*	10	8	F	moderate structure, below dominant canopy, old wound on NE face	No	Remove	Building
3506	Oregon white oak	*Quercus garryana*	12	15	F	codominant with 3506, moderate structure	Yes	Remove	Building
3507	Oregon white oak	*Quercus garryana*	16	20	F	codominant with 3505, moderate structure, old wound on N face	Yes	Remove	Building
3508	Oregon white oak	*Quercus garryana*	10	10	G	below dominant canopy	Yes	Remove	Building
3509	bigleaf maple	*Acer macrophyllum*	10	15	F	poor structure, basal decay	No	Remove	Building
3510	Oregon white oak	*Quercus garryana*	9	10	F	moderate structure, forked top	Yes	Remove	Grading
3511	pine	*Pinus* spp.	11	12	G	forked top, no major defects	No	Retain	n/a
3512	western redcedar	*Thuja plicata*	5,8	10	F	codom stems ~1' above ground level, E stem topped and with new leader	No	Retain	n/a
3513	bigleaf maple	*Acer macrophyllum*	2x8	14	P	poor structure	No	Retain	n/a
3514	western redcedar	*Thuja plicata*	7	8	F	below dominant canopy	No	Retain	n/a
3515	western redcedar	*Thuja plicata*	8	8	F	trunk sweep to south	No	Retain	n/a
3516	Oregon ash	*Fraxinus latifolia*	17	16	F	high live crown, severe ivy up trunk	No	Retain	n/a
3517	European white birch	*Betula pendula*	9	10	P	invasive species	No	Remove	Condition
3518	deciduous	unknown	4,8	10	P	mostly dead, dead and broken branches, severe ivy infestation	No	Remove	Condition
3520	bigleaf maple	*Acer macrophyllum*	10	14	F	moderate structure	No	Remove	Building
3521	Douglas-fir	*Pseudotsuga menziesii*	30	20	P	old broken top, new codom leaders, included bark, resin	No	Remove	Building

No.	Common Name	Species Name	DBH*	C-Rad^	Cond#	Comments	Sig?	Treatment	Reason
3522	Oregon white oak	*Quercus garryana*	16	20	F	moderate structure, some ivy	Yes	Remove	Building
3523	Oregon white oak	*Quercus garryana*	16	14	P	poor structure, extensive ivy	No	Remove	Condition
3524	Douglas-fir	*Pseudotsuga menziesii*	15	15	P	excessive lean into 2668, extensive ivy	No	Remove	Condition
3525	Oregon white oak	*Quercus garryana*	22	25	F	moderate structure, ivy up trunk	Yes	Retain	n/a
3526	Oregon white oak	*Quercus garryana*	20	25	F	moderate structure, ivy up trunk	Yes	Retain	n/a
3537	Oregon white oak	*Quercus garryana*	18	16	P	poor crown structure, some ivy	No	Remove	Building
3539	Oregon white oak	*Quercus garryana*	22	30	G	some branch decay	Yes	Remove	ROW
3677	Douglas-fir	*Pseudotsuga menziesii*	30	32	G	no major defects, some twig dieback, ivy up lower trunk	Yes	Remove	ROW
3767	Douglas-fir	*Pseudotsuga menziesii*	12	12	F	broken top	No	Retain	n/a
3775	Scouler's willow	*Salix scouleriana*	18	20	F	codominant stems, ivy	No	Remove	ROW
3776	Douglas-fir	*Pseudotsuga menziesii*	28	12	P	decline	No	Remove	Building
3777	Oregon white oak	*Quercus garryana*	15	14	F	moderate structure	No	Remove	Building
3778	Oregon ash	*Fraxinus latifolia*	10	12	F	small high live crown	No	Remove	Building
3779	Douglas-fir	*Pseudotsuga menziesii*	18	12	P	small live crown, epicormics	No	Remove	Building
3780	Douglas-fir	*Pseudotsuga menziesii*	15	10	F	one-sided crown, below dominant canopy, not suitable for retention with adjacent removal	No	Remove	Building

***DBH** is tree diameter measured at breast height, 4.5-feet above the ground level (inches); codominant trunks splitting below DBH are measured individually and separated by a comma, except codominant stems of equal size are noted as quantity x size.

^C-Rad is the average crown radius measured in feet.

#Cond is an arborist assigned rating to generally describe the condition of individual trees as follows- **D**ead; **P**oor; **F**air; or **G**ood condition.

Sig? asks whether or not individual trees are considered potentially significant, either Yes (likely significant) or No (not considered significant).

Spir, Peter

From: Andrew Tull <andrew.tull@3j-consulting.com>
Sent: Wednesday, February 03, 2016 3:32 PM
To: Spir, Peter
Subject: RE: Chene Blanc arborists report

Thanks, Peter. Please add this email to the record for the project.

Andrew Tull
3J Consulting, Inc.
PH: (503) 545-1907

From: Spir, Peter [mailto:Pspir@westlinnoregon.gov]
Sent: Wednesday, February 3, 2016 3:31 PM
To: Andrew Tull <andrew.tull@3j-consulting.com>
Subject: FW: Chene Blanc arborists report

Peter Spir
Associate Planner
22500 Salamo Rd.
West Linn, Oregon 97068
Pspir@westlinnoregon.gov
westlinnoregon.gov
Phone (503) 723-2539

Click to Connect!

From: Perkins, Michael
Sent: Wednesday, February 03, 2016 3:21 PM
To: Spir, Peter <Pspir@westlinnoregon.gov>
Subject: RE: Chene Blanc arborists report

I concur with the consulting arborist's Arborist Report for the trees on this project. The trees labeled "potentially significant" in the report were found to be indeed significant.

Michael Perkins, City Arborist/Park Development Coordinator
Parks and Recreation, #1554

CITY OF West Linn

Planning & Development • 22500 Salamo Rd #1000 • West Linn, Oregon 97068
Telephone 503.656.4211 • Fax 503.656.4106 • westlinnoregon.gov

DEVELOPMENT REVIEW APPLICATION

For Office Use Only		
STAFF CONTACT Peter Spir	PROJECT NO(S). SU-1503	
NON-REFUNDABLE FEE(S) 500	REFUNDABLE DEPOSIT(S) 11000-	TOTAL 11500-

Type of Review (Please check all that apply):

- [ ] Annexation (ANX)
- [ ] Appeal and Review (AP) *
- [ ] Conditional Use (CUP)
- [ ] Design Review (DR)
- [ ] Easement Vacation
- [ ] Extraterritorial Ext. of Utilities
- [ ] Final Plat or Plan (FP)
- [ ] Flood Management Area
- [ ] Hillside Protection & Erosion Control
- [ ] Historic Review
- [ ] Legislative Plan or Change
- [ ] Lot Line Adjustment (LLA) */**
- [ ] Minor Partition (MIP) (Preliminary Plat or Plan)
- [ ] Non-Conforming Lots, Uses & Structures
- [ ] Planned Unit Development (PUD)
- [ ] Pre-Application Conference (PA) */**
- [ ] Street Vacation
- [x] Subdivision (SUB) 4200 + 200 per lot 11000- TOTAL
- [ ] Temporary Uses *
- [ ] Time Extension *
- [ ] Variance (VAR)
- [ ] Water Resource Area Protection/Single Lot (WAP)
- [ ] Water Resource Area Protection/Wetland (WAP)
- [ ] Willamette & Tualatin River Greenway (WRG)
- [ ] Zone Change

Home Occupation, Pre-Application, Sidewalk Use, Sign Review Permit, and Temporary Sign Permit applications require different or additional application forms, available on the City website or at City Hall.

Site Location/Address:

18000 Upper Midhill Drive

Assessor's Map No.: 21E14CA
Tax Lot(s): 200
Total Land Area:

Brief Description of Proposal:

The Applicant is proposing a 34 lot single family subdivision consistent with the standards of the R-4.5 zone.

Applicant Name: (please print) Upper Midhill Estates, LLC attn: Ryan Zygar
Phone: 360-798-4838
Address: 931 SW King Avenue
Email: ryan@zygar.com
City State Zip: Portland, OR 97205

Owner Name (required): (please print) 18000 Midhill Drive, LLC C/O David Chiddix
Phone:
Address: 1235 N Dutton Ave #E
Email:
City State Zip: Santa Rosa, CA 95401

Consultant Name: (please print) 3J Consulting, INC attn: Andrew Tull
Phone: 503-545-1907
Address: 5075 SW Griffith Drive, Suite 150
Email: andrew.tull@3j-consulting.com
City State Zip: Beaverton, OR 97005

1. All application fees are non-refundable (excluding deposit). **Any overruns to deposit will result in additional billing.**
2. The owner/applicant or their representative should be present at all public hearings.
3. A denial or approval may be reversed on appeal. No permit will be in effect until the appeal period has expired.
4. **Three (3) complete hard-copy sets (single sided) of application materials must be submitted with this application. One (1) complete set of digital application materials must also be submitted on CD in PDF format. If large sets of plans are required in application please submit only two sets.**

* No CD required / ** Only one hard-copy set needed

RECEIVED
OCT 21 2015
PLANNING & BUILDING
CITY OF WEST LINN
INT. TIME

The undersigned property owner(s) hereby authorizes the filing of this application, and authorizes on site review by authorized staff. I hereby agree to comply with all code requirements applicable to my application. Acceptance of this application does not infer a complete submittal. All amendments to the Community Development Code and to other regulations adopted after the application is approved shall be enforced where applicable. Approved applications and subsequent development is not vested under the provisions in place at the time of the initial application.

DocuSigned by:
Applicant's signature — 9/29/2015 | 4:30 PM PT — Date

DocuSigned by:
Owner's signature *(required)* — 9/29/2015 | 4:26 PM — Date

CONTENTS

Appendix List

GENERAL INFORMATION

Property Owner:	**18000 Midhill Drive, LLC** **1235 North Dutton Ave, Suite E** **Santa Rosa, CA 95401** **Contact: David Chiddix**
Applicant:	**Upper Midhill Estates, LLC** **931 SW King Avenue** **Portland, OR 97205** **Contact: Ryan Zygar** **Phone: 360-798-4838** **Email:** ryan@zygar.com
Applicant's Representative:	**3J Consulting, Inc.** **5075 SW Griffith Drive, Suite 150** **Beaverton, OR 97005** **Contact: Andrew Tull** **Phone: 503-545-1907** **Email:** andrew.tull@3j-consulting.com

SITE INFORMATION

Tax Lot Numbers:	**2S1E13CA0200**
Address:	**18000 Upper Midhill Drive**
Size:	**6.10 acres**
Zoning Designation:	**R-4.5 (City of West Linn)**
Neighborhood:	**Robinwood**
Comprehensive Plan:	**Medium Density Residential**
Existing Use:	**The site is vacant.**
Street Functional Classification:	**The site currently takes access from Upper Midhill Drive, a local street. Adjacent College View Drive, Scenic Drive and Hillside Drive are local streets.**
Surrounding Zoning:	**North, East and West- City of Lake Oswego** **South- R-4.5 (West Linn)**

INTRODUCTION

APPLICANT'S REQUEST

The Applicant seeks approval of an application for Subdivision Preliminary Plat and Water Resource Area (WRA) Alternative Review for the development of 34 residential lots (Chêne Blanc Estates). This narrative describes the proposed subdivision of the site and documents compliance with the relevant sections of the City of West Linn's Community Development Code ("CDC").

PROPOSED SITE IMPROVEMENTS

The project site consists of a total of 6.10 acres. The property is located at the north end of Upper Midhill Drive, adjacent to the City of Lake Oswego to the north. The site is currently vacant. The 34 lots will take access from either Upper Midhill Drive or Scenic Drive, both local streets.

The intent of this subdivision is to provide thirty-four (34) buildable lots on the subject property. Each of the proposed lots will exceed the minimum of 4,500 square feet in size, for development with single-family detached homes, a use permitted outright in the R-4.5 zone. This application would create thirty-four (34) lots for needed housing, contributing to the City's inventory of diverse and available housing stock.

The lot layout and configuration of streets and drainage are dictated by four main factors: topography, existing street grades, the abundance of significant trees, and the city's requirement that any development provide a minimum of 34 lots. The application demonstrates how these factors have been successfully addressed in compliance with all applicable criteria.

APPLICABLE CRITERIA

The following sections of the CDC have been extracted as they have been deemed to be applicable to the proposal. Following each applicable criteria or design standard, the Applicant has provided a series of draft findings. The intent of providing code and detailed responses and findings is to document that the proposed development has satisfied the approval criteria for Subdivision Preliminary Plat.

DIVISION 2. ZONING PROVISIONS

CHAPTER 14. SINGLE-FAMILY RESIDENTIAL ATTACHED AND DETACHED/DUPLEX, R-4.5

14.030 PERMITTED USES

The following uses are permitted outright in this zoning district.

1. **Single-family detached residential unit.**
2. **Duplex residential units.**
3. **Family day care.**
4. **Single-family attached residential units.**
5. **Community recreation.**
6. **Residential home.**
7. **Utilities, minor.**
8. **Manufactured housing.**
9. **Transportation facilities (Type I). (Ord. 1180, 1986; Ord. 1226, 1988; Ord. 1248, 1989; Ord. 1354, 1994; Ord. 1584, 2008)**

Applicant's Finding:	The proposed subdivision is intended for single-family detached residential units, a use permitted outright in the R-4.5 zone. The requirements of this section have been satisfied.

14.070 DIMENSIONAL REQUIREMENTS, USES PERMITTED OUTRIGHT AND USES PERMITTED UNDER PRESCRIBED CONDITIONS

Except as may be otherwise provided by the provisions of this code, the following are the requirements for uses within this zone:

A. **The minimum lot size shall be:**
   1. **For a single-family detached unit, 4,500 square feet.**
   2. **For each attached single-family unit, 4,000 square feet.**
   3. **For a duplex, 8,000 square feet or 4,000 square feet for each unit.**

B. **The minimum front lot line length or the minimum lot width at the front lot line shall be 35 feet.**

C. **The average minimum lot width shall be 35 feet.**

D. ***Repealed by Ord. 1622.***

E. **The minimum yard dimensions or minimum building setback areas from the lot line shall be:**
   1. **For a front yard, 20 feet; except for steeply sloped lots where the provisions of CDC 41.010 shall apply.**
   2. **For an interior side yard, five feet.**

3. For a side yard abutting a street, 15 feet.
4. For a rear yard, 20 feet.

F. The maximum building height shall be 35 feet, except for steeply sloped lots in which case the provisions of CDC 41.010 shall apply.

G. The maximum lot coverage shall be 40 percent.

H. The minimum width of an accessway to a lot which does not abut a street or a flag lot shall be 15 feet.

I. The floor area ratio shall be 0.45. Type I and II lands shall not be counted toward lot area when determining allowable floor area ratio, except that a minimum floor area ratio of 0.30 shall be allowed regardless of the classification of lands within the property. That 30 percent shall be based upon the entire property including Type I and II lands. Existing residences in excess of this standard may be replaced to their prior dimensions when damaged without the requirement that the homeowner obtain a non-conforming structures permit under Chapter 66 CDC.

J. The sidewall provisions of Chapter 43 CDC shall apply. (Ord. 1226, 1988; Ord. 1308, 1991; Ord. 1377, 1995; Ord. 1538, 2006; Ord. 1622 § 24, 2014)

Applicant's Finding:

The proposed lots range in size from 4,615 square feet to 9,905 square feet, well over the 4,500 square foot minimum for single-family detached residential in the R-4.5 zone. The lot widths at front property line and lot width averages all exceed 35 feet, as demonstrated on the submitted plans. There are no accessways proposed as all lots access a public street. Yard dimensions, building height, lot coverage, floor area ratios and sidewall provisions will all meet the requirements of this section and will be verified at time of building permit submittal.

The requirements of this section have been satisfied.

DIVISION 8. LAND DIVISION

CHAPTER 85. GENERAL PROVISIONS

85.170 SUPPLEMENTAL SUBMITTAL REQUIREMENTS FOR TENTATIVE SUBDIVISION OR PARTITION PLAN

B. Transportation.

2. Traffic Impact Analysis (TIA).

a. Purpose. The purpose of this section of the code is to implement Section 660-012-0045(2)(e) of the State Transportation Planning Rule that requires the City to adopt a process to apply conditions to development proposals in order to minimize adverse impacts to and protect transportation facilities. This section establishes the standards for when a proposal must be reviewed for potential traffic impacts; when a Traffic Impact Analysis must be submitted with a development application in order to determine whether conditions are needed to minimize impacts to and protect transportation facilities; what must be in a Traffic Impact Study; and who is qualified to prepare the study.

b. Typical average daily trips. The latest edition of the Trip Generation manual, published by the Institute of Transportation Engineers (ITE) shall be used as the standards by which to gauge average daily vehicle trips.

c. <u>When required</u>. A Traffic Impact Analysis may be required to be submitted to the City with a land use application, when the following conditions apply:

1) The development application involves one or more of the following actions:

(A) A change in zoning or a plan amendment designation; or

Applicant's Finding: The Applicant is not proposing a change in zoning or a plan amendment designation as a part of this land use application, therefore a Traffic Impact Analysis is not required per this subsection.

The requirements of this section have been satisfied.

(B) Any proposed development or land use action that ODOT states may have operational or safety concerns along a State highway; and

Applicant's Finding: The proposed development is not located along a State highway, therefore a Traffic Impact Analysis is not required per this subsection.

The requirements of this section have been satisfied.

(C) The development shall cause one or more of the following effects, which can be determined by field counts, site observation, traffic impact analysis or study, field measurements, crash history, Institute of Transportation Engineers Trip Generation manual; and information and studies provided by the local reviewing jurisdiction and/or ODOT:

(1) An increase in site traffic volume generation by 250 average daily trips (ADT) or more (or as required by the City Engineer); or

Applicant's Finding: The *Institute of Transportation Engineers Trip Generation Manual, 9th Edition* estimates an average increase in daily trips as 9.5 trips/ residential lot. The proposed 34 lot subdivision will generate 323 average daily trips (ADT), exceeding the 250 ADT threshold. Therefore, the submittal includes a Transportation Impact Analysis prepared by Kittleson & Associates, Inc. in support of this project.

The requirements of this section have been satisfied.

(2) An increase in use of adjacent streets by vehicles exceeding the 20,000-pound gross vehicle weights by 10 vehicles or more per day; or

Applicant's Finding: The proposed development is intended to serve primarily residential traffic and is not estimated to increase the use of adjacent streets by vehicles exceeding 20,000-pound gross vehicle weights by 10 vehicles or more per day, therefore a Traffic Impact Analysis is not required per this subsection.

The requirements of this section have been satisfied.

(3) The location of the access driveway does not meet minimum intersection sight distance requirements, or is located where vehicles entering or leaving the property are restricted, or such vehicles queue or hesitate on the State highway, creating a safety hazard; or

Applicant's Finding: Proposed access driveways have been designed to meet the minimum intersection site distance for new single family homes.

The requirements of this section have been satisfied.

(4) The location of the access driveway does not meet the access spacing standard of the roadway on which the driveway is located; or

Applicant's Finding: Proposed access driveways have been designed to meet the minimum intersection site distance for new single family homes.

The requirements of this section have been satisfied.

(5) A change in internal traffic patterns that may cause safety problems, such as backup onto the highway or traffic crashes in the approach area.

Applicant's Finding: No changes to local traffic patterns hold the potential to cause off-site safety problems.

The requirements of this section have been satisfied.

d. Traffic impact analysis requirements.

1) Preparation. A Traffic Impact Analysis shall be prepared by a professional engineer qualified under OAR 734-051-0040. The City shall commission the traffic analysis and it will be paid for by the applicant.

2) Transportation Planning Rule compliance. See CDC 105.050(D), Transportation Planning Rule Compliance.

3) Pre-application conference. The applicant will meet with West Linn Public Works prior to submitting an application that requires a traffic impact application. This meeting will determine the required elements of the TIA and the level of analysis expected.

e. Approval criteria.

1) Criteria. When a Traffic Impact Analysis is required, approval of the development proposal requires satisfaction of the following criteria:

(A) The Traffic Impact Analysis was prepared by a professional traffic engineer qualified under OAR 734-051-0040; and

(B) If the proposed development shall cause one or more of the effects in subsection (B)(2) of this section, or other traffic hazard or negative impact to a transportation facility, the Traffic Impact Analysis includes mitigation measures that meet the City's

level of service and are satisfactory to the City Engineer, and ODOT when applicable; and

(C) The proposed site design and traffic and circulation design and facilities, for all transportation modes, including any mitigation measures, are designed to:

(1) Have the least negative impact on all applicable transportation facilities; and

(2) Accommodate and encourage non-motor vehicular modes of transportation to the extent practicable; and

(3) Make the most efficient use of land and public facilities as practicable; and

(4) Provide the most direct, safe and convenient routes practicable between on-site destinations, and between on-site and off-site destinations; and

(5) Otherwise comply with applicable requirements of the City of West Linn Community Development Code.

f. Conditions of approval. The City may deny, approve, or approve the proposal with appropriate conditions.

1) Dedication of land for streets, transit facilities, sidewalks, bikeways, paths, or accessways shall be required where the existing transportation system will be impacted by or is inadequate to handle the additional burden caused by the proposed use.

2) Improvements such as paving, curbing, installation or contribution to traffic signals, or construction of sidewalks, bikeways, accessways, paths, or streets that serve the proposed use where the existing transportation system may be burdened by the proposed use may be required.

Applicant's Finding:

The transportation impact analysis submitted with this application was prepared by a professional traffic engineer and finds that the proposed subdivision can be constructed while maintaining safe and acceptable traffic operations at the study intersection and adjacent roadways. The following is a list of recommended mitigation measures:

- Construct an extension of Upper Midhill Road consistent with the City's local street standard.
- Shrubbery and landscaping near the internal intersections and site access points should be maintained to ensure adequate sight distance.
- Develop a cost estimate for the proposed improvements to the Arbor/highway 43 intersection in coordination with the City and ODOT staff and pay a proportionate share (estimated at 1.9 percent) of the total cost of the improvements.

The requirements of this section have been satisfied.

85.200 APPROVAL CRITERIA

No tentative subdivision or partition plan shall be approved unless adequate public facilities will be available to provide service to the partition or subdivision area prior to final plat approval and the Planning Commission or Planning Director, as applicable, finds that the following standards have been satisfied, or can be satisfied by condition of approval.

A. Streets.

1. General. The location, width and grade of streets shall be considered in their relation to existing and planned streets, to the generalized or reasonable layout of streets on adjacent undeveloped lot or parcels, to topographical conditions, to public convenience and safety, to accommodate various types of transportation (automobile, bus, pedestrian, bicycle), and to the proposed use of land to be served by the streets. The functional class of a street aids in defining the primary function and associated design standards for the facility. The hierarchy of the facilities within the network in regard to the type of traffic served (through or local trips), balance of function (providing access and/or capacity), and the level of use (generally measured in vehicles per day) are generally dictated by the functional class. The street system shall assure an adequate traffic or circulation system with intersection angles, grades, tangents, and curves appropriate for the traffic to be carried. Streets should provide for the continuation, or the appropriate projection, of existing principal streets in surrounding areas and should not impede or adversely affect development of adjoining lands or access thereto.

To accomplish this, the emphasis should be upon a connected continuous pattern of local, collector, and arterial streets rather than discontinuous curvilinear streets and cul-de-sacs. Deviation from this pattern of connected streets should only be permitted in cases of extreme topographical challenges including excessive slopes (35 percent-plus), hazard areas, steep drainageways, wetlands, etc. In such cases, deviations may be allowed but the connected continuous pattern must be reestablished once the topographic challenge is passed. Streets should be oriented with consideration of the sun, as site conditions allow, so that over 50 percent of the front building lines of homes are oriented within 30 degrees of an east-west axis.

Internal streets are the responsibility of the developer. All streets bordering the development site are to be developed by the developer with, typically, half-street improvements or to City standards prescribed by the City Engineer. Additional travel lanes may be required to be consistent with adjacent road widths or to be consistent with the adopted Transportation System Plan (TSP) and any adopted updated plans.

An applicant may submit a written request for a waiver of abutting street improvements if the TSP prohibits the street improvement for which the waiver is requested. Those areas with numerous (particularly contiguous) under-developed or undeveloped tracts will be required to install street improvements. When an applicant requests a waiver of street improvements and the waiver is granted, the applicant shall pay an in-lieu fee equal to the estimated cost, accepted by the City Engineer, of the otherwise required street improvements. As a basis for this determination, the City Engineer shall consider the cost of similar improvements in recent development projects and may require up to three estimates from the applicant. The amount of the fee shall be established prior to the Planning Commission's decision on the associated application. The in-lieu fee shall be used for in kind or related improvements. Streets shall also be laid out to avoid and protect tree clusters and significant trees, but not to the extent that it would compromise connectivity requirements per this subsection (A)(1), or bring the density below 70 percent of the maximum density for the developable net area. The developable net area is calculated by taking the total site acreage and deducting Type I and II lands; then up to 20 percent of the remaining land may be excluded as necessary for the purpose of protecting significant tree clusters or stands as defined in CDC 55.100(B)(2).

Applicant's Finding: This site is located north end of Upper Midhill Drive, a local street. The development will include the extension of Scenic Drive, also a local street. The development of this site

will not negatively affect the connectivity of these two streets. Figure 8-6 of the West Linn Transportation System Plan - Future Local Street Connectivity Improvements, does not identify a new street connection within or adjacent to this site. However, the proposed subdivision will include connection of Upper Midhill Drive to Scenic Drive to provide connectivity throughout this site.

The extension of Upper Midhill and Scenic will require right-of-way dedication with this subdivision. The Applicant proposes additional right-of-way within the site for the extension of both of these streets, as discussed below. Sidewalks and planter strips are also proposed.

This section requires the developer to be responsible for the construction of internal streets. The Applicant proposes full responsibility for construction of the extensions of Upper Midhill and Scenic.

The requirements of this section have been satisfied.

2. Right-of-way and roadway widths. In order to accommodate larger tree-lined boulevards and sidewalks, particularly in residential areas, the standard right-of-way widths for the different street classifications shall be within the range listed below. But instead of filling in the right-of-way with pavement, they shall accommodate the amenities (e.g., boulevards, street trees, sidewalks). The exact width of the right-of-way shall be determined by the City Engineer or the approval authority. The following ranges will apply:

Street Classification	Right-of-Way
Local Street	40' – 60'

Additional rights-of-way for slopes may be required. Sidewalks shall not be located outside of the right-of-way unless to accommodate significant natural features or trees.

Applicant's Finding: The Applicant proposes dedication of a variable width between 48' and 50' of right-of-way within the site for both Upper Midhill and Scenic, as shown on the preliminary plat, sheet C200. These dedications are consistent with the Transportation System Plan (TSP) requirements of 40'-60' ROW for a local street.

The requirements of this section have been satisfied.

3. Street widths. Street widths shall depend upon which classification of street is proposed. The classifications and required cross sections are established in Chapter 8 of the adopted TSP.

Applicant's Finding: The width of the paved section of the extensions of Upper Midhill and Scenic will be 24 feet, per the TSP standard for a local street.

The requirements of this section have been satisfied.

4. The decision-making body shall consider the City Engineer's recommendations on the desired right-of-way width, pavement width and street geometry of the various street types within the subdivision after consideration by the City Engineer of the following criteria:

- **a. The type of road as set forth in the Transportation Master Plan.**
- **b. The anticipated traffic generation.**
- **c. On-street parking requirements.**
- **d. Sidewalk and bikeway requirements.**
- **e. Requirements for placement of utilities.**
- **f. Street lighting.**
- **g. Drainage and slope impacts.**
- **h. Street trees.**
- **i. Planting and landscape areas.**
- **j. Existing and future driveway grades.**
- **k. Street geometry.**
- **l. Street furniture needs, hydrants.**

Applicant's Finding:

The City's Development Engineer has reviewed the proposal and made recommendations to the applicant, which are incorporated into the proposed roadway configuration.

The Applicant has specifically requested a modification along the western edge of the extension of Scenic Drive. This modification would involve the placement of a curb-tight sidewalk along the western edge of the street. The curb-tight sidewalk has been proposed in order to reduce grading impacts and wall construction along the roadway's western edge. The western edge of Scenic currently abuts several existing structures.

The requirements of this section have been satisfied.

5. Additionally, when determining appropriate street width, the decision-making body shall consider the following criteria:

- **a. When a local street is the only street serving a residential area and is expected to carry more than the normal local street traffic load, the designs with two travel and one parking lane are appropriate.**
- **b. Streets intended to serve as signed but unstriped bike routes should have the travel lane widened by two feet.**
- **c. Collectors should have two travel lanes and may accommodate some parking. Bike routes are appropriate.**
- **d. Arterials should have two travel lanes. On-street parking is not allowed unless part of a Street Master Plan. Bike lanes are required as directed by the Parks Master Plan and Transportation Master Plan.**

Applicant's Finding:

The local street load will not exceed that expected of a residential area. This site is also not designated as a bike route and does not include collector or arterial streets.

The requirements of this section have been satisfied.

6. Reserve strips. Reserve strips or street plugs controlling the access to streets are not permitted unless owned by the City.

Applicant's Finding: The applicant does not propose reserve strips or street plugs with this application. All rights-of-way will be dedicated to the edge of the adjoining properties.

The requirements of this section have been satisfied.

7. Alignment. All streets other than local streets or cul-de-sacs, as far as practical, shall be in alignment with existing streets by continuations of the centerlines thereof. The staggering of street alignments resulting in "T" intersections shall, wherever practical, leave a minimum distance of 200 feet between the centerlines of streets having approximately the same direction and otherwise shall not be less than 100 feet.

Applicant's Finding: The extension of both local streets will be in direct alignment. One "L" shaped intersection between Scenic and Upper Midhill Drive is proposed, where the two streets intersect at the northwestern corner of the site.

The requirements of this section have been satisfied.

8. Future extension of streets. Where necessary to give access to or permit a satisfactory future subdivision of adjoining land, streets shall be extended to the boundary of the subdivision and the resulting dead-end streets may be approved without turnarounds. (Temporary turnarounds built to Fire Department standards are required when the dead-end street is over 100 feet long.)

Applicant's Finding: The Applicant proposes to construct Upper Midhill to connect to Scenic, both local public streets.

The requirements of this section have been satisfied.

9. Intersection angles. Streets shall be laid out to intersect angles as near to right angles as practical, except where topography requires lesser angles, but in no case less than 60 degrees unless a special intersection design is approved. Intersections which are not at right angles shall have minimum corner radii of 15 feet along right-of-way lines which form acute angles. Right-of-way lines at intersections with arterial streets shall have minimum curb radii of not less than 35 feet. Other street intersections shall have curb radii of not less than 25 feet. All radii shall maintain a uniform width between the roadway and the right-of-way lines. The intersection of more than two streets at any one point will not be allowed unless no alternative design exists.

Applicant's Finding: The proposed street configuration includes one intersection between Scenic and Upper Midhill Drive. The proposed intersection has limited options for alignment due to the grading necessary to connect these two streets. The proposed angle between Upper Midhill and Scenic Drive is approximately 74 degrees.

The requirements of this section have been satisfied.

10. Additional right-of-way for existing streets. Wherever existing street rights-of-way adjacent to or within a tract are of inadequate widths based upon the standards of this chapter, additional right-of-way shall be provided at the time of subdivision or partition.

Applicant's Finding: Additional right-of-way for extensions of Upper Midhill and Scenic, as discussed above, will be dedicated at time of subdivision.

The requirements of this section have been satisfied.

11. Cul-de-sacs.

a. New cul-de-sacs and other closed-end streets (not including stub streets intended to be connected) on sites containing less than 5 acres, or sites accommodating uses other than residential or mixed use development, are not allowed unless the applicant demonstrates that there is no feasible alternative due to :***

Applicant's Finding: No cul-de-sacs are proposed with this subdivision.

The requirements of this section have been satisfied.

12. Street names. No street names shall be used which will duplicate or be confused with the names of existing streets within the City. Street names that involve difficult or unusual spellings are discouraged. Street names shall be subject to the approval of the Planning Commission or Planning Director, as applicable. Continuations of existing streets shall have the name of the existing street. Streets, drives, avenues, ways, boulevards, and lanes shall describe through streets. Place and court shall describe cul-de-sacs. Crescent, terrace, and circle shall describe loop or arcing roads.

Applicant's Finding: The street names of Upper Midhill and Scenic are established. No new street names are proposed.

The requirements of this section have been satisfied.

13. Grades and curves. Grades shall not exceed 8 percent on major or secondary arterials, 10 percent on collector streets, or 15 percent on any other street unless by variance. Willamette Drive/Highway 43 shall be designed to a minimum horizontal and vertical design speed of 45 miles per hour, subject to Oregon Department of Transportation (ODOT) approval. Arterials shall be designed to a minimum horizontal and vertical design speed of 35 miles per hour. Collectors shall be designed to a minimum horizontal and vertical design speed of 30 miles per hour. All other streets shall be designed to have a minimum centerline radii of 50 feet. Super elevations (i.e., banking) shall not exceed four percent. The centerline profiles of all streets may be provided where terrain constraints (e.g., over 20 percent slopes) may result in considerable deviation from the originally proposed alignment.

Applicant's Finding: The grade of the extensions of Hillside Drive and Scenic Drive will not exceed 15 percent, per this standard. All city centerline radii standards will be met.

The requirements of this section have been satisfied.

14. Access to local streets. Intersection of a local residential street with an arterial street may be prohibited by the decision-making authority if suitable alternatives exist for providing interconnection of proposed local residential streets with other local streets. Where a subdivision or partition abuts or contains an existing or proposed major arterial street, the decision-making authority may require marginal access streets, reverse-frontage lots with suitable depth, visual barriers, noise barriers, berms, no-access reservations along side and rear property lines, and/or other measures necessary for adequate protection of residential properties from incompatible land uses, and to ensure separation of through traffic and local traffic.

Applicant's Finding: The subject property does not abut nor contain an existing or proposed Major Arterial Street, nor is an intersection of a Local Residential Street with an Arterial Street proposed.

The requirements of this section have been satisfied.

15. Alleys. Alleys shall be provided in commercial and industrial districts unless other permanent provisions for access to off-street parking and loading facilities are made as approved by the decision-making authority. While alley intersections and sharp changes in alignment should be avoided, the corners of necessary alley intersections shall have radii of not less than 10 feet. Alleys may be provided in residential subdivisions or multi-family projects. The decision to locate alleys shall consider the relationship and impact of the alley to adjacent land uses. ***

Applicant's Finding: No alleys are proposed with this subdivision.

The requirements of this section have been satisfied.

16. Sidewalks. Sidewalks shall be installed per CDC 92.010(H), Sidewalks. The residential sidewalk width is six feet plus planter strip as specified below. Sidewalks in commercial zones shall be constructed per subsection (A)(3) of this section. See also subsection C of this section. Sidewalk width may be reduced with City Engineer approval to the minimum amount (e.g., four feet wide) necessary to respond to site constraints such as grades, mature trees, rock outcroppings, etc., or to match existing sidewalks or right-of-way limitations.

Applicant's Finding: The applicant proposes to install a 6-foot sidewalk plus planter strip along the both sides of Upper Midhill and Scenic within this property, per this standard.

The requirements of this section have been satisfied.

17. Planter strip. The planter strip is between the curb and sidewalk providing space for a grassed or landscaped area and street trees. The planter strip shall be at least 6 feet wide to accommodate a fully matured tree without the boughs interfering with pedestrians on the sidewalk or vehicles along the curbline. Planter strip width may be reduced or eliminated, with City Engineer approval, when it cannot

be corrected by site plan, to the minimum amount necessary to respond to site constraints such as grades, mature trees, rock outcroppings, etc., or in response to right-of-way limitations.

Applicant's Finding: The applicant proposes to install a minimum 6-foot planter strip between all proposed sidewalks and paved street sections on Upper Midhill. The Applicant proposes a curb-tight sidewalk configuration along the western edge of Scenic in order to reduce the intensity of grading and wall construction required adjacent to the site's neighboring single family homes.

The requirements of this section have been satisfied.

18. Streets and roads shall be dedicated without any reservations or restrictions.

Applicant's Finding: No reservations or restrictions are proposed with the street dedication.

The requirements of this section have been satisfied.

19. All lots in a subdivision shall have access to a public street. Lots created by partition may have access to a public street via an access easement pursuant to the standards and limitations set forth for such accessways in Chapter 48 CDC.

Applicant's Finding: All lots have direct access to a public street.

The requirements of this section have been satisfied.

20. Gated streets. Gated streets are prohibited in all residential areas on both public and private streets. A driveway to an individual home may be gated.

Applicant's Finding: Gated streets are not proposed.

The requirements of this section have been satisfied.

21. Entryway treatments and street isle design. When the applicant desires to construct certain walls, planters, and other architectural entryway treatments within a subdivision, the following standards shall apply:

a. All entryway treatments except islands shall be located on private property and not in the public right-of-way.

b. Planter islands may be allowed provided there is no structure (i.e., brick, signs, etc.) above the curbline, except for landscaping. Landscaped islands shall be set back a minimum of 24 feet from the curbline of the street to which they are perpendicular.

c. All islands shall be in public ownership. The minimum aisle width between the curb and center island curbs shall be 14 feet. Additional width may be required as determined by the City Engineer.

d. Brick or special material treatments are acceptable at intersections with the understanding that the City will not maintain these sections except with asphalt overlay, and that they must meet the

Americans with Disabilities Act (ADA) standards. They shall be laid out to tie into existing sidewalks at intersections.

e. Maintenance for any common areas and entryway treatments (including islands) shall be guaranteed through homeowners association agreements, CC&Rs, etc.

f. Under Chapter 52 CDC, subdivision monument signs shall not exceed 32 square feet in area.

Applicant's Finding: The applicant does not propose to construct entryway treatments to the subdivision at this time.

The requirements of this section have been satisfied.

22. Based upon the determination of the City Manager or the Manager's designee, the applicant shall construct or cause to be constructed, or contribute a proportionate share of the costs, for all necessary off-site improvements identified by the transportation analysis commissioned to address CDC 85.170(B)(2) that are required to mitigate impacts from the proposed subdivision. The proportionate share of the costs shall be determined by the City Manager or Manager's designee, who shall assume that the proposed subdivision provides improvements in rough proportion to identified impacts of the subdivision. Off-site transportation improvements will include bicycle and pedestrian improvements as identified in the adopted City of West Linn TSP.

Applicant's Finding: The submitted Transportation Impact Analysis includes the following mitigation measures:

- Construct an extension of Upper Midhill Road consistent with the City's local street standard.
- Shrubbery and landscaping near the internal intersections and site access points should be maintained to ensure adequate sight distance.
- Develop a cost estimate for the proposed improvements to the Arbor/highway 43 intersection in coordination with the City and ODOT staff and pay a proportionate share (estimated at 1.9 percent) of the total cost of the improvements.

The Applicant proposes to accomplish these mitigation measures with this subdivision project.

The requirements of this section have been satisfied.

B. Blocks and lots.

1. General. The length, width, and shape of blocks shall be designed with due regard for the provision of adequate building sites for the use contemplated; consideration of the need for traffic safety, convenience, access, circulation, and control; and recognition of limitations and opportunities of topography and solar access.

Applicant's Finding: The lot layout is based on due regard for the provision of adequate building sites; traffic safety, convenience, access, circulation and control; and the limitations and opportunities of topography and existing roadway network. The lots are generously sized to accommodate homes that are similar in nature to those in surrounding subdivisions. The

extensions of Upper Midhill Drive and Scenic Drive allow all traffic access from a local-classification street. The site is adjacent to the City's boundary to the north, east and west, limiting connectivity options. The lots are all deep in the north-south direction, thus enhancing solar access on the building sites.

The requirements of this section have been satisfied.

2. Sizes. The recommended block size is 400 feet in length to encourage greater connectivity within the subdivision. Blocks shall not exceed 800 feet in length between street lines, except for blocks adjacent to arterial streets or unless topographical conditions or the layout of adjacent streets justifies a variation. Designs of proposed intersections shall demonstrate adequate sight distances to the City Engineer's specifications. Block sizes and proposed accesses must be consistent with the adopted TSP.

Applicant's Finding: Though the site has topographic considerations as well as the location adjacent to the City limits, no block length exceeds 800 feet. Scenic Drive connects to Hillside Drive less than 800 feet from where it turns 90 degrees to connect with Upper Midhill Drive. Upper Midhill Drive connects to College View Drive less than 800 feet from where it turns 90 degrees to connect with Scenic Drive. The entire site is looped to enhance connectivity and meet the intent of the block length standards.

The requirements of this section have been satisfied.

3. Lot size and shape. Lot or parcel size, width, shape, and orientation shall be appropriate for the location of the subdivision or partition, for the type of use contemplated, for potential utilization of solar access, and for the protection of drainageways, trees, and other natural features. No lot or parcel shall be dimensioned to contain part of an existing or proposed street. All lots or parcels shall be buildable. "Buildable" describes lots that are free of constraints such as wetlands, drainageways, etc., that would make home construction impossible. Lot or parcel sizes shall not be less than the size required by the zoning code unless as allowed by planned unit development (PUD).
Depth and width of properties reserved or laid out for commercial and industrial purposes shall be adequate to provide for the off-street parking and service facilities required by the type of use proposed.

Chapter 14- Single-Family Residential Detached and Attached, R-4.5 standards are as follows:

Lot Size (Detached Dwelling Units)	**4,500 square feet**
Lot Size (Attached Dwelling Units)	**4,000 square feet**
Front Lot Line Length/Minimum Lot Width at Front Lot Line	**35 feet**
Average Minimum Lot Width	**35 feet**

Applicant's Finding: All proposed lots are a minimum of 4,500 square feet in size to accommodate single-family detached dwelling units. All 34 proposed lots exceed the minimum requirements for front lot line length, lot width and lot depth.

The requirements of this section have been satisfied.

4. Access. Access to subdivisions, partitions, and lots shall conform to the provisions of Chapter 48 CDC, Access, Egress and Circulation.

Applicant's Finding: Section 48.020.B states: "All lots shall have access from a public street or from a platted private street approved under the land division chapter." All proposed lots will have access from a public street.

The requirements of this section have been satisfied.

5. Double frontage lots and parcels. Double frontage lots and parcels have frontage on a street at the front and rear property lines. Double frontage lots and parcels shall be avoided except where they are essential to provide separation of residential development from arterial streets or adjacent non-residential activities, or to overcome specific disadvantages of topography and orientation. A planting screen or impact mitigation easement at least 10 feet wide, and across which there shall be no right of access, may be required along the line of building sites abutting such a traffic artery or other incompatible use.

Applicant's Finding: Due to the location of the Upper Midhill right-of-way and topography of the site, Lots 21 and 22 are double frontage. However, the tip of Upper Midhill, which will be the rear of these two lots, is a local street that will be providing access to other homes in the subdivision. No access restrictions are necessary. Two double-frontage lots were unavoidable to accommodate the topography, the need for connectivity, and the existing public street pattern.

The requirements of this section have been satisfied.

6. Lot and parcel side lines. The lines of lots and parcels, as far as is practicable, should run at right angles to the street upon which they face, except that on curved streets they should be radial to the curve.

Applicant's Finding: Though the shape of the subject site is somewhat irregular, all side lot lines run at approximate right angles to the streets upon which they face as far as practicable.

The requirements of this section have been satisfied.

7. Flag lots. Flag lots can be created where it can be shown that no other reasonable street access is possible to achieve the requested land division. A single flag lot shall have a minimum street frontage of 15 feet for its accessway. Where two to four flag lots share a common accessway, the minimum street frontage and accessway shall be eight feet in width per lot. Common accessways shall have mutual maintenance agreements and reciprocal access and utility easements. ***

Applicant's Finding: There are no flag lots proposed with this subdivision.

The requirements of this section have been satisfied.

8. Large lots or parcels. In dividing tracts into large lots or parcels which, at some future time, are likely to be redivided, the approval authority may:

a. require that the blocks be of such size and shape, and be so divided into building sites, and contain such easements and site restrictions as will provide for extension and opening of streets at intervals which will permit a subsequent division of any tract into lots or parcels of smaller size; or

b. alternately, in order to prevent further subdivision or partition of oversized and constrained lots or parcels, restrictions may be imposed on the subdivision or partition plat.

Applicant's Finding: Lot 5 is sized such that it could be redivided in the future; however, the location of the lot adjacent to Tract A and the width of the lot's frontage make redivision very unlikely. If redivision is proposed in the future, all requirements of the R-4.5 zone could be met while accommodating two parcels from lot 5.

The requirements of this section have been satisfied.

C. Pedestrian and bicycle trails.

1. Trails or multi-use pathways shall be installed, consistent and compatible with federal ADA requirements and with the Oregon Transportation Planning Rule, between subdivisions, cul-de-sacs, and streets that would otherwise not be connected by streets due to excessive grades, significant tree(s), and other constraints natural or manmade. Trails shall also accommodate bicycle or pedestrian traffic between neighborhoods and activity areas such as schools, libraries, parks, or commercial districts. Trails shall also be required where designated by the Parks Master Plan.

Applicant's Finding: The proposed extensions of Upper Midhill Drive and Scenic Drive include sidewalks and, therefore, additional trails or pedestrian connections are not required. There are no existing trail connections which require connection from this site.

The requirements of this section have been satisfied.

D. Transit facilities.

1. The applicant shall consult with Tri-Met and the City Engineer to determine the appropriate location of transit stops, bus pullouts, future bus routes, etc., contiguous to or within the development site. If transit service is planned to be provided within the next two years, then facilities such as pullouts shall be constructed per Tri-Met standards at the time of development. More elaborate facilities, like shelters, need only be built when service is existing or imminent. Additional rights-of-way may be required of developers to accommodate buses.

Applicant's Finding: Transit facilities have not been identified by Tri-Met or the City Development Engineer adjacent to this property.

The requirements of this section have been satisfied.

E. Grading. Grading of building sites shall conform to the following standards unless physical conditions demonstrate the propriety of other standards:

1. All cuts and fills shall comply with the excavation and grading provisions of the Uniform Building Code and the following:

   a. Cut slopes shall not exceed one and one-half feet horizontally to one foot vertically (i.e., 67 percent grade).

   b. Fill slopes shall not exceed two feet horizontally to one foot vertically (i.e., 50 percent grade). Please see the following illustration.***

2. The character of soil for fill and the characteristics of lot and parcels made usable by fill shall be suitable for the purpose intended.

3. If areas are to be graded (more than any four-foot cut or fill), compliance with CDC 85.170(C) is required.

4. The proposed grading shall be the minimum grading necessary to meet roadway standards, and to create appropriate building sites, considering maximum allowed driveway grades.

5. Type I lands shall require a report submitted by an engineering geologist, and Type I and Type II lands shall require a geologic hazard report.

6. Repealed by Ord. 1635.

7. On land with slopes in excess of 12 percent, cuts and fills shall be regulated as follows:

   a. Toes of cuts and fills shall be set back from the boundaries of separate private ownerships at least three feet, plus one-fifth of the vertical height of the cut or fill. Where an exception is required from that requirement, slope easements shall be provided.

   b. Cuts shall not remove the toe of any slope where a severe landslide or erosion hazard exists (as described in subsection (G)(5) of this section).

   c. Any structural fill shall be designed by a registered engineer in a manner consistent with the intent of this code and standard engineering practices, and certified by that engineer that the fill was constructed as designed.

   d. Retaining walls shall be constructed pursuant to Section 2308(b) of the Oregon State Structural Specialty Code.

   e. Roads shall be the minimum width necessary to provide safe vehicle access, minimize cut and fill, and provide positive drainage control.

   8. Land over 50 percent slope shall be developed only where density transfer is not feasible. The development will provide that:

   a. At least 70 percent of the site will remain free of structures or impervious surfaces.

   b. Emergency access can be provided.

   c. Design and construction of the project will not cause erosion or land slippage.

   d. Grading, stripping of vegetation, and changes in terrain are the minimum necessary to construct the development in accordance with subsection J of this section.

Applicant's Finding: A geotechnical engineering report is included with this submittal. A preliminary grading plan has been included in the submitted plans which complies with all criteria of this subsection. The Applicant has provided a plan which minimizes cuts and fills and reduces the need for significant retaining walls where possible.

The requirements of this section have been satisfied.

F. Water.

1. A plan for domestic water supply lines or related water service facilities shall be prepared consistent with the adopted Comprehensive Water System Plan, plan update, March 1987, and subsequent superseding revisions or updates.
2. Adequate location and sizing of the water lines.
3. Adequate looping system of water lines to enhance water quality.
4. For all non-single-family developments, there shall be a demonstration of adequate fire flow to serve the site.
5. A written statement, signed by the City Engineer, that water service can be made available to the site by the construction of on-site and off-site improvements and that such water service has sufficient volume and pressure to serve the proposed development's domestic, commercial, industrial, and fire flows.

Applicant's Finding: The applicant will connect all lots to public water per the submitted Composite Utility Plan, sheet C300. This plan is consistent with the adopted Comprehensive Water System Plan.

The requirements of this section have been satisfied.

G. Sewer.

1. A plan prepared by a licensed engineer shall show how the proposal is consistent with the Sanitary Sewer Master Plan (July 1989). Agreement with that plan must demonstrate how the sanitary sewer proposal will be accomplished and how it is gravity-efficient. The sewer system must be in the correct basin and should allow for full gravity service.
2. Sanitary sewer information will include plan view of the sanitary sewer lines, including manhole locations and depth or invert elevations.
3. Sanitary sewer lines shall be located in the public right-of-way, particularly the street, unless the applicant can demonstrate why the alternative location is necessary and meets accepted engineering standards.
4. Sanitary sewer line should be at a depth that can facilitate connection with down-system properties in an efficient manner.
5. The sanitary sewer line should be designed to minimize the amount of lineal feet in the system.
6. The sanitary sewer line shall avoid disturbance of wetland and drainageways. In those cases where that is unavoidable, disturbance shall be mitigated pursuant to Chapter 32 CDC, Water Resource Area Protection, all trees replaced, and proper permits obtained. Dual sewer lines may be required so the drainageway is not disturbed.
7. Sanitary sewer shall be extended or stubbed out to the next developable subdivision or a point in the street that allows for reasonable connection with adjacent or nearby properties.
8. The sanitary sewer system shall be built pursuant to DEQ, City, and Tri-City Service District sewer standards. The design of the sewer system should be prepared by a licensed engineer, and the applicant must be able to demonstrate the ability to satisfy these submittal requirements or standards at the pre-construction phase.
9. A written statement, signed by the City Engineer, that sanitary sewers with sufficient capacity to serve the proposed development and that adequate sewage treatment plant capacity is available to the City to serve the proposed development.

Applicant's Finding: The applicant will connect all lots to public sanitary sewer per the submitted Composite Utility Plan, Sheet C300. The proposed sanitary sewer system is consistent with the Sanitary Sewer Master Plan, is in the correct basin and allows for full gravity service.

The requirements of this section have been satisfied.

H. Storm

1. A stormwater quality and detention plan shall be submitted which complies with the submittal criteria and approval standards contained within Chapter 33 CDC. It shall include profiles of proposed drainageways with reference to the adopted Storm Drainage Master Plan.

2. Storm treatment and detention facilities shall be sized to accommodate a 25-year storm incident. A registered civil engineer shall prepare a plan and statement which shall be supported by factual data that clearly shows that there will be no adverse off-site impacts from increased intensity of runoff downstream or constriction causing ponding upstream. The plan and statement shall identify all on- or off-site impacts and measures to mitigate those impacts. The plan and statement shall, at a minimum, determine the off-site impacts from a 25-year storm.

3. Plans shall demonstrate how storm drainage will be collected from all impervious surfaces including roof drains. Storm drainage connections shall be provided to each dwelling unit/lot. The location, size, and type of material selected for the system shall correlate with the 25-year storm incident.

4. Treatment of storm runoff shall meet municipal code standards.

Applicant's Finding: The proposed stormwater treatment and detention has been designed to meet City standards, as detailed in the submitted stormwater report. The project will be served by a stormwater facility located at midpoint of the development in Tract C.

The requirements of this section have been satisfied.

I. Utility easements. Subdivisions and partitions shall establish utility easements to accommodate the required service providers as determined by the City Engineer. The developer of the subdivision shall make accommodation for cable television wire in all utility trenches and easements so that cable can fully serve the subdivision.

Applicant's Finding: The applicant will establish utility easements as determined by the City Engineer and shown on the preliminary plat.

The requirements of this section have been satisfied.

J. Supplemental provisions.

1. Wetland and natural drainageways. Wetlands and natural drainageways shall be protected as required by Chapter 32 CDC, Water Resource Area Protection. Utilities may be routed through the protected corridor as a last resort, but impact mitigation is required.

Applicant's Finding: There are two small wetlands on the site that will be removed and mitigated to accommodate the public roadway network. Given the minimum density requirements

and the need to grade and connect roadways on site, there is no alternative to routing utilities and roadways through the two wetlands. This is discussed further in response to the provisions of Chapter 32.

2. Willamette and Tualatin Greenways. The approval authority may require the dedication to the City or setting aside of greenways which will be open or accessible to the public. Except for trails or paths, such greenways will usually be left in a natural condition without improvements. Refer to Chapter 28 CDC for further information on the Willamette and Tualatin River Greenways.

Applicant's Finding: No greenways exist on this site or have been identified for dedication on this property. This property is not adjacent to the Willamette or Tualatin River and, therefore, a River Greenway is not feasible on this site.

The requirements of this section have been satisfied.

3. Street trees. Street trees are required as identified in the appropriate section of the municipal code and Chapter 54 CDC.

Applicant's Finding: Street trees will be installed as part of the public improvements with the development of this subdivision.

The requirements of this section have been satisfied.

4. Lighting. To reduce ambient light and glare, high or low pressure sodium light bulbs shall be required for all subdivision street or alley lights. The light shall be shielded so that the light is directed downwards rather than omni-directional.

Applicant's Finding: Any street light installation within the subdivision will utilize LED fixtures.

The requirements of this section have been satisfied.

5. Dedications and exactions. The City may require an applicant to dedicate land and/or construct a public improvement that provides a benefit to property or persons outside the property that is the subject of the application when the exaction is roughly proportional. No exaction shall be imposed unless supported by a determination that the exaction is roughly proportional to the impact of development.

Applicant's Finding: The applicant is proposing right-of-way dedication and improvements that are roughly proportional to the development of a 34-lot subdivision. The proposed improvements include, the creation and improvement of a local street network from which the proposed homes will take access, a new infrastructure system for the provision of urban services to the development, and a contribution of a proportionate share of the eventual improvements to the intersection improvements associated with Highway 43 and Arbor Drive.

The requirements of this section have been satisfied.

6. Underground utilities. All utilities, such as electrical, telephone, and television cable, that may at times be above ground or overhead shall be buried underground in the case of new development. The exception would be in those cases where the area is substantially built out and adjacent properties have above-ground utilities and where the development site's frontage is under 200 feet and the site is less than one acre. High voltage transmission lines, as classified by Portland General Electric or electric service provider, would also be exempted. Where adjacent future development is expected or imminent, conduits may be required at the direction of the City Engineer. All services shall be underground with the exception of standard above-grade equipment such as some meters, etc.

Applicant's Finding: All utilities will be installed in compliance with this section.

The requirements of this section have been satisfied.

7. Density requirement. Density shall occur at 70 percent or more of the maximum density allowed by the underlying zoning. These provisions would not apply when density is transferred from Type I and II lands as defined in CDC 02.030. Development of Type I or II lands are exempt from these provisions. Land divisions of three lots or less would also be exempt.

Applicant's Finding: The R-4.5 zone permits a maximum density of 9.68 dwelling units per net acre. Net acre is defined as "The total gross acres less the public right-of-way and other acreage deductions, as applicable". The net acreage of this site after removal of dedicated right-of way is 5.10 acres. At 9.68 dwelling units per net acre, the maximum number of dwelling units on this site is 49. The minimum density of this site is 70% of 49 units, or 34 units, which is the number of dwelling units proposed.

The requirements of this section have been satisfied.

8. Mix requirement. The "mix" rule means that developers shall have no more than 15 percent of the R-2.1 and R-3 development as single-family residential. The intent is that the majority of the site shall be developed as medium high density multi-family housing.

Applicant's Finding: This property is zoned R-4.5 and, therefore, the use of the parcel as an entirely residential development is permitted.

The requirements of this section have been satisfied.

9. Heritage trees/significant tree and tree cluster protection. All heritage trees, as defined in the Municipal Code, shall be saved. Diseased heritage trees, as determined by the City Arborist, may be removed at his/her direction. All non-heritage trees and clusters of trees (three or more trees with overlapping dripline; however, native oaks need not have an overlapping dripline) that are considered significant by virtue of their size, type, location, health, or numbers shall be saved pursuant to CDC

55.100(B)(2). Trees are defined per the municipal code as having a trunk six inches in diameter or 19 inches in circumference at a point five feet above the mean ground level at the base of the trunk.

Applicant's Finding: No heritage trees have been identified on this site. Tree preservation is discussed further in this report in Section 55.100.

The requirements of this section have been satisfied.

DIVISION 3. SUPPLEMENTAL PROVISIONS AND EXCEPTIONS

CHAPTER 32. WATER RESOURCE AREA PROTECTION

32.070 ALTERNATE REVIEW PROCESS

This section establishes a review and approval process that applicants can use when there is reason to believe that the width of the WRA prescribed under the standard process (CDC 32.060(D)) is larger than necessary to protect the functions of the water resource at a particular site. It allows a qualified professional to determine what water resources and associated functions (see Table 32-4 below) exist at a site and the WRA width that is needed to maintain those functions. (Ord. 1623 § 1, 2014)

32.080 APPROVAL CRITERIA (ALTERNATE REVIEW PROCESS)

Applications reviewed under the alternate review process shall meet the following approval criteria:

A. The proposed WRA shall be, at minimum, qualitatively equal, in terms of maintaining the level of functions allowed by the WRA standards of CDC 32.060(D).

B. If a WRA is already significantly degraded (e.g., native forest and ground cover have been removed or the site dominated by invasive plants, debris, or development), the approval authority may allow a reduced WRA in exchange for mitigation, if:

1. The proposed reduction in WRA width, coupled with the proposed mitigation, would result in better performance of functions than the standard WRA without such mitigation. The approval authority shall make this determination based on the applicant's proposed mitigation plan and a comparative analysis of ecological functions under existing and enhanced conditions (see Table 32-4).

2. The mitigation project shall include all of the following components as applicable. It may also include other forms of enhancement (mitigation) deemed appropriate by the approval authority.

a. Removal of invasive vegetation.

b. Planting native, non-invasive plants (at minimum, consistent with CDC 32.100) that provide improved filtration of sediment, excess nutrients, and pollutants. The amount of enhancement (mitigation) shall meet or exceed the standards of CDC 32.090(C).

c. Providing permanent improvements to the site hydrology that would improve water resource functions.

d. Substantial improvements to the aquatic and/or terrestrial habitat of the WRA.

C. Identify and discuss site design and methods of development as they relate to WRA functions.

D. Address the approval criteria of CDC 32.060, with the exception of CDC 32.060(D).

Applicant's Finding: The Applicant engaged Schott & Associates, Ecologists & Wetland Specialists to determine the size and location of the WRA area on the site. There are two areas of WRA on this site. The first WRA consists of two small wetlands located in the alignment of the public road right-of-way totaling 3,963 square feet; and the other is the ephemeral drainageway along the northwest property line. The ephemeral drainageway will not be affected by this development. The wetlands will be removed due to roadway construction; however, mitigation will be accomplished as identified below.

The requirements of this section have been satisfied.

32.090 MITIGATION PLAN

A A mitigation plan shall only be required if development is proposed within a WRA (including development of a PDA). (Exempted activities of CDC 32.040 do not require mitigation unless specifically stated. Temporarily disturbed areas, including TDAs associated with exempted activities, do not require mitigation, just grade and soil restoration and re-vegetation.) The mitigation plan shall satisfy all applicable provisions of CDC 32.100, Re-Vegetation Plan Requirements.

B. Mitigation shall take place in the following locations, according to the following priorities (subsections (B)(1) through (4) of this section):

1. On-site mitigation by restoring, creating or enhancing WRAs.

2. Off-site mitigation in the same sub-watershed will be allowed, but only if the applicant has demonstrated that:

a. It is not practicable to complete mitigation on-site, for example, there is not enough area on-site; and

b. The mitigation will provide equal or superior ecological function and value.

3. Off-site mitigation outside the sub-watershed will be allowed, but only if the applicant has demonstrated that:

a. It is not practicable to complete mitigation on-site, for example, there is not enough area on-site; and

b. The mitigation will provide equal or superior ecological function and value.

4. Purchasing mitigation credits though DSL or other acceptable mitigation bank.

C. Amount of mitigation.

1. The amount of mitigation shall be based on the square footage of the permanent disturbance area by the application. For every one square foot of non-PDA disturbed area, on-site mitigation shall require one square foot of WRA to be created, enhanced or restored.

2. For every one square foot of PDA that is disturbed, on-site mitigation shall require one half a square foot of WRA vegetation to be created, enhanced or restored.

3. For any off-site mitigation, including the use of DSL mitigation credits, the requirement shall be for every one square foot of WRA that is disturbed, two square feet of WRA shall be created, enhanced or restored. The DSL mitigation credits program or mitigation bank shall require a legitimate bid on the cost of on-site mitigation multiplied by two to arrive at the appropriate dollar amount.

D. The Planning Director may limit or define the scope of the mitigation plan and submittal requirements commensurate with the scale of the disturbance relative to the resource and pursuant to

the authority of Chapter 99 CDC. The Planning Director may determine that a consultant is required to complete all or a part of the mitigation plan requirements.

E. A mitigation plan shall contain the following information:

1. A list of all responsible parties including, but not limited to, the owner, applicant, contractor, or other persons responsible for work on the development site.

2. A map showing where the specific adverse impacts will occur and where the mitigation activities will occur.

3. A re-vegetation plan for the area(s) to be mitigated that meets the standards of CDC 32.100.

4. An implementation schedule, including timeline for construction, mitigation, mitigation maintenance, monitoring, and reporting. All in-stream work in fish bearing streams shall be done in accordance with the Oregon Department of Fish and Wildlife.

5. Assurances shall be established to rectify any mitigation actions that are not successful within the first three years. This may include bonding or other surety. (Ord. 1623 § 1, 2014)

Applicant's Finding:	Mitigation for the 3,963 square feet of wetland area is proposed off-site at a ratio of two square feet of mitigation per every one square foot of WRA removal. This 7,926 square feet of mitigation is proposed to be located within a City owned or a City sponsored property. The Applicant intends to work with the City's parks department to find a suitable location for the proposed mitigation. The subject property does not have a suitable WRA mitigation site located within the development. The requirements of this section have been satisfied.

CHAPTER 42. CLEAR VISION AREAS

42.020 CLEAR VISION AREAS REQUIRED, USES PROHIBITED

A. A clear vision area shall be maintained on the corners of all property adjacent to an intersection as provided by CDC 42.040 and 42.050.

B. A clear vision area shall contain no planting, fence, wall, structure or temporary or permanent obstruction (except for an occasional utility pole or tree) exceeding three feet in height, measured from the top of the curb, or, where no curb exists, from the street centerline grade, except that trees exceeding this height may be located in this area, provided all branches below eight feet are removed. (Ord. 1192, 1987)

42.030 EXCEPTIONS

The following described area in Willamette shall be exempt from the provisions of this chapter. The parcels of land zoned General Commercial which abut Willamette Falls Drive, located between 10th and 16th Streets. Beginning at the intersection of Willamette Falls Drive and 11th Street on 7th Avenue to 16th Street; on 16th Street to 9th Avenue; on 9th Avenue to 14th Street to the Tualatin River; following the Tualatin River and Willamette River to 12th Street; on 12th Street to 4th Avenue; on 4th Avenue to 11th Street; on 11th Street to Willamette Falls Drive. This described area does not include the northerly side of Willamette Falls Drive.

42.040 COMPUTATION; STREET AND ACCESSWAY 24 FEET OR MORE IN WIDTH

The clear vision area for all street intersections and street and accessway intersections (accessways having 24 feet or more in width) shall be that triangular area formed by the right-of-way or property

lines along such lots and a straight line joining the right-of-way or property line at points which are 30 feet distant from the intersection of the right-of-way line and measured along such lines.

42.050 COMPUTATION; ACCESSWAY LESS THAN 24 FEET IN WIDTH

The clear vision area for street and accessway intersections (accessways having less than 24 feet in width) shall be that triangular area whose base extends 30 feet along the street right-of-way line in both directions from the centerline of the accessway at the front setback line of a single-family and two-family residence, and 30 feet back from the property line on all other types of uses.

Applicant's Finding: All clear vision areas at the intersections of public streets with driveways or other public streets on the subject site will be free of plantings, fences, walls, structures and obstructions, meeting the requirements for clear vision areas.

The requirements of this section have been satisfied.

CHAPTER 44. FENCES

44.020 SIGHT-OBSCURING FENCE; SETBACK AND HEIGHT LIMITATIONS

A. A sight- or non-sight-obscuring fence may be located on the property line or in a yard setback area subject to the following:

1. The fence is located within:

a. A required front yard area, and it does not exceed three feet, except pillars and driveway entry features subject to the requirements of Chapter 42 CDC, Clear Vision Areas, and approval by the Planning Director;

b. A required side yard which abuts a street and it is within that portion of the side yard which is also part of the front yard setback area and it does not exceed three feet;

c. A required side yard which abuts a street and it is within that portion of the side yard which is not also a portion of the front yard setback area and it does not exceed six feet provided the provisions of Chapter 42 CDC are met;

d. A required rear yard which abuts a street and it does not exceed six feet; or

e. A required side yard area which does not abut a street or a rear yard and it does not exceed six feet.

Applicant's Finding: New fences are not indicated on the proposed plans because the exact locations have yet to be determined. All fences constructed as part of this subdivision will meet the requirements of these standards.

B. Fence or wall on a retaining wall. When a fence is built on a retaining wall or an artificial berm, the following standards shall apply:

1. When the retaining wall or artificial berm is 30 inches or less in height from finished grade, the maximum fence or wall height on top of the retaining wall shall be six feet.

2. When the retaining wall or earth berm is greater than 30 inches in height, the combined height of the retaining wall and fence or wall from finished grade shall not exceed eight and one-half feet.

3. Fences or walls located on top of retaining walls or earth berms in excess of 30 inches above finished grade may exceed the total allowed combined height of eight and one-half feet; provided, that the fence or wall is located a minimum of two feet from the retaining wall and the fence or wall height shall not exceed six feet.

Applicant's Finding: Any fences built on retaining walls will meet these standards.

The requirements of this section have been satisfied.

44.030 SCREENING OF OUTDOOR STORAGE

A. All service, repair, and storage activities carried on in connection with any commercial, business or industrial activity and not conducted within an enclosed building shall be screened from view of all adjacent properties and adjacent streets by a sight-obscuring fence.

B. The sight-obscuring fence shall be in accordance with provisions of Chapter 42 CDC, Clear Vision Areas, and shall be subject to the provisions of Chapter 55 CDC, Design Review.

Applicant's Finding: This site is residential and no service, repair, or storage activities in connection with commercial, business, or industry activities are proposed.

44.040 LANDSCAPING

Landscaping which is located on the fence line and which impairs sight vision shall not be located within the clear vision area as provided in Chapter 42 CDC.

44.050 STANDARDS FOR CONSTRUCTION

A. The structural side of the fence shall face the owner's property; and

B. The sides of the fence abutting adjoining properties and the street shall be maintained. (Ord. 1291, 1990

Applicant's Finding: Any fences built will meet these standards.

The requirements of this section have been satisfied.

CHAPTER 54. LANDSCAPING

54.020 APPROVAL CRITERIA

A. Every development proposal requires inventorying existing site conditions which include trees and landscaping. In designing the new project, every reasonable attempt should be made to preserve and protect existing trees and to incorporate them into the new landscape plan. Similarly, significant landscaping (e.g., bushes, shrubs) should be integrated. The rationale is that saving a 30-foot-tall mature tree helps maintain the continuity of the site, they are qualitatively superior to two or three two-inch caliper street trees, they provide immediate micro-climate benefits (e.g., shade), they soften views of the street, and they can increase the attractiveness, marketability, and value of the development.

Applicant's Finding: This subdivision application includes a tree inventory and preservation plan focused on maintaining significant trees and clusters. Roads, utilities, and lots have been carefully placed to allow the retention of as many trees as possible.

B. To encourage tree preservation, the parking requirement may be reduced by one space for every significant tree that is preserved in the parking lot area for a maximum reduction of 10 percent of the required parking. The City Parks Supervisor or Arborist shall determine the significance of the tree and/or landscaping to determine eligibility for these reductions.

Applicant's Finding: No parking areas, aside from driveways, are required for residential subdivisions. No parking reduction is requested.

C. Developers must also comply with the municipal code chapter on tree protection.

Applicant's Finding: The developer will comply with all municipal code requirements for tree protection.

D. Heritage trees. Heritage trees are trees which, because of their age, type, notability, or historical association, are of special importance. Heritage trees are trees designated by the City Council following review of a nomination. A heritage tree may not be removed without a public hearing at least 30 days prior to the proposed date of removal. Development proposals involving land with heritage tree(s) shall be required to protect and save the tree(s). Further discussion of heritage trees is found in the municipal code.

Applicant's Finding: No heritage trees have been identified on this site.

The requirements of this section have been satisfied.

E. (Not applicable to single-family residential)

F. Landscaping (trees) in new subdivision.

1. Street trees shall be planted by the City within the planting strips (minimum six-foot width) of any new subdivision in conformity with the street tree plan for the area, and in accordance with the planting specifications of the Parks and Recreation Department. All trees shall be planted during the first planting season after occupancy. In selecting types of trees, the City Arborist may determine the appropriateness of the trees to local conditions and whether that tree has been overplanted, and whether alternate species should be selected. Also see subsection (C) of this section.

2. The cost of street trees shall be paid by the developer of the subdivision.

3. The fee per street tree, as established by the City, shall be based upon the following:

a. The cost of the tree;

b. Labor and equipment for original placement;

c. Regular maintenance necessary for tree establishment during the initial two-year period following the City schedule of maintenance; and

d. A two-year replacement warranty based on the City's established failure rate. (Ord. 1408, 1998; Ord. 1463, 2000)

Applicant's Finding: The applicant will pay for the installation of street trees by the City and maintain the trees for the two-year establishment period.

The requirements of this section have been satisfied.

54.030 PLANTING STRIPS FOR MODIFIED AND NEW STREETS

All proposed changes in width in a public street right-of-way or any proposed street improvement shall, where feasible, include allowances for planting strips. Plans and specifications for planting such areas shall be integrated into the general plan of street improvements. This chapter requires any multi-family, commercial, or public facility which causes change in public right-of-way or street improvement to comply with the street tree planting plan and standards.

Applicant's Finding: Minimum width 6-foot-wide planting strips will be installed between the sidewalk and the asphalt within the right-of-way of Bland Circle and Tannler Drive.

The requirements of this section have been satisfied.

54.040 INSTALLATION

A. All landscaping shall be installed according to accepted planting procedures.

B. The soil and plant materials shall be of good quality.

C. Landscaping shall be installed in accordance with the provisions of this code.

D. Certificates of occupancy shall not be issued unless the landscaping requirements have been met or other arrangements have been made and approved by the City such as the posting of a bond.

Applicant's Finding: All landscaping installation will meet the requirements of this section.

The requirements of this section have been satisfied.

54.050 PROTECTION OF STREET TREES

Street trees may not be topped or trimmed unless approval is granted by the Parks Supervisor or, in emergency cases, when a tree imminently threatens power lines.

Applicant's Finding: There are no existing street trees adjacent to this property.

The requirements of this section have been satisfied.

54.060 MAINTENANCE

A. The owner, tenant and their agent, if any, shall be jointly and severally responsible for the maintenance of all landscaping which shall be maintained in good condition so as to present a healthy, neat, and orderly appearance and shall be kept free from refuse and debris.

B. All plant growth in interior landscaped areas shall be controlled by pruning, trimming, or otherwise so that:

1. **It will not interfere with the maintenance or repair of any public utility;**
2. **It will not restrict pedestrian or vehicular access; and**
3. **It will not constitute a traffic hazard because of reduced visibility.**

Applicant's Finding: The owners of this property, including future homeowners, will be responsible for maintenance of landscaping.

The requirements of this section have been satisfied.

54.070 SPECIFICATION SUMMARY

*****25% of residential/multi-family site must be landscaped.**

Applicant's Finding: A minimum of 25% of this site will be landscaped as part of the yards of future homes.

The requirements of this section have been satisfied.

DIVISION 4. DESIGN REVIEW

CHAPTER 55. DESIGN REVIEW

55.100 APPROVAL STANDARDS - CLASS II DESIGN REVIEW

B. Relationship to the natural and physical environment.

1. The buildings and other site elements shall be designed and located so that all heritage trees, as defined in the municipal code, shall be saved. Diseased heritage trees, as determined by the City Arborist, may be removed at his/her direction.

Applicant's Finding: No heritage trees were identified on this site.

The requirements of this section have been satisfied.

2. All heritage trees, as defined in the municipal code, all trees and clusters of trees ("cluster" is defined as three or more trees with overlapping driplines; however, native oaks need not have an overlapping dripline) that are considered significant by the City Arborist, either individually or in consultation with certified arborists or similarly qualified professionals, based on accepted arboricultural standards including consideration of their size, type, location, health, long term survivability, and/or numbers, shall be protected pursuant to the criteria of subsections (B)(2)(a) through (f) of this section. In cases where there is a difference of opinion on the significance of a tree or tree cluster, the City Arborist's

findings shall prevail. It is important to acknowledge that all trees are not significant and, further, that this code section will not necessarily protect all trees deemed significant.

Applicant's Finding: The findings of subsections (B)(2)(a) through (f) are found below.

The requirements of this section have been satisfied.

a. Non-residential and residential projects on Type I and II lands shall protect all heritage trees and all significant trees and tree clusters by either the dedication of these areas or establishing tree conservation easements. Development of Type I and II lands shall require the careful layout of streets, driveways, building pads, lots, and utilities to avoid heritage trees and significant trees and tree clusters, and other natural resources pursuant to this code. The method for delineating the protected trees or tree clusters ("dripline + 10 feet") is explained in subsection (B)(2)(b) of this section. Exemptions of subsections (B)(2)(c), (e), and (f) of this section shall apply.

Applicant's Finding: This site is not classified as Type I or Type II and, therefore, this standard is not applicable to the vast majority of the property. The Applicant has submitted a slope analysis showing the slopes present on the site. A very small portion of type I and Type II lands exist on the property however these areas fall within a portion of the site which is located adjacent to a Water Quality Resource. These areas will not be developed at the time of site construction and tree protection within these areas will be achieved.

The requirements of this section have been satisfied.

b. Non-residential and residential projects on non-Type I and II lands shall set aside up to 20 percent of the area to protect trees and tree clusters that are determined to be significant, plus any heritage trees. Therefore, in the event that the City Arborist determines that a significant tree cluster exists at a development site, then up to 20 percent of the non-Type I and II lands shall be devoted to the protection of those trees, either by dedication or easement. The exact percentage is determined by establishing the driplines of the trees or tree clusters that are to be protected. In order to protect the roots which typically extend further, an additional 10-foot measurement beyond the dripline shall be added. The square footage of the area inside this "dripline plus 10 feet" measurement shall be the basis for calculating the percentage (see figure below). The City Arborist will identify which tree(s) are to be protected. Development of non-Type I and II lands shall also require the careful layout of streets, driveways, building pads, lots, and utilities to avoid significant trees, tree clusters, heritage trees, and other natural resources pursuant to this code. Exemptions of subsections (B)(2)(c), (e), and (f) of this section shall apply. Please note that in the event that more than 20 percent of the non-Type I and II lands comprise significant trees or tree clusters, the developer shall not be required to save the excess trees, but is encouraged to do so.

Applicant's Finding: The proposed subdivision is located on non-Type I and II lands. Streets, driveways, building pads, lots and utilities have been carefully laid out so as to avoid significant trees and clusters with particular attention to the vegetation around the boundary of the site. The site plan's concept includes deeper than necessary lots around the boundary with the specific goal of retaining a buffer of trees between this site and the neighboring, developed properties. Every reasonable effort has been made to retain trees as they enhance the value of the properties for the developer and the future homeowners. The applicant has inventoried all trees on site and has consulted with the City's arborist to determine which trees on site are significant. The

applicant is proposing tree preservation consistent with these requirements, as detailed in the tree plan.

There are a total of 169 trees identified as significant on this site. The significant tree canopy area on site totals 238,212 square feet or 5.4 acres. Of these trees, 50 significant trees will be retained through the site development and homebuilding process. A total of 77,863 square feet of significant canopy will be retained or 1.7 acres. The proposed retention represents 33 percent of the site's existing canopy. In addition to the trees determined to be significant, 62 additional non-significant trees have been proposed for retention. The retention of these trees has been made possible through the Applicant's careful placement of streets, driveways, building pads, lots and utilities throughout the project site. With larger than required back yards and purposeful placement of utilities, the site's preservation requirement of 20% of the significant tree canopy has been met and exceeded.

The requirements of this section have been satisfied.

c. Where stubouts of streets occur on abutting properties, and the extension of those streets will mean the loss of significant trees, tree clusters, or heritage trees, it is understood that tree loss may be inevitable. In these cases, the objective shall be to minimize tree loss. These provisions shall also apply in those cases where access, per construction code standards, to a lot or parcel is blocked by a row or screen of significant trees or tree clusters.

Applicant's Finding: No street stub outs are proposed on abutting properties.

The requirements of this section have been satisfied.

d. For both non-residential and residential development, the layout shall achieve at least 70 percent of maximum density for the developable net area. The developable net area excludes all Type I and II lands and up to 20 percent of the remainder of the site for the purpose of protection of stands or clusters of trees as defined in subsection (B)(2) of this section.

Applicant's Finding: The R-4.5 zone permits a maximum density of 9.68 dwelling units per net acre. Net acre is defined as "The total gross acres less the public right-of-way and other acreage deductions, as applicable". The net acreage of this site after removal of dedicated right-of way is 5.10 acres. At 9.68 dwelling units per net acre, the maximum number of dwelling units on this site is 49. The minimum density of this site is 70% of 49 units, or 34 units, which is the number of dwelling units proposed.

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The requirements of this section have been satisfied.

e. For arterial and collector street projects, including Oregon Department of Transportation street improvements, the roads and graded areas shall avoid tree clusters where possible. Significant trees, tree clusters, and heritage tree loss may occur, however, but shall be minimized.

Applicant's Finding: No arterial or collector street projects are included with this development application.

The requirements of this section have been satisfied.

f. If the protection of significant tree(s) or tree clusters is to occur in an area of grading that is necessary for the development of street grades, per City construction codes, which will result in an adjustment in the grade of over or under two feet, which will then threaten the health of the tree(s), the applicant will submit evidence to the Planning Director that all reasonable alternative grading plans have been considered and cannot work. The applicant will then submit a mitigation plan to the City Arborist to compensate for the removal of the tree(s) on an "inch by inch" basis (e.g., a 48-inch Douglas fir could be replaced by 12 trees, each four-inch). The mix of tree sizes and types shall be approved by the City Arborist.

Applicant's Finding:

19 significant trees with a total DBH of 434 inches are proposed for removal due to street construction. The Applicant is proposing to mitigate for the removal of 434 inches of DBH by planting street trees and landscape trees on the project site. The remaining trees which are not able to be planted on site will be mitigated for either in off-site plantings in a location chosen by the City's arborist or the Applicant will pay a fee in lieu to the City for trees which cannot be planted on site.

The requirements of this section have been satisfied.

DIVISION 8. LAND DIVISIONS

CHAPTER 92. REQUIRED IMPROVEMENTS

92.010 PUBLIC IMPROVEMENTS FOR ALL DEVELOPMENT

The following improvements shall be installed at the expense of the developer and meet all City codes and standards:

A. Streets within subdivisions.

1. All streets within a subdivision, including alleys, shall be graded for the full right-of-way width and improved to the City's permanent improvement standards and specifications which include sidewalks and bicycle lanes, unless the decision-making authority makes the following findings:

a. The right-of-way cannot be reasonably improved in a manner consistent with City road standards or City standards for the protection of wetlands and natural drainageways.

b. The right-of-way does not provide a link in a continuous pattern of connected local streets, or, if it does provide such a link, that an alternative street link already exists or the applicant has proposed an alternative street which provides the necessary connectivity, or the applicant has proven that there is no feasible location on the property for an alternative street providing the link.

2. When the decision-making authority makes these findings, the decision-making authority may impose any of the following conditions of approval:

a. A condition that the applicant initiate vacation proceedings for all or part of the right-of-way.

b. A condition that the applicant build a trail, bicycle path, or other appropriate way.

If the applicant initiates vacation proceedings pursuant to subsection (A)(2)(a) of this section, and the right-of-way cannot be vacated because of opposition from adjacent property owners, the City Council shall consider and decide whether to process a City-initiated street vacation pursuant to Chapter 271 ORS.

Construction staging area shall be established and approved by the City Engineer. Clearing, grubbing, and grading for a development shall be confined to areas that have been granted approval in the land use approval process only. Clearing, grubbing, and grading outside of land use approved areas can only be approved through a land use approval modification and/or an approved Building Department grading permit for survey purposes. Catch basins shall be installed and connected to pipe lines leading to storm sewers or drainageways.

B. Extension of streets to subdivisions. The extension of subdivision streets to the intercepting paving line of existing streets with which subdivision streets intersect shall be graded for the full right-of-way width and improved to a minimum street structural section and width of 24 feet.

C. Local and minor collector streets within the rights-of-way abutting a subdivision shall be graded for the full right-of-way width and approved to the City's permanent improvement standards and specifications. The City Engineer shall review the need for street improvements and shall specify whether full street or partial street improvements shall be required. The City Engineer shall also specify the extent of storm drainage improvements required. The City Engineer shall be guided by the purpose of the City's systems development charge program in determining the extent of improvements which are the responsibility of the subdivider.

D. Monuments. Upon completion of the first pavement lift of all street improvements, monuments shall be installed and/or reestablished at every street intersection and all points of curvature and points of tangency of street centerlines with an iron survey control rod. Elevation benchmarks shall be established at each street intersection monument with a cap (in a monument box) with elevations to a U.S. Geological Survey datum that exceeds a distance of 800 feet from an existing benchmark.

E. Surface drainage and storm sewer system. A registered civil engineer shall prepare a plan and statement which shall be supported by factual data that clearly shows that there will be no adverse impacts from increased intensity of runoff off site of a 100-year storm, or the plan and statement shall identify all off-site impacts and measures to mitigate those impacts commensurate to the particular land use application. Mitigation measures shall maintain pre-existing levels and meet buildout volumes, and meet planning and engineering requirements.

F. Sanitary sewers. Sanitary sewers shall be installed to City standards to serve the subdivision and to connect the subdivision to existing mains.

1. If the area outside the subdivision to be directly served by the sewer line has reached a state of development to justify sewer installation at the time, the Planning Commission may recommend to the City Council construction as an assessment project with such arrangement with the subdivider as is desirable to assure financing his share of the construction.

2. If the installation is not made as an assessment project, the City may reimburse the subdivider an amount estimated to be a proportionate share of the cost for each connection made to the sewer by property owners outside of the subdivision for a period of 10 years from the time of

installation of the sewers. The actual amount shall be determined by the City Administrator considering current construction costs.

G. Water system. Water lines with valves and fire hydrants providing service to each building site in the subdivision and connecting the subdivision to City mains shall be installed. Prior to starting building construction, the design shall take into account provisions for extension beyond the subdivision and to adequately grid the City system. Hydrant spacing is to be based on accessible area served according to the City Engineer's recommendations and City standards. If required water mains will directly serve property outside the subdivision, the City may reimburse the developer an amount estimated to be the proportionate share of the cost for each connection made to the water mains by property owners outside the subdivision for a period of 10 years from the time of installation of the mains. If oversizing of water mains is required to areas outside the subdivision as a general improvement, but to which no new connections can be identified, the City may reimburse the developer that proportionate share of the cost for oversizing. The actual amount and reimbursement method shall be as determined by the City Administrator considering current or actual construction costs.

H. Sidewalks.

1. Sidewalks shall be installed on both sides of a public street and in any special pedestrian way within the subdivision, except that in the case of primary or secondary arterials, or special type industrial districts, or special site conditions, the Planning Commission may approve a subdivision without sidewalks if alternate pedestrian routes are available.

In the case of the double-frontage lots, provision of sidewalks along the frontage not used for access shall be the responsibility of the developer. Providing front and side yard sidewalks shall be the responsibility of the land owner at the time a request for a building permit is received. Additionally, deed restrictions and CC&Rs shall reflect that sidewalks are to be installed prior to occupancy and it is the responsibility of the lot or homeowner to provide the sidewalk, except as required above for double-frontage lots.

2. On local streets serving only single-family dwellings, sidewalks may be constructed during home construction, but a letter of credit shall be required from the developer to ensure construction of all missing sidewalk segments within four years of final plat approval pursuant to CDC 91.010(A)(2).

3. The sidewalks shall measure at least six feet in width and be separated from the curb by a six-foot minimum width planter strip. Reductions in widths to preserve trees or other topographic features, inadequate right-of-way, or constraints, may be permitted if approved by the City Engineer in consultation with the Planning Director.

4. Sidewalks should be buffered from the roadway on high volume arterials or collectors by landscape strip or berm of three and one-half-foot minimum width.

5. The City Engineer may allow the installation of sidewalks on one side of any street only if the City Engineer finds that the presence of any of the factors listed below justifies such waiver:

a. The street has, or is projected to have, very low volume traffic density;

b. The street is a dead-end street;

c. The housing along the street is very low density; or

d. The street contains exceptional topographic conditions such as steep slopes, unstable soils, or other similar conditions making the location of a sidewalk undesirable.

I. Bicycle routes. If appropriate to the extension of a system of bicycle routes, existing or planned, the Planning Commission may require the installation of separate bicycle lanes within streets and separate bicycle paths.

J. Street name signs. All street name signs and traffic control devices for the initial signing of the new development shall be installed by the City with sign and installation costs paid by the developer.

K. Dead-end street signs. Signs indicating "future roadway" shall be installed at the end of all discontinued streets. Signs shall be installed by the City per City standards, with sign and installation costs paid by the developer.

L. Signs indicating future use shall be installed on land dedicated for public facilities (e.g., parks, water reservoir, fire halls, etc.). Sign and installation costs shall be paid by the developer.

M. Street lights. Street lights shall be installed and shall be served from an underground source of supply. The street lighting shall meet IES lighting standards. The street lights shall be the shoe-box style light (flat lens) with a 30-foot bronze pole in residential (non-intersection) areas. The street light shall be the cobra head style (drop lens) with an approximate 50-foot (sized for intersection width) bronze pole. The developer shall submit to the City Engineer for approval of any alternate residential, commercial, and industrial lighting, and alternate lighting fixture design. The developer and/or homeowners association is required to pay for all expenses related to street light energy and maintenance costs until annexed into the City.

N. Utilities. The developer shall make necessary arrangements with utility companies or other persons or corporations affected for the installation of underground lines and facilities. Electrical lines and other wires, including but not limited to communication, street lighting, and cable television, shall be placed underground.

O. Curb cuts and driveways. Curb cuts and driveway installations are not required of the subdivider at the time of street construction, but, if installed, shall be according to City standards. Proper curb cuts and hard-surfaced driveways shall be required at the time buildings are constructed.

P. Street trees. Street trees shall be provided by the City Parks and Recreation Department in accordance with standards as adopted by the City in the Municipal Code. The fee charged the subdivider for providing and maintaining these trees shall be set by resolution of the City Council.

Q. Joint mailbox facilities shall be provided in all residential subdivisions, with each joint mailbox serving at least two, but no more than eight, dwelling units. Joint mailbox structures shall be placed in the street right-of-way adjacent to roadway curbs. Proposed locations of joint mailboxes shall be designated on a copy of the tentative plan of the subdivision, and shall be approved as part of the tentative plan approval. In addition, sketch plans for the joint mailbox structures to be used shall be submitted and approved by the City Engineer prior to final plat approval. (Ord. 1180, 1986; Ord. 1192, 1987; Ord. 1287, 1990; Ord. 1321, 1992; Ord. 1339, 1993; Ord. 1401, 1997; Ord. 1408, 1998; Ord. 1442, 1999)

Applicant's Finding:	All improvements will be installed per the submitted plans and in conformance with the requirements of this title.

The requirements of this section have been satisfied.

92.030 IMPROVEMENT PROCEDURES

In addition to other requirements, improvements installed by the developer, either as a requirement of these regulations or at the developer's own option, shall conform to the requirements of this title and permanent improvement standards and specifications adopted by the City and shall be installed in accordance with the following procedure:

A. Improvement work shall not be commenced until plans have been checked for adequacy and approved by the City. To the extent necessary for evaluation of the proposal, the improvement plans may be required before approval of the tentative plan of a subdivision or partition. Plans shall be prepared in accordance with the requirements of the City.

B. Improvement work shall not be commenced until the City has been notified in advance, and if work has been discontinued for any reason, it shall not be resumed until the City has been notified.

C. Improvements shall be constructed under the Engineer. The City may require changes in typical sections and details in the public interest if unusual conditions arise during construction to warrant the change.

D. All underground utilities, sanitary sewers, and storm drains installed in streets by the subdivider or by any utility company shall be constructed prior to the surfacing of the streets. Stubs for service connections for underground utilities and sanitary sewers shall be placed to a length obviating the necessity for disturbing the street improvements when service connections are made.

E. A digital and mylar map showing all public improvements as built shall be filed with the City Engineer upon completion of the improvements. (Ord. 1408, 1998)

Applicant's Finding: All improvements will be installed in conformance with the requirements of this title.

The requirements of this section have been satisfied.

DIVISION 9. ADMINISTRATIVE PROCEDURES
CHAPTER 99 PROCEDURES FOR DECISION MAKING: QUASI-JUDICIAL

99.030 APPLICATION PROCESS: WHO MAY APPLY, PRE-APPLICATION CONFERENCE, REQUIREMENTS, REFUSAL OF APPLICATION, FEES

A. <u>Who may apply</u>.

1. Applications for approval required under this chapter may be initiated by:

a. The owner of the property that is the subject of the application or the owner's duly authorized representative;

b. The purchaser of such property who submits a duly executed written contract or copy thereof, which has been recorded with the Clackamas Clerk;

c. A lessee in possession of such property who submits written consent of the owner to make such application; or

d. Motion by the Planning Commission or City Council.

2. Any person authorized by this chapter to submit an application for approval may be represented by an agent who is authorized in writing by such a person to make the application.

Applicant's Finding: The owner of the property is initiating this application for approval.

The requirements of this section have been satisfied.

B. Pre-application conferences.

1. Subject to subsection (B)(4) of this section, a pre-application conference is required for, but not limited to, ***l. land divisions.

Applicant's Finding: A pre-application meeting was held September 3, 2015.

The requirements of this section have been satisfied.

C. The requirements for making an application.

1. The application shall be made on forms provided by the Director as provided by CDC 99.040(A)(1);

2. The application shall be complete and shall contain the information requested on the form, shall address the appropriate submittal requirements and approval criteria in sufficient detail for review and action, and shall be accompanied by the deposit or fee required by CDC 99.033. No application will be accepted if not accompanied by the required fee or deposit. In the event an additional deposit is required by CDC 99.033 and not provided within the time required, the application shall be rejected without further processing or deliberation and all application materials shall be returned to the applicant, notwithstanding any determination of completeness. (Ord. 1527, 2005; Ord. 1568, 2008; Ord. 1590 § 1, 2009; Ord. 1599 § 6, 2011)

Applicant's Finding: This application has been made on forms provided by the City's Planning Department. The application contains the necessary information and the required fee.

The requirements of this section have been satisfied.

99.033 FEES

The Council shall adopt a schedule of fees reasonably calculated to defray the expenses of the administrative process. The Council may establish either a set fee or a deposit system in which the applicant pays a deposit and the City determines the total administrative cost at the end of the process and refunds any unused amount of the deposit to the applicant. No additional deposit shall be required for additional costs that are incurred because the matter is referred to or called up by a higher decision-making authority. The Council shall charge no fees for City-initiated land use applications or appeals filed by a recognized neighborhood association pursuant to the provisions of CDC 99.240. (Ord. 1527, 2005; Ord. 1568, 2008; Ord. 1604 § 70, 2011)

Applicant's Finding: The required fee was submitted with the land use application. The requirements of this section have been satisfied.

99.038 NEIGHBORHOOD CONTACT REQUIRED FOR CERTAIN APPLICATIONS

Prior to submittal of an application for any subdivision, conditional use permit, multi-family project, planned unit development of four or more lots, non-residential buildings of over 1,500 square feet, or a zone change that requires a Comprehensive Plan amendment, the applicant shall contact and discuss the proposed development with any affected neighborhood as provided in this section. Although not required for other or smaller projects, contact with neighbors is highly recommended. The Planning Director may require neighborhood contact pursuant to this section prior to the filing of an application for any other development permit if the Director deems neighborhood contact to be beneficial.

A. Purpose. The purpose of neighborhood contact is to identify potential issues or conflicts regarding a proposed application so that they may be addressed prior to filing. This contact is intended to result in a better application and to expedite and lessen the expense of the review process by avoiding needless delays, appeals, remands, or denials. The City expects an applicant to take the reasonable concerns and recommendations of the neighborhood into consideration when preparing an application. The City expects the neighborhood association to work with the applicant to provide such input.

B. The applicant shall contact by letter all recognized neighborhood associations whose boundaries contain all or part of the site of the proposed development and all property owners within 500 feet of the site.

C. The letter shall be sent by to the president of the neighborhood association, and to one designee as submitted to the City by the neighborhood association, and shall be sent by regular mail to the other officers of the association and the property owners within 500 feet. If another neighborhood association boundary is located within the 500-foot notice radius, the letter shall be sent to that association's president, and to one designee as submitted to the City by the neighborhood association as well. The letter shall briefly describe the nature and location of the proposed development, and invite the association and interested persons to a meeting to discuss the proposal in more detail. The meeting shall be scheduled at the association's regularly scheduled monthly meeting, or at another time at the discretion of the association, and not less than 20 days from the date of mailing of the notice. If the meeting is scheduled as part of the association's regular monthly meeting, the letter shall explain that the proposal may not be the only topic of discussion on the meeting agenda. The letter shall encourage concerned citizens to contact their association president, or their association designee, with any questions that they may want to relay to the applicant.

Neighborhood contact shall be initiated by the applicant by mailing the association president, and to one designee as submitted to the City by the neighborhood association, a letter, return receipt requested, formally requesting, within 60 days, a date and location to have their required neighborhood meeting. The 60 days shall be calculated from the date that the applicant mails this letter to the association. If the neighborhood association does not want to meet within the 60-day timeframe, or if there is no neighborhood association, the applicant may hold a public meeting during the evening after 6:00 p.m., or on the weekend no less than 20 days from the date of mailing of the notice. All meetings shall be held at a location open to the public within the boundaries of the association or at a public facility within the City of West Linn. If the meeting is held at a business, it shall be posted at the time of the meeting as the meeting place and shall note that the meeting is open to the public and all interested persons may attend.

D. On the same date the letters described in subsections A through C of this section are mailed, the applicant shall provide and post notice on the property subject to the proposed application. The notice shall be posted at a location visible from the public right-of-way. If the site is not located adjacent to a

through street, then an additional sign shall be posted on the nearest through street. The sign notice shall be at least 11 inches by 17 inches in size on durable material and in clear, legible writing. The notice shall state that the site may be subject to a proposed development (e.g., subdivision, variance, conditional use) and shall set forth the name of the applicant and a telephone number where the applicant can be reached for additional information. The site shall remain posted until the conclusion of the meeting.

E. An application shall not be accepted as complete unless and until the applicant demonstrates compliance with this section by including with the application:

1. A copy of the certified letter to the neighborhood association with a copy of return receipt;

2. A copy of the letter to officers of the association and to property owners within 500 feet, including an affidavit of mailing and a copy of the mailing list containing the names and addresses of such owners and residents;

3. A copy of the required posted notice, along with an affidavit of posting;

4. A copy of the minutes of the meetings, produced by the neighborhood association, which shall include a record of any verbal comments received, and copies of any written comments from property owners, residents, and neighborhood association members. If there are no minutes, the applicant may provide a summary of the meeting comments. The applicant shall also send a copy of the summary to the chair of the neighborhood association. The chair shall be allowed to supplement the summary with any additional comments regarding the content of the meeting, as long as such comments are filed before the record is closed;

5. An audiotape of the meeting; and

6. In the event that it is discovered by staff that the aforementioned procedures of this section were not followed, or that a review of the audio tape and meeting minutes show the applicant has made a material misrepresentation of the project at the neighborhood meeting, the application shall be deemed incomplete until the applicant demonstrates compliance with this section. (Ord. 1425, 1998; Ord. 1474, 2001; Ord. 1568, 2008; Ord. 1590 § 1, 2009)

Applicant's Finding:

This section requires the applicant to contact and discuss the proposed development with any affected neighborhood as provided in this section.

A meeting was held with the Robinwood and Skyline Ridge Neighborhood Associations on August 11, 2015. The meeting was scheduled and noticed per the requirements of this section, and the required neighborhood meeting documentation is submitted with this application. The applicant provided renderings and information regarding the proposed subdivision and answered all questions asked by the members of the neighborhood association.

The requirements of this section have been satisfied.

SUMMARY AND CONCLUSION

Based upon the materials submitted herein, the Applicant respectfully requests that the City's Planning Commission approve this 34-lot subdivision and water resource area permit.

City of West Linn

PRE-APPLICATION CONFERENCE MEETING
SUMMARY NOTES

September 3, 2015

SUBJECT: Application for a 34 lot subdivision and a Water Resource Area (WRA) permit at 1800 Upper Midhill Drive.

FILE: PA-15-33

ATTENDEES: Applicants: Ryan Zygar, Andrew Tull, Aaron Murphy, David Noren
Staff: Peter Spir (Planning), Khoi Le (Engineering)
ODOT: Avi Tayar, Joshua Brooking
Public: Kevin Bryck, Dorianne Palmer

The following is a summary of the meeting discussion provided to you from staff meeting notes. Additional information may be provided to address any "follow-up" items identified during the meeting. These comments are PRELIMINARY in nature. Please contact the Planning Department with any questions regarding approval criteria, submittal requirements, or any other planning-related items. Please note disclaimer statement below.

SITE INFORMATION:

Site Address:	1800 Upper Midhill Drive (21E14CA tax lot 200)
Site Area:	266,726 square feet
Neighborhood:	Robinwood NA
Comp. Plan:	Medium density residential
Zoning:	R-4.5 (Single Family Residential Attached and Detached/Duplex / 4,500 square foot minimum lot size for detached homes)
Applicable code:	CDC Chapter 32: Water Resource Area (WRA) permit CDC Chapter 85: Land Division CDC Chapter 14: R-4.5

PROJECT DETAILS:

The site comprises a tree covered hillside that slopes down from west to east at a fairly constant 14 percent. There are some small isolated wetlands at the north end of the site as well as a potential ephemeral stream along the north property line.

The proposal is to develop a 34 lot subdivision with all lots over 4,500 square feet. Two existing street right of ways (ROW): Upper Midhill and Hillside Drive will be connected to access the lots. Issues raised included the disposition of an unused section of Upper Midhill Drive ROW and the appropriateness of a sidewalk and planter strip on the west/uphill side of Hillside Drive.

Engineering/TVFR Comments: Contact Khoi Le at kle@westlinnoregon.gov for Engineering comments and Ty Darby at tdarby@tvfr.com for TVFR comments.

PROCESS:

The application requires a neighborhood meeting per CDC 99.038. Please follow those requirements very carefully. Contact the Robinwood Neighborhood Association, at RobinwoodNA@westlinnoregon.gov and Skyline Ridge Neighborhood Association, at SkylineNA@westlinnoregon.gov.

Land use applications include subdivision (Chapter 85) and a WRA permit (Chapter 32). Staff recommends the Alternate Review Process (32.070 and 32.080) for the WRA permit. The CDC is online at http://westlinnoregon.gov/cdc.

Required specialist studies include an arborist's tree inventory, wetland delineation, geotechnical (including drainage) report and traffic study.

N/A is not an acceptable response to the approval criteria. The submittal requirements may be waived, but the applicant must first identify the specific submittal requirement and request, in letter form, that it be waived by the Planning Manager and must identify the specific grounds for that waiver. The waiver may or may not be granted by the Planning Director. Waivers may also be subsequently overruled by the decision making body.

Submit the application to the Planning Department with an application form signed by the property owner. The deposit for a subdivision is $4,200 plus $200 per lot. The final plat fee is $2,000. There is also a $500 fee for final site inspection. The deposit for a WRA is $2,600 and an inspection fee of $250.

Once the application and deposit/fee are submitted, the City has 30 days to determine if the application is complete or not. If the application is not complete, the applicant has 180 days to make it complete or provide written notice to staff that no other information will be provided. Once the submittal is deemed complete, staff will provide notice per CDC Chapter 99 and schedule a public hearing with the Planning Commission. Appeals of the Planning Commission's decision are heard by City Council.

Typical land use applications can take 6-10 months from beginning to end.

DISCLAIMER: This summary discussion covers issues identified to date. It does not imply that these are the only issues. The burden of proof is on the applicant to demonstrate that all approval criteria have been met. These notes do not constitute an endorsement of the proposed application ***or provide any assurance of potential outcomes***. Staff responses are based on limited material presented at this pre-application meeting. New issues, requirements, etc. could emerge as the application is developed. ***A new pre-application conference would have to be scheduled one that period lapses and these notes would no longer be valid. Any changes to the CDC standards may require a different design or submittal.***

NEIGHBORHOOD MEETING

AFFIDAVIT OF MAILING

STATE OF OREGON)

SS

County of Clackamas)

I, Mercedes Smith, being duly sworn, state that I represent the party initiating interest in a proposed subdivision affecting the land located at 18000 Upper Midhill Drive in West Linn, Oregon and that pursuant to Community development Code Section 99, did on the 21st day of July, 2015 caused to have mailed, to each of the persons on the attached list, a notice of a meeting to discuss the proposed development of the aforementioned property.

I further state that said notices were enclosed in plainly addressed envelopes to said persons and were deposited on the date indicated above in the United States Post Office with postage prepaid thereon.

This 29TH day of JULY, 2015.

Signature

Subscribed and sworn to, or affirmed, before me this 29th day of July, 2015.

OFFICIAL SEAL
ERIKA ELIZABETH WHITE
NOTARY PUBLIC - OREGON
COMMISSION NO. 475096
MY COMMISSION EXPIRES JANUARY 28, 2017

Notary Public for the State of Oregon

County of Washington

My Commission Expires: 1.28.2017

NEIGHBORHOOD MEETING

AFFIDAVIT OF POSTING NOTICE

STATE OF OREGON)

SS

County of Clackamas)

I, Mercedes Smith, being duly sworn, state that I represent the party initiating interest in a proposed subdivision affecting the land located at 18000 Upper Midhill Drive in West Linn, Oregon and that pursuant to Community development Code Section 99, did on the 22nd day of July, 2015 personally post notice indicating that the site may be proposed for a subdivision application.

A sign was posted along the northern property line.

This 29TH day of JULY, 2015.

Signature

Subscribed and sworn to, or affirmed, before me this 29th day of July, 2015.

OFFICIAL SEAL
ERIKA ELIZABETH WHITE
NOTARY PUBLIC - OREGON
COMMISSION NO. 475096
MY COMMISSION EXPIRES JANUARY 26, 2017

Notary Public for the State of Oregon

County of Washington

My Commission Expires: 1.26.2017

Civil Engineering
Water Resources
Land Use Planning

July 16, 2015

Robinwood Neighborhood Association
Kazi Ahmed
Robinwood NA President
18649 Midhill Cir
West Linn, OR 97068

18000 Upper Midhill Drive
Proposed Residential Subdivision

Dear Mr. Ahmed,

3J Consulting acts on behalf of Upper Midhill Estates LLC., regarding the planned subdivision of a property located off of 18000 Upper Midhill Drive. The location of the property is shown on the attached map. The tax lot number for the property is 21E 14CA 200. The property is located inside the City of West Linn's boundaries and it is zoned R-4.5 for Single Family Dwellings.

Upper Midhill Estates is considering a subdivision of the 6.13 acre property in order to create 34 new single-family residential lots. It is envisaged that each of the proposed lots will exceed 4,500 square feet, which is the minimum lot size within the R-4.5 zoning district. The proposed lots will take access from Upper Midhill Drive and Hillside Drive.

Before finalizing an application to the City's Planning Department for the proposed subdivision, we would like to take the opportunity to discuss this proposal with the members of the Robinwood and neighborhood association and property owners residing within 500 feet of the property.

The purpose of this meeting will be to provide a forum for surrounding property owners and residents to review the proposal and to identify issues so they can be given proper consideration. These meetings are required the public to share with the project team any special information about the property involved. The project team will try to answer questions related to how the project meets the relevant development standards consistent with West Linn's land use regulations.

We would like to formally request a meeting with the neighborhood association. Further to our discussions over the phone, we understand that the Neighborhood Association would be able to include us during your agenda for the Robinwood Neighborhood Association's August 11th meeting. If you could please confirm that this meeting is possible, we will send notification to residents located within the City's 500 foot notification boundary.

Please note that this will be an informational meeting based upon preliminary development plans and that these plans may change before the application is submitted to the City.

If the proposed meeting is acceptable, we would ask that you please respond to this letter with an email to andrew.tull@3j-consulting.com or phone call to 503-946-9365.

Sincerely,

Andrew Tull
Principal Planner
3J Consulting, Inc

3J Consulting, Inc.
5075 SW Griffith Drive, Suite 150, Beaverton, OR 97005
Ph: 503-946-9365
andrew.tull@3j-consulting.com

Civil Engineering
Water Resources
Land Use Planning

July 16, 2015

Robinwood Neighborhood Association
Kevin Bryck
Robinwood NA Designee
18840 Nixon Avenue
West Linn, OR 97068

18000 Upper Midhill Drive
Proposed Residential Subdivision

Dear Mr. Bryck,

3J Consulting acts on behalf of Upper Midhill Estates LLC., regarding the planned subdivision of a property located off of 18000 Upper Midhill Drive. The location of the property is shown on the attached map. The tax lot number for the property is 21E 14CA 200. The property is located inside the City of West Linn's boundaries and it is zoned R-4.5 for Single Family Dwellings.

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Before finalizing an application to the City's Planning Department for the proposed subdivision, we would like to take the opportunity to discuss this proposal with the members of the Robinwood and neighborhood association and property owners residing within 500 feet of the property.

The purpose of this meeting will be to provide a forum for surrounding property owners and residents to review the proposal and to identify issues so they can be given proper consideration. These meetings are required the public to share with the project team any special information about the property involved. The project team will try to answer questions related to how the project meets the relevant development standards consistent with West Linn's land use regulations.

We would like to formally request a meeting with the neighborhood association. Further to our discussions over the phone, we understand that the Neighborhood Association would be able to include us during your agenda for the Robinwood Neighborhood Association's August 11th meeting. If you could please confirm that this meeting is possible, we will send notification to residents located within the City's 500 foot notification boundary.

Please note that this will be an informational meeting based upon preliminary development plans and that these plans may change before the application is submitted to the City.

If the proposed meeting is acceptable, we would ask that you please respond to this letter with an email to andrew.tull@3j-consulting.com or phone call to 503-946-9365.

Sincerely,

Andrew Tull
Principal Planner
3J Consulting, Inc

3J Consulting, Inc.
5075 SW Griffith Drive, Suite 150, Beaverton, OR 97005
Ph: 503-946-9365
andrew.tull@3j-consulting.com

Civil Engineering
Water Resources
Land Use Planning

July 16, 2015

Robinwood Neighborhood Association
Tracey Gilday
Skyline Ridge NA President
1341 Stonehaven Dr
West Linn, OR 97068

18000 Upper Midhill Drive
Proposed Residential Subdivision

Dear Ms. Gilday,

3J Consulting acts on behalf of Upper Midhill Estates LLC., regarding the planned subdivision of a property located off of 18000 Upper Midhill Drive. The location of the property is shown on the attached map. The tax lot number for the property is 21E 14CA 200. The property is located inside the City of West Linn's boundaries and it is zoned R-4.5 for Single Family Dwellings.

Upper Midhill Estates is considering a subdivision of the 6.13 acre property in order to create 34 new single-family residential lots. It is envisaged that each of the proposed lots will exceed 4,500 square feet, which is the minimum lot size within the R-4.5 zoning district. The proposed lots will take access from Upper Midhill Drive and Hillside Drive.

Before finalizing an application to the City's Planning Department for the proposed subdivision, we would like to take the opportunity to discuss this proposal with the members of the Robinwood and neighborhood association and property owners residing within 500 feet of the property.

The purpose of this meeting will be to provide a forum for surrounding property owners and residents to review the proposal and to identify issues so they can be given proper consideration. These meetings are required the public to share with the project team any special information about the property involved. The project team will try to answer questions related to how the project meets the relevant development standards consistent with West Linn's land use regulations.

We would like to formally request a meeting with the neighborhood association. Further to our discussions over the phone, we understand that the Neighborhood Association would be able to include us during your agenda for the Robinwood Neighborhood Association's August 11th meeting. If you could please confirm that this meeting is possible, we will send notification to residents located within the City's 500 foot notification boundary.

Please note that this will be an informational meeting based upon preliminary development plans and that these plans may change before the application is submitted to the City.

If the proposed meeting is acceptable, we would ask that you please respond to this letter with an email to andrew.tull@3j-consulting.com or phone call to 503-946-9365.

Sincerely,

Andrew Tull
Principal Planner
3J Consulting, Inc

3J Consulting, Inc.
5075 SW Griffith Drive, Suite 150, Beaverton, OR 97005
Ph: 503-946-9365
andrew.tull@3j-consulting.com

Civil Engineering
Water Resources
Land Use Planning

July 21, 2015

18000 Upper Midhill Drive
Proposed Residential Subdivision

To Our Neighbors,

3J Consulting acts on behalf of Upper Midhill Estates LLC., regarding the planned subdivision of a property located off of 18000 Upper Midhill Drive. The location of the property is shown on the attached map. The tax lot number for the property is 21E 14CA 200. The property is located inside the City of West Linn's boundaries and it is zoned R-4.5 for Single Family Dwellings.

Upper Midhill Estates is considering a subdivision of the 6.13 acre property in order to create 34 new single-family residential lots. It is envisaged that each of the proposed lots will exceed 4,500 square feet, which is the minimum lot size within the R-4.5 zoning district. The proposed lots will take access from Upper Midhill Drive and Hillside Drive.

Before finalizing an application to the City's Planning Department for the proposed subdivision, we would like to take the opportunity to discuss this proposal with the members of the Robinwood and Skyline Ridge Neighborhoods and property owners residing within 500 feet of the property.

A meeting to discuss this project has been scheduled at the following time and location:

Informational Meeting
Tuesday, August 11th at 7:00 pm
Robinwood Station Community Center
3706 Cedaroak Drive, West Linn, 97068

The purpose of this meeting will be to provide a forum for surrounding property owners and residents to review the proposal and to identify issues so they can be given property consideration. This meeting will provide the opportunity for the public share with the project team any special information about the property involved. The project team will try to answer questions related to how the project meets the relevant development standards consistent with West Linn's land use regulations.

Please note that this will be an informational meeting based upon preliminary development plans and that these plans may change before the application is submitted to the City.

We look forward to discussing this proposal with you. Please feel free to contact us by emailing andrew.tull@3j-consulting.com if you have any questions.

Sincerely,

Andrew Tull
Principal Planner
3J Consulting, Inc.

3J Consulting, Inc.
5075 SW Griffith Drive, Suite 150, Beaverton, OR 97005
Ph: 503-946-9365
www.3j-consulting.com

SITE MAP

PUBLIC NOTICE

OF A NEIGHBORHOOD MEETING

THIS SITE MAY BE SUBJECT TO A PROPOSED SUBDIVISION.

PLEASE CONTACT THE APPLICANT FOR MORE INFORMATION AT
THE FOLLOWING NUMBER OR FEEL FREE TO ATTEND THE
SCHEDULED NEIGHBORHOOD MEETING:
3J CONSULTING, INC. C/O ANDREW TULL
503-946-9365

NEIGHBORHOOD MEETING:

ROBINWOOD NEIGHBORHOOD ASSOCIATION
AUGUST 11, 2015 AT 7:00 PM
ROBINWOOD STATION COMMUNITY CENTER
3706 CEDAROAK DRIVE,
WEST LINN, OR 97068

SENDER: COMPLETE THIS SECTION

• Place barcode on Sender's side of the form at the bottom of the Section 1.
• Scan barcode according to Retail System prompt.
Return Receipt Tracer Number Label 3811TB, June 2015

or on the front if space permits.

1. Article Addressed to:

KEVIN BRYCK
ROBINWOOD NA DESIGNEE
18840 NIXON AVE.
WEST LINN, OR 97068

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) C Bryck C. Date of Delivery 7-18

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☐ Certified Mail® ☐ Priority Mail Express™
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ Collect on Delivery

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7014 2870 0001 6537 2506

PS Form 3811, July 2013 Domestic Return Receipt

SENDER: COMPLETE THIS SECTION

• Place barcode on Sender's side of the form at the bottom of the Section 1.
• Scan barcode according to Retail System prompt.
Return Receipt Tracer Number Label 3811TB, June 2015

or on the front if space permits.

1. Article Addressed to:

KAZI AHMED
18649 MIDHILL CTR.
WEST LINN OR 97068

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) C. Date of Delivery 7/18/15

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☐ Certified Mail® ☐ Priority Mail Express™
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ Collect on Delivery

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7014 2870 0001 6538 3328

PS Form 3811, July 2013 Domestic Return Receipt

SENDER: COMPLETE THIS SECTION

• Place barcode on Sender's side of the form at the bottom of the Section 1.
• Scan barcode according to Retail System prompt.
Return Receipt Tracer Number Label 3811TB, June 2015

1. Article Addressed to:

TRACY GILDAY
1341 STONEHAVEN DR.
WEST LINN OR 97068

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) TRACY GILDAY C. Date of Delivery

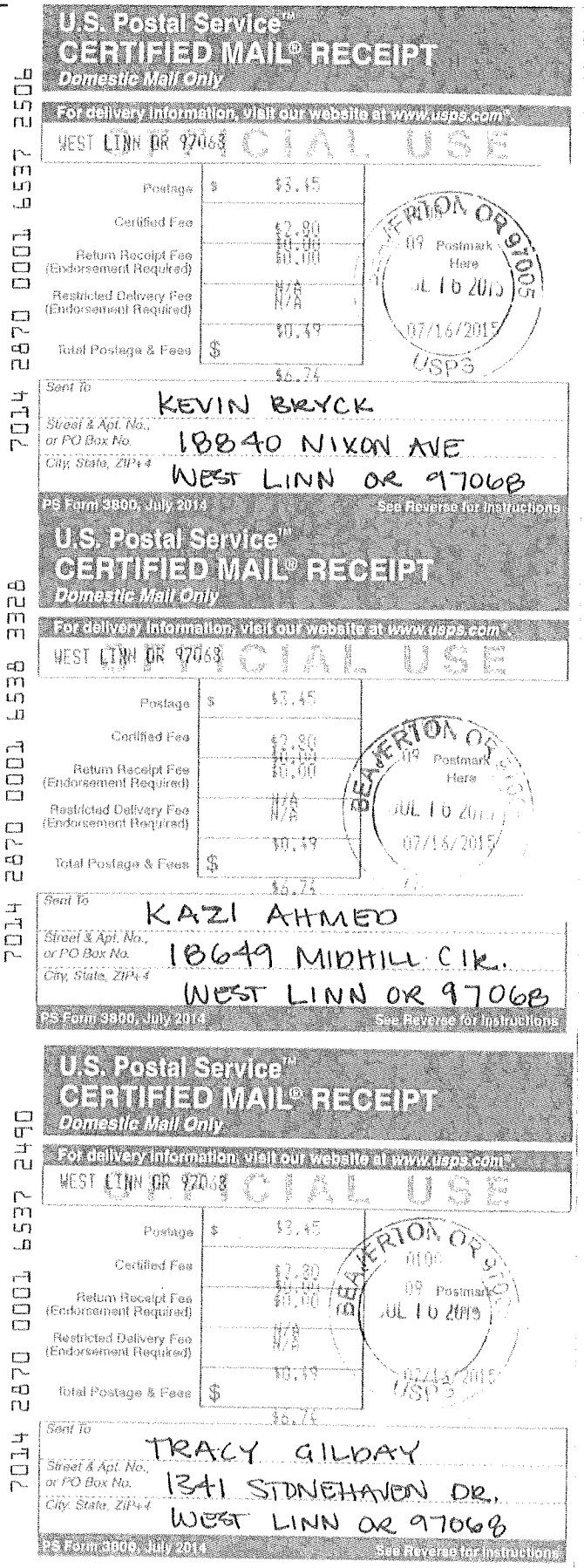
D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☒ No

3. Service Type
☐ Certified Mail® ☐ Priority Mail Express™
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ Collect on Delivery

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7014 2870 0001 6537 2490

PS Form 3811, July 2013 Domestic Return Receipt



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WEST LINN OR 97068

OFFICIAL USE

Postage	$3.45
Certified Fee	$2.80
Return Receipt Fee (Endorsement Required)	$0.00
Restricted Delivery Fee (Endorsement Required)	N/A
Total Postage & Fees	$6.24

BEAVERTON OR 97005
09 Postmark Here
JUL 16 2015
07/16/2015
USPS

7014 2870 0001 6537 2506

Sent To: KEVIN BRYCK
Street & Apt. No., or PO Box No.: 18840 NIXON AVE
City, State, ZIP+4: WEST LINN OR 97068

PS Form 3800, July 2014 — See Reverse for Instructions

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WEST LINN OR 97068

OFFICIAL USE

Postage	$3.45
Certified Fee	$2.80
Return Receipt Fee (Endorsement Required)	$0.00
Restricted Delivery Fee (Endorsement Required)	N/A
Total Postage & Fees	$6.24

BEAVERTON OR 97005
09 Postmark Here
JUL 16 2015
07/16/2015

7014 2870 0001 6538 3328

Sent To: KAZI AHMED
Street & Apt. No., or PO Box No.: 18649 MIDHILL CIR.
City, State, ZIP+4: WEST LINN OR 97068

PS Form 3800, July 2014 — See Reverse for Instructions

U.S. Postal Service™
CERTIFIED MAIL® RECEIPT
Domestic Mail Only

For delivery information, visit our website at www.usps.com®.

WEST LINN OR 97068

OFFICIAL USE

Postage	$3.45
Certified Fee	$2.80
Return Receipt Fee (Endorsement Required)	$0.00
Restricted Delivery Fee (Endorsement Required)	N/A
Total Postage & Fees	$6.24

BEAVERTON OR 97005
09 Postmark Here
JUL 16 2015
07/16/2015
USPS

7014 2870 0001 6537 2490

Sent To: TRACY GILDAY
Street & Apt. No., or PO Box No.: 1341 STONEHAVEN DR.
City, State, ZIP+4: WEST LINN OR 97068

PS Form 3800, July 2014 — See Reverse for Instructions

SITE STATISTICS

GROSS AREA 4.88 ACRES

MINIMUM LOT SIZE:
4,500 SF

MAXIUMUM BUILDING HEIGHT
35 FEET

NTS

N

* Note: All building lines are conceptual, sizes and shapes may change.

UPPER MIDHILL ESTATES - PRELIMINARY SUBDIVISION CONCEPT

AUGUST 2015

Civil Engineering
Water Resources
Land Use Planning

Meeting Minutes – Upper Midhill Estates

Date: August 11, 2015
Meeting No: Neighborhood Meeting
Project: Upper Midhill Estates
3J No.: 15266
Location: Robinwood Community Center, West Linn

Presenters	Company
Andrew Tull	**3J Consulting**
Ryan Zygar	**Upper Midhill Estates**

In preparation for the submission of a land use application for the subdivision or partitioning of the subject property, the applicant conducted a neighborhood meeting with the Robinwood Neighborhood Association.

The meeting began with a presentation by Andrew Tull and Ryan Zygar. The project team started by explain that the property would be subdivided in accordance with the City's development codes. A description of the development, the road access, and the proposed lots was provided. The general timeframe for the land use and construction process was described.

Following the introduction of the project, neighbors and attendees openly asked questions of the project team. The following is a record of the questions and the project teams' responses.

Item	Question	Response
1	Have you completed a traffic study?	The traffic study is underway, it will be submitted to the City with our land use applications.
2	When with the Application be submitted?	1 to 2 months.
3	Will you be transparent in the land use review process?	We will not post this on our website. The City's website will have the most up to date information.
4	What's the name of the developer and what is his experience. What else has the developer completed? What reports will the City require for you to submit with the Application.	The developer is Ryan Zygar with Upper Midhill Estates. Ryan has 15 years of experience. First subdivision in Forest Grove. I've completed 40 or so subdivisions since that time. We've completed several parade of homes neighborhoods. We will be required to submit a stormwater report, plans, and a traffic report with our application.
5	What is the average lot size?	The project's average is approximately 6,250 sf. The zoning for the property is R-4.5, 4,500 sf. The zoning was set because the area has larger lots which could be divided. Roads within the neighborhood could be improved as properties come together to develop. The lot count is at the lower end of the density range

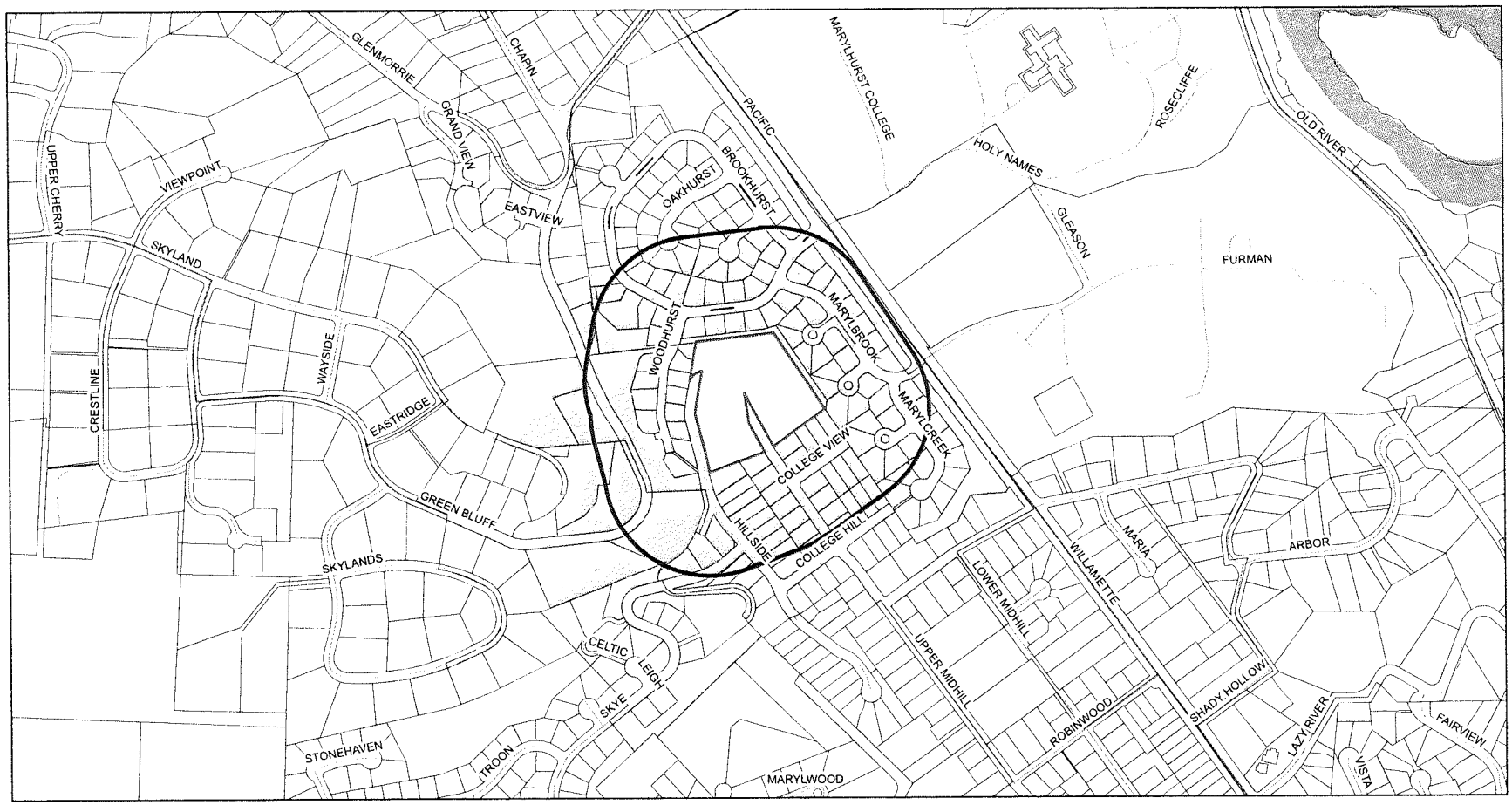
6	Why no access through lake Oswego?	Roadways which would have connected to the North were vacated several years ago. The road connections are fairly well established.
7	Neighbors not happy about the lot sizes. The streets cannot likely handle the traffic impacts. There need to be fewer, larger lots which are consistent with the neighborhood.	Thanks for your comments. Your comments are going to the City as part of this recording.
8	Will you be contributing to parks?	The developer will be required to pay system development charges which pay for infrastructure and parks.
9	Will you be retaining trees along the boundaries?	The project has been laid out to try to retain trees along the boundary. We know we have a tree retention requirement and we hope to use the trees along the boundaries to meet the tree retention requirement.
10	Will Hilltop Road be improved?	The developer will be required to develop a road within the Hilltop Right-of-way. We're willing to ask the City if we can reduce the amount of infrastructure which will be required within the right-of-way. If the City will allow us to drop one of the sidewalks or planters, we'll certainly work with them to design less.
11	This project is impacting the sale of our house. What should we do?	It should be regarded as a good thing to have a new neighborhood come into the area.
12	The height limit is how high?	35'. The builders have not yet been selected.
13	What size home would be permitted?	The lots, we believe, will have a 40% lot coverage requirement. The project will probably have 2 story homes, with daylight basements and garage under homes.
14	What kind of homes will come in with the application?	We are only handling the land use applications. No homes are currently proposed. Buildings will be proposed by individuals.
15	How much will the homes be priced?	These are going to be on the higher end of the pricing range for lots in West Linn?
16	Will there be an HOA/CC&R's?	There will be some common property, its likely that there will be CC&R's.
17	Will every home be restricted to certain minimum standards?	This is a possibility.
18	Are you at the minimum density? Would you be willing to work with the City to rezone the property?	The project is at the minimum density for the zone. The developer is not willing to rezone the property. 10,000 SF lots would not be economical and it was not part of the development plan.
19	Is the fire department's requirements being considered as part of this?	The project has two points of entry/exit. The fire marshal will review and provide input.
20	Are the schools able to handle all these additional students?	We've not spoken with the school district however the district is required to plan for the zoning within the City. Other school districts in the area have been receptive to higher density as they are in need of younger families with new students.
21	A handful of builders are concerning because we are not keen to be living next to ongoing construction.	

The meeting concluded at approximately 7:50pm.

3

21E14CA - 200

Subject Property
500ft Radius
Radius Results



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(503) 603-1700 cs@wfgnationaltitle.com

WFG National Title - Customer Service Department
12909 SW 68th Pkwy # 350 Portland, OR 97223
Phone: 503.603.1700 Fax: 888.833.6840
E-mail: cs@wfgnationaltitle.com

Date	:7/1/2015	Prepared By	:Amanda Shaw
Time	:9:57 AM	Prepared For	:
County	:Clackamas (OR)	Company	:
Sort Type	:OWNER	Address	:
Parcels Records	:137	City/ST/Zip	:

SEARCH PARAMETERS

Reference Parcel Number...137

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SEARCH PARAMETERS (Continued)

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SEARCH PARAMETERS (Continued)

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CITY OF West Linn

PLANNING COMMISSION MEETING

PROJECT # SUB-15-03/WAP-16-03
MAIL: 3/31/16 TIDINGS: 4/7/16

CITIZEN CONTACT INFORMATION

To lessen the bulk of agenda packets, land use application notice, and to address the worries of some City residents about testimony contact information and online application packets containing their names and addresses as a reflection of the mailing notice area, this sheet substitutes for the photocopy of the testimony forms and/or mailing labels. A copy is available upon request.

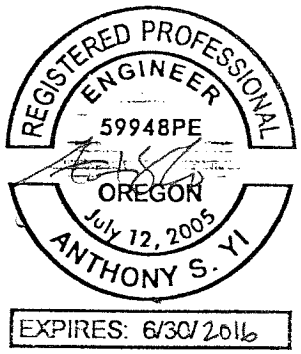
Citizen Contact Information Agenda Packets and Project Files

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING
610 SW Alder Street, Suite 700, Portland, OR 97205 503.228.5230 503.273.8169

MEMORANDUM

Date: September 10, 2015 Project #: 18758.0

To: Khoi Le, City of West Linn
Avi Tayar, Oregon Department of Transportation, Region 1
cc: Ryan Zygar, Upper Midhill Estates, LLC
From: Matt Bell, Anthony Yi, and Alexander Kado
Project: Upper Midhill Estates Residential Development
Subject: Transportation Impact Analysis



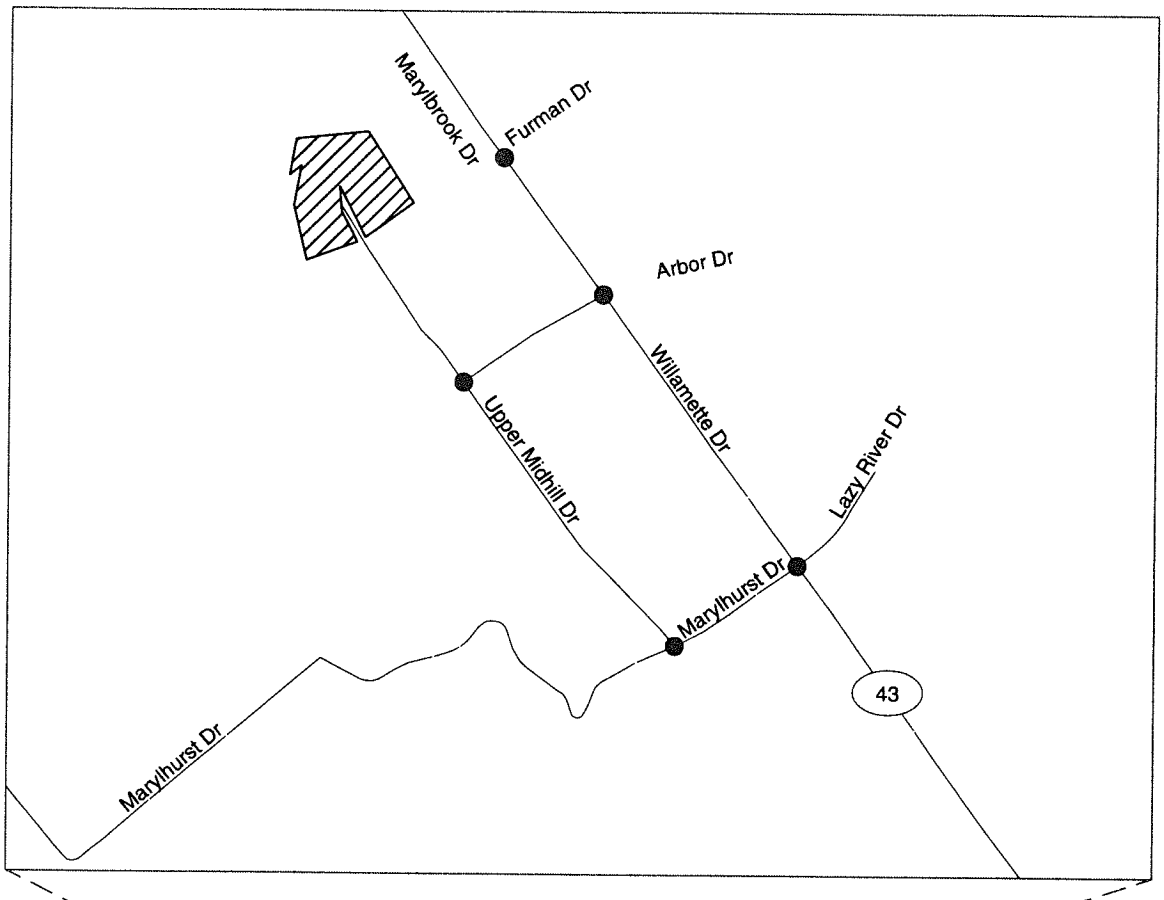
This memorandum summarizes the results of a transportation impact analysis prepared for the proposed Upper Midhill Estates residential development located at the northern terminus of Upper Midhill Road in West Linn, Oregon. Figure 1 illustrates the site vicinity map. The proposed development plan includes 34 single-family residential homes located along an extension of Upper Midhill Drive that connects to Hillside Drive to the west. Figure 2 illustrates the conceptual site plan. Construction of the proposed development is expected to occur in 2015 with full build-out and occupancy in 2016.

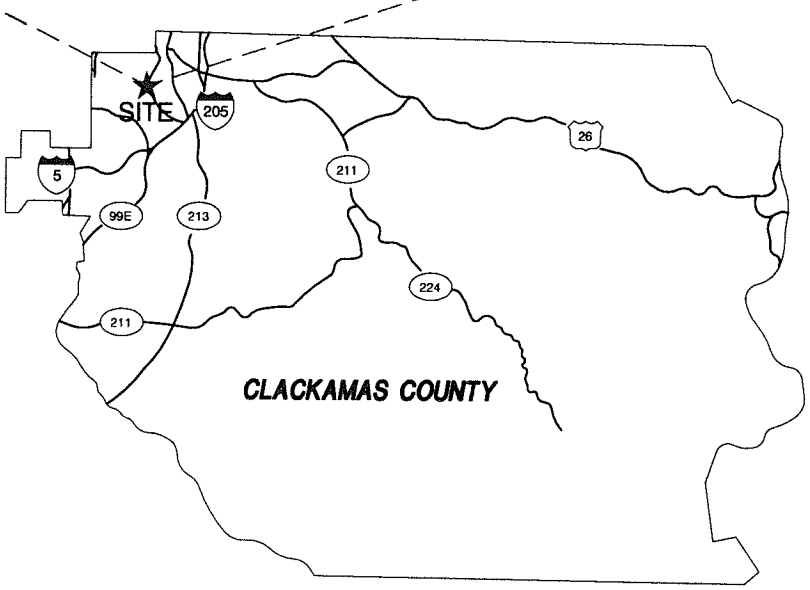
The results of this analysis indicate that the proposed Upper Midhill Estates residential development can be constructed while maintaining safe and acceptable traffic operations at the study intersections assuming provision of the recommended mitigation measures. Additional details of the study methodology, findings, and recommendations are provided herein.

SCOPE OF THE REPORT

This analysis determines the transportation-related impacts associated with the proposed Upper Midhill Estates residential development and was prepared in accordance with the City of West Linn and Oregon Department of Transportation Department (ODOT) requirements for transportation impact analyses. The study intersections and scope of this project were selected in coordination with City and ODOT staff. The operational analyses were performed at the following study intersections:

- Willamette Drive (OR43)/Marylbrook Drive
- Willamette Drive (OR43)/Arbor Drive
- Willamette Drive (OR43)/Marylhurst Drive
- Upper Midhill Drive/Arbor Drive
- Upper Midhill Drive/Marylhurst Drive





● - Study Intersections

Site Vicinity Map
West Linn, OR

Figure
1

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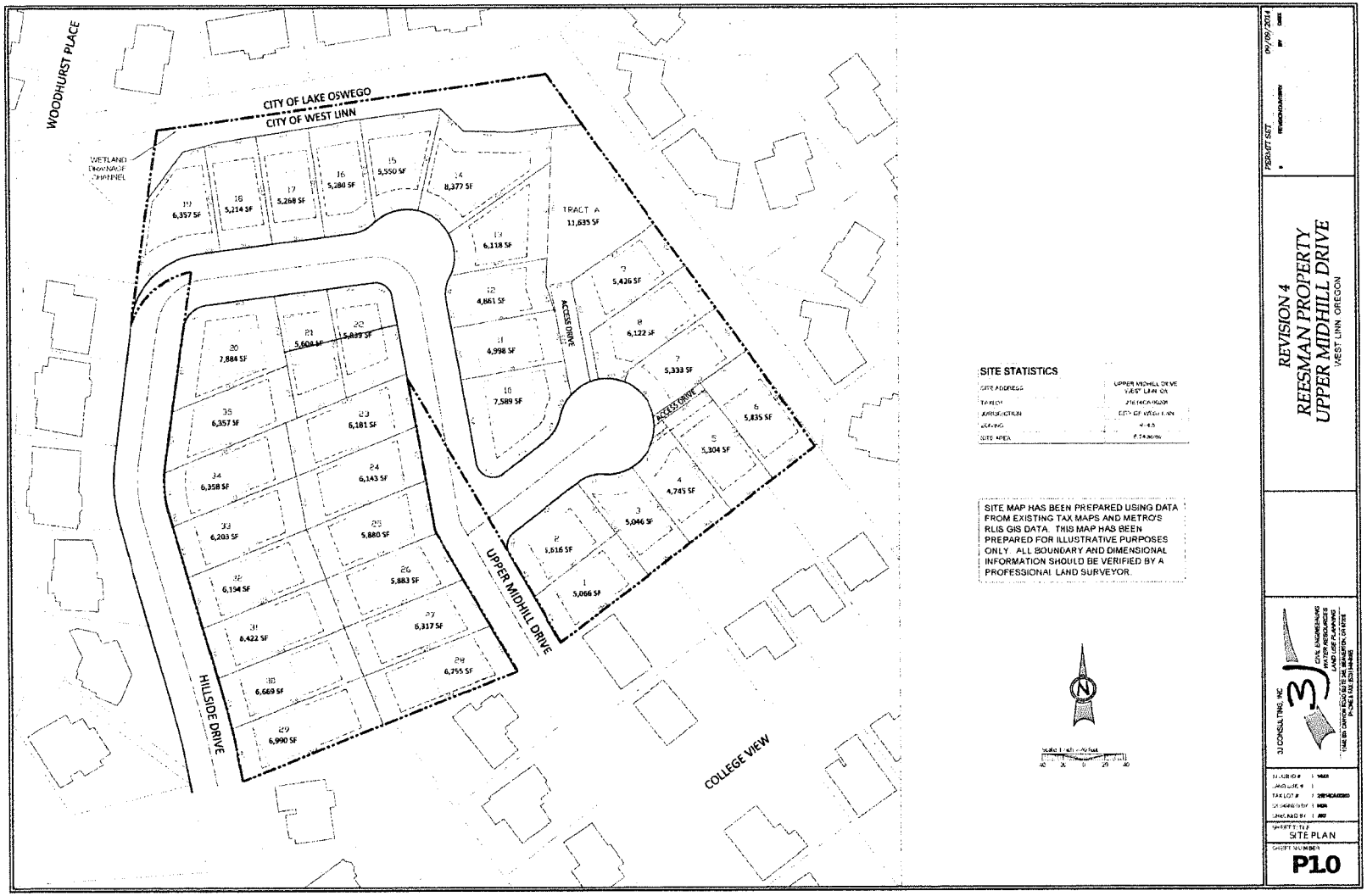
TRANSPORTATION ENGINEERING PLANNING



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Conceptual Site Plan
West Linn, OR

Figure
2

This report evaluates these transportation issues:

- Year 2015 existing land-use and transportation-system conditions within the site vicinity during the weekday a.m. and p.m. peak periods;
- Developments and transportation improvements planned in the study area;
- Year 2016 background traffic conditions (without the proposed development) during the weekday a.m. and p.m. peak periods;
- Trip generation and distribution estimates for the proposed development; and
- Year 2016 total traffic conditions (with full build-out and occupancy of the proposed development) during the weekday a.m. and p.m. peak periods.

EXISTING CONDITIONS

The existing conditions analysis identifies the site conditions and the current physical and operational characteristics of the roadways within the study area. These conditions will be compared with future conditions later in this report.

Kittelson & Associates, Inc. (KAI) staff visited and inventoried the proposed development site and surrounding study area in July 2015. At that time, KAI collected information regarding site conditions, adjacent land uses, existing traffic operations, and transportation facilities in the study area.

SITE CONDITIONS AND ADJACENT LAND USES

The proposed development site is located within the West Linn city limits, is currently vacant, and is zoned for medium density residential. The adjacent land uses include single family residential homes and a small city park located further south along Upper Midhill Drive.

TRANSPORTATION FACILITIES

Table 1 summarizes the characteristics of the transportation facilities within the site vicinity.

Table 1: Existing Transportation Facilities

Roadway	Functional Classification[1]	Number of Lanes	Posted Speed (mph)	Sidewalks	Bicycle Lanes	On-Street Parking
Highway 43	Principal Arterial	2	35	Partial	Yes	No
Upper Midhill Drive	Local Street	2	25	Partial	No	Yes
Arbor Drive	Local Street	2	25	No	No	No
Marylhurst Drive	Collector	2	25	No	No	No

1. City of West Linn Transportation System Plan (TSP – Reference 1).

Roadway Facilities

Willamette Drive is the major north-south arterial within the City of West Linn providing access to the cities of Lake Oswego and Portland to the north, and Oregon City to the south. Marylhurst Drive is an east-west collector, which provides access to Willamette Drive via a signalized intersection. Arbor Drive is an east-west local street that provides access to Willamette Drive via a two-way stop-control intersection. Upper Midhill Drive is a north-south local street that connects the proposed development to Arbor Drive and Marylhurst Drive. The segment of Upper Midhill Drive located south of Arbor Drive is relatively narrow; however, two vehicles can pass each other on the roadway. Also, should redevelopment occur along Upper Midhill Drive, it is assumed the roadway will be improved to the City's local street standard. Figure 3 illustrates the existing lane configurations and traffic control devices at the study intersections.

Pedestrian and Bicycle Facilities

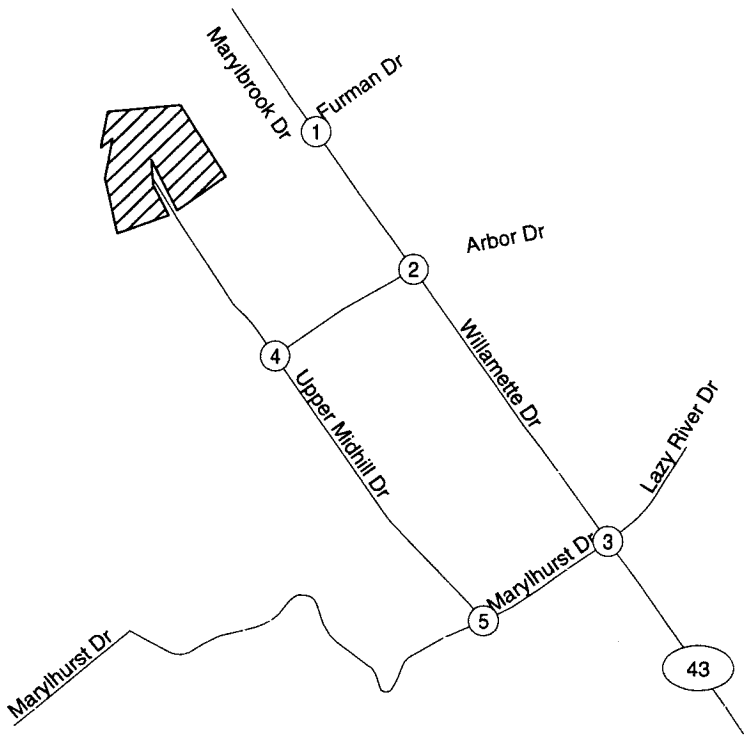
Sidewalks are limited within the site vicinity to segments of Upper Midhill Drive located north of Arbor Drive and segments of Willamette Drive located north and south of Marylhurst Drive. Crosswalks are provided at the Willamette Drive/Marylhurst Drive and Willamette Drive/Marylbrook intersections, which are signalized with pedestrian pushbuttons and countdown signal heads. Bike lanes are provided within the site vicinity to Willamette Drive, which provides continuous bike lanes north and south of the proposed development.

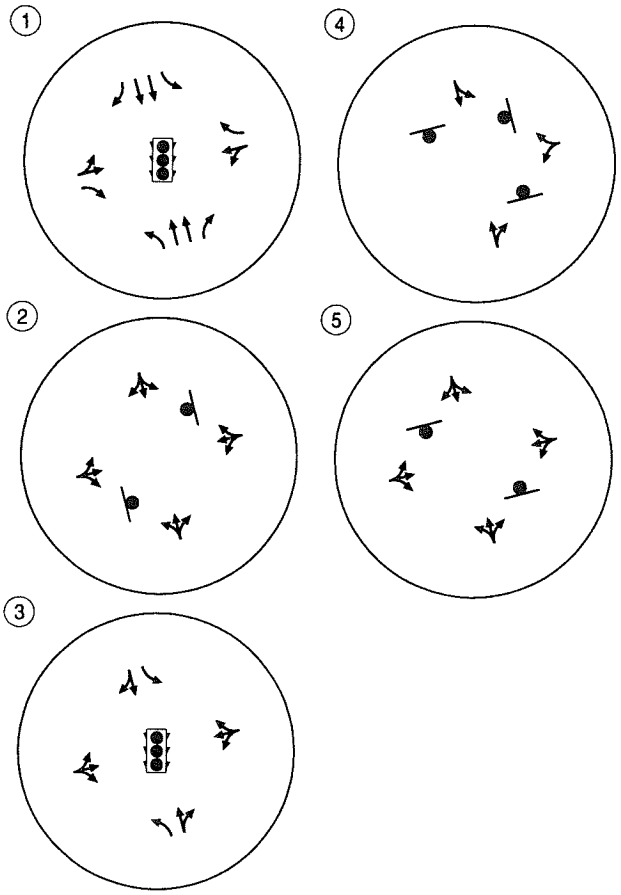
Transit Facilities

Local transit service is provided within the site vicinity by TriMet. TriMet Line 35 provides frequent service along Willamette Drive, Monday through Friday from 6:00 a.m. to 12:00 a.m. on 15-30 minute headways. Limited service is provided on Saturdays and Sundays. Line 35 serves two stops located adjacent to Arbor Drive (Stop 6301 and 6302) and two stops located adjacent to Marylhurst Drive (Stop 9216 and 6337). The stops located adjacent to Arbor Drive are not supported by sidewalks or crosswalks, while the stops located adjacent to Marylhurst Drive have sidewalks and a signalized crossing at the Willamette Drive/Marylhurst Drive intersection.

TRAFFIC VOLUMES AND PEAK HOUR OPERATIONS

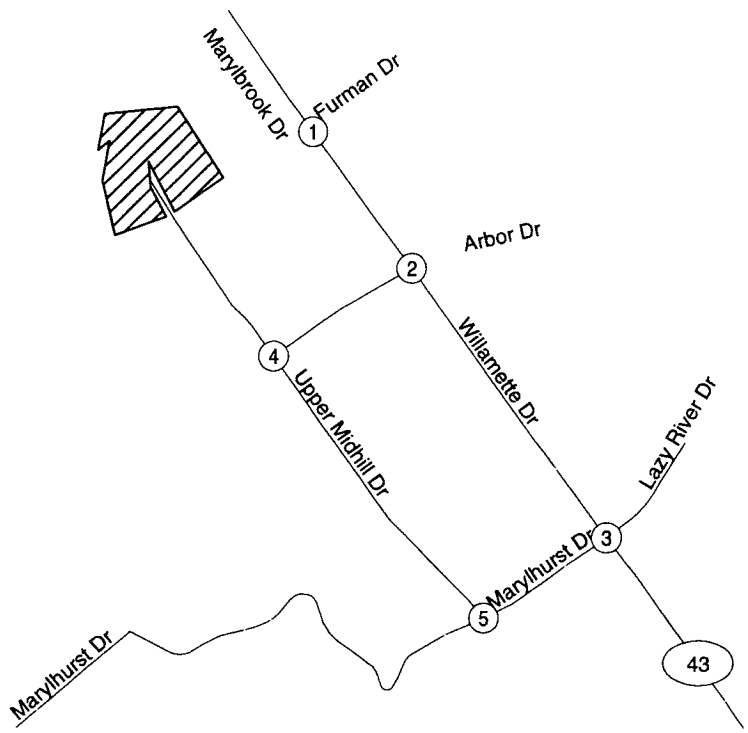
Manual turning movement counts were conducted at the study intersections in June 2015. All the counts were conducted on a typical mid-week day during the morning (7:00 to 9:00 a.m.) and evening (4:00 to 6:00 p.m.) peak time periods. The system-wide morning and evening peak hours were found to occur between 7:00 and 8:00 a.m. and 4:40 and 5:40 p.m., respectively. Figure 4 provides a summary of the year 2015 turning-movement counts for the weekday a.m. and p.m. peak hours. The traffic counts shown in Figure 4 were seasonally adjusted to 30th Highest Hour Volumes (30HV) in accordance with the methodology outlined in the ODOT Analysis Procedures Manual (APM – Reference 2). *Appendix "A" contains the traffic count worksheets used in this study.*

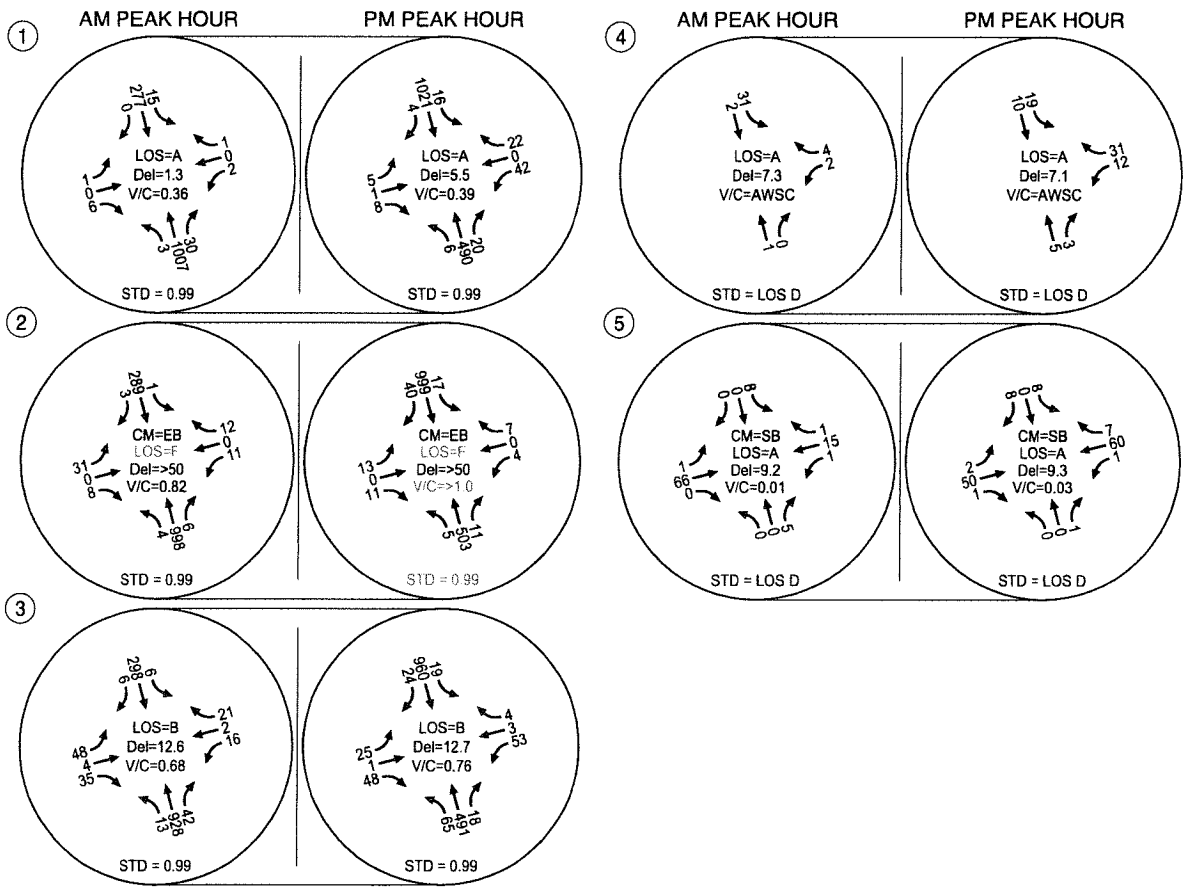




Existing Lane Configurations & Traffic Control Devices
West Linn, OR

Figure 3





CM = CRITICAL MOVEMENT (TWSC)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED/AWSC) / CRITICAL MOVEMENT LEVEL OF SERVICE (TWSC)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED/AWSC) / CRITICAL MOVEMENT CONTROL DELAY (TWSC)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO
TWC = TWO-WAY STOP CONTROL
AWSC= ALL-WAY STOP CONTROL
STD = MOBILITY STANDARD

Existing Traffic Conditions
Weekday AM & PM Peak Hour
West Linn, OR

Figure
4

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TRANSPORTATION ENGINEERING PLANNING

Current Levels of Service

All level-of-service analyses described in this report were performed in accordance with the procedures stated in the 2000 *Highway Capacity Manual* (HCM – Reference 3). *A description of level of service and the criteria by which they are determined is presented in Appendix "B".* Appendix "B" also indicates how level of service is measured and what is generally considered an acceptable range.

The City of West Linn requires all signalized and unsignalized intersections to maintain LOS D or better, while ODOT requires all signalized and unsignalized intersections to maintain a v/c ration of 0.99. The City controls the Upper Midhill Drive/Arbor Drive and Upper Midhill Drive/Marylhurst Drive intersections while the ODOT controls the intersections located along Willamette Drive.

All intersection level-of-service evaluations used the peak 15-minute flow rates that occurred during the weekday a.m. and p.m. peak hours. Using the peak 15-minute flow rates ensures that this analysis is based on a reasonable worst-case scenario. For this reason, the analysis reflects conditions that are only likely to occur for 15 minutes out of each average peak hour. The transportation system will likely operate under conditions better than those described in this report during all other time periods.

Figure 4 summarizes the results of the traffic operations analysis at the study intersections under existing traffic conditions. As shown, all of the study intersections currently operate acceptably during the weekday a.m. and p.m. peak hours with the exception of the Willamette Drive/Arbor Drive intersection. Additional information on the operational issues identified at the study intersection is provided below. *Appendix "C" includes the worksheets used to evaluate existing traffic conditions at the study intersections.*

Willamette Drive/Arbor Drive

The eastbound approach to the Willamette Drive/Arbor Drive intersection currently operates at LOS F and above capacity during the weekday p.m. peak hour. This is primarily due to the relatively low volume of eastbound traffic along Arbor Drive conflicting with the relatively high volume of northbound and southbound traffic along Willamette Drive. Potential mitigation measures are identified later in this report.

Traffic Safety

The crash history of the study intersections was reviewed in an effort to identify any potential safety issues. ODOT provided the five most recent years of crash data available for the study intersections, including January 1, 2009 through December 31, 2013. Table 2 summarizes the crash history of the study intersections over the five-year period.

Table 2: Study Intersection Crash Summary (January 1, 2009 – December 31, 2013)

Location	Crash Type						Severity			Total
	Angle	Turn	Rear-End	Side Swipe	Fixed Object	Ped/ Bike	PDO	Injury	Fatal	
Willamette Drive/Marylbrook Drive	0	1	1	0	0	1	0	3	0	3
Willamette Drive/Arbor Drive	0	4	5	0	0	0	4	5	0	9
Willamette Drive/Marylhurst Drive	0	1	2	0	0	0	1	2	0	3
Upper Midhill Drive/Arbor Drive	0	0	0	0	0	0	0	0	0	0
Upper Midhill Drive/Marylhurst Drive	0	0	0	0	0	0	0	0	0	0

PDO = Property Damage Only

As shown in Table 2, the Willamette Drive/Arbor Drive intersection experienced the highest number of crashes over the five year period. Further review of the crashes indicates that a majority of the rear-end crashes occurred in the northbound direction when a motorist failed to avoid another slowed or stopped motorist waiting to turn left onto Arbor Drive. Potential mitigation measures are identified later in this report. No other trends or patterns were identified in the crash data that requires mitigation associated with the proposed development. *Appendix "D" contains the crash data obtained from ODOT.*

TRANSPORTATION IMPACT ANALYSIS

The transportation impact analysis identifies how the study area's transportation system will operate in the year the proposed development is expected to be fully built, year 2016. The impact of traffic generated by the proposed development was examined as follows:

- Developments and transportation improvements planned in the site vicinity were identified.
- Year 2016 background traffic conditions (without the proposed development) were analyzed at the study intersections during the weekday a.m. and p.m. peak hours.
    - Background traffic conditions were developed by applying a 1-percent annual growth rate to the existing traffic volumes to account for regional growth in the site vicinity between years 2015 and 2016.
- Site-generated trips were estimated for build-out of the site.
- Site trip-distribution patterns were derived after the existing traffic patterns and the major trip origins and destinations in West Linn and the Metro area.
- Year 2016 total traffic conditions (with full build-out and occupancy of the proposed development) were analyzed at the study intersections during the weekday a.m. and p.m. peak hours.

YEAR 2016 BACKGROUND TRAFFIC CONDITIONS

The year 2016 background traffic conditions analysis identifies how the study area's transportation system will operate without the proposed development. This analysis includes traffic attributed to planned developments within the study area and to general growth in the region, but does not include traffic from the proposed development.

Planned Developments and Transportation Improvements

No planned developments or transportation improvements were identified within the site vicinity that will impact traffic operations under year 2016 traffic conditions.

Traffic Volumes

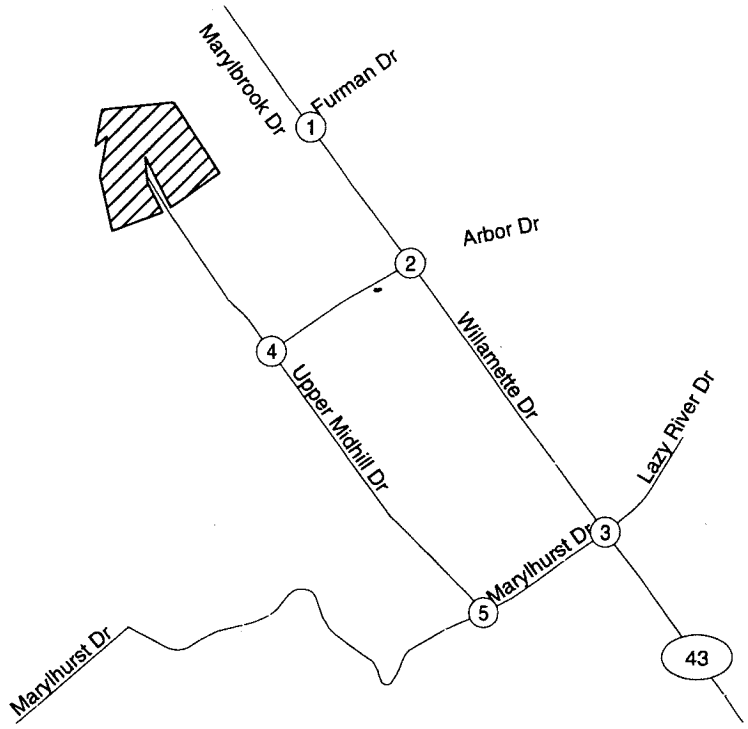
The growth rate used in this analysis was developed based on a review of historical traffic volumes along Willamette Drive and discussions with City staff. Based on the review and discussions, a 1-percent annual growth rate was applied to the existing traffic volumes to account for regional growth between 2015 and 2016. Figure 5 illustrates the resulting forecast year 2016 background traffic volumes during the weekday a.m. and p.m. peak hours.

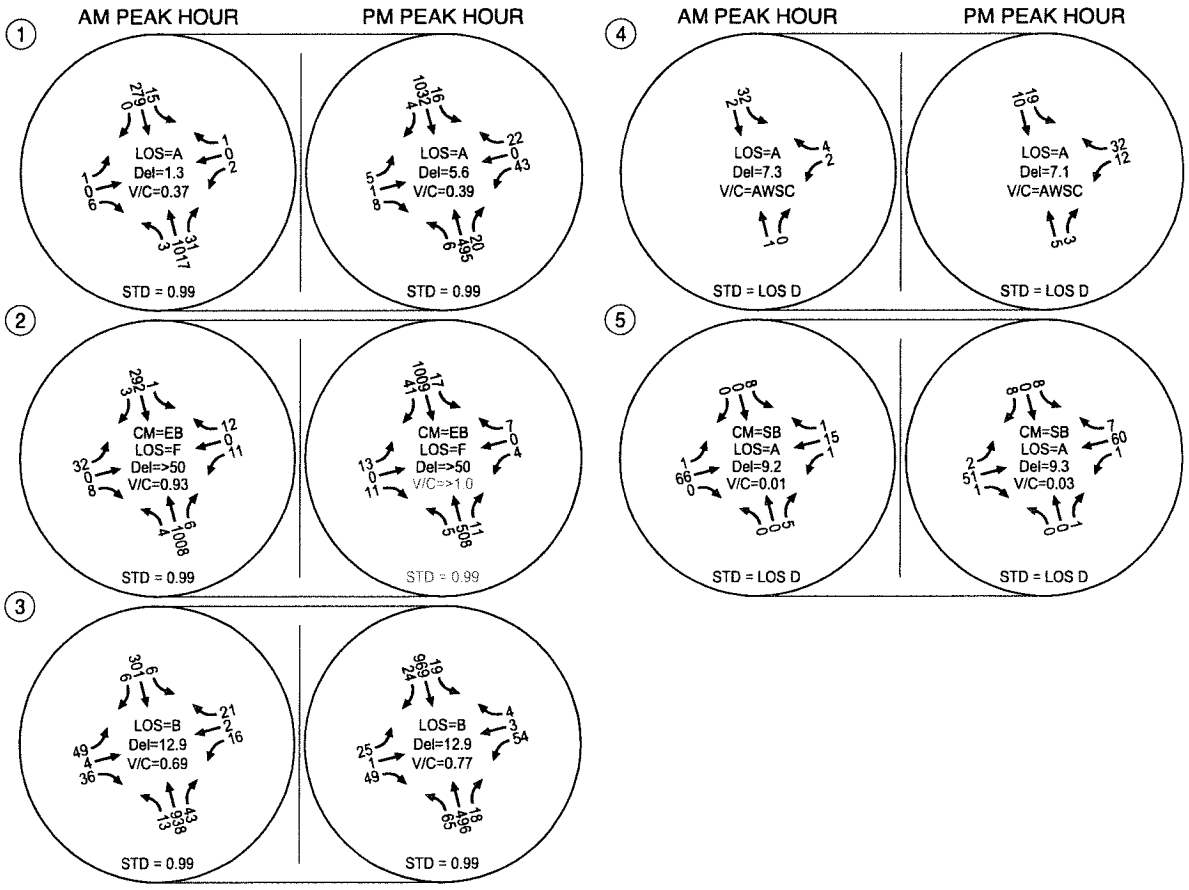
Intersection Level-of-Service

The traffic volumes shown in Figure 5 were used to conduct an operations analysis at the study intersections under year 2016 background traffic conditions. As shown, all of the study intersections are expected to operate acceptably during the weekday a.m. and p.m. peak hours with the exception of the Willamette Drive/Arbor Drive intersection. Additional information on the operational issues identified at the study intersection is provided below. *Appendix "E" includes the worksheets used to evaluate year 2016 background traffic conditions at the study intersections.*

Willamette Drive/Arbor Drive

The eastbound approach to the Willamette Drive/Arbor Drive intersection is expected to continue to operate at LOS F and above capacity during the weekday p.m. peak hour. Potential mitigation measures are identified later in this report.





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Year 2016 Background Traffic Conditions
Weekday AM & PM Peak Hour
West Linn, OR

Figure
5

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TRANSPORTATION ENGINEERING PLANNING

PROPOSED DEVELOPMENT PLAN

Upper Midhill Estates, LLC is proposing to develop the 6.14 acre site located at the northern terminus of Upper Midhill Drive. The proposed development plan consists of 34 single-family residential homes located along an extension of Upper Midhill Drive that will connect to Scenic Drive to the west. Construction of the proposed development is expected to occur in 2015 with full build-out and occupancy in 2016.

Trip Generation

A trip generation estimate was prepared for the proposed development based on information provided in the standard reference manual, *Trip Generation*, 9th Edition, published by the Institute of Transportation Engineers (ITE – Reference 4). Table 3 summarizes the trip generation estimate for the daily, weekday a.m. and weekday p.m. peak hours.

Table 3: Trip Generation Estimate

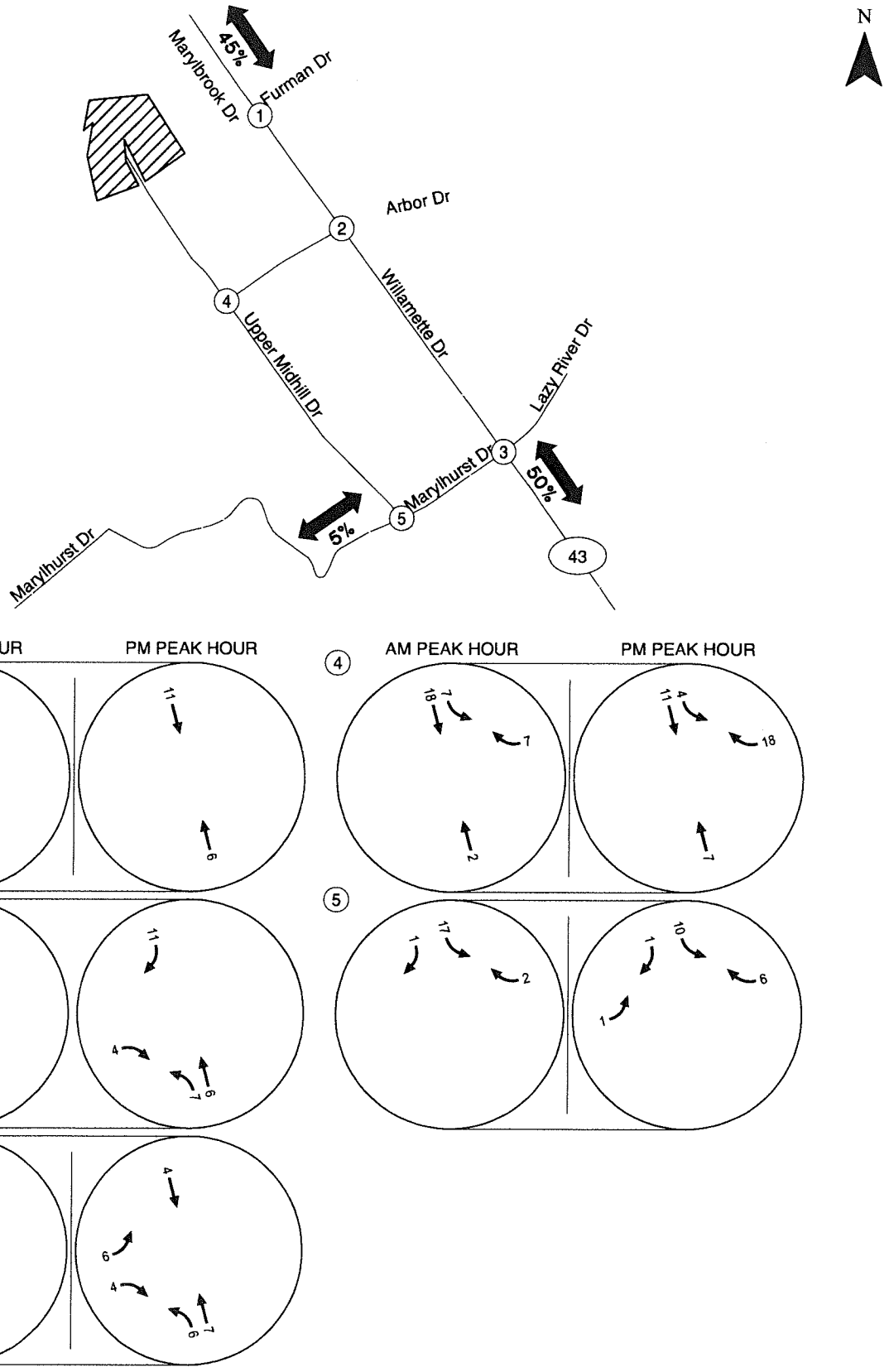
Land Use	ITE Code	Size	Daily Trips	Weekday AM Peak Hour Trips			Weekday PM Peak Hour Trips		
				Total	In	Out	Total	In	Out
Single-Family Homes	210	34 units	389	34	9	25	40	25	15

As shown in Table 3, the proposed development is estimated to generate approximately 389 daily trips, including 34 trips (9 inbound, 25 outbound) during the weekday a.m. peak hour and 40 trips (25 inbound, 15 outbound) during the weekday p.m. peak hour.

Site Trip Distribution/Trip Assignment

The site-generated trips were distributed onto the study area roadway system according to the existing traffic patterns, the location of major trip origins and destinations in West Linn and the Metro area. Figure 6 illustrates the estimated trip distribution pattern for the proposed development.

The site-generated trips were assigned to the network by distributing the trips shown in Table 3 according to the trip distribution pattern shown in Figure 6. Figure 6 also illustrates the site-generated trips that are expected to use the roadway system during the weekday a.m. and p.m. peak hours. As shown, no additional trips were added to the eastbound left-turn movement at the Willamette Drive/Arbor Drive intersection due to the existing and projected future operational issues associated with that movement. It is assumed that all trips from the site headed north on Willamette Drive will use the traffic signal at Willamette Drive/Marylhurst Drive.



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Estimated Trip Distribution Pattern & Site Generated Trips
Weekday AM & PM Peak Hour
West Linn, OR

Figure 6

YEAR 2016 TOTAL TRAFFIC CONDITIONS

The total traffic conditions analysis forecasts how the study area's transportation system will operate with the traffic generated by the proposed development. The year 2016 background traffic volumes shown in Figure 5 were added to the site-generated traffic shown in Figure 6 to arrive at the total traffic volumes shown in Figure 7.

Intersection Level of Service

The traffic volumes shown in Figure 7 were used to conduct an operations analysis at the study intersections under year 2016 total traffic conditions. As shown, all of the study intersections are expected to operate acceptably during the weekday a.m. and p.m. peak hours with the exception of the Willamette Drive/Arbor Drive intersection. Additional information on the operational issues identified at the study intersection is provided below. *Appendix "F" includes the worksheets used to evaluate year 2016 total traffic conditions at the study intersections.*

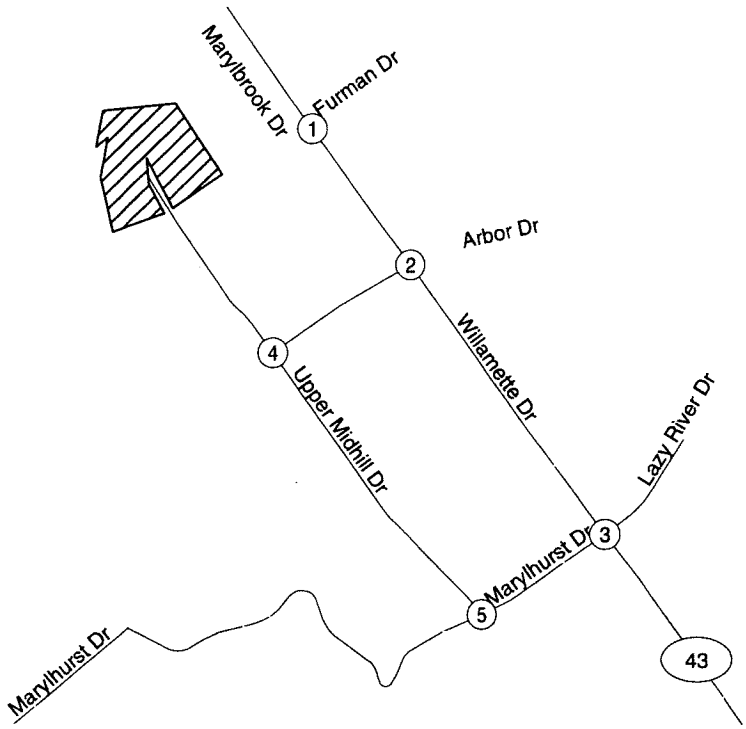
Willamette Drive/Arbor Drive

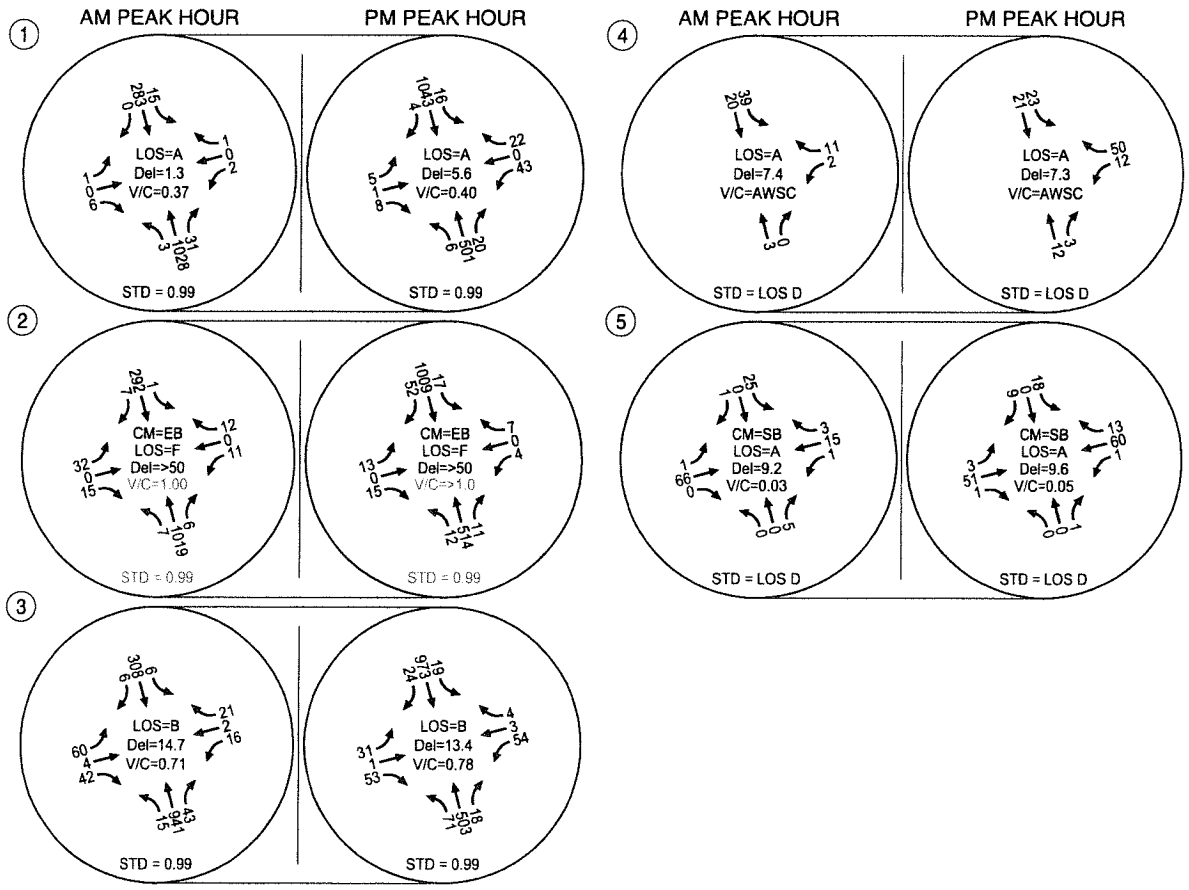
The eastbound approach to the Willamette Drive/Arbor Drive intersection is expected to operate at LOS F and above capacity during the weekday a.m. and p.m. peak hours under year 2016 total traffic conditions. Potential mitigation measures are identified below.

Mitigation

The provision of a separate northbound left-turn lane at the Willamette Drive/Arbor Drive intersection would provide an incremental improvement in traffic operations over total traffic conditions as well as improve safety by providing separation between the slowed or stopped northbound left-turning vehicles and northbound through vehicles; however, the intersection would continue to operate at LOS F and above capacity during the weekday p.m. peak hour. If, however, the north leg of the intersection were designed to accommodate two-stage left-turn movements from the eastbound approach, the intersection would operate at LOS C during the weekday a.m. and LOS D during the weekday p.m. peak hours and below capacity during both time periods.

Figure 8 summarizes the results of the traffic operations analysis at the study intersection under year 2016 total traffic conditions with the proposed mitigation (with and without the two-stage left-turn capability). *Appendix "G" includes the worksheets used to evaluate year 2016 total traffic conditions at the Willamette Drive/Arbor Drive intersection with the proposed mitigation.*





CM = CRITICAL MOVEMENT (TWSC)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED/AWSC) / CRITICAL MOVEMENT LEVEL OF SERVICE (TWSC)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED/AWSC) / CRITICAL MOVEMENT CONTROL DELAY (TWSC)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO
TWC = TWO-WAY STOP CONTROL
AWSC= ALL-WAY STOP CONTROL
STD = MOBILITY STANDARD

Year 2016 Total Traffic Conditions
Weekday AM & PM Peak Hour
West Linn, OR

Figure
7

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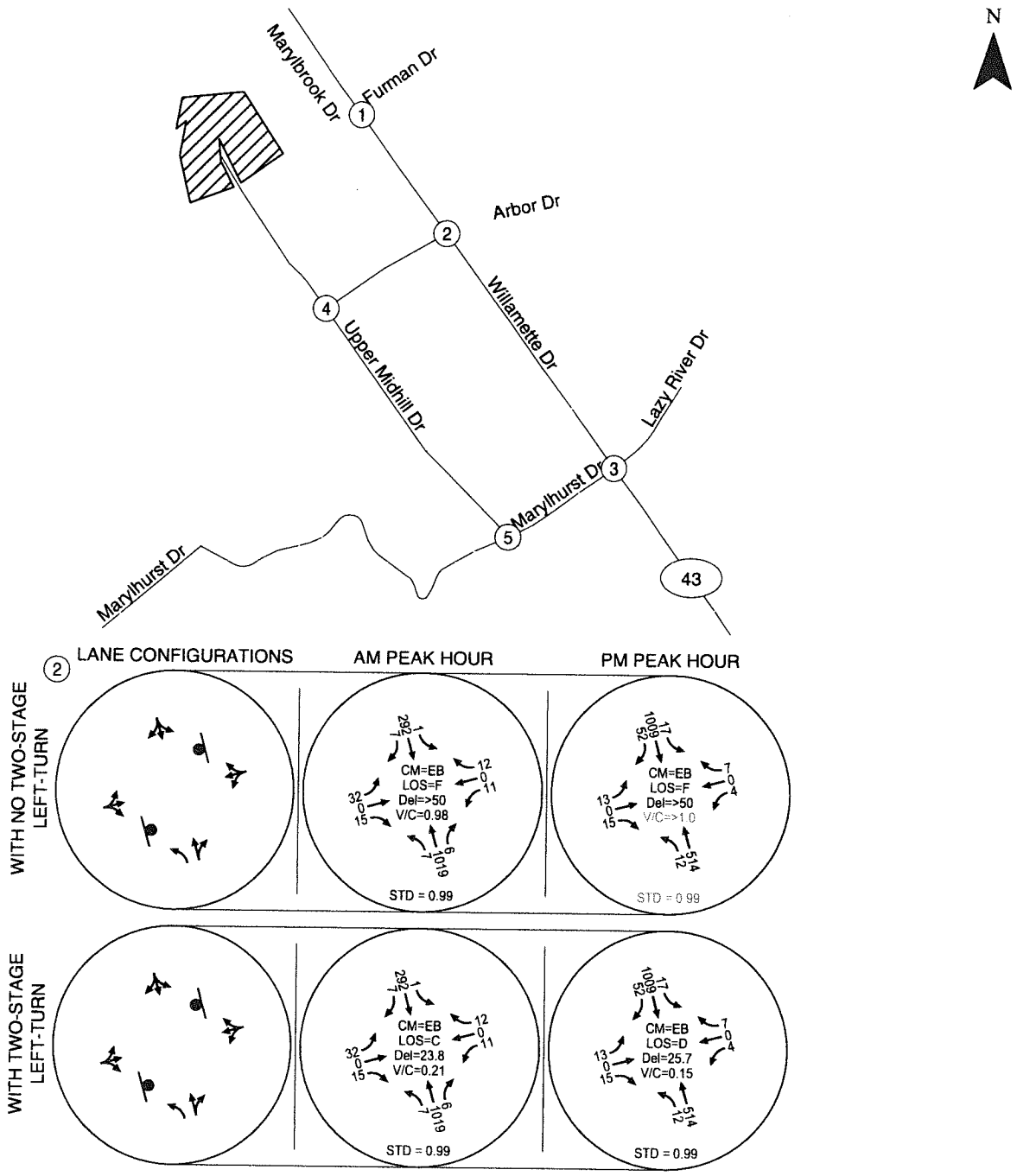
KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING PLANNING



CM = CRITICAL MOVEMENT (TWSC)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED/AWSC) / CRITICAL MOVEMENT LEVEL OF SERVICE (TWSC)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED/AWSC) / CRITICAL MOVEMENT CONTROL DELAY (TWSC)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO
TWC = TWO-WAY STOP CONTROL
AWSC= ALL-WAY STOP CONTROL
STD = MOBILITY STANDARD

Year 2016 Total Traffic Conditions - Mitigated Weekday AM & PM Peak Hour West Linn, OR

Figure 8

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING PLANNING

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Proportionate Share

The proposed development will result in a 1.9 percent increase in traffic volumes at the Willamette Drive/Arbor Drive intersection during the weekday a.m. peak hour and a 1.8 percent increase during the weekday p.m. peak hour. Therefore, the cost of the proposed mitigation will likely exceed the proportionate impacts of the proposed development. Section 55.125 of the West Linn Community Development Code (CDC) allows the City to condition mitigation that either addresses or minimizes the impacts of a proposed development. Section 55.100.I.1 allows the City to require construction or contribution of a proportionate share for necessary off-site improvements identified by the transportation analysis. Because the cost of the proposed mitigation will likely exceed the project's share of the impact, we recommend the City collect a proportionate share of the project's impact for use on the future project. A cost estimate for the proposed mitigation should be developed in coordination with the City and ODOT and the developer should pay a 1.9 percent proportionate share of the total cost.

CONCLUSIONS AND RECOMMENDATIONS

The results of the traffic impact analysis indicate that the proposed Upper Midhill Estates residential development can be constructed while maintaining safe and acceptable traffic operations at the study intersection and adjacent roadways assuming provision of the recommended mitigation measures. The findings of this analysis and our recommendations are discussed below.

FINDINGS

Existing Conditions

- All of the study intersections operate acceptably during the weekday a.m. and p.m. peak hours with the exception of the Willamette Drive/Arbor Drive intersection.
    - Mitigation measures have been identified as described below.
- The Willamette Drive/Arbor Drive intersection experienced the highest number of crashes over the five year study period, a majority of which involved vehicles turning to/from the minor street.
    - Mitigation measures have been identified as described below.
    - No other trends or patterns were identified in the crash data that require mitigation associated with this project.
- The segment of Upper Midhill Drive located south of Arbor Drive is relatively narrow; however, two vehicles can pass each other on the roadway. Also, should redevelopment occur along Upper Midhill Drive, it is assumed the roadway will be improved to the City's local street standard.

Year 2016 Background Traffic Conditions

- No planned developments or transportation improvements were identified within the site vicinity that will impact traffic operations under 2016 traffic conditions.
- All of the study intersections are forecast to operate acceptably during the weekday a.m. and p.m. peak hours with the exception of the Willamette Drive/Arbor Drive intersection.
    - Mitigation measures have been identified as described below.

Proposed Development Plan

- The proposed development will include 34 single family residential homes located along an extension of Upper Midhill Drive.
- The proposed development is estimated to generate approximately 400 daily trips, including 34 trips (9 inbound, 25 outbound) during the weekday a.m. peak hour and 40 trips (25 inbound, 15 outbound) during the weekday p.m. peak hour.

Year 2016 Total Traffic Conditions

- All of the study intersections are forecast to operate acceptably during the weekday a.m. and p.m. peak hours with the exception of the Willamette Drive/Arbor Drive intersection.
    - Mitigation measures have been identified as described below.

RECOMMENDATIONS

The following list summarizes the mitigation measures recommended as part of this proposed development.

- Construct an extension of Upper Midhill Road consistent with the City's local street standard.
- Shrubbery and landscaping near the internal intersections and site access points should be maintained to ensure adequate sight distance.
- Develop a cost estimate for the proposed mitigation in coordination with the City and ODOT staff and pay a proportionate share (1.9 percent) of the total cost toward the improvement.

REFERENCES

1. City of West Linn. *Transportation System Plan*. 2008.
2. Oregon Department of Transportation. *Analysis Procedures Manual*. 2015.
3. Transportation Research Board. *Highway Capacity Manual*. 2000.
4. Institute of Transportation Engineers. *Trip Generation, 9th Edition*. 2012.

APPENDIX

A. Traffic Counts
B. Description of Level of Service
C. Existing Traffic Conditions Worksheets
D. Crash Data
E. Year 2016 Background Traffic Conditions Worksheets
F. Year 2016 Total Traffic Conditions Worksheets
G. Year 2016 Total Traffic Conditions Worksheets - Mitigated

Appendix A Traffic Counts

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: Willamette Dr (OR 43) -- Marylbrook Dr/Furman Dr

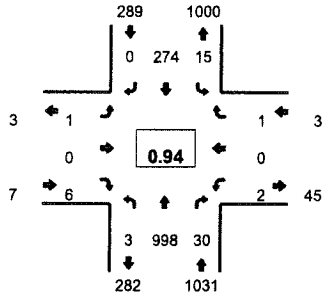
CITY/STATE: Lake Oswego, OR

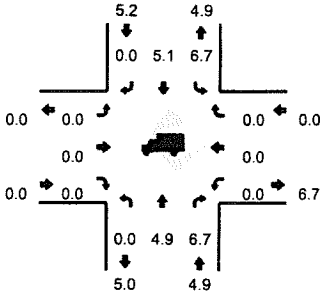
QC JOB #: 13423109

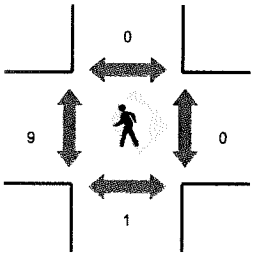
DATE: Wed, Jun 17 2015

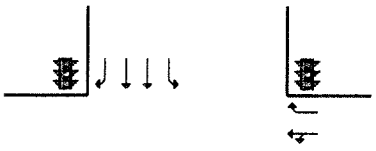
Peak-Hour: 7:00 AM -- 8:00 AM

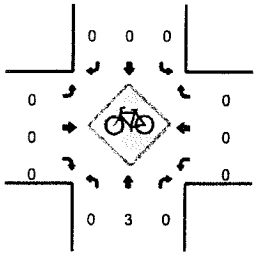
Peak 15-Min: 7:20 AM -- 7:35 AM

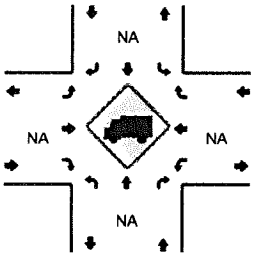


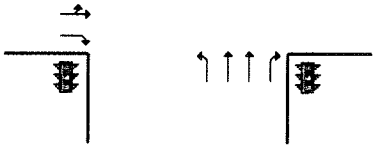


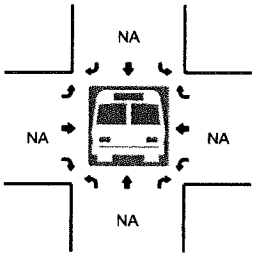












5-Min Count Period Beginning At	Willamette Dr (OR 43) (Northbound)				Willamette Dr (OR 43) (Southbound)				Marylbrook Dr/Furman Dr (Eastbound)				Marylbrook Dr/Furman Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	78	2	0	0	20	0	0	0	0	1	0	0	0	0	0	101	
7:05 AM	0	90	2	0	0	20	0	0	0	0	0	0	1	0	0	0	113	
7:10 AM	0	79	1	0	1	22	0	0	0	0	0	0	0	0	1	0	104	
7:15 AM	1	76	0	0	1	15	0	0	0	0	1	0	1	0	0	0	95	
7:20 AM	1	89	3	0	0	18	0	0	0	0	0	0	0	0	0	0	111	
7:25 AM	0	95	6	0	3	27	0	0	0	0	1	0	0	0	0	0	132	
7:30 AM	0	81	2	0	1	25	0	0	0	0	0	0	0	0	0	0	109	
7:35 AM	0	79	1	0	0	21	0	0	0	0	1	0	0	0	0	0	102	
7:40 AM	0	91	3	0	3	23	0	0	0	0	0	0	0	0	0	0	120	
7:45 AM	0	90	3	0	1	26	0	0	1	0	1	0	0	0	0	0	122	
7:50 AM	0	68	2	0	1	28	0	0	0	0	1	0	0	0	0	0	100	
7:55 AM	1	82	5	0	4	29	0	0	0	0	0	0	0	0	0	0	121	1330
8:00 AM	0	66	2	0	1	26	0	0	0	0	2	0	0	0	0	0	97	1326
8:05 AM	0	68	1	0	4	22	1	0	0	0	0	0	0	0	1	0	97	1310
8:10 AM	0	60	0	0	0	29	0	0	0	0	0	0	0	0	0	0	89	1295
8:15 AM	0	62	0	0	2	27	0	0	0	0	1	0	0	0	0	0	92	1292
8:20 AM	0	73	3	0	2	26	0	0	0	0	0	0	1	0	0	0	105	1286
8:25 AM	0	57	3	0	1	42	0	0	1	0	0	0	0	0	0	0	104	1258
8:30 AM	1	56	6	0	1	46	0	0	0	0	1	0	1	0	1	0	113	1262
8:35 AM	1	67	5	0	3	35	0	0	0	0	1	0	0	0	0	0	112	1272
8:40 AM	1	49	2	0	2	35	0	0	1	0	0	0	0	0	0	0	90	1242
8:45 AM	0	82	3	0	3	47	1	0	0	0	0	0	1	0	0	0	137	1257
8:50 AM	0	66	3	0	8	39	0	0	0	0	0	0	1	0	1	0	118	1275
8:55 AM	1	65	4	0	7	25	0	0	1	0	1	0	0	0	0	0	104	1258

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	4	1060	44	0	16	280	0	0	0	0	4	0	0	0	0	0	1408
Heavy Trucks	0	44	8		4	16	0		0	0	0		0	0	0		72
Pedestrians		0				0				4				0			4
Bicycles	0	1	0		0	0	0		0	0	0		0	0	0		1
Railroad Stopped Buses																	

Comments:

Report generated on 6/23/2015 10:21 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

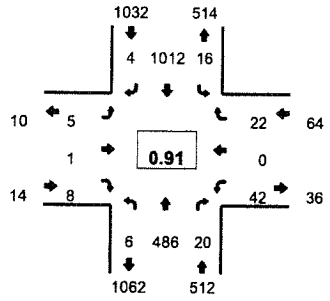
Method for determining peak hour: Total Entering Volume

LOCATION: Willamette Dr (OR 43) -- Marylbrook Dr/Furman Dr

CITY/STATE: Lake Oswego, OR

QC JOB #: 13423110

DATE: Wed, Jun 17 2015



Peak-Hour: 4:40 PM -- 5:40 PM

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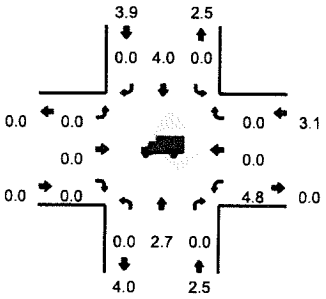

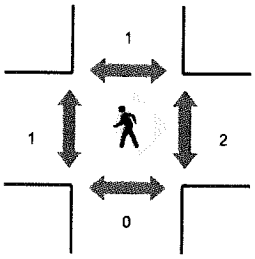

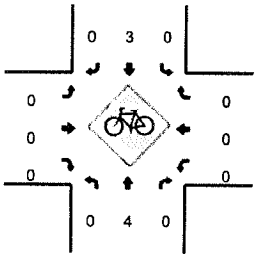

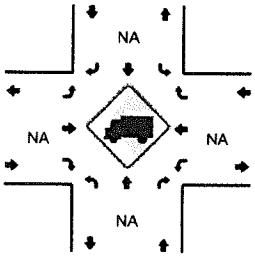

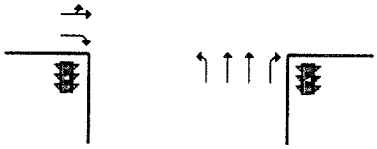

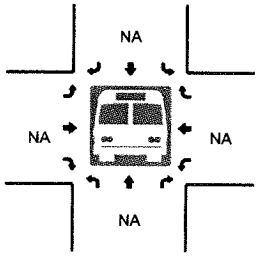

5-Min Count Period Beginning At	Willamette Dr (OR 43) (Northbound)				Willamette Dr (OR 43) (Southbound)				Marylbrook Dr/Furman Dr (Eastbound)				Marylbrook Dr/Furman Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	34	1	0	2	43	0	0	0	0	0	0	1	0	1	0	82	
4:05 PM	0	26	2	0	0	47	0	0	0	0	0	0	5	0	4	0	84	
4:10 PM	1	39	0	0	0	39	0	0	0	0	0	0	2	0	1	0	82	
4:15 PM	0	58	2	0	1	32	0	0	0	0	0	0	1	0	2	0	96	
4:20 PM	0	60	3	0	0	35	1	0	0	0	0	0	3	0	2	0	104	
4:25 PM	1	55	1	0	0	32	0	0	0	0	1	0	2	0	1	0	93	
4:30 PM	0	50	1	0	2	57	0	0	1	0	0	0	2	0	0	0	113	
4:35 PM	1	53	1	0	2	46	0	0	0	0	0	0	3	0	3	0	109	
4:40 PM	0	43	1	0	1	92	1	0	0	1	0	0	3	0	2	0	144	
4:45 PM	0	47	3	0	2	96	1	0	0	0	0	0	0	0	2	0	151	
4:50 PM	0	45	6	0	0	94	0	0	0	0	0	0	2	0	2	0	149	
4:55 PM	2	33	2	0	2	92	1	0	1	0	0	0	6	0	1	0	140	1347
5:00 PM	1	43	1	0	1	80	0	1	0	0	1	0	6	0	1	0	135	1400
5:05 PM	0	36	1	0	3	85	0	0	0	0	0	0	9	0	4	0	138	1454
5:10 PM	0	37	2	0	2	69	0	0	1	0	1	0	5	0	4	0	121	1493
5:15 PM	0	41	0	0	0	60	0	0	1	0	2	0	4	0	1	0	109	1506
5:20 PM	2	42	0	0	1	91	0	0	0	0	1	0	2	0	3	0	142	1544
5:25 PM	0	35	3	0	0	84	0	0	0	0	0	0	1	0	0	0	123	1574
5:30 PM	0	47	1	0	3	81	1	0	2	0	1	0	2	0	1	0	139	1600
5:35 PM	1	37	0	0	0	88	0	0	0	0	2	0	2	0	1	0	131	1622
5:40 PM	0	37	2	0	3	83	1	0	0	0	1	0	1	0	5	0	133	1611
5:45 PM	0	33	1	0	2	88	2	0	0	0	0	0	0	0	3	0	129	1589
5:50 PM	0	45	1	0	0	69	0	0	0	0	1	0	2	0	2	0	120	1560
5:55 PM	1	28	3	0	3	71	0	0	0	0	0	0	1	0	3	0	110	1530

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	540	40	0	12	1128	8	0	0	4	0	0	20	0	24	0	1776
Heavy Trucks	0	8	0		0	48	0		0	0	0		4	0	0		60
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 6/23/2015 10:21 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: Willamette Dr (OR 43) -- Arbor Dr
CITY/STATE: West Linn, OR

QC JOB #: 13423107
DATE: Wed, Jun 17 2015

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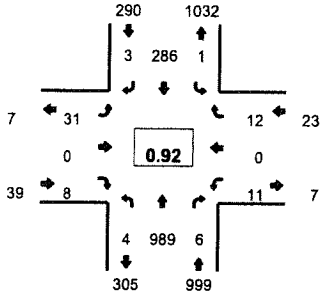
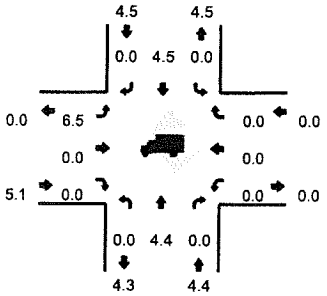
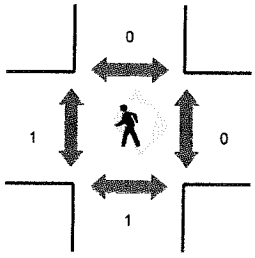
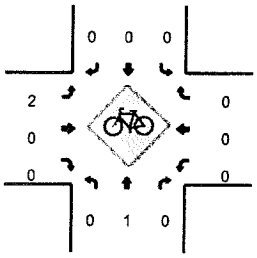
Peak 15-Min: 7:20 AM -- 7:35 AM

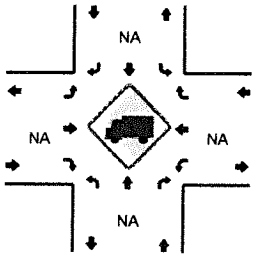


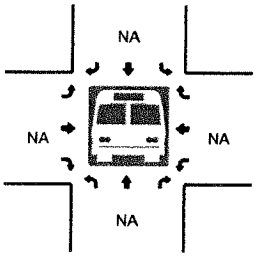


Quality Counts









5-Min Count Period Beginning At	Willamette Dr (OR 43) (Northbound)				Willamette Dr (OR 43) (Southbound)				Arbor Dr (Eastbound)				Arbor Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	80	0	0	0	19	1	0	1	0	0	0	1	0	1	0	103	
7:05 AM	0	89	0	0	0	24	0	0	3	0	1	0	0	0	2	0	119	
7:10 AM	0	80	0	0	0	24	0	0	3	0	0	0	0	0	1	0	108	
7:15 AM	0	73	0	0	0	19	0	0	3	0	0	0	1	0	0	0	96	
7:20 AM	0	96	0	0	0	18	0	0	7	0	0	0	0	0	0	0	121	
7:25 AM	1	98	1	0	0	26	0	0	2	0	2	0	0	0	2	0	132	
7:30 AM	0	86	2	0	0	25	0	0	0	0	0	0	2	0	0	0	115	
7:35 AM	1	74	0	0	0	24	0	0	2	0	0	0	3	0	1	0	105	
7:40 AM	0	84	1	0	0	23	0	0	2	0	1	0	0	0	3	0	114	
7:45 AM	1	87	0	0	0	26	0	0	3	0	1	0	1	0	0	0	119	
7:50 AM	1	68	1	0	0	28	1	0	2	0	2	0	3	0	1	0	107	
7:55 AM	0	74	1	0	1	30	1	0	3	0	1	0	0	0	1	0	112	1351
8:00 AM	0	66	0	0	0	28	0	0	2	0	0	0	0	0	1	0	97	1345
8:05 AM	0	64	0	0	0	23	1	0	2	0	2	0	1	0	0	0	93	1319
8:10 AM	0	63	0	0	0	28	0	0	1	0	1	0	1	0	0	0	94	1305
8:15 AM	1	59	1	0	1	28	0	0	0	0	0	0	2	0	4	0	96	1305
8:20 AM	0	67	0	0	1	22	0	0	6	0	1	0	0	0	3	0	100	1284
8:25 AM	0	61	0	0	0	44	0	0	0	0	1	0	0	0	0	0	106	1258
8:30 AM	0	70	0	0	0	46	1	0	0	0	0	0	0	0	0	0	117	1260
8:35 AM	0	66	0	0	0	36	1	0	4	0	1	0	0	0	1	0	109	1264
8:40 AM	0	55	0	0	0	35	0	0	1	0	1	0	0	0	0	0	92	1242
8:45 AM	1	86	0	0	1	43	1	0	3	0	2	0	0	0	2	0	139	1262
8:50 AM	0	65	1	0	0	38	1	0	0	0	1	0	1	0	1	0	108	1263
8:55 AM	0	72	0	0	0	24	2	0	0	0	0	0	1	0	0	0	99	1250

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	4	1120	12	0	0	276	0	0	36	0	8	0	8	0	8	0	1472
Heavy Trucks	0	44	0		0	16	0		4	0	0		0	0	0		64
Pedestrians		4				0				0				0			4
Bicycles	0	0	0		0	0	0		1	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 6/23/2015 10:21 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

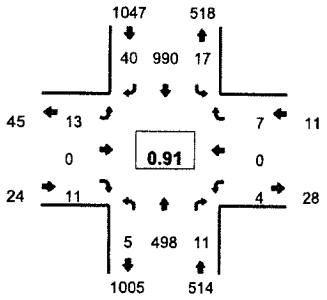
Type of peak hour being reported: Intersection Peak

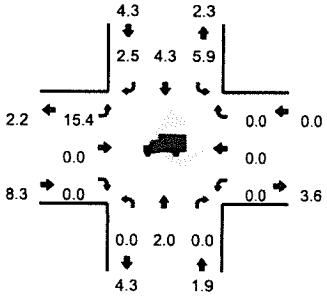
Method for determining peak hour: Total Entering Volume

LOCATION: Willamette Dr (OR 43) -- Arbor Dr
CITY/STATE: West Linn, OR

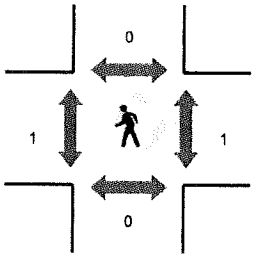
QC JOB #: 13423108
DATE: Wed, Jun 17 2015

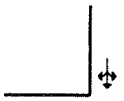
Peak-Hour: 4:40 PM -- 5:40 PM
Peak 15-Min: 4:40 PM -- 4:55 PM

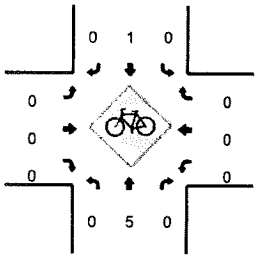


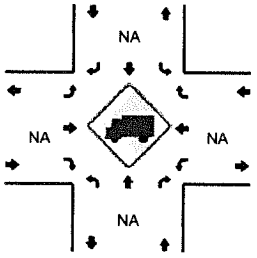


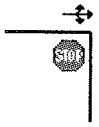
Quality Counts

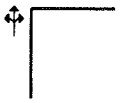


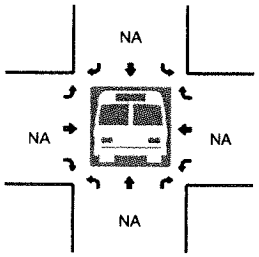












5-Min Count Period Beginning At	Willamette Dr (OR 43) (Northbound)				Willamette Dr (OR 43) (Southbound)				Arbor Dr (Eastbound)				Arbor Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	1	34	2	0	0	43	2	0	2	0	0	0	0	1	0	0	85	
4:05 PM	2	35	1	0	0	54	1	0	0	0	1	0	0	0	1	0	95	
4:10 PM	0	30	0	0	0	43	0	0	4	0	3	0	0	0	1	0	81	
4:15 PM	0	59	0	0	0	26	0	0	1	0	1	0	0	0	0	0	87	
4:20 PM	2	59	1	0	2	41	1	0	1	0	0	0	1	0	1	0	109	
4:25 PM	0	59	1	0	0	31	0	0	0	0	0	0	0	0	1	0	92	
4:30 PM	0	46	1	0	0	59	0	0	0	0	1	0	0	0	0	0	107	
4:35 PM	1	53	0	0	0	48	2	0	0	0	0	0	0	0	0	0	104	
4:40 PM	0	46	1	0	5	89	3	0	1	0	1	0	0	0	1	0	147	
4:45 PM	2	44	0	0	3	83	4	0	1	0	1	0	1	0	1	0	140	
4:50 PM	1	52	3	0	1	89	4	0	1	0	0	0	0	0	0	0	151	
4:55 PM	1	32	2	0	1	92	4	0	4	0	3	0	1	0	1	0	141	1339
5:00 PM	0	41	1	0	0	78	7	0	0	0	1	0	0	0	1	0	129	1383
5:05 PM	0	39	1	0	0	80	3	0	1	0	2	0	0	0	0	0	126	1414
5:10 PM	0	32	1	0	0	75	1	0	1	0	1	0	1	0	1	0	113	1446
5:15 PM	0	46	0	0	2	75	4	0	0	0	0	0	1	0	1	0	129	1488
5:20 PM	1	40	0	0	1	81	3	0	2	0	2	0	0	0	0	0	130	1509
5:25 PM	0	33	0	0	2	81	0	0	1	0	0	0	0	0	0	0	117	1534
5:30 PM	0	49	1	0	1	79	2	0	0	0	0	0	0	0	1	0	133	1560
5:35 PM	0	44	1	0	1	88	5	0	1	0	0	0	0	0	0	0	140	1596
5:40 PM	2	32	0	0	0	73	3	0	0	0	1	0	0	0	3	0	114	1563
5:45 PM	0	29	2	0	4	83	2	0	0	0	0	0	2	0	2	0	124	1547
5:50 PM	3	43	0	0	3	73	3	0	2	0	2	0	0	0	1	0	130	1526
5:55 PM	0	39	1	0	0	70	5	0	0	0	0	0	0	0	1	0	116	1501

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	12	568	16	0	36	1044	44	0	12	0	8	0	4	0	8	0	1752
Heavy Trucks	0	12	0		4	52	0		0	0	0		0	0	0		68
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 6/23/2015 10:21 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: Willamette Dr (OR 43) -- Marylhurst Dr/Lazy River Dr

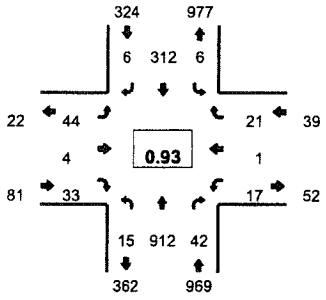
QC JOB #: 13423105

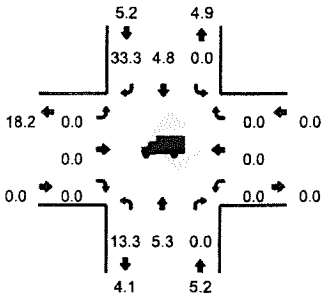
CITY/STATE: West Linn, OR

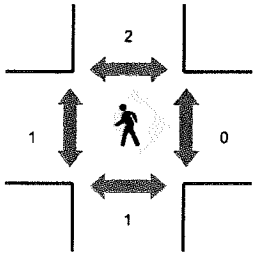
DATE: Wed, Jun 17 2015

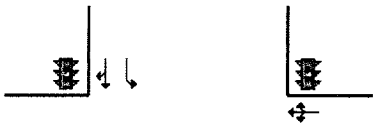
Peak-Hour: 7:05 AM -- 8:05 AM

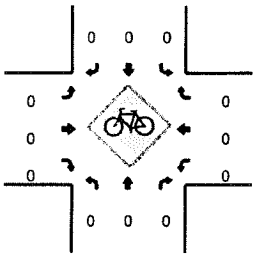
Peak 15-Min: 7:20 AM -- 7:35 AM

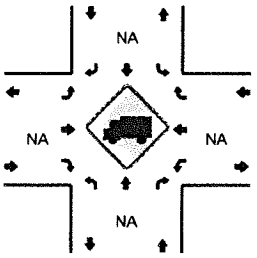


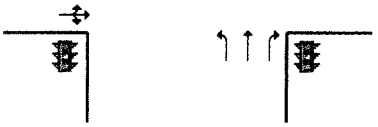


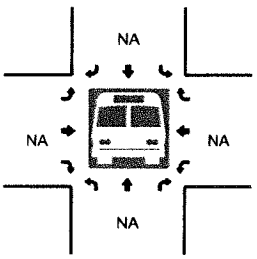












5-Min Count Period Beginning At	Willamette Dr (OR 43) (Northbound)				Willamette Dr (OR 43) (Southbound)				Marylhurst Dr/Lazy River Dr (Eastbound)				Marylhurst Dr/Lazy River Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	1	76	3	0	0	10	0	0	6	1	3	0	0	1	1	0	102	
7:05 AM	3	78	3	0	0	25	2	0	2	0	4	0	2	0	2	0	121	
7:10 AM	0	74	3	0	0	29	0	0	2	1	6	0	0	0	3	0	118	
7:15 AM	1	73	7	0	0	21	0	0	5	0	2	0	2	0	1	0	112	
7:20 AM	1	84	6	0	0	18	0	0	6	0	1	0	2	0	4	0	122	
7:25 AM	1	89	4	0	1	25	1	0	8	0	3	0	1	0	1	0	134	
7:30 AM	1	86	3	0	1	26	0	0	3	0	2	0	0	0	2	0	124	
7:35 AM	0	72	1	0	1	24	0	0	4	1	4	0	3	0	1	0	111	
7:40 AM	2	76	3	0	1	24	0	0	3	0	0	0	2	1	2	0	114	
7:45 AM	1	74	2	0	1	34	0	0	4	0	3	0	3	0	1	0	123	
7:50 AM	0	75	3	0	0	29	0	0	3	0	3	0	1	0	3	0	117	
7:55 AM	2	63	4	0	1	30	3	0	2	1	4	0	0	0	0	0	110	1408
8:00 AM	3	68	3	0	0	27	0	0	2	1	1	0	1	0	1	0	107	1413
8:05 AM	2	51	3	0	0	24	0	0	3	0	4	0	0	1	3	0	91	1383
8:10 AM	1	67	6	0	0	27	1	0	2	1	6	0	3	0	1	0	115	1380
8:15 AM	0	60	5	0	0	34	0	0	3	0	3	0	1	0	3	0	109	1377
8:20 AM	3	61	8	0	1	26	0	0	4	2	3	0	3	0	2	0	113	1368
8:25 AM	1	46	4	0	0	42	0	0	7	1	7	0	1	0	1	0	110	1344
8:30 AM	2	65	6	0	1	39	0	0	5	0	8	0	3	0	2	0	131	1351
8:35 AM	3	62	3	0	4	46	3	0	4	0	6	0	0	0	2	0	133	1373
8:40 AM	2	58	3	0	2	31	1	0	2	1	8	0	2	0	1	0	111	1370
8:45 AM	0	70	3	0	2	40	1	0	5	0	4	0	0	0	2	0	127	1374
8:50 AM	2	61	2	0	0	39	3	0	5	0	8	0	0	0	1	0	121	1378
8:55 AM	5	65	4	0	1	25	0	0	1	0	3	0	0	0	1	0	105	1373

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	12	1036	52	0	8	276	4	0	68	0	24	0	12	0	28	0	1520
Heavy Trucks	4	44	0		0	20	0		0	0	0		0	0	0		68
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 6/23/2015 10:21 AM

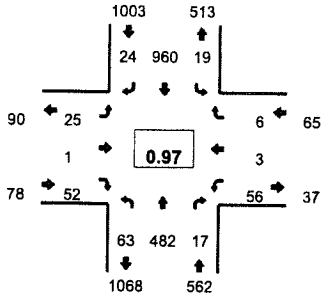
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

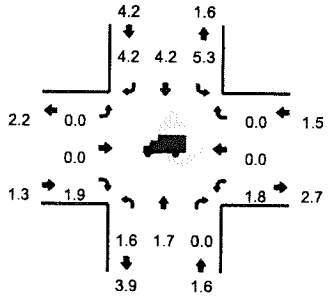
Method for determining peak hour: Total Entering Volume

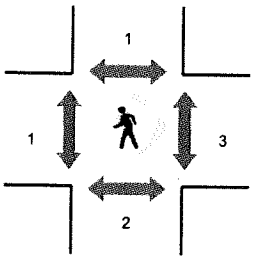
LOCATION: Willamette Dr (OR 43) -- Marylhurst Dr/Lazy River Dr
CITY/STATE: West Linn, OR

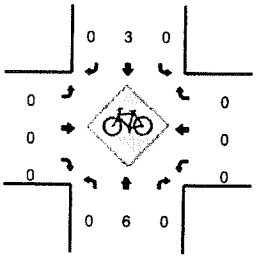
QC JOB #: 13423106
DATE: Wed, Jun 17 2015

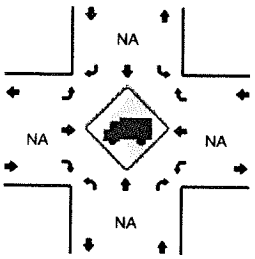


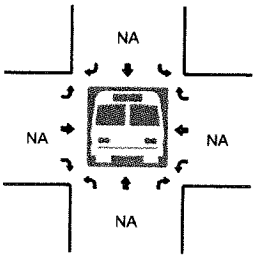
Peak-Hour: 4:45 PM -- 5:45 PM
Peak 15-Min: 4:45 PM -- 5:00 PM











5-Min Count Period Beginning At	Willamette Dr (OR 43) (Northbound)				Willamette Dr (OR 43) (Southbound)				Marylhurst Dr/Lazy River Dr (Eastbound)				Marylhurst Dr/Lazy River Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	10	33	3	0	0	57	3	0	1	0	1	0	4	0	0	0	112	
4:05 PM	9	35	0	0	2	49	0	0	2	1	1	0	5	0	1	0	105	
4:10 PM	6	42	2	0	0	49	2	0	2	0	4	0	4	0	0	0	111	
4:15 PM	1	56	2	0	0	26	1	0	0	0	3	0	1	0	0	0	90	
4:20 PM	10	63	3	0	0	47	1	0	1	0	3	0	0	0	1	0	129	
4:25 PM	4	61	1	0	0	10	0	0	3	0	1	0	5	0	1	0	86	
4:30 PM	9	48	0	0	2	74	2	0	2	0	4	0	4	0	1	0	146	
4:35 PM	3	43	1	0	0	49	3	0	4	0	1	0	2	0	1	0	107	
4:40 PM	6	45	1	0	1	62	1	0	2	0	3	0	1	0	0	0	122	
4:45 PM	7	52	2	0	1	91	2	0	2	0	3	0	1	0	2	0	163	
4:50 PM	4	48	2	0	1	87	2	0	2	0	5	0	3	0	1	0	155	
4:55 PM	3	27	1	0	1	76	0	0	0	0	6	0	6	0	0	0	120	1446
5:00 PM	3	43	2	0	2	84	3	0	0	0	3	0	3	0	0	0	143	1477
5:05 PM	8	45	2	0	2	76	3	0	3	0	4	0	8	0	0	0	151	1523
5:10 PM	8	34	3	0	3	77	2	0	2	0	2	0	6	0	0	0	137	1549
5:15 PM	8	37	1	0	1	73	4	0	2	1	4	0	5	0	0	0	136	1595
5:20 PM	8	44	1	0	3	76	0	0	5	0	10	0	6	3	0	0	156	1622
5:25 PM	3	35	0	0	2	85	1	0	1	0	4	0	8	0	0	0	139	1675
5:30 PM	3	36	3	0	0	81	3	0	4	0	2	0	4	0	1	0	137	1666
5:35 PM	3	41	0	0	2	83	3	0	2	0	2	0	2	0	0	0	138	1697
5:40 PM	5	40	0	0	1	71	1	0	2	0	7	0	4	0	2	0	133	1708
5:45 PM	4	24	1	0	2	80	2	0	1	0	4	0	4	0	0	0	122	1667
5:50 PM	6	43	1	0	0	73	5	0	2	0	3	0	0	0	1	0	134	1646
5:55 PM	7	39	0	0	1	64	2	0	4	0	10	0	3	0	1	0	131	1657

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	56	508	20	0	12	1016	16	0	16	0	56	0	40	0	12	0	1752
Heavy Trucks	4	8	0		0	48	0		0	0	0		0	0	0		60
Pedestrians		8				0				0				0			8
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 6/23/2015 10:21 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

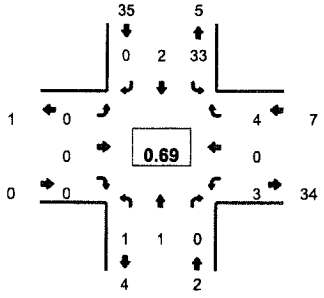
Type of peak hour being reported: Intersection Peak

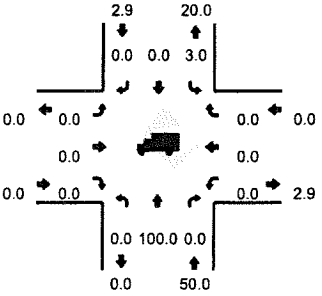
Method for determining peak hour: Total Entering Volume

LOCATION: Upper Midhill Dr -- Arbor Dr
CITY/STATE: West Linn, OR

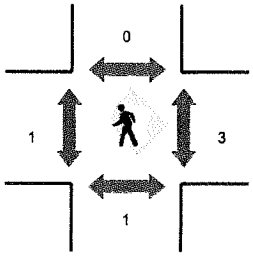
QC JOB #: 13423101
DATE: Wed, Jun 17 2015

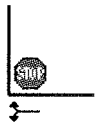
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:15 AM -- 7:30 AM

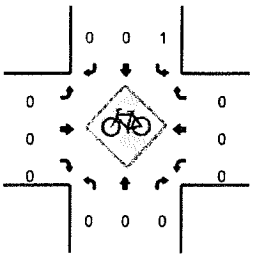


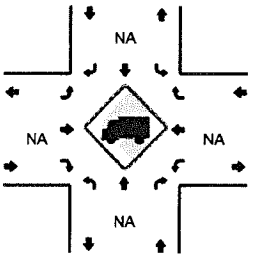


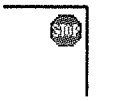
Quality Counts

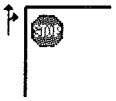


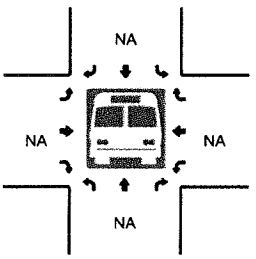












5-Min Count Period	Upper Midhill Dr (Northbound)				Upper Midhill Dr (Southbound)				Arbor Dr (Eastbound)				Arbor Dr (Westbound)				Total	Hourly Totals
Beginning At	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	
7:05 AM	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	3	
7:10 AM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2	
7:15 AM	1	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	6	
7:20 AM	0	0	0	0	6	1	0	0	0	0	0	0	0	0	0	0	7	
7:25 AM	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	3	
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:35 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	2	
7:40 AM	0	1	0	0	4	0	0	0	0	0	0	0	0	0	0	0	5	
7:45 AM	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	3	
7:50 AM	0	0	0	0	4	1	0	0	0	0	0	0	0	0	1	1	7	
7:55 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	2	42
8:00 AM	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	3	43
8:05 AM	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	3	43
8:10 AM	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	3	44
8:15 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	2	40
8:20 AM	0	0	1	0	5	0	0	0	0	0	0	0	0	0	0	0	6	39
8:25 AM	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	2	38
8:30 AM	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	3	41
8:35 AM	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	3	42
8:40 AM	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	3	40
8:45 AM	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	3	40
8:50 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	2	0	4	37
8:55 AM	0	0	0	0	1	2	0	0	0	0	0	0	0	0	2	0	5	40

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	4	0	0	0	52	4	0	0	0	0	0	0	4	0	0	0	64
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	0	0		0
Pedestrians		0				0				0				4			4
Bicycles	0	0	0		1	0	0		0	0	0		0	0	0		1
Railroad Stopped Buses																	

Comments:

Report generated on 6/23/2015 10:21 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

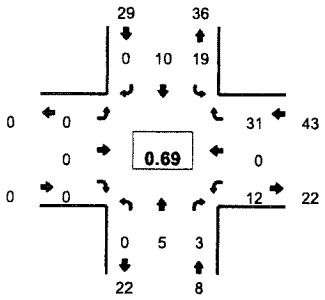
Type of peak hour being reported: Intersection Peak

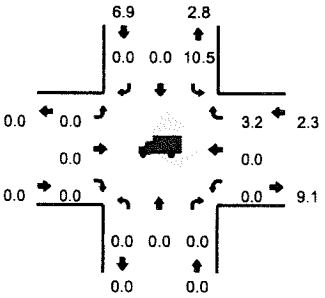
Method for determining peak hour: Total Entering Volume

LOCATION: Upper Midhill Dr -- Arbor Dr
CITY/STATE: West Linn, OR

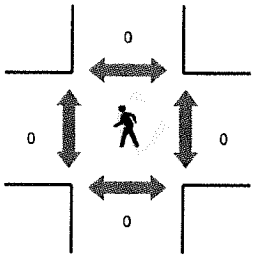
QC JOB #: 13423102
DATE: Wed, Jun 17 2015

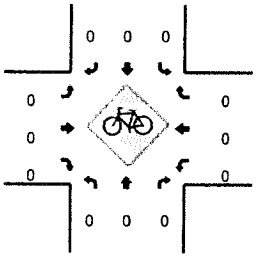
Peak-Hour: 4:40 PM -- 5:40 PM
Peak 15-Min: 4:50 PM -- 5:05 PM

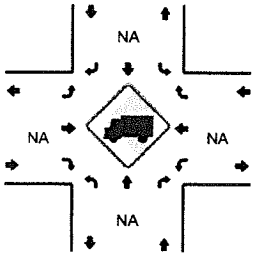


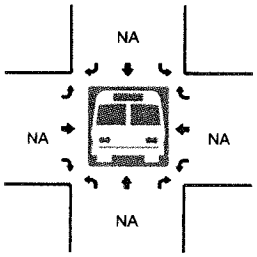


Quality Counts









5-Min Count Period	Upper Midhill Dr (Northbound)				Upper Midhill Dr (Southbound)				Arbor Dr (Eastbound)				Arbor Dr (Westbound)				Total	Hourly Totals
Beginning At	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	4	0	6	
4:05 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	3	0	5	
4:10 PM	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	7	
4:15 PM	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	
4:20 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	3	
4:25 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:30 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	
4:35 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	
4:40 PM	0	0	1	0	1	1	0	0	0	0	0	0	2	0	0	0	5	
4:45 PM	0	0	0	0	2	0	0	0	0	0	0	0	1	0	5	0	8	
4:50 PM	0	0	0	0	3	1	0	0	0	0	0	0	1	0	3	0	8	
4:55 PM	0	0	1	0	4	2	0	0	0	0	0	0	0	0	4	0	11	58
5:00 PM	0	0	0	0	2	1	0	0	0	0	0	0	2	0	5	0	10	62
5:05 PM	0	0	0	0	2	1	0	0	0	0	0	0	0	0	4	0	7	64
5:10 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0	3	60
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	3	61
5:20 PM	0	1	0	0	2	2	0	0	0	0	0	0	2	0	3	0	10	68
5:25 PM	0	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	4	72
5:30 PM	0	0	0	0	0	1	0	0	0	0	0	0	1	0	1	0	3	73
5:35 PM	0	1	0	0	1	1	0	0	0	0	0	0	2	0	3	0	8	80
5:40 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	3	78
5:45 PM	0	0	0	0	1	1	0	0	0	0	0	0	3	0	0	0	5	75
5:50 PM	0	0	0	0	1	0	0	0	0	0	0	0	3	0	3	0	7	74
5:55 PM	0	1	0	1	0	1	0	0	0	0	0	0	2	0	1	0	6	69

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	4	0	36	16	0	0	0	0	0	0	12	0	48	0	116
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	0	0		0
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

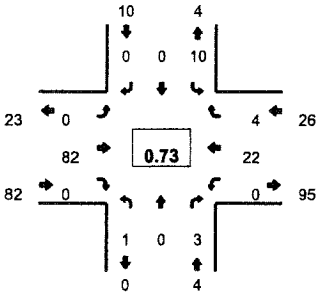
Report generated on 6/23/2015 10:21 AM

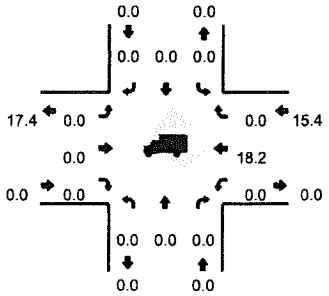
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

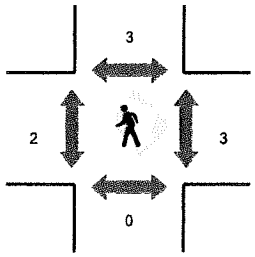
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

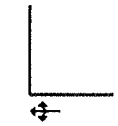
LOCATION: Upper Midhill Dr/Midhill Cir -- Marylhurst Dr | **QC JOB #:** 13423103
CITY/STATE: West Linn, OR | **DATE:** Wed, Jun 17 2015

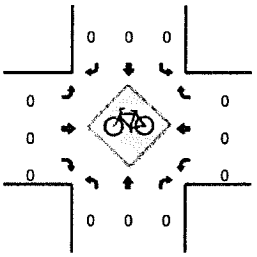
Peak-Hour: 7:55 AM -- 8:55 AM
Peak 15-Min: 8:25 AM -- 8:40 AM

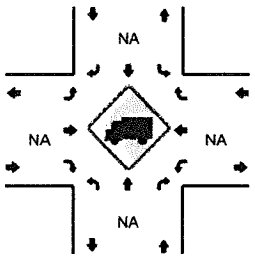


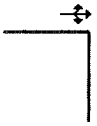


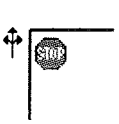


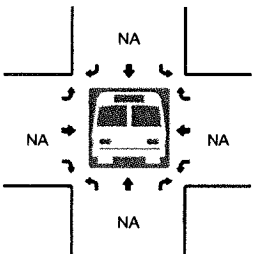












5-Min Count Period	Upper Midhill Dr/Midhill Cir (Northbound)				Upper Midhill Dr/Midhill Cir (Southbound)				Marylhurst Dr (Eastbound)				Marylhurst Dr (Westbound)				Total	Hourly Totals
Beginning At	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	0	0	0	1	0	0	0	0	8	0	0	0	2	0	0	11	
7:05 AM	0	0	0	0	0	0	0	0	0	6	0	0	0	2	0	0	8	
7:10 AM	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	7	
7:15 AM	0	0	0	0	0	0	0	0	0	4	0	0	0	0	1	0	5	
7:20 AM	0	0	0	0	2	0	0	0	0	5	0	0	0	1	0	0	8	
7:25 AM	0	0	1	0	0	0	0	0	0	11	0	0	0	0	0	0	12	
7:30 AM	0	0	1	0	1	0	0	0	0	3	0	0	1	0	0	0	6	
7:35 AM	0	0	0	0	3	0	0	0	0	6	0	0	0	0	0	0	9	
7:40 AM	0	0	0	0	0	0	0	0	1	3	0	0	0	3	0	0	7	
7:45 AM	0	0	0	0	0	0	0	0	0	4	0	0	0	2	0	0	6	
7:50 AM	0	0	1	0	0	0	0	0	0	4	0	0	0	0	0	0	5	
7:55 AM	0	0	2	0	1	0	0	0	0	4	0	0	0	5	0	0	12	96
8:00 AM	0	0	0	0	0	0	0	0	0	3	0	0	0	1	0	0	4	89
8:05 AM	1	0	0	0	1	0	0	0	0	6	0	0	0	2	0	0	10	91
8:10 AM	0	0	0	0	0	0	0	0	0	5	0	0	0	1	1	0	7	91
8:15 AM	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	8	94
8:20 AM	0	0	0	0	2	0	0	0	0	7	0	0	0	3	0	0	12	98
8:25 AM	0	0	0	0	3	0	0	0	0	9	0	0	0	1	0	0	13	99
8:30 AM	0	0	0	0	1	0	0	0	0	9	0	0	0	0	1	0	11	104
8:35 AM	0	0	0	0	2	0	0	0	0	11	0	0	0	5	0	0	18	113
8:40 AM	0	0	0	0	0	0	0	0	0	6	0	0	0	2	0	0	8	114
8:45 AM	0	0	0	0	0	0	0	0	0	6	0	0	0	1	0	0	7	115
8:50 AM	0	0	1	0	0	0	0	0	0	8	0	0	0	1	2	0	12	122
8:55 AM	0	0	0	0	0	0	1	0	0	3	0	0	0	7	0	0	11	121

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	24	0	0	0	0	116	0	0	0	24	4	0	168
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	4	0		4
Pedestrians		0				0				0				4			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 6/23/2015 10:21 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

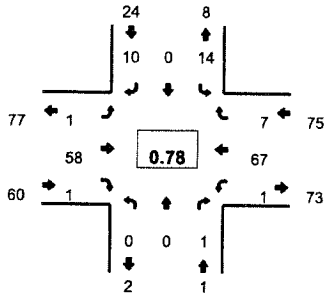
Type of peak hour being reported: Intersection Peak

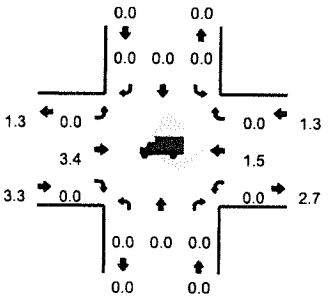
Method for determining peak hour: Total Entering Volume

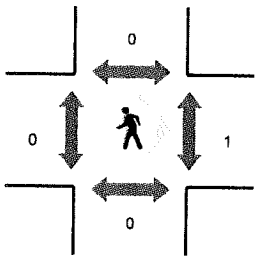
LOCATION: Upper Midhill Dr/Midhill Cir -- Marylhurst Dr
CITY/STATE: West Linn, OR

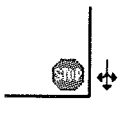
QC JOB #: 13423104
DATE: Wed, Jun 17 2015

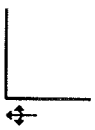
Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:10 PM -- 5:25 PM

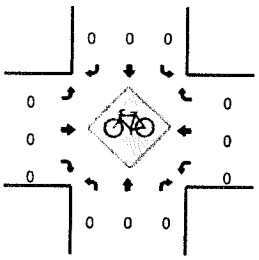


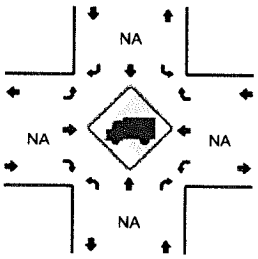


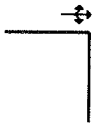


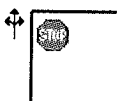


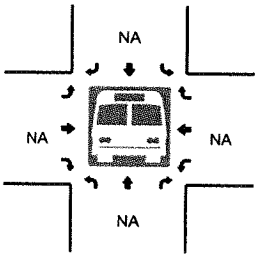












5-Min Count Period Beginning At	Upper Midhill Dr/Midhill Cir (Northbound)				Upper Midhill Dr/Midhill Cir (Southbound)				Marylhurst Dr (Eastbound)				Marylhurst Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	0	0	0	0	0	0	1	0	0	0	1	9	2	0	13	
4:05 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	6	0	0	8	
4:10 PM	0	0	0	0	0	0	0	0	0	3	0	0	0	7	0	0	10	
4:15 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	4	
4:20 PM	0	0	0	0	1	0	0	0	0	3	0	0	0	8	2	0	14	
4:25 PM	0	0	0	0	1	0	0	0	0	4	0	0	0	2	0	0	7	
4:30 PM	0	0	0	0	0	0	0	0	1	5	0	0	0	8	1	0	15	
4:35 PM	0	0	0	0	0	0	0	0	0	3	0	0	0	3	1	0	7	
4:40 PM	0	0	0	0	1	0	1	0	1	2	0	0	1	4	1	0	11	
4:45 PM	0	0	0	0	0	0	0	0	0	5	0	0	0	5	0	0	10	
4:50 PM	0	0	1	0	1	0	1	0	0	3	0	0	0	2	1	0	9	
4:55 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	3	111
5:00 PM	0	0	0	0	1	0	1	0	0	3	0	0	0	5	0	0	10	108
5:05 PM	0	0	0	0	0	0	0	0	0	4	0	0	0	10	0	0	14	114
5:10 PM	0	0	0	0	0	0	0	0	0	5	0	0	0	6	0	0	11	115
5:15 PM	0	0	0	0	2	0	1	0	0	4	0	0	0	10	0	0	17	128
5:20 PM	0	0	0	0	1	0	1	0	0	12	0	0	0	6	3	0	23	137
5:25 PM	0	0	0	0	1	0	0	0	0	5	0	0	0	3	1	0	10	140
5:30 PM	0	0	0	0	1	0	1	0	0	3	1	0	0	5	0	0	11	136
5:35 PM	0	0	0	0	0	0	2	0	1	2	0	0	0	2	1	0	8	137
5:40 PM	0	0	1	0	2	0	1	0	0	6	0	0	0	3	0	0	13	139
5:45 PM	0	0	0	0	2	0	1	0	0	4	0	0	0	3	0	0	10	139
5:50 PM	0	0	0	0	1	0	0	0	0	4	0	0	1	9	0	0	15	145
5:55 PM	0	0	0	0	3	0	2	0	0	6	0	0	0	5	2	0	18	160

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	12	0	8	0	0	84	0	0	0	88	12	0	204
Heavy Trucks	0	0	0		0	0	0		0	4	0		0	0	0		4
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 6/23/2015 10:21 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Appendix B Description of Level of Service

DESCRIPTION OF LEVEL OF SERVICE

Level of service (LOS) is a concept developed to quantify the degree of comfort (including such elements as travel time, number of stops, total amount of stopped delay, and impediments caused by other vehicles) afforded to drivers as they travel through an intersection or roadway segment. Six grades are used to denote the various level of service from "A" to "F".1

Signalized Intersections

The six level-of-service grades are described qualitatively for signalized intersections in Table B1. Additionally, Table B2 identifies the relationship between level of service and average control delay per vehicle. Control delay is defined to include initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. Using this definition, Level of Service "D" is generally considered to represent the minimum acceptable design standard.

Table B1: Level-of-Service Definitions (Signalized Intersections)

Level of Service	Average Delay per Vehicle
A	Very low average control delay, less than 10 seconds per vehicle. This occurs when progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.
B	Average control delay is greater than 10 seconds per vehicle and less than or equal to 20 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for a level of service A, causing higher levels of average delay.
C	Average control delay is greater than 20 seconds per vehicle and less than or equal to 35 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.
D	Average control delay is greater than 35 seconds per vehicle and less than or equal to 55 seconds per vehicle. The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle length, or high volume/capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
E	Average control delay is greater than 55 seconds per vehicle and less than or equal to 80 seconds per vehicle. This is usually considered to be the limit of acceptable delay. These high delay values generally (but not always) indicate poor progression, long cycle lengths, and high volume/capacity ratios. Individual cycle failures are frequent occurrences.
F	Average control delay is in excess of 80 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with oversaturation. It may also occur at high volume/capacity ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also contribute to such high delay values.

1 Most of the material in this appendix is adapted from the Transportation Research Board, Highway Capacity Manual, (2000).

Table B2: Level-of-Service Criteria for Signalized Intersections

Level of Service	Average Control Delay per Vehicle (Seconds)
A	<10.0
B	>10 and ≤20
C	>20 and ≤35
D	>35 and ≤55
E	>55 and ≤80
F	>80

Unsignalized Intersections

Unsignalized intersections include two-way stop-controlled (TWSC) and all-way stop-controlled (AWSC) intersections. The 2000 Highway Capacity Manual (HCM) provides models for estimating control delay at both TWSC and AWSC intersections. A qualitative description of the various service levels associated with an unsignalized intersection is presented in Table B3. A quantitative definition of level of service for unsignalized intersections is presented in Table B4. Using this definition, Level of Service "E" is generally considered to represent the minimum acceptable design standard.

Table B3: Level-of-Service Criteria for Unsignalized Intersections

Level of Service	Average Delay per Vehicle to Minor Street
A	• Nearly all drivers find freedom of operation. • Very seldom is there more than one vehicle in queue.
B	• Some drivers begin to consider the delay an inconvenience. • Occasionally there is more than one vehicle in queue.
C	• Many times there is more than one vehicle in queue. • Most drivers feel restricted, but not objectionably so.
D	• Often there is more than one vehicle in queue. • Drivers feel quite restricted.
E	• Represents a condition in which the demand is near or equal to the probable maximum number of vehicles that can be accommodated by the movement. • There is almost always more than one vehicle in queue. • Drivers find the delays approaching intolerable levels.
F	• Forced flow. • Represents an intersection failure condition that is caused by geometric and/or operational constraints external to the intersection.

Table B4: Level-of-Service Criteria for Unsignalized Intersections

Level of Service	Average Control Delay per Vehicle (Seconds)
A	<10.0
B	>10.0 and ≤ 15.0
C	>15.0 and ≤ 25.0
D	>25.0 and ≤ 35.0
E	>35.0 and ≤ 50.0
F	>50.0

It should be noted that the level-of-service criteria for unsignalized intersections are somewhat different than the criteria used for signalized intersections. The primary reason for this difference is that drivers expect different levels of performance from different kinds of transportation facilities. The expectation is that a signalized intersection is designed to carry higher traffic volumes than an unsignalized intersection. Additionally, there are a number of driver behavior considerations that combine to make delays at signalized intersections less galling than at unsignalized intersections. For example, drivers at signalized intersections are able to relax during the red interval, while drivers on the minor street approaches to TWSC intersections must remain attentive to the task of identifying

acceptable gaps and vehicle conflicts. Also, there is often much more variability in the amount of delay experienced by individual drivers at unsignalized intersections than signalized intersections. For these reasons, it is considered that the control delay threshold for any given level of service is less for an unsignalized intersection than for a signalized intersection. While overall intersection level of service is calculated for AWSC intersections, level of service is only calculated for the minor approaches and the major street left turn movements at TWSC intersections. No delay is assumed to the major street through movements. For TWSC intersections, the overall intersection level of service remains undefined: level of service is only calculated for each minor street lane.

In the performance evaluation of TWSC intersections, it is important to consider other measures of effectiveness (MOEs) in addition to delay, such as v/c ratios for individual movements, average queue lengths, and 95th-percentile queue lengths. By focusing on a single MOE for the worst movement only, such as delay for the minor-street left turn, users may make inappropriate traffic control decisions. The potential for making such inappropriate decisions is likely to be particularly pronounced when the HCM level-of-service thresholds are adopted as legal standards, as is the case in many public agencies.

Appendix C Existing Traffic Conditions Worksheets

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	0	6	2	0	1	3	1007	30	15	277	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		1.00	0.99		1.00	1.00	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00	1.00	0.99	1.00	1.00	1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1805	1594		1803	1615	1789	3438	1477	1687	3438	
Flt Permitted		1.00	1.00		1.00	1.00	0.57	1.00	1.00	0.25	1.00	
Satd. Flow (perm)		1900	1594		1898	1615	1076	3438	1477	451	3438	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	1	0	6	2	0	1	3	1071	32	16	295	0
RTOR Reduction (vph)	0	0	6	0	0	1	0	0	4	0	0	0
Lane Group Flow (vph)	0	1	0	0	2	0	3	1071	28	16	295	0
Confl. Peds. (#/hr)			1	1			9					9
Confl. Bikes (#/hr)									3			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	5%	7%	7%	5%	0%
Turn Type	Perm		Perm	Perm		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		8	4	4	4	2		2	6		6
Actuated Green, G (s)		1.2	1.2		1.2	1.2	84.3	83.3	83.3	86.3	84.3	
Effective Green, g (s)		1.2	1.2		1.2	1.2	84.3	83.3	83.3	86.3	84.3	
Actuated g/C Ratio		0.01	0.01		0.01	0.01	0.84	0.83	0.83	0.86	0.84	
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.3	4.8	4.8	2.3	4.8	
Lane Grp Cap (vph)		23	19		23	19	914	2864	1230	414	2898	
v/s Ratio Prot							0.00	c0.31		c0.00	0.09	
v/s Ratio Perm		0.00	0.00		c0.00	0.00	0.00		0.02	0.03		
v/c Ratio		0.04	0.00		0.09	0.00	0.00	0.37	0.02	0.04	0.10	
Uniform Delay, d1		48.8	48.8		48.9	48.8	1.2	2.0	1.4	1.0	1.3	
Progression Factor		1.00	1.00		1.00	1.00	0.38	0.27	0.19	1.00	1.00	
Incremental Delay, d2		0.6	0.1		1.2	0.0	0.0	0.3	0.0	0.0	0.0	
Delay (s)		49.4	48.9		50.0	48.8	0.5	0.8	0.3	1.1	1.4	
Level of Service		D	D		D	D	A	A	A	A	A	
Approach Delay (s)		48.9			49.6			0.8			1.4	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM Average Control Delay	1.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	49.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	31	0	8	11	0	12	4	998	6	1	289	3
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	34	0	9	12	0	13	4	1085	7	1	314	3
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								992			884	
pX, platoon unblocked	0.31	0.31		0.31	0.31	0.31				0.31		
vC, conflicting volume	1429	1419	318	1424	1417	1088	318			1091		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1271	1239	318	1257	1234	176	318			186		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	19	100	99	74	100	95	100			100		
cM capacity (veh/h)	42	55	726	46	55	271	1252			436		

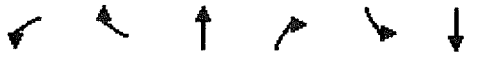
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	42	25	1096	318
Volume Left	34	12	4	1
Volume Right	9	13	7	3
cSH	52	81	1252	436
Volume to Capacity	0.82	0.31	0.00	0.00
Queue Length 95th (ft)	86	29	0	0
Control Delay (s)	198.7	68.5	0.1	0.1
Lane LOS	F	F	A	A
Approach Delay (s)	198.7	68.5	0.1	0.1
Approach LOS	F	F		

Intersection Summary				
Average Delay	6.9			
Intersection Capacity Utilization	66.3%	ICU Level of Service	C	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	48	4	35	16	2	21	13	928	42	6	298	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.95			0.93		1.00	0.99		1.00	1.00	
Flt Protected		0.97			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1723			1701		1568	1802		1805	1812	
Flt Permitted		0.86			0.84		0.56	1.00		0.19	1.00	
Satd. Flow (perm)		1517			1452		926	1802		355	1812	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	52	4	38	17	2	23	14	998	45	6	320	6
RTOR Reduction (vph)	0	28	0	0	21	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	66	0	0	21	0	14	1042	0	6	326	0
Confl. Peds. (#/hr)	2					2	1					1
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	15%	5%	0%	0%	4%	33%
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)		8.4			8.4		77.7	76.6		77.5	76.5	
Effective Green, g (s)		8.4			8.4		77.7	76.6		77.5	76.5	
Actuated g/C Ratio		0.08			0.08		0.78	0.77		0.78	0.76	
Clearance Time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Vehicle Extension (s)		2.5			2.5		2.3	5.2		2.3	5.2	
Lane Grp Cap (vph)		127			122		727	1380		290	1386	
v/s Ratio Prot							c0.00	c0.58		0.00	0.18	
v/s Ratio Perm		c0.04			0.01		0.01			0.02		
v/c Ratio		0.52			0.17		0.02	0.76		0.02	0.23	
Uniform Delay, d1		43.9			42.6		2.5	6.5		6.3	3.4	
Progression Factor		1.00			1.00		1.00	1.00		1.90	1.79	
Incremental Delay, d2		2.6			0.5		0.0	3.9		0.0	0.4	
Delay (s)		46.5			43.1		2.5	10.4		11.9	6.4	
Level of Service		D			D		A	B		B	A	
Approach Delay (s)		46.5			43.1			10.3			6.5	
Approach LOS		D			D			B			A	

Intersection Summary			
HCM Average Control Delay	12.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	66.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Volume (vph)	2	4	1	0	31	2
Peak Hour Factor	0.66	0.66	0.66	0.66	0.66	0.66
Hourly flow rate (vph)	3	6	2	0	47	3

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	9	2	50
Volume Left (vph)	3	0	47
Volume Right (vph)	6	0	0
Hadj (s)	-0.33	1.70	0.19
Departure Headway (s)	3.7	5.7	4.1
Degree Utilization, x	0.01	0.00	0.06
Capacity (veh/h)	958	624	870
Control Delay (s)	6.7	8.7	7.4
Approach Delay (s)	6.7	8.7	7.4
Approach LOS	A	A	A

Intersection Summary			
Delay	7.3		
HCM Level of Service	A		
Intersection Capacity Utilization	18.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	1	66	0	1	15	1	0	0	5	8	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	1	74	0	1	17	1	0	0	6	9	0	0
Pedestrians		1			1							
Lane Width (ft)		12.0			12.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		0			0							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					868							
pX, platoon unblocked												
vC, conflicting volume	18			74			97	97	75	103	96	18
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	18			74			97	97	75	103	96	18
tC, single (s)	5.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	3.1			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	99	99	100	100
cM capacity (veh/h)	1141			1538			888	796	991	876	796	1065

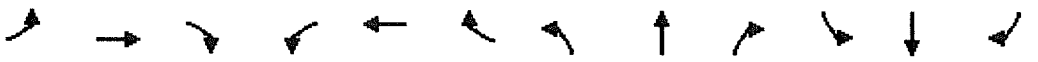
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	75	19	6	9
Volume Left	1	1	0	9
Volume Right	0	1	6	0
cSH	1141	1538	991	876
Volume to Capacity	0.00	0.00	0.01	0.01
Queue Length 95th (ft)	0	0	0	1
Control Delay (s)	0.1	0.4	8.7	9.2
Lane LOS	A	A	A	A
Approach Delay (s)	0.1	0.4	8.7	9.2
Approach LOS			A	A

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	17.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	1	8	42	0	22	6	490	20	16	1021	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		1.00	1.00		1.00	0.99	1.00	1.00	0.97	1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1822	1615		1719	1594	1805	3505	1570	1803	3471	1576
Flt Permitted		0.78	1.00		0.75	1.00	0.24	1.00	1.00	0.45	1.00	1.00
Satd. Flow (perm)		1479	1615		1364	1594	453	3505	1570	846	3471	1576
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	5	1	9	46	0	24	7	538	22	18	1122	4
RTOR Reduction (vph)	0	0	8	0	0	22	0	0	5	0	0	1
Lane Group Flow (vph)	0	6	1	0	46	2	7	538	17	18	1122	3
Confl. Peds. (#/hr)	1					1	1		2	2		1
Confl. Bikes (#/hr)									4			3
Heavy Vehicles (%)	0%	0%	0%	5%	0%	0%	0%	3%	0%	0%	4%	0%
Turn Type	Perm		Perm	Perm		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		8	4	4	4	2		2	6		6
Actuated Green, G (s)		7.7	7.7		7.7	7.7	87.7	86.7	86.7	89.9	87.8	87.8
Effective Green, g (s)		7.7	7.7		7.7	7.7	87.7	86.7	86.7	89.9	87.8	87.8
Actuated g/C Ratio		0.07	0.07		0.07	0.07	0.80	0.79	0.79	0.82	0.80	0.80
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.3	4.8	4.8	2.3	4.8	4.8
Lane Grp Cap (vph)		104	113		95	112	373	2763	1237	710	2770	1258
v/s Ratio Prot							0.00	0.15		c0.00	c0.32	
v/s Ratio Perm		0.00	0.00		c0.03	0.00	0.01		0.01	0.02		0.00
v/c Ratio		0.06	0.01		0.48	0.01	0.02	0.19	0.01	0.03	0.41	0.00
Uniform Delay, d1		47.8	47.6		49.2	47.6	2.4	2.9	2.5	1.9	3.3	2.2
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.2	0.0		2.8	0.0	0.0	0.2	0.0	0.0	0.2	0.0
Delay (s)		47.9	47.6		52.1	47.7	2.4	3.1	2.5	1.9	3.5	2.2
Level of Service		D	D		D	D	A	A	A	A	A	A
Approach Delay (s)		47.7			50.5			3.0			3.5	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM Average Control Delay	5.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	13	0	11	4	0	7	5	503	11	17	999	40
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	14	0	12	4	0	8	5	553	12	19	1098	44
Pedestrians		1			1							
Lane Width (ft)		12.0			12.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		0			0							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								992			884	
pX, platoon unblocked	0.25	0.25	0.22	0.25	0.25	0.93	0.22			0.93		
vC, conflicting volume	1736	1735	1121	1740	1751	560	1143			566		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1783	1780	0	1800	1843	486	0			493		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	0	100	95	70	100	99	98			98		
cM capacity (veh/h)	14	20	237	15	19	542	356			973		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	26	12	570	1160
Volume Left	14	4	5	19
Volume Right	12	8	12	44
cSH	25	38	356	973
Volume to Capacity	1.05	0.31	0.02	0.02
Queue Length 95th (ft)	81	26	1	1
Control Delay (s)	418.5	136.7	0.5	0.6
Lane LOS	F	F	A	A
Approach Delay (s)	418.5	136.7	0.5	0.6
Approach LOS	F	F		

Intersection Summary			
Average Delay	7.8		
Intersection Capacity Utilization	75.7%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	25	1	48	53	3	4	65	491	18	19	960	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.98			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.91			0.99		1.00	0.99		1.00	1.00	
Flt Protected		0.98			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1654			1763		1770	1852		1716	1821	
Flt Permitted		0.90			0.69		0.17	1.00		0.45	1.00	
Satd. Flow (perm)		1512			1265		309	1852		815	1821	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	26	1	50	55	3	4	68	511	19	20	1000	25
RTOR Reduction (vph)	0	46	0	0	3	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	31	0	0	59	0	68	529	0	20	1024	0
Confl. Peds. (#/hr)	1		2	2		1	1		3	3		1
Confl. Bikes (#/hr)									5			3
Heavy Vehicles (%)	0%	0%	2%	2%	0%	0%	2%	2%	0%	5%	4%	0%
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)		8.1			8.1		80.5	75.8		75.3	73.2	
Effective Green, g (s)		8.1			8.1		80.5	75.8		75.3	73.2	
Actuated g/C Ratio		0.08			0.08		0.80	0.76		0.75	0.73	
Clearance Time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Vehicle Extension (s)		2.5			2.5		2.3	5.2		2.3	5.2	
Lane Grp Cap (vph)		122			102		317	1404		633	1333	
v/s Ratio Prot							c0.01	0.29		0.00	c0.56	
v/s Ratio Perm		0.02			c0.05		0.16			0.02		
v/c Ratio		0.25			0.58		0.21	0.38		0.03	0.77	
Uniform Delay, d1		43.1			44.3		8.2	4.1		3.1	8.2	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.8			6.8		0.2	0.8		0.0	4.3	
Delay (s)		43.9			51.1		8.4	4.9		3.1	12.5	
Level of Service		D			D		A	A		A	B	
Approach Delay (s)		43.9			51.1			5.3			12.3	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM Average Control Delay	12.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.5
Intersection Capacity Utilization	69.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Volume (vph)	12	31	5	3	19	10
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69
Hourly flow rate (vph)	17	45	7	4	28	14

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	62	12	42
Volume Left (vph)	17	0	28
Volume Right (vph)	45	4	0
Hadj (s)	-0.34	-0.22	0.25
Departure Headway (s)	3.7	3.8	4.3
Degree Utilization, x	0.06	0.01	0.05
Capacity (veh/h)	959	908	823
Control Delay (s)	6.9	6.9	7.5
Approach Delay (s)	6.9	6.9	7.5
Approach LOS	A	A	A

Intersection Summary			
Delay	7.1		
HCM Level of Service	A		
Intersection Capacity Utilization	18.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	2	50	1	1	60	7	0	0	1	8	0	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
Hourly flow rate (vph)	3	75	1	1	90	10	0	0	1	12	0	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					868							
pX, platoon unblocked												
vC, conflicting volume	100			76			191	184	75	181	180	95
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	100			76			191	184	75	181	180	95
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	98	100	99
cM capacity (veh/h)	1505			1536			762	711	992	782	715	967

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	79	101	1	24
Volume Left	3	1	0	12
Volume Right	1	10	1	12
cSH	1505	1536	992	865
Volume to Capacity	0.00	0.00	0.00	0.03
Queue Length 95th (ft)	0	0	0	2
Control Delay (s)	0.3	0.1	8.6	9.3
Lane LOS	A	A	A	A
Approach Delay (s)	0.3	0.1	8.6	9.3
Approach LOS			A	A

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	18.2%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix D Crash Data

OREGON DEPARTMENT OF TRANSPORTATI TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

State Street /Oswego Hwy (003) & Marylbrook Drive/Furman Drive
January 1, 2009 through December 31, 2013

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2012														
PEDESTRIAN	0	1	0	1	0	1	0	1	0	1	0	1	0	0
REAR-END	0	1	0	1	0	3	0	0	1	1	0	1	0	0
TURNING MOVEMENTS	0	1	0	1	0	2	0	1	0	0	1	1	0	0
2012 TOTAL	0	3	0	3	0	6	0	2	1	2	1	3	0	0
FINAL TOTAL	0	3	0	3	0	6	0	2	1	2	1	3	0	0

Disclaimer: A higher number of crashes may be reported as of 2011 compared to prior years. This does not reflect an increase in annual crashes. The higher numbers result from a change to an internal departmental process that allows the Crash Analysis and Reporting Unit to add previously unavailable, non-fatal crash reports to the annual data file. Please be aware of this change when comparing pre-2011 crash statistics.

003 OSWEGO

State Street /Oswego Hwy (003) & Marylbrook Drive/Furman Drive
January 1, 2009 through December 31, 2013

SER# / INVEST	SPEED	ALCOHOL	DRUGS	SCHL BUS	WORK ZONE	DATE / DAY / TIME	COUNTY / CITY / URBAN AREA	RD# / COMPNT / MLG / MILEPNT	FC / TYP	CONN # / FIRST STREET / SECOND STREET	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
04841	N	N	N			12/15/2012	CLACKAMAS	1	14		INTER	CROSS	N		N	RAIN	S-1STOP	01	NONE 0	STRGHT										07
NONE						Sat	LAKE OSWEGO	0 0		MARYLBROOK DR	SE		TRF SIGNAL		N	WET	REAR		PRVTE	SE NW									000	00
						2P	PORTLAND UA	7.91		STATE ST	06	0			N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	65	M	OR-Y OR<25		026	000	07
																		02	NONE 0	STOP										
																			PRVTE	SE NW									011	00
																			PSNGR CAR		01	DRVR	NONE	71	M	OR-Y OR<25		000	000	00
																					02	PSNG	INJC	58	F			000	000	00
																					03	PSNG	INJC	14	F			000	000	00
																					04	PSNG	INJC	22	F			000	000	00
04573	N	N	N	N	N	11/26/2012	CLACKAMAS	1	14		INTER	3-LEG	N		N	CLR	PED	01	NONE 0	TURN-L										02
CITY						Mon	LAKE OSWEGO	0 0		MARYLBROOK DR	NW		TRF SIGNAL		N	DRY	PED		PRVTE	SW NW									000	00
						7A	PORTLAND UA	7.91		STATE ST	05	0			N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	24	F	OTH-Y N-RES		029	000	02
																				STRGHT SW NE	01	PED	INJB	72	M		01	000	035	00
03767	N	N	N	N	N	10/10/2012	CLACKAMAS	1	14		INTER	CROSS	N		N	CLR	ANGL-OTH	01	NONE 0	STRGHT										02
CITY						Wed	LAKE OSWEGO	0 0		MARYLBROOK DR	CN		TRF SIGNAL		N	DRY	TURN		PRVTE	SE NW									000	00
						8P	PORTLAND UA	7.91		STATE ST	02	0			N	DLIT	INJ		PSNGR CAR		01	DRVR	INJC	81	F	OR-Y OR<25		000	000	00
																					02	PSNG	INJC	90	F			000	000	00
																		02	NONE 0	TURN-R										
																			PRVTE	NE NW									016	00
																			PSNGR CAR		01	DRVR	NONE	64	M	OR-Y OR<25		028	000	02

TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT

CRASH SUMMARIES BY YEAR BY COLLISION TYPE

Willamette Drive /Oswego Hwy (003) & Arbor Drive

January 1, 2009 through December 31, 2013

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2013														
TURNING MOVEMENTS	0	0	1	1	0	0	0	1	0	1	0	1	0	0
2013 TOTAL	0	0	1	1	0	0	0	1	0	1	0	1	0	0
YEAR: 2012														
REAR-END	0	0	1	1	0	0	0	1	0	1	0	1	0	0
2012 TOTAL	0	0	1	1	0	0	0	1	0	1	0	1	0	0
YEAR: 2011														
REAR-END	0	1	0	1	0	3	0	1	0	1	0	1	0	0
TURNING MOVEMENTS	0	2	0	2	0	2	0	0	2	2	0	2	0	0
2011 TOTAL	0	3	0	3	0	5	0	1	2	3	0	3	0	0
YEAR: 2010														
REAR-END	0	2	0	2	0	2	0	2	0	2	0	2	0	0
2010 TOTAL	0	2	0	2	0	2	0	2	0	2	0	2	0	0
YEAR: 2009														
REAR-END	0	0	1	1	0	0	0	1	0	1	0	1	0	0
TURNING MOVEMENTS	0	0	1	1	0	0	0	1	0	1	0	1	0	0
2009 TOTAL	0	0	2	2	0	0	0	2	0	2	0	2	0	0
FINAL TOTAL	0	5	4	9	0	7	0	7	2	9	0	9	0	0

Disclaimer: A higher number of crashes may be reported as of 2011 compared to prior years. This does not reflect an increase in annual crashes. The higher numbers result from a change to an internal departmental process that allows the Crash Analysis and Reporting Unit to add previously unavailable, non-fatal crash reports to the annual data file. Please be aware of this change when comparing pre-2011 crash statistics.

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

003 OSWEGO

Willamette Drive /Oswego Hwy (003) & Arbor Drive
January 1, 2009 through December 31, 2013

SER# INVEST	S P E E D C / D R A L U C G S H C R L W O K	DATE DAY TIME	COUNTY CITY URBAN AREA	RD# FC COMPNT MLG TYP MILEPNT	CONN # FIRST STREET SECOND STREET	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
01276 CITY	N N N N N	04/09/2009 Thu 1P	CLACKAMAS WEST LINN PORTLAND UA	1 14 0 0 8.07	ARBOR DR WILLAMETTE DR	INTER SE 06	CROSS 0	N NONE	N N N	CLR DRY DAY	S-1STOP REAR PDO	01	NONE 0 PRVTE PSNGR CAR	STRGHT S N	01	DRVR	NONE	18	F	OR-Y OR<25		026	000 000		22,07 22 07
												02	NONE 0 PRVTE PSNGR CAR	STOP S N	01	DRVR	NONE	37	F	OR-Y OR<25		000	012 000		00 00
03239 CITY	N N N	09/10/2010 Fri 12P	CLACKAMAS WEST LINN PORTLAND UA	1 14 0 0 8.07	ARBOR DR WILLAMETTE DR	INTER SE 06	CROSS 0	N UNKNOWN	N N N	CLR DRY DAY	S-1STOP REAR INJ	01	NONE 0 PRVTE PSNGR CAR	STRGHT SE NW	01	DRVR	NONE	20	F	OR-Y OR<25		016,026	000 000		27,07 00 27,07
												02	NONE 0 PRVTE PSNGR CAR	STOP SE NW	01	DRVR	INJC	76	F	OR-Y OR<25		000	012 000		00 00
03242 CITY	N N N N N	09/02/2011 Fri 4P	CLACKAMAS WEST LINN PORTLAND UA	1 14 0 0 8.07	ARBOR DR WILLAMETTE DR	INTER SE 06	CROSS 0	N UNKNOWN	N N N	CLR DRY DAY	S-1STOP REAR INJ	01	NONE 0 PRVTE PSNGR CAR	STRGHT SE NW	01	DRVR	INJC	19	M	OR-Y OR<25		052,016,026	000 000	013	32,27 00 32,27
												02	NONE 0 PRVTE PSNGR CAR	STOP SE NW	01	DRVR	INJC	51	F	OR-Y OR<25		000	011 000	013	00 00
												03	POLCE 0 PUBLC PSNGR CAR	STOP SE NW	01	DRVR	INJC	33	M	OR-Y OR<25		000	012 000		00 00
03374 CITY	N N N	09/11/2012 Tue 6P	CLACKAMAS WEST LINN PORTLAND UA	1 14 0 0 8.07	ARBOR DR WILLAMETTE DR	INTER SE 06	CROSS 0	N NONE	N N N	CLR DRY DAY	S-1STOP REAR PDO	01	NONE 0 PRVTE PSNGR CAR	STRGHT SE NW	01	DRVR	NONE	23	M	SUSP OR<25		043,026	000 000	013	07 00 07
												02	NONE 0 PRVTE PSNGR CAR	STOP SE NW	01	DRVR	NONE	41	M	OR-Y OR<25		000	011 000	013	00 00
												03	NONE 0 PRVTE PSNGR CAR	STOP SE NW	01	DRVR	NONE	45	M	OR-Y OR<25		000	022 000		00 00
00637 NONE	Y N N	02/23/2011 Wed 2P	CLACKAMAS WEST LINN PORTLAND UA	1 14 0 0 8.07	ARBOR DR WILLAMETTE DR	INTER SW 06	CROSS 0	N UNKNOWN	N N N	SNOW ICE DAY	ANGL-OTH TURN INJ	01	NONE 0 PRVTE PSNGR CAR	TURN-R NW SW	01	DRVR	NONE	22	F	OR-Y OR<25		047,001	000 000	124 124	01,08 00 01,08

003 OSWEGO

Willamette Drive /Oswego Hwy (003) & Arbor Drive
January 1, 2009 through December 31, 2013

SER# / INVEST	S P E L	D R S W A U C O L G H R K	DATE / DAY / TIME	COUNTY / CITY / URBAN AREA	RD# FC / COMPNT / MLG TYP / MILEPNT	CONN # / FIRST STREET / SECOND STREET	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS / (#LANES)	INT-REL / TRAF- / CNTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / VEH TYPE	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	A G E	S E X	LICNS RES	PED LOC	ERROR	ACTN EVENT	CAUSE
													02	NONE 0 PRVTE PSNGR CAR	STOP SW NE									011 000	00 00
01551	N N N N N	05/06/2011	CLACKAMAS	1 14		INTER	CROSS	N		N	RAIN	ANGL-OTH	01	NONE 0	STRGHT										02
CITY		Fri	WEST LINN	0 0	ARBOR DR	CN		STOP SIGN		N	WET	TURN		PRVTE	SE NW									000	00
		5P	PORTLAND UA	8.07	WILLAMETTE DR	02	0			N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	25	M	OR-Y OR<25		000	000	00
													02	NONE 0 PRVTE PSNGR CAR	TURN-L NE SE	01	DRVR	INJB	18	F	NONE OR<25		028	015 000	00 02
03165	N N N N N	09/15/2009	CLACKAMAS	1 14		INTER	CROSS	N		N	CLR	ANGL-OTH	01	NONE 0	STRGHT										03
CITY		Tue	WEST LINN	0 0	ARBOR DR	CN		STOP SIGN		N	DRY	TURN		PRVTE	W E									000	00
		4P	PORTLAND UA	8.07	WILLAMETTE DR	03	0			N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	84	M	OR-Y OR<25		028	000	02
													02	NONE 0 PRVTE PSNGR CAR	STRGHT N S	01	DRVR	NONE	35	F	OR-Y OR<25		000	000	00 00
01165	N N N N N	04/25/2010	CLACKAMAS	1 14		INTER	CROSS	N		N	CLR	S-1STOP	01	NONE 0	STRGHT										07
CITY		Sun	WEST LINN	0 0	ARBOR DR	SE		UNKNOWN		N	DRY	REAR		PRVTE	SE NW									000	00
		2P	PORTLAND UA	8.08	WILLAMETTE DR	06	0			N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	17	F	OR-Y OR<25		026	000	07
													02	NONE 0 PRVTE PSNGR CAR	STOP SE NW	01	DRVR	INJC	56	F	OR-Y OR<25		000	012 000	00 00
00682	N N N	02/26/2013	CLACKAMAS	1 14		INTER	CROSS	N		N	CLR	ANGL-OTH	01	NONE 0	STRGHT										02
COUNTY		Tue	WEST LINN	0 0	ARBOR DR	CN		STOP SIGN		N	DRY	TURN		PRVTE	NW SE									000	00
		7A	PORTLAND UA	8.11	WILLAMETTE DR	03	0			N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	24	F	OR-Y OR<25		000	000	00
													02	NONE 0 UNKN PSNGR CAR	TURN-L SW NW	01	DRVR	NONE	00	U	UNK UNK		028	015 000	00 02

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

Willamette Drive /Oswego Hwy (003) & Marylhurst Drive/Lazy River Drive
January 1, 2009 through December 31, 2013

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2012														
TURNING MOVEMENTS	0	0	1	1	0	0	0	0	1	1	0	1	0	0
2012 TOTAL	0	0	1	1	0	0	0	0	1	1	0	1	0	0
YEAR: 2010														
REAR-END	0	2	0	2	0	3	0	1	1	2	0	2	0	0
2010 TOTAL	0	2	0	2	0	3	0	1	1	2	0	2	0	0
FINAL TOTAL	0	2	1	3	0	3	0	1	2	3	0	3	0	0

Disclaimer: A higher number of crashes may be reported as of 2011 compared to prior years. This does not reflect an increase in annual crashes. The higher numbers result from a change to an internal departmental process that allows the Crash Analysis and Reporting Unit to add previously unavailable, non-fatal crash reports to the annual data file. Please be aware of this change when comparing pre-2011 crash statistics.

CDS380 6/25/2015

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

003 OSWEGO

Willamette Drive /Oswego Hwy (003) & Marylhurst Drive/Lazy River Drive
January 1, 2009 through December 31, 2013

SER# INVEST	S D P RSW EAUCO ELGHR DCSLK	DATE DAY TIME	COUNTY CITY URBAN AREA	RD# FC COMPNT MLG TYP MILEPNT	CONN # FIRST STREET SECOND STREET	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
01333 CITY	N N N N N	04/21/2010 Wed 8A	CLACKAMAS WEST LINN PORTLAND UA	1 14 0 0 8.43	 LAZY RIVER DR WILLAMETTE DR	INTER SE 06	CROSS 0	N TRF SIGNAL	N N N	CLR DRY DAY	S-1STOP REAR INJ	01	NONE 0 PRVTE PSNGR CAR	STRGHT SE NW	01	DRVR	INJB	55	F	OR-Y OR<25		043,026	001 000		07 00 07
												02	NONE 0 PRVTE PSNGR CAR	STOP SE NW	01	DRVR	NONE	41	M	OR-Y OR<25		000	011 000		00 00
01650 CITY	N N N N N	05/17/2010 Mon 4P	CLACKAMAS WEST LINN PORTLAND UA	1 14 0 0 8.43	 LAZY RIVER DR WILLAMETTE DR	INTER SE 06	CROSS 0	N TRF SIGNAL	N N N	RAIN WET DAY	S-1STOP REAR INJ	01	NONE 0 PRVTE PSNGR CAR	STRGHT SE NW	01	DRVR	NONE	21	M	OR-Y OR<25		016,043,026	000 000	013	27,07 00 27,07
												02	NONE 0 PRVTE PSNGR CAR	STOP SE NW	01	DRVR	INJC	64	M	OR-Y OR<25		000	011 000	013	00 00
												03	NONE 0 PRVTE PSNGR CAR	STOP SE NW	01	DRVR	INJC	53	F	OR-Y OR<25		000	022 000		00 00
04783 NONE	N N N	12/10/2012 Mon 10A	CLACKAMAS WEST LINN PORTLAND UA	1 14 0 0 8.43	 LAZY RIVER DR WILLAMETTE DR	INTER CN 04	CROSS 0	N TRF SIGNAL	N N N	UNK WET DAY	O-1TURN TURN PDO	01	NONE 0 UNKN UNKNOWN	TURN-L NW NE	01	DRVR	NONE	00	F	UNK UNK		028,004	000 000		02 00 02
												02	NONE 0 PRVTE PSNGR CAR	STRGHT SE NW	01	DRVR	NONE	59	F	OTH-Y N-RES		000	000 000		00 00

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

Upper Midhill Drive & Arbor Drive
January 1, 2009 through December 31, 2013

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR:														
TOTAL														
FINAL TOTAL														

Disclaimer: A higher number of crashes may be reported as of 2011 compared to prior years. This does not reflect an increase in annual crashes. The higher numbers result from a change to an internal departmental process that allows the Crash Analysis and Reporting Unit to add previously unavailable, non-fatal crash reports to the annual data file. Please be aware of this change when comparing pre-2011 crash statistics.

OREGON DEPARTMENT OF TRANSPORTATION TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

Upper Midhill Drive & Marylhurst Drive
January 1, 2009 through December 31, 2013

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR:														
TOTAL														
FINAL TOTAL														

Disclaimer: A higher number of crashes may be reported as of 2011 compared to prior years. This does not reflect an increase in annual crashes. The higher numbers result from a change to an internal departmental process that allows the Crash Analysis and Reporting Unit to add previously unavailable, non-fatal crash reports to the annual data file. Please be aware of this change when comparing pre-2011 crash statistics.

ACTION CODE TRANSLATION LIST

ACTION CODE	SHORT DESCRIPTION	LONG DESCRIPTION
000	NONE	NO ACTION OR NON-WARRANTED
001	SKIDDED	SKIDDED
002	ON/OFF V	GETTING ON OR OFF STOPPED OR PARKED VEHICLE
003	LOAD OVR	OVERHANGING LOAD STRUCK ANOTHER VEHICLE, ETC.
006	SLOW DN	SLOWED DOWN
007	AVOIDING	AVOIDING MANEUVER
008	PAR PARK	PARALLEL PARKING
009	ANG PARK	ANGLE PARKING
010	INTERFERE	PASSENGER INTERFERING WITH DRIVER
011	STOPPED	STOPPED IN TRAFFIC NOT WAITING TO MAKE A LEFT TURN
012	STP/L TRN	STOPPED BECAUSE OF LEFT TURN SIGNAL OR WAITING, ETC.
013	STP TURN	STOPPED WHILE EXECUTING A TURN
015	GO A/STOP	PROCEED AFTER STOPPING FOR A STOP SIGN/FLASHING RED.
016	TRN A/RED	TURNED ON RED AFTER STOPPING
017	LOSTCTRL	LOST CONTROL OF VEHICLE
018	EXIT DWY	ENTERING STREET OR HIGHWAY FROM ALLEY OR DRIVEWAY
019	ENTR DWY	ENTERING ALLEY OR DRIVEWAY FROM STREET OR HIGHWAY
020	STR ENTR	BEFORE ENTERING ROADWAY, STRUCK PEDESTRIAN, ETC. ON SIDEWALK OR SHOULDER
021	NO DRVR	CAR RAN AWAY - NO DRIVER
022	PREV COL	STRUCK, OR WAS STRUCK BY, VEHICLE OR PEDESTRIAN IN PRIOR COLLISION BEFORE ACC. STABILIZED
023	STALLED	VEHICLE STALLED
024	DRVR DEAD	DEAD BY UNASSOCIATED CAUSE
025	FATIGUE	FATIGUED, SLEEPY, ASLEEP
026	SUN	DRIVER BLINDED BY SUN
027	HDLGHTS	DRIVER BLINDED BY HEADLIGHTS
028	ILLNESS	PHYSICALLY ILL
029	THRU MED	VEHICLE CROSSED, PLUNGED OVER, OR THROUGH MEDIAN BARRIER
030	PURSUIT	PURSUING OR ATTEMPTING TO STOP A VEHICLE
031	PASSING	PASSING SITUATION
032	PRKOFFRD	VEHICLE PARKED BEYOND CURB OR SHOULDER
033	CROS MED	VEHICLE CROSSED EARTH OR GRASS MEDIAN
034	X N/SGNL	CROSSING AT INTERSECTION - NO TRAFFIC SIGNAL PRESENT
035	X W/ SGNL	CROSSING AT INTERSECTION - TRAFFIC SIGNAL PRESENT
036	DIAGONAL	CROSSING AT INTERSECTION - DIAGONALLY
037	BTWN INT	CROSSING BETWEEN INTERSECTIONS
038	DISTRACT	DRIVER'S ATTENTION DISTRACTED
039	W/TRAF-S	WALKING, RUNNING, RIDING, ETC., ON SHOULDER WITH TRAFFIC
040	A/TRAF-S	WALKING, RUNNING, RIDING, ETC., ON SHOULDER FACING TRAFFIC
041	W/TRAF-P	WALKING, RUNNING, RIDING, ETC., ON PAVEMENT WITH TRAFFIC
042	A/TRAF-P	WALKING, RUNNING, RIDING, ETC., ON PAVEMENT FACING TRAFFIC
043	PLAYINRD	PLAYING IN STREET OR ROAD
044	PUSH MV	PUSHING OR WORKING ON VEHICLE IN ROAD OR ON SHOULDER
045	WORK ON	WORKING IN ROADWAY OR ALONG SHOULDER
046	W/ TRAFIC	NON-MOTORIST WALKING, RUNNING, RIDING, ETC. WITH TRAFFIC
047	A/ TRAFIC	NON-MOTORIST WALKING, RUNNING, RIDING, ETC. FACING TRAFFIC
050	LAY ON RD	STANDING OR LYING IN ROADWAY
051	ENT OFFRD	ENTERING / STARTING IN TRAFFIC LANE FROM OFF ROAD
052	MERGING	MERGING
055	SPRAY	BLINDED BY WATER SPRAY
088	OTHER	OTHER ACTION

ACTION CODE TRANSLATION LIST

ACTION CODE	SHORT DESCRIPTION	LONG DESCRIPTION
099	UNK	UNKNOWN ACTION

CAUSE CODE TRANSLATION LIST

CAUSE CODE	SHORT DESCRIPTION	LONG DESCRIPTION
00	NO CODE	NO CAUSE ASSOCIATED AT THIS LEVEL
01	TOO-FAST	TOO FAST FOR CONDITIONS (NOT EXCEED POSTED SPEED
02	NO-YIELD	DID NOT YIELD RIGHT-OF-WAY
03	PAS-STOP	PASSED STOP SIGN OR RED FLASHER
04	DIS SIG	DISREGARDED TRAFFIC SIGNAL
05	LEFT-CTR	DROVE LEFT OF CENTER ON TWO-WAY ROAD; STRADDLING
06	IMP-OVER	IMPROPER OVERTAKING
07	TOO-CLOS	FOLLOWED TOO CLOSELY
08	IMP-TURN	MADE IMPROPER TURN
09	DRINKING	ALCOHOL OR DRUG INVOLVED
10	OTHR-IMP	OTHER IMPROPER DRIVING
11	MECH-DEF	MECHANICAL DEFECT
12	OTHER	OTHER (NOT IMPROPER DRIVING)
13	IMP LN C	IMPROPER CHANGE OF TRAFFIC LANES
14	DIS TCD	DISREGARDED OTHER TRAFFIC CONTROL DEVICE
15	WRNG WAY	WRONG WAY ON ONE-WAY ROAD; WRONG SIDE DIVIDED RO
16	FATIGUE	DRIVER DROWSY/FATIGUED/SLEEPY
17	ILLNESS	PHYSICAL ILLNESS
18	IN RDWY	NON-MOTORIST ILLEGALLY IN ROADWAY
19	NT VISBL	NOT VISIBLE: DARK / NON-REFLECTIVE CLOTHING
20	IMP PKNG	VEHICLE IMPROPERLY PARKED
21	DEF STER	DEFECTIVE STEERING MECHANISM
22	DEF BRKE	INADEQUATE OR NO BRAKES
24	LOADSHFT	VEHICLE LOST LOAD OR LOAD SHIFTED
25	TIREFAIL	TIRE FAILURE
26	PHANTOM	PHANTOM / NON-CONTACT VEHICLE
27	INATTENT	INATTENTION
28	NM INATT	NON-MOTORIST INATTENTION
29	F AVOID	FAILED TO AVOID VEHICLE AHEAD
30	SPEED	DRIVING IN EXCESS OF POSTED SPEED
31	RACING	SPEED RACING (PER PAR)
32	CARELESS	CARELESS DRIVING (PER PAR)
33	RECKLESS	RECKLESS DRIVING (PER PAR)
34	AGGRESV	AGGRESSIVE DRIVING (PER PAR)
35	RD RAGE	ROAD RAGE (PER PAR)
40	VIEW OBS	VIEW OBSCURED
50	USED MDN	IMPROPER USE OF MEDIAN OR SHOULDER

COLLISION TYPE CODE TRANSLATION LIST

COLL CODE	SHORT DESCRIPTION	LONG DESCRIPTION
&	OTH	MISCELLANEOUS
-	BACK	BACKING
0	PED	PEDESTRIAN
1	ANGL	ANGLE
2	HEAD	HEAD-ON
3	REAR	REAR-END
4	SS-M	SIDESWIPE - MEETING
5	SS-O	SIDESWIPE - OVERTAKING
6	TURN	TURNING MOVEMENT
7	PARK	PARKING MANEUVER
8	NCOL	NON-COLLISION
9	FIX	FIXED OBJECT OR OTHER OBJECT

CRASH TYPE CODE TRANSLATION LIST

CRASH TYPE	SHORT DESCRIPTION	LONG DESCRIPTION
&	OVERTURN	OVERTURNED
0	NON-COLL	OTHER NON-COLLISION
1	OTH RDWY	MOTOR VEHICLE ON OTHER ROADWAY
2	PRKD MV	PARKED MOTOR VEHICLE
3	PED	PEDESTRIAN
4	TRAIN	RAILWAY TRAIN
6	BIKE	PEDALCYCLIST
7	ANIMAL	ANIMAL
8	FIX OBJ	FIXED OBJECT
9	OTH OBJ	OTHER OBJECT
A	ANGL-STP	ENTERING AT ANGLE - ONE VEHICLE STOPPED
B	ANGL-OTH	ENTERING AT ANGLE - ALL OTHERS
C	S-STRGHT	FROM SAME DIRECTION - BOTH GOING STRAIGHT
D	S-1TURN	FROM SAME DIRECTION - ONE TURN, ONE STRAIGHT
E	S-1STOP	FROM SAME DIRECTION - ONE STOPPED
F	S-OTHER	FROM SAME DIRECTION-ALL OTHERS, INCLUDING PARKING
G	O-STRGHT	FROM OPPOSITE DIRECTION - BOTH GOING STRAIGHT
H	O-1TURN	FROM OPPOSITE DIRECTION - ONE TURN, ONE STRAIGHT
I	O-1STOP	FROM OPPOSITE DIRECTION - ONE STOPPED
J	O-OTHER	FROM OPPOSITE DIRECTION-ALL OTHERS INCL. PARKING

DRIVER LICENSE CODE TRANSLATION LIST

LIC CODE	SHORT DESC	LONG DESCRIPTION
0	NONE	NOT LICENSED (HAD NEVER BEEN LICENSED)
1	OR-Y	VALID OREGON LICENSE
2	OTH-Y	VALID LICENSE, OTHER STATE OR COUNTRY
3	SUSP	SUSPENDED/REVOKED

DRIVER RESIDENCE CODE TRANSLATION LIST

RES CODE	SHORT DESC	LONG DESCRIPTION
1	OR<25	OREGON RESIDENT WITHIN 25 MILE OF HOME
2	OR>25	OREGON RESIDENT 25 OR MORE MILES FROM HOME
3	OR-?	OREGON RESIDENT - UNKNOWN DISTANCE FROM HOME
4	N-RES	NON-RESIDENT
9	UNK	UNKNOWN IF OREGON RESIDENT

ERROR CODE TRANSLATION LIST

ERROR CODE	SHORT DESCRIPTION	FULL DESCRIPTION
000	NONE	NO ERROR
001	WIDE TRN	WIDE TURN
002	CUT CORN	CUT CORNER ON TURN
003	FAIL TRN	FAILED TO OBEY MANDATORY TRAFFIC TURN SIGNAL, SIGN OR LANE MARKINGS
004	L IN TRF	LEFT TURN IN FRONT OF ONCOMING TRAFFIC
005	L PROHIB	LEFT TURN WHERE PROHIBITED
006	FRM WRNG	TURNED FROM WRONG LANE
007	TO WRONG	TURNED INTO WRONG LANE
008	ILLEG U	U-TURNED ILLEGALLY
009	IMP STOP	IMPROPERLY STOPPED IN TRAFFIC LANE
010	IMP SIG	IMPROPER SIGNAL OR FAILURE TO SIGNAL
011	IMP BACK	BACKING IMPROPERLY (NOT PARKING)
012	IMP PARK	IMPROPERLY PARKED
013	UNPARK	IMPROPER START LEAVING PARKED POSITION
014	IMP STRT	IMPROPER START FROM STOPPED POSITION
015	IMP LGHT	IMPROPER OR NO LIGHTS (VEHICLE IN TRAFFIC)
016	INATTENT	INATTENTION (FAILURE TO DIM LIGHTS PRIOR TO 4/1/97)
017	UNSF VEH	DRIVING UNSAFE VEHICLE (NO OTHER ERROR APPARENT)
018	OTH PARK	ENTERING/EXITING PARKED POSITION W/ INSUFFICIENT CLEARANCE; OTHER IMPROPER PARKING MANEUVER
019	DIS DRIV	DISREGARDED OTHER DRIVER'S SIGNAL
020	DIS SGNL	DISREGARDED TRAFFIC SIGNAL
021	RAN STOP	DISREGARDED STOP SIGN OR FLASHING RED
022	DIS SIGN	DISREGARDED WARNING SIGN, FLARES OR FLASHING AMBER
023	DIS OFCR	DISREGARDED POLICE OFFICER OR FLAGMAN
024	DIS EMER	DISREGARDED SIREN OR WARNING OF EMERGENCY VEHICLE
025	DIS RR	DISREGARDED RR SIGNAL, RR SIGN, OR RR FLAGMAN
026	REAR-END	FAILED TO AVOID STOPPED OR PARKED VEHICLE AHEAD OTHER THAN SCHOOL BUS
027	BIKE ROW	DID NOT HAVE RIGHT-OF-WAY OVER PEDALCYCLIST
028	NO ROW	DID NOT HAVE RIGHT-OF-WAY
029	PED ROW	FAILED TO YIELD RIGHT-OF-WAY TO PEDESTRIAN
030	PAS CURV	PASSING ON A CURVE
031	PAS WRNG	PASSING ON THE WRONG SIDE
032	PAS TANG	PASSING ON STRAIGHT ROAD UNDER UNSAFE CONDITIONS
033	PAS X-WK	PASSED VEHICLE STOPPED AT CROSSWALK FOR PEDESTRIAN
034	PAS INTR	PASSING AT INTERSECTION
035	PAS HILL	PASSING ON CREST OF HILL
036	N/PAS ZN	PASSING IN "NO PASSING" ZONE
037	PAS TRAF	PASSING IN FRONT OF ONCOMING TRAFFIC
038	CUT-IN	CUTTING IN (TWO LANES - TWO WAY ONLY)
039	WRNGSIDE	DRIVING ON WRONG SIDE OF THE ROAD (2-WAY UNDIVIDED ROADWAYS)
040	THRU MED	DRIVING THROUGH SAFETY ZONE OR OVER ISLAND
041	F/ST BUS	FAILED TO STOP FOR SCHOOL BUS

ERROR CODE TRANSLATION LIST

ERROR CODE	SHORT DESCRIPTION	FULL DESCRIPTION
042	F/SLO MV	FAILED TO DECREASE SPEED FOR SLOWER MOVING VEHICLE
043	TO CLOSE	FOLLOWING TOO CLOSELY (MUST BE ON OFFICER'S REPORT)
044	STRDL LN	STRADDLING OR DRIVING ON WRONG LANES
045	IMP CHG	IMPROPER CHANGE OF TRAFFIC LANES
046	WRNG WAY	WRONG WAY ON ONE-WAY ROADWAY; WRONG SIDE DIVIDED ROAD
047	BASCRULE	DRIVING TOO FAST FOR CONDITIONS (NOT EXCEEDING POSTED SPEED)
048	OPN DOOR	OPENED DOOR INTO ADJACENT TRAFFIC LANE
049	IMPEDING	IMPEDING TRAFFIC
050	SPEED	DRIVING IN EXCESS OF POSTED SPEED
051	RECKLESS	RECKLESS DRIVING (PER PAR)
052	CARELESS	CARELESS DRIVING (PER PAR)
053	RACING	SPEED RACING (PER PAR)
054	X N/SGNL	CROSSING AT INTERSECTION, NO TRAFFIC SIGNAL PRESENT
055	X W/SGNL	CROSSING AT INTERSECTION, TRAFFIC SIGNAL PRESENT
056	DIAGONAL	CROSSING AT INTERSECTION - DIAGONALLY
057	BTWN INT	CROSSING BETWEEN INTERSECTIONS
059	W/TRAF-S	WALKING, RUNNING, RIDING, ETC., ON SHOULDER WITH TRAFFIC
060	A/TRAF-S	WALKING, RUNNING, RIDING, ETC., ON SHOULDER FACING TRAFFIC
061	W/TRAF-P	WALKING, RUNNING, RIDING, ETC., ON PAVEMENT WITH TRAFFIC
062	A/TRAF-P	WALKING, RUNNING, RIDING, ETC., ON PAVEMENT FACING TRAFFIC
063	PLAYINRD	PLAYING IN STREET OR ROAD
064	PUSH MV	PUSHING OR WORKING ON VEHICLE IN ROAD OR ON SHOULDER
065	WK IN RD	WORKING IN ROADWAY OR ALONG SHOULDER
070	LAYON RD	STANDING OR LYING IN ROADWAY
071	NM IMP USE	IMPROPER USE OF TRAFFIC LANE BY NON-MOTORIST
073	ELUDING	ELUDING / ATTEMPT TO ELUDE
079	F NEG CURV	FAILED TO NEGOTIATE A CURVE
080	FAIL LN	FAILED TO MAINTAIN LANE
081	OFF RD	RAN OFF ROAD
082	NO CLEAR	DRIVER MISJUDGED CLEARANCE
083	OVRSTEER	OVER-CORRECTING
084	NOT USED	CODE NOT IN USE
085	OVRLOAD	OVERLOADING OR IMPROPER LOADING OF VEHICLE WITH CARGO OR PASSENGERS
097	UNA DIS TC	UNABLE TO DETERMINE WHICH DRIVER DISREGARDED TRAFFIC CONTROL DEVICE

EVENT CODE TRANSLATION LIST

EVENT CODE	SHORT DESCRIPTION	LONG DESCRIPTION
001	FEL/JUMP	OCCUPANT FELL, JUMPED OR WAS EJECTED FROM MOVING VEHICLE
002	INTERFER	PASSENGER INTERFERED WITH DRIVER
003	BUG INTF	ANIMAL OR INSECT IN VEHICLE INTERFERED WITH DRIVER
004	INDRCT PED	PEDESTRIAN INDIRECTLY INVOLVED (NOT STRUCK)
005	SUB-PED	"SUB-PED": PEDESTRIAN INJURED SUBSEQUENT TO COLLISION, ETC.
006	INDRCT BIK	PEDALCYCLIST INDIRECTLY INVOLVED (NOT STRUCK)
007	HITCHIKR	HITCHHIKER (SOLICITING A RIDE)
008	PSNGR TOW	PASSENGER OR NON-MOTORIST BEING TOWED OR PUSHED ON CONVEYANCE
009	ON/OFF V	GETTING ON/OFF STOPPED/PARKED VEHICLE (OCCUPANTS ONLY; MUST HAVE PHYSICAL CONTACT W/ VEHI(
010	SUB OTRN	OVERTURNED AFTER FIRST HARMFUL EVENT
011	MV PUSHD	VEHICLE BEING PUSHED
012	MV TOWED	VEHICLE TOWED OR HAD BEEN TOWING ANOTHER VEHICLE
013	FORCED	VEHICLE FORCED BY IMPACT INTO ANOTHER VEHICLE, PEDALCYCLIST OR PEDESTRIAN
014	SET MOTN	VEHICLE SET IN MOTION BY NON-DRIVER (CHILD RELEASED BRAKES, ETC.)
015	RR ROW	AT OR ON RAILROAD RIGHT-OF-WAY (NOT LIGHT RAIL)
016	LT RL ROW	AT OR ON LIGHT-RAIL RIGHT-OF-WAY
017	RR HIT V	TRAIN STRUCK VEHICLE
018	V HIT RR	VEHICLE STRUCK TRAIN
019	HIT RR CAR	VEHICLE STRUCK RAILROAD CAR ON ROADWAY
020	JACKNIFE	JACKKNIFE; TRAILER OR TOWED VEHICLE STRUCK TOWING VEHICLE
021	TRL OTRN	TRAILER OR TOWED VEHICLE OVERTURNED
022	CN BROKE	TRAILER CONNECTION BROKE
023	DETACH TRL	DETACHED TRAILING OBJECT STRUCK OTHER VEHICLE, NON-MOTORIST, OR OBJECT
024	V DOOR OPN	VEHICLE DOOR OPENED INTO ADJACENT TRAFFIC LANE
025	WHEELOFF	WHEEL CAME OFF
026	HOOD UP	HOOD FLEW UP
028	LOAD SHIFT	LOST LOAD, LOAD MOVED OR SHIFTED
029	TIREFAIL	TIRE FAILURE
030	PET	PET: CAT, DOG AND SIMILAR
031	LVSTOCK	STOCK: COW, CALF, BULL, STEER, SHEEP, ETC.
032	HORSE	HORSE, MULE, OR DONKEY
033	HRSE&RID	HORSE AND RIDER
034	GAME	WILD ANIMAL, GAME (INCLUDES BIRDS; NOT DEER OR ELK)
035	DEER ELK	DEER OR ELK, WAPITI
036	ANML VEH	ANIMAL-DRAWN VEHICLE
037	CULVERT	CULVERT, OPEN LOW OR HIGH MANHOLE
038	ATENUATN	IMPACT ATTENUATOR
039	PK METER	PARKING METER
040	CURB	CURB (ALSO NARROW SIDEWALKS ON BRIDGES)
041	JIGGLE	JIGGLE BAR OR TRAFFIC SNAKE FOR CHANNELIZATION
042	GDRL END	LEADING EDGE OF GUARDRAIL
043	GARDRAIL	GUARD RAIL (NOT METAL MEDIAN BARRIER)
044	BARRIER	MEDIAN BARRIER (RAISED OR METAL)
045	WALL	RETAINING WALL OR TUNNEL WALL
046	BR RAIL	BRIDGE RAILING OR PARAPET (ON BRIDGE OR APPROACH)
047	BR ABUTMNT	BRIDGE ABUTMENT (INCLUDED "APPROACH END" THRU 2013)
048	BR COLMN	BRIDGE PILLAR OR COLUMN
049	BR GIRDR	BRIDGE GIRDER (HORIZONTAL BRIDGE STRUCTURE OVERHEAD)
050	ISLAND	TRAFFIC RAISED ISLAND
051	GORE	GORE
052	POLE UNK	POLE - TYPE UNKNOWN
053	POLE UTL	POLE - POWER OR TELEPHONE
054	ST LIGHT	POLE - STREET LIGHT ONLY
055	TRF SGNL	POLE - TRAFFIC SIGNAL AND PED SIGNAL ONLY
056	SGN BRDG	POLE - SIGN BRIDGE
057	STOPSIGN	STOP OR YIELD SIGN
058	OTH SIGN	OTHER SIGN, INCLUDING STREET SIGNS
059	HYDRANT	HYDRANT

EVENT CODE TRANSLATION LIST

EVENT CODE	SHORT DESCRIPTION	LONG DESCRIPTION
060	MARKER	DELINEATOR OR MARKER (REFLECTOR POSTS)
061	MAILBOX	MAILBOX
062	TREE	TREE, STUMP OR SHRUBS
063	VEG OHED	TREE BRANCH OR OTHER VEGETATION OVERHEAD, ETC.
064	WIRE/CBL	WIRE OR CABLE ACROSS OR OVER THE ROAD
065	TEMP SGN	TEMPORARY SIGN OR BARRICADE IN ROAD, ETC.
066	PERM SGN	PERMANENT SIGN OR BARRICADE IN/OFF ROAD
067	SLIDE	SLIDES, FALLEN OR FALLING ROCKS
068	FRGN OBJ	FOREIGN OBSTRUCTION/DEBRIS IN ROAD (NOT GRAVEL)
069	EQP WORK	EQUIPMENT WORKING IN/OFF ROAD
070	OTH EQP	OTHER EQUIPMENT IN OR OFF ROAD (INCLUDES PARKED TRAILER, BOAT)
071	MAIN EQP	WRECKER, STREET SWEEPER, SNOW PLOW OR SANDING EQUIPMENT
072	OTHER WALL	ROCK, BRICK OR OTHER SOLID WALL
073	IRRGL PVMT	OTHER BUMP (NOT SPEED BUMP), POTHOLE OR PAVEMENT IRREGULARITY (PER PAR)
074	OVERHD OBJ	OTHER OVERHEAD OBJECT (HIGHWAY SIGN, SIGNAL HEAD, ETC.); NOT BRIDGE
075	CAVE IN	BRIDGE OR ROAD CAVE IN
076	HI WATER	HIGH WATER
077	SNO BANK	SNOW BANK
078	LO-HI EDGE	LOW OR HIGH SHOULDER AT PAVEMENT EDGE
079	DITCH	CUT SLOPE OR DITCH EMBANKMENT
080	OBJ FRM MV	STRUCK BY ROCK OR OTHER OBJECT SET IN MOTION BY OTHER VEHICLE (INCL. LOST LOADS)
081	FLY-OBJ	STRUCK BY ROCK OR OTHER MOVING OR FLYING OBJECT (NOT SET IN MOTION BY VEHICLE)
082	VEH HID	VEHICLE OBSCURED VIEW
083	VEG HID	VEGETATION OBSCURED VIEW
084	BLDG HID	VIEW OBSCURED BY FENCE, SIGN, PHONE BOOTH, ETC.
085	WIND GUST	WIND GUST
086	IMMERSED	VEHICLE IMMERSED IN BODY OF WATER
087	FIRE/EXP	FIRE OR EXPLOSION
088	FENC/BLD	FENCE OR BUILDING, ETC.
089	OTHR CRASH	CRASH RELATED TO ANOTHER SEPARATE CRASH
090	TO 1 SIDE	TWO-WAY TRAFFIC ON DIVIDED ROADWAY ALL ROUTED TO ONE SIDE
091	BUILDING	BUILDING OR OTHER STRUCTURE
092	PHANTOM	OTHER (PHANTOM) NON-CONTACT VEHICLE
093	CELL PHONE	CELL PHONE (ON PAR OR DRIVER IN USE)
094	VIOL GDL	TEENAGE DRIVER IN VIOLATION OF GRADUATED LICENSE PGM
095	GUY WIRE	GUY WIRE
096	BERM	BERM (EARTHEN OR GRAVEL MOUND)
097	GRAVEL	GRAVEL IN ROADWAY
098	ABR EDGE	ABRUPT EDGE
099	CELL WTNSD	CELL PHONE USE WITNESSED BY OTHER PARTICIPANT
100	UNK FIXD	FIXED OBJECT, UNKNOWN TYPE.
101	OTHER OBJ	NON-FIXED OBJECT, OTHER OR UNKNOWN TYPE
102	TEXTING	TEXTING
103	WZ WORKER	WORK ZONE WORKER
104	ON VEHICLE	PASSENGER RIDING ON VEHICLE EXTERIOR
105	PEDAL PSGR	PASSENGER RIDING ON PEDALCYCLE
106	MAN WHLCHR	PEDESTRIAN IN NON-MOTORIZED WHEELCHAIR
107	MTR WHLCHR	PEDESTRIAN IN MOTORIZED WHEELCHAIR
108	OFFICER	LAW ENFORCEMENT / POLICE OFFICER
109	SUB-BIKE	"SUB-BIKE": PEDALCYCLIST INJURED SUBSEQUENT TO COLLISION, ETC.
110	N-MTR	NON-MOTORIST STRUCK VEHICLE
111	S CAR VS V	STREET CAR/TROLLEY (ON RAILS OR OVERHEAD WIRE SYSTEM) STRUCK VEHICLE
112	V VS S CAR	VEHICLE STRUCK STREET CAR/TROLLEY (ON RAILS OR OVERHEAD WIRE SYSTEM)
113	S CAR ROW	AT OR ON STREET CAR OR TROLLEY RIGHT-OF-WAY
114	RR EQUIP	VEHICLE STRUCK RAILROAD EQUIPMENT (NOT TRAIN) ON TRACKS
115	DSTRCT GPS	DISTRACTED BY NAVIGATION SYSTEM OR GPS DEVICE
116	DSTRCT OTH	DISTRACTED BY OTHER ELECTRONIC DEVICE
117	RR GATE	RAIL CROSSING DROP-ARM GATE

EVENT CODE TRANSLATION LIST

EVENT CODE	SHORT DESCRIPTION	LONG DESCRIPTION
118	EXPNSN JNT	EXPANSION JOINT
119	JERSEY BAR	JERSEY BARRIER
120	WIRE BAR	WIRE OR CABLE MEDIAN BARRIER
121	FENCE	FENCE
123	OBJ IN VEH	LOOSE OBJECT IN VEHICLE STRUCK OCCUPANT
124	SLIPPERY	SLIDING OR SWERVING DUE TO WET, ICY, SLIPPERY OR LOOSE SURFACE (NOT GRAVEL)
125	SHLDR	SHOULDER GAVE WAY
126	BOULDER	ROCK(S), BOULDER (NOT GRAVEL; NOT ROCK SLIDE)
127	LAND SLIDE	ROCK SLIDE OR LAND SLIDE
128	CURVE INV	CURVE PRESENT AT CRASH LOCATION
129	HILL INV	VERTICAL GRADE / HILL PRESENT AT CRASH LOCATION
130	CURVE HID	VIEW OBSCURED BY CURVE
131	HILL HID	VIEW OBSCURED BY VERTICAL GRADE / HILL
132	WINDOW HID	VIEW OBSCURED BY VEHICLE WINDOW CONDITIONS
133	SPRAY HID	VIEW OBSCURED BY WATER SPRAY

FUNCTIONAL CLASSIFICATION TRANSLATION LIST

FUNC CLASS	DESCRIPTION
01	RURAL PRINCIPAL ARTERIAL - INTERSTATE
02	RURAL PRINCIPAL ARTERIAL - OTHER
06	RURAL MINOR ARTERIAL
07	RURAL MAJOR COLLECTOR
08	RURAL MINOR COLLECTOR
09	RURAL LOCAL
11	URBAN PRINCIPAL ARTERIAL - INTERSTATE
12	URBAN PRINCIPAL ARTERIAL - OTHER FREEWAYS AND EXP
14	URBAN PRINCIPAL ARTERIAL - OTHER
16	URBAN MINOR ARTERIAL
17	URBAN COLLECTOR
19	URBAN LOCAL
78	UNKNOWN RURAL SYSTEM
79	UNKNOWN RURAL NON-SYSTEM
98	UNKNOWN URBAN SYSTEM
99	UNKNOWN URBAN NON-SYSTEM

HIGHWAY COMPONENT TRANSLATION LIST

CODE	DESCRIPTION
0	MAINLINE STATE HIGHWAY
1	COUPLET
3	FRONTAGE ROAD
6	CONNECTION
8	HIGHWAY - OTHER

INJURY SEVERITY CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
1	KILL	FATAL INJURY
2	INJA	INCAPACITATING INJURY - BLEEDING, BROKEN BONES
3	INJB	NON-INCAPACITATING INJURY
4	INJC	POSSIBLE INJURY - COMPLAINT OF PAIN
5	PRI	DIED PRIOR TO CRASH
7	NO<5	NO INJURY - 0 TO 4 YEARS OF AGE

LIGHT CONDITION CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	UNK	UNKNOWN
1	DAY	DAYLIGHT
2	DLIT	DARKNESS - WITH STREET LIGHTS
3	DARK	DARKNESS - NO STREET LIGHTS
4	DAWN	DAWN (TWILIGHT)
5	DUSK	DUSK (TWILIGHT)

MEDIAN TYPE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	NONE	NO MEDIAN
1	RSDMD	SOLID MEDIAN BARRIER
2	DIVMD	EARTH, GRASS OR PAVED MEDIAN

MILEAGE TYPE CODE TRANSLATION LIST

CODE	LONG DESCRIPTION
0	REGULAR MILEAGE
T	TEMPORARY
Y	SPUR
Z	OVERLAPPING

MOVEMENT TYPE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	UNK	UNKNOWN
1	STRGHT	STRAIGHT AHEAD
2	TURN-R	TURNING RIGHT
3	TURN-L	TURNING LEFT
4	U-TURN	MAKING A U-TURN
5	BACK	BACKING
6	STOP	STOPPED IN TRAFFIC
7	PRKD-P	PARKED - PROPERLY
8	PRKD-I	PARKED - IMPROPERLY

PEDESTRIAN LOCATION CODE TRANSLATION LIST

CODE	LONG DESCRIPTION
00	AT INTERSECTION - NOT IN ROADWAY
01	AT INTERSECTION - INSIDE CROSSWALK
02	AT INTERSECTION - IN ROADWAY, OUTSIDE CROSSWALK
03	AT INTERSECTION - IN ROADWAY, XWALK AVAIL UNKNWN
04	NOT AT INTERSECTION - IN ROADWAY
05	NOT AT INTERSECTION - ON SHOULDER
06	NOT AT INTERSECTION - ON MEDIAN
07	NOT AT INTERSECTION - WITHIN TRAFFIC RIGHT-OF-WAY
08	NOT AT INTERSECTION - IN BIKE PATH
09	NOT-AT INTERSECTION - ON SIDEWALK
10	OUTSIDE TRAFFICWAY BOUNDARIES
13	AT INTERSECTION - IN BIKE LANE
15	NOT AT INTERSECTION - INSIDE MID-BLOCK CROSSWALK
18	OTHER, NOT IN ROADWAY
99	UNKNOWN LOCATION

ROAD CHARACTER CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	UNK	UNKNOWN
1	INTER	INTERSECTION
2	ALLEY	DRIVEWAY OR ALLEY
3	STRGHT	STRAIGHT ROADWAY
4	TRANS	TRANSITION
5	CURVE	CURVE (HORIZONTAL CURVE)
6	OPENAC	OPEN ACCESS OR TURNOUT
7	GRADE	GRADE (VERTICAL CURVE)
8	BRIDGE	BRIDGE STRUCTURE
9	TUNNEL	TUNNEL

PARTICIPANT TYPE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	OCC	UNKNOWN OCCUPANT TYPE
1	DRVR	DRIVER
2	PSNG	PASSENGER
3	PED	PEDESTRIAN
4	CONV	PEDESTRIAN USING A PEDESTRIAN CONVEYA
5	PTOW	PEDESTRIAN TOWING OR TRAILERING AN OB
6	BIKE	PEDALCYCLIST
7	BTOW	PEDALCYCLIST TOWING OR TRAILERING AN
8	PRKD	OCCUPANT OF A PARKED MOTOR VEHICLE
9	UNK	UNKNOWN TYPE OF NON-MOTORIST

TRAFFIC CONTROL DEVICE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
000	NONE	NO CONTROL
001	TRF SIGNAL	TRAFFIC SIGNALS
002	FLASHBCN-R	FLASHING BEACON - RED (STOP)
003	FLASHBCN-A	FLASHING BEACON - AMBER (SLOW)
004	STOP SIGN	STOP SIGN
005	SLOW SIGN	SLOW SIGN
006	REG-SIGN	REGULATORY SIGN
007	YIELD	YIELD SIGN
008	WARNING	WARNING SIGN
009	CURVE	CURVE SIGN
010	SCHL X-ING	SCHOOL CROSSING SIGN OR SPECIAL SIGNAL
011	OFCR/FLAG	POLICE OFFICER, FLAGMAN - SCHOOL PATROL
012	BRDG-GATE	BRIDGE GATE - BARRIER
013	TEMP-BARR	TEMPORARY BARRIER
014	NO-PASS-ZN	NO PASSING ZONE
015	ONE-WAY	ONE-WAY STREET
016	CHANNEL	CHANNELIZATION
017	MEDIAN BAR	MEDIAN BARRIER
018	PILOT CAR	PILOT CAR
019	SP PED SIG	SPECIAL PEDESTRIAN SIGNAL
020	X-BUCK	CROSSBUCK
021	THR-GN-SIG	THROUGH GREEN ARROW OR SIGNAL
022	L-GRN-SIG	LEFT TURN GREEN ARROW, LANE MARKINGS, OR SIGNAL
023	R-GRN-SIG	RIGHT TURN GREEN ARROW, LANE MARKINGS, OR SIGNAL
024	WIGWAG	WIGWAG OR FLASHING LIGHTS W/O DROP-ARM GATE
025	X-BUCK WRN	CROSSBUCK AND ADVANCE WARNING
026	WW W/ GATE	FLASHING LIGHTS WITH DROP-ARM GATES
027	OVRHD SGNL	SUPPLEMENTAL OVERHEAD SIGNAL (RR XING ONLY)
028	SP RR STOP	SPECIAL RR STOP SIGN
029	ILUM GRD X	ILLUMINATED GRADE CROSSING
037	RAMP METER	METERED RAMPS
038	RUMBLE STR	RUMBLE STRIP
090	L-TURN REF	LEFT TURN REFUGE (WHEN REFUGE IS INVOLVED)
091	R-TURN ALL	RIGHT TURN AT ALL TIMES SIGN, ETC.
092	EMR SGN/FL	EMERGENCY SIGNS OR FLARES
093	ACCEL LANE	ACCELERATION OR DECELERATION LANES
094	R-TURN PRO	RIGHT TURN PROHIBITED ON RED AFTER STOPPING

VEHICLE TYPE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
01	PSNGR CAR	PASSENGER CAR, PICKUP, LIGHT DELIVERY, ETC.
02	BOBTAIL	TRUCK TRACTOR WITH NO TRAILERS (BOBTAIL)
03	FARM TRCTR	FARM TRACTOR OR SELF-PROPELLED FARM EQUIPMENT
04	SEMI TOW	TRUCK TRACTOR WITH TRAILER/MOBILE HOME IN TOW
05	TRUCK	TRUCK WITH NON-DETACHABLE BED, PANEL, ETC.
06	MOPED	MOPED, MINIBIKE, SEATED MOTOR SCOOTER, MOTOR BIKE
07	SCHL BUS	SCHOOL BUS (INCLUDES VAN)
08	OTH BUS	OTHER BUS
09	MTRCYCLE	MOTORCYCLE, DIRT BIKE
10	OTHER	OTHER: FORKLIFT, BACKHOE, ETC.
11	MOTRHOME	MOTORHOME
12	TROLLEY	MOTORIZED STREET CAR/TROLLEY (NO RAILS/WIRES)
13	ATV	ATV
14	MTRSCTR	MOTORIZED SCOOTER (STANDING)
15	SNOWMOBILE	SNOWMOBILE
99	UNKNOWN	UNKNOWN VEHICLE TYPE

095	BUS STPSGN	BUS STOP SIGN AND RED LIGHTS
099	UNKNOWN	UNKNOWN OR NOT DEFINITE

WEATHER CONDITION CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	UNK	UNKNOWN
1	CLR	CLEAR
2	CLD	CLOUDY
3	RAIN	RAIN
4	SLT	SLEET
5	FOG	FOG
6	SNOW	SNOW
7	DUST	DUST
8	SMOK	SMOKE
9	ASH	ASH

Appendix E Year 2016 Background Traffic Conditions Worksheets

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	0	6	2	0	1	3	1017	31	15	279	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		1.00	0.99		1.00	1.00	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00	1.00	0.99	1.00	1.00	1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1805	1594		1803	1615	1789	3438	1477	1687	3438	
Flt Permitted		1.00	1.00		1.00	1.00	0.57	1.00	1.00	0.25	1.00	
Satd. Flow (perm)		1900	1594		1898	1615	1074	3438	1477	445	3438	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	1	0	6	2	0	1	3	1082	33	16	297	0
RTOR Reduction (vph)	0	0	6	0	0	1	0	0	4	0	0	0
Lane Group Flow (vph)	0	1	0	0	2	0	3	1082	29	16	297	0
Confl. Peds. (#/hr)			1	1			9					9
Confl. Bikes (#/hr)									3			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	5%	7%	7%	5%	0%
Turn Type	Perm		Perm	Perm		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		8	4	4	4	2		2	6		6
Actuated Green, G (s)		1.2	1.2		1.2	1.2	84.3	83.3	83.3	86.3	84.3	
Effective Green, g (s)		1.2	1.2		1.2	1.2	84.3	83.3	83.3	86.3	84.3	
Actuated g/C Ratio		0.01	0.01		0.01	0.01	0.84	0.83	0.83	0.86	0.84	
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.3	4.8	4.8	2.3	4.8	
Lane Grp Cap (vph)		23	19		23	19	913	2864	1230	409	2898	
v/s Ratio Prot							0.00	c0.31		c0.00	0.09	
v/s Ratio Perm		0.00	0.00		c0.00	0.00	0.00		0.02	0.03		
v/c Ratio		0.04	0.00		0.09	0.00	0.00	0.38	0.02	0.04	0.10	
Uniform Delay, d1		48.8	48.8		48.9	48.8	1.2	2.0	1.4	1.0	1.3	
Progression Factor		1.00	1.00		1.00	1.00	0.33	0.27	0.18	1.00	1.00	
Incremental Delay, d2		0.6	0.1		1.2	0.0	0.0	0.3	0.0	0.0	0.0	
Delay (s)		49.4	48.9		50.0	48.8	0.4	0.8	0.3	1.1	1.4	
Level of Service		D	D		D	D	A	A	A	A	A	
Approach Delay (s)		48.9			49.6			0.8			1.4	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM Average Control Delay	1.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	49.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	32	0	8	11	0	12	4	1008	6	1	292	3
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	0	9	12	0	13	4	1096	7	1	317	3
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								992			884	
pX, platoon unblocked	0.30	0.30		0.30	0.30	0.30				0.30		
vC, conflicting volume	1443	1433	321	1438	1431	1099	322			1102		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1309	1276	321	1294	1271	158	322			169		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	8	100	99	71	100	95	100			100		
cM capacity (veh/h)	38	50	723	41	50	267	1249			425		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	43	25	1107	322
Volume Left	35	12	4	1
Volume Right	9	13	7	3
cSH	47	74	1249	425
Volume to Capacity	0.93	0.34	0.00	0.00
Queue Length 95th (ft)	96	32	0	0
Control Delay (s)	248.0	76.8	0.1	0.1
Lane LOS	F	F	A	A
Approach Delay (s)	248.0	76.8	0.1	0.1
Approach LOS	F	F		

Intersection Summary				
Average Delay	8.6			
Intersection Capacity Utilization	66.9%	ICU Level of Service	C	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	49	4	36	16	2	21	13	938	43	6	301	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.95			0.93		1.00	0.99		1.00	1.00	
Flt Protected		0.97			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1722			1701		1568	1801		1805	1812	
Flt Permitted		0.86			0.84		0.56	1.00		0.18	1.00	
Satd. Flow (perm)		1514			1454		922	1801		342	1812	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	53	4	39	17	2	23	14	1009	46	6	324	6
RTOR Reduction (vph)	0	28	0	0	21	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	68	0	0	21	0	14	1054	0	6	330	0
Confl. Peds. (#/hr)	2					2	1					1
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	15%	5%	0%	0%	4%	33%
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)		8.6			8.6		77.5	76.4		77.3	76.3	
Effective Green, g (s)		8.6			8.6		77.5	76.4		77.3	76.3	
Actuated g/C Ratio		0.09			0.09		0.78	0.76		0.77	0.76	
Clearance Time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Vehicle Extension (s)		2.5			2.5		2.3	5.2		2.3	5.2	
Lane Grp Cap (vph)		130			125		722	1376		279	1383	
v/s Ratio Prot							0.00	c0.59		c0.00	0.18	
v/s Ratio Perm		c0.04			0.01		0.01			0.02		
v/c Ratio		0.52			0.17		0.02	0.77		0.02	0.24	
Uniform Delay, d1		43.7			42.4		2.6	6.7		6.6	3.4	
Progression Factor		1.00			1.00		1.00	1.00		1.89	1.79	
Incremental Delay, d2		2.8			0.5		0.0	4.1		0.0	0.4	
Delay (s)		46.6			42.8		2.6	10.8		12.5	6.6	
Level of Service		D			D		A	B		B	A	
Approach Delay (s)		46.6			42.8			10.7			6.7	
Approach LOS		D			D			B			A	

Intersection Summary			
HCM Average Control Delay	12.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	67.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Volume (vph)	2	4	1	0	32	2
Peak Hour Factor	0.66	0.66	0.66	0.66	0.66	0.66
Hourly flow rate (vph)	3	6	2	0	48	3

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	9	2	52
Volume Left (vph)	3	0	48
Volume Right (vph)	6	0	0
Hadj (s)	-0.33	1.70	0.19
Departure Headway (s)	3.7	5.7	4.1
Degree Utilization, x	0.01	0.00	0.06
Capacity (veh/h)	957	623	869
Control Delay (s)	6.7	8.7	7.4
Approach Delay (s)	6.7	8.7	7.4
Approach LOS	A	A	A

Intersection Summary			
Delay	7.3		
HCM Level of Service	A		
Intersection Capacity Utilization	18.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	1	66	0	1	15	1	0	0	5	8	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	1	74	0	1	17	1	0	0	6	9	0	0
Pedestrians		1			1							
Lane Width (ft)		12.0			12.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		0			0							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					868							
pX, platoon unblocked												
vC, conflicting volume	18			74			97	97	75	103	96	18
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	18			74			97	97	75	103	96	18
tC, single (s)	5.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	3.1			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	99	99	100	100
cM capacity (veh/h)	1141			1538			888	796	991	876	796	1065

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	75	19	6	9
Volume Left	1	1	0	9
Volume Right	0	1	6	0
cSH	1141	1538	991	876
Volume to Capacity	0.00	0.00	0.01	0.01
Queue Length 95th (ft)	0	0	0	1
Control Delay (s)	0.1	0.4	8.7	9.2
Lane LOS	A	A	A	A
Approach Delay (s)	0.1	0.4	8.7	9.2
Approach LOS			A	A

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	17.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	1	8	43	0	22	6	495	20	16	1032	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		1.00	1.00		1.00	0.99	1.00	1.00	0.97	1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1822	1615		1719	1594	1805	3505	1570	1803	3471	1576
Flt Permitted		0.78	1.00		0.75	1.00	0.23	1.00	1.00	0.44	1.00	1.00
Satd. Flow (perm)		1482	1615		1364	1594	446	3505	1570	841	3471	1576
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	5	1	9	47	0	24	7	544	22	18	1134	4
RTOR Reduction (vph)	0	0	8	0	0	22	0	0	5	0	0	1
Lane Group Flow (vph)	0	6	1	0	47	2	7	544	17	18	1134	3
Confl. Peds. (#/hr)	1					1	1		2	2		1
Confl. Bikes (#/hr)									4			3
Heavy Vehicles (%)	0%	0%	0%	5%	0%	0%	0%	3%	0%	0%	4%	0%
Turn Type	Perm		Perm	Perm		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		8	4	4	4	2		2	6		6
Actuated Green, G (s)		7.8	7.8		7.8	7.8	87.6	86.6	86.6	89.8	87.7	87.7
Effective Green, g (s)		7.8	7.8		7.8	7.8	87.6	86.6	86.6	89.8	87.7	87.7
Actuated g/C Ratio		0.07	0.07		0.07	0.07	0.80	0.79	0.79	0.82	0.80	0.80
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.3	4.8	4.8	2.3	4.8	4.8
Lane Grp Cap (vph)		105	115		97	113	368	2759	1236	705	2767	1257
v/s Ratio Prot							0.00	0.16		c0.00	c0.33	
v/s Ratio Perm		0.00	0.00		c0.03	0.00	0.01		0.01	0.02		0.00
v/c Ratio		0.06	0.01		0.48	0.02	0.02	0.20	0.01	0.03	0.41	0.00
Uniform Delay, d1		47.7	47.5		49.2	47.5	2.4	2.9	2.5	1.9	3.4	2.3
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.2	0.0		2.8	0.0	0.0	0.2	0.0	0.0	0.2	0.0
Delay (s)		47.8	47.5		51.9	47.6	2.4	3.1	2.5	1.9	3.6	2.3
Level of Service		D	D		D	D	A	A	A	A	A	A
Approach Delay (s)		47.6			50.5			3.1			3.5	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM Average Control Delay	5.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	50.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	13	0	11	4	0	7	5	508	11	17	1009	41
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	14	0	12	4	0	8	5	558	12	19	1109	45
Pedestrians		1			1							
Lane Width (ft)		12.0			12.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		0			0							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								992			884	
pX, platoon unblocked	0.26	0.26	0.22	0.26	0.26	0.92	0.22			0.92		
vC, conflicting volume	1753	1752	1132	1757	1768	565	1155			571		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1822	1820	0	1839	1884	489	0			495		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	0	100	95	68	100	99	98			98		
cM capacity (veh/h)	14	19	238	14	18	539	356			968		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	26	12	576	1173
Volume Left	14	4	5	19
Volume Right	12	8	12	45
cSH	24	36	356	968
Volume to Capacity	1.11	0.33	0.02	0.02
Queue Length 95th (ft)	83	27	1	1
Control Delay (s)	455.8	146.7	0.5	0.7
Lane LOS	F	F	A	A
Approach Delay (s)	455.8	146.7	0.5	0.7
Approach LOS	F	F		

Intersection Summary				
Average Delay	8.3			
Intersection Capacity Utilization	76.3%	ICU Level of Service	D	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	25	1	49	54	3	4	65	496	18	19	969	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.98			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.91			0.99		1.00	0.99		1.00	1.00	
Flt Protected		0.98			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1653			1763		1770	1852		1716	1821	
Flt Permitted		0.90			0.68		0.16	1.00		0.45	1.00	
Satd. Flow (perm)		1513			1254		301	1852		809	1821	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	26	1	51	56	3	4	68	517	19	20	1009	25
RTOR Reduction (vph)	0	47	0	0	3	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	31	0	0	60	0	68	535	0	20	1033	0
Confl. Peds. (#/hr)	1		2	2		1	1		3	3		1
Confl. Bikes (#/hr)									5			3
Heavy Vehicles (%)	0%	0%	2%	2%	0%	0%	2%	2%	0%	5%	4%	0%
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)		8.1			8.1		80.5	75.8		75.3	73.2	
Effective Green, g (s)		8.1			8.1		80.5	75.8		75.3	73.2	
Actuated g/C Ratio		0.08			0.08		0.80	0.76		0.75	0.73	
Clearance Time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Vehicle Extension (s)		2.5			2.5		2.3	5.2		2.3	5.2	
Lane Grp Cap (vph)		123			102		311	1404		628	1333	
v/s Ratio Prot							c0.01	0.29		0.00	c0.57	
v/s Ratio Perm		0.02			c0.05		0.17			0.02		
v/c Ratio		0.25			0.59		0.22	0.38		0.03	0.78	
Uniform Delay, d1		43.1			44.3		8.5	4.1		3.1	8.3	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.8			7.4		0.2	0.8		0.0	4.5	
Delay (s)		43.9			51.8		8.7	4.9		3.1	12.8	
Level of Service		D			D		A	A		A	B	
Approach Delay (s)		43.9			51.8			5.3			12.6	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM Average Control Delay	12.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.5
Intersection Capacity Utilization	70.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Volume (vph)	12	32	5	3	19	10
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69
Hourly flow rate (vph)	17	46	7	4	28	14

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	64	12	42
Volume Left (vph)	17	0	28
Volume Right (vph)	46	4	0
Hadj (s)	-0.34	-0.22	0.25
Departure Headway (s)	3.7	3.8	4.3
Degree Utilization, x	0.07	0.01	0.05
Capacity (veh/h)	960	907	822
Control Delay (s)	6.9	6.9	7.5
Approach Delay (s)	6.9	6.9	7.5
Approach LOS	A	A	A

Intersection Summary			
Delay	7.1		
HCM Level of Service	A		
Intersection Capacity Utilization	18.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	2	51	1	1	60	7	0	0	1	8	0	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
Hourly flow rate (vph)	3	76	1	1	90	10	0	0	1	12	0	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					868							
pX, platoon unblocked												
vC, conflicting volume	100			78			193	186	77	182	181	95
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	100			78			193	186	77	182	181	95
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	98	100	99
cM capacity (veh/h)	1505			1534			760	710	990	781	714	967

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	81	101	1	24
Volume Left	3	1	0	12
Volume Right	1	10	1	12
cSH	1505	1534	990	864
Volume to Capacity	0.00	0.00	0.00	0.03
Queue Length 95th (ft)	0	0	0	2
Control Delay (s)	0.3	0.1	8.6	9.3
Lane LOS	A	A	A	A
Approach Delay (s)	0.3	0.1	8.6	9.3
Approach LOS			A	A

Intersection Summary				
Average Delay	1.3			
Intersection Capacity Utilization	18.2%	ICU Level of Service	A	
Analysis Period (min)	15			

Appendix F Year 2016 Total Traffic Conditions Worksheets

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	0	6	2	0	1	3	1028	31	15	283	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		1.00	0.99		1.00	1.00	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00	1.00	0.99	1.00	1.00	1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1805	1594		1803	1615	1789	3438	1477	1687	3438	
Flt Permitted		1.00	1.00		1.00	1.00	0.57	1.00	1.00	0.25	1.00	
Satd. Flow (perm)		1900	1594		1898	1615	1070	3438	1477	439	3438	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	1	0	6	2	0	1	3	1094	33	16	301	0
RTOR Reduction (vph)	0	0	6	0	0	1	0	0	4	0	0	0
Lane Group Flow (vph)	0	1	0	0	2	0	3	1094	29	16	301	0
Confl. Peds. (#/hr)			1	1			9					9
Confl. Bikes (#/hr)									3			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	5%	7%	7%	5%	0%
Turn Type	Perm		Perm	Perm		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		8	4	4	4	2		2	6		6
Actuated Green, G (s)		1.2	1.2		1.2	1.2	84.3	83.3	83.3	86.3	84.3	
Effective Green, g (s)		1.2	1.2		1.2	1.2	84.3	83.3	83.3	86.3	84.3	
Actuated g/C Ratio		0.01	0.01		0.01	0.01	0.84	0.83	0.83	0.86	0.84	
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.3	4.8	4.8	2.3	4.8	
Lane Grp Cap (vph)		23	19		23	19	909	2864	1230	404	2898	
v/s Ratio Prot							0.00	c0.32		c0.00	0.09	
v/s Ratio Perm		0.00	0.00		c0.00	0.00	0.00		0.02	0.03		
v/c Ratio		0.04	0.00		0.09	0.00	0.00	0.38	0.02	0.04	0.10	
Uniform Delay, d1		48.8	48.8		48.9	48.8	1.2	2.0	1.4	1.0	1.4	
Progression Factor		1.00	1.00		1.00	1.00	0.42	0.29	0.22	1.00	1.00	
Incremental Delay, d2		0.6	0.1		1.2	0.0	0.0	0.3	0.0	0.0	0.0	
Delay (s)		49.4	48.9		50.0	48.8	0.5	0.9	0.3	1.1	1.4	
Level of Service		D	D		D	D	A	A	A	A	A	
Approach Delay (s)		48.9			49.6			0.9			1.4	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM Average Control Delay	1.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	50.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	32	0	15	11	0	12	7	1019	6	1	292	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	0	16	12	0	13	8	1108	7	1	317	8
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								992			884	
pX, platoon unblocked	0.32	0.32		0.32	0.32	0.32				0.32		
vC, conflicting volume	1464	1454	323	1467	1454	1111	326			1114		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1386	1356	323	1396	1357	286	326			296		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	2	100	98	68	100	95	99			100		
cM capacity (veh/h)	36	48	721	37	48	243	1244			409		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	51	25	1122	326
Volume Left	35	12	8	1
Volume Right	16	13	7	8
cSH	51	67	1244	409
Volume to Capacity	1.00	0.38	0.01	0.00
Queue Length 95th (ft)	110	35	0	0
Control Delay (s)	254.4	88.4	0.2	0.1
Lane LOS	F	F	A	A
Approach Delay (s)	254.4	88.4	0.2	0.1
Approach LOS	F	F		

Intersection Summary			
Average Delay	10.1		
Intersection Capacity Utilization	70.0%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	4	42	16	2	21	15	941	43	6	308	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.95			0.93		1.00	0.99		1.00	1.00	
Flt Protected		0.97			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1724			1701		1568	1801		1805	1812	
Flt Permitted		0.84			0.86		0.54	1.00		0.17	1.00	
Satd. Flow (perm)		1483			1489		892	1801		314	1812	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	65	4	45	17	2	23	16	1012	46	6	331	6
RTOR Reduction (vph)	0	27	0	0	21	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	87	0	0	21	0	16	1057	0	6	336	0
Confl. Peds. (#/hr)	2					2	1					1
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	15%	5%	0%	0%	4%	33%
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)		10.8			10.8		76.3	74.2		74.1	73.1	
Effective Green, g (s)		10.8			10.8		76.3	74.2		74.1	73.1	
Actuated g/C Ratio		0.11			0.11		0.76	0.74		0.74	0.73	
Clearance Time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Vehicle Extension (s)		2.5			2.5		2.3	5.2		2.3	5.2	
Lane Grp Cap (vph)		160			161		695	1336		248	1325	
v/s Ratio Prot							c0.00	c0.59		0.00	0.19	
v/s Ratio Perm		c0.06			0.01		0.02			0.02		
v/c Ratio		0.55			0.13		0.02	0.79		0.02	0.25	
Uniform Delay, d1		42.3			40.4		2.9	8.1		8.1	4.4	
Progression Factor		1.00			1.00		1.00	1.00		1.83	1.58	
Incremental Delay, d2		3.0			0.3		0.0	4.9		0.0	0.5	
Delay (s)		45.3			40.6		2.9	12.9		14.9	7.5	
Level of Service		D			D		A	B		B	A	
Approach Delay (s)		45.3			40.6			12.8			7.6	
Approach LOS		D			D			B			A	

Intersection Summary			
HCM Average Control Delay	14.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Volume (vph)	2	11	3	0	39	20
Peak Hour Factor	0.66	0.66	0.66	0.66	0.66	0.66
Hourly flow rate (vph)	3	17	5	0	59	30

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	20	5	89
Volume Left (vph)	3	0	59
Volume Right (vph)	17	0	0
Hadj (s)	-0.48	1.70	0.13
Departure Headway (s)	3.6	5.7	4.1
Degree Utilization, x	0.02	0.01	0.10
Capacity (veh/h)	961	616	874
Control Delay (s)	6.7	8.8	7.5
Approach Delay (s)	6.7	8.8	7.5
Approach LOS	A	A	A

Intersection Summary			
Delay	7.4		
HCM Level of Service	A		
Intersection Capacity Utilization	19.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	1	66	0	1	15	3	0	0	5	25	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	1	74	0	1	17	3	0	0	6	28	0	1
Pedestrians		1			1							
Lane Width (ft)		12.0			12.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		0			0							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					868							
pX, platoon unblocked												
vC, conflicting volume	20			74			99	99	75	104	97	20
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	20			74			99	99	75	104	97	20
tC, single (s)	5.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	3.1			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	99	97	100	100
cM capacity (veh/h)	1138			1538			884	794	991	874	795	1063

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	75	21	6	29
Volume Left	1	1	0	28
Volume Right	0	3	6	1
cSH	1138	1538	991	880
Volume to Capacity	0.00	0.00	0.01	0.03
Queue Length 95th (ft)	0	0	0	3
Control Delay (s)	0.1	0.4	8.7	9.2
Lane LOS	A	A	A	A
Approach Delay (s)	0.1	0.4	8.7	9.2
Approach LOS			A	A

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	18.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	1	8	43	0	22	6	501	20	16	1043	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		1.00	1.00		1.00	0.99	1.00	1.00	0.97	1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1822	1615		1719	1594	1805	3505	1570	1803	3471	1576
Flt Permitted		0.78	1.00		0.75	1.00	0.23	1.00	1.00	0.44	1.00	1.00
Satd. Flow (perm)		1482	1615		1364	1594	440	3505	1570	836	3471	1576
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	5	1	9	47	0	24	7	551	22	18	1146	4
RTOR Reduction (vph)	0	0	8	0	0	22	0	0	5	0	0	1
Lane Group Flow (vph)	0	6	1	0	47	2	7	551	17	18	1146	3
Confl. Peds. (#/hr)	1					1	1		2	2		1
Confl. Bikes (#/hr)									4			3
Heavy Vehicles (%)	0%	0%	0%	5%	0%	0%	0%	3%	0%	0%	4%	0%
Turn Type	Perm		Perm	Perm		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		8	4	4	4	2		2	6		6
Actuated Green, G (s)		7.8	7.8		7.8	7.8	87.6	86.6	86.6	89.8	87.7	87.7
Effective Green, g (s)		7.8	7.8		7.8	7.8	87.6	86.6	86.6	89.8	87.7	87.7
Actuated g/C Ratio		0.07	0.07		0.07	0.07	0.80	0.79	0.79	0.82	0.80	0.80
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.3	4.8	4.8	2.3	4.8	4.8
Lane Grp Cap (vph)		105	115		97	113	363	2759	1236	701	2767	1257
v/s Ratio Prot							0.00	0.16		c0.00	c0.33	
v/s Ratio Perm		0.00	0.00		c0.03	0.00	0.02		0.01	0.02		0.00
v/c Ratio		0.06	0.01		0.48	0.02	0.02	0.20	0.01	0.03	0.41	0.00
Uniform Delay, d1		47.7	47.5		49.2	47.5	2.4	3.0	2.5	1.9	3.4	2.3
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.2	0.0		2.8	0.0	0.0	0.2	0.0	0.0	0.2	0.0
Delay (s)		47.8	47.5		51.9	47.6	2.4	3.1	2.5	1.9	3.6	2.3
Level of Service		D	D		D	D	A	A	A	A	A	A
Approach Delay (s)		47.6			50.5			3.1			3.5	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM Average Control Delay	5.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	50.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	13	0	15	4	0	7	12	514	11	17	1009	52
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	14	0	16	4	0	8	13	565	12	19	1109	57
Pedestrians		1			1							
Lane Width (ft)		12.0			12.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		0			0							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								992			884	
pX, platoon unblocked	0.26	0.26	0.22	0.26	0.26	0.92	0.22			0.92		
vC, conflicting volume	1781	1780	1138	1789	1803	572	1167			578		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1894	1891	0	1928	1979	491	0			498		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	0	100	93	62	100	99	96			98		
cM capacity (veh/h)	12	17	237	12	15	534	355			961		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	31	12	590	1185
Volume Left	14	4	13	19
Volume Right	16	8	12	57
cSH	24	31	355	961
Volume to Capacity	1.27	0.39	0.04	0.02
Queue Length 95th (ft)	96	32	3	1
Control Delay (s)	514.3	183.8	1.2	0.7
Lane LOS	F	F	A	A
Approach Delay (s)	514.3	183.8	1.2	0.7
Approach LOS	F	F		

Intersection Summary			
Average Delay	10.8		
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	1	53	54	3	4	71	503	18	19	973	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.98			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.92			0.99		1.00	0.99		1.00	1.00	
Flt Protected		0.98			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1660			1763		1770	1852		1716	1821	
Flt Permitted		0.89			0.64		0.16	1.00		0.44	1.00	
Satd. Flow (perm)		1508			1184		294	1852		802	1821	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	32	1	55	56	3	4	74	524	19	20	1014	25
RTOR Reduction (vph)	0	50	0	0	3	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	38	0	0	60	0	74	542	0	20	1038	0
Confl. Peds. (#/hr)	1		2	2		1	1		3	3		1
Confl. Bikes (#/hr)									5			3
Heavy Vehicles (%)	0%	0%	2%	2%	0%	0%	2%	2%	0%	5%	4%	0%
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)		8.2			8.2		80.5	75.7		75.1	73.0	
Effective Green, g (s)		8.2			8.2		80.5	75.7		75.1	73.0	
Actuated g/C Ratio		0.08			0.08		0.80	0.76		0.75	0.73	
Clearance Time (s)		4.5			4.5		4.5	5.0		4.5	5.0	
Vehicle Extension (s)		2.5			2.5		2.3	5.2		2.3	5.2	
Lane Grp Cap (vph)		124			97		308	1402		621	1329	
v/s Ratio Prot							c0.01	0.29		0.00	c0.57	
v/s Ratio Perm		0.02			c0.05		0.18			0.02		
v/c Ratio		0.30			0.62		0.24	0.39		0.03	0.78	
Uniform Delay, d1		43.2			44.4		8.9	4.2		3.2	8.5	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.0			10.2		0.2	0.8		0.0	4.6	
Delay (s)		44.2			54.6		9.1	5.0		3.2	13.1	
Level of Service		D			D		A	A		A	B	
Approach Delay (s)		44.2			54.6			5.5			12.9	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM Average Control Delay	13.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.5
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Volume (vph)	12	50	12	3	23	21
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69
Hourly flow rate (vph)	17	72	17	4	33	30

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	90	22	64
Volume Left (vph)	17	0	33
Volume Right (vph)	72	4	0
Hadj (s)	-0.40	-0.12	0.20
Departure Headway (s)	3.7	4.0	4.3
Degree Utilization, x	0.09	0.02	0.08
Capacity (veh/h)	950	861	816
Control Delay (s)	7.1	7.1	7.7
Approach Delay (s)	7.1	7.1	7.7
Approach LOS	A	A	A

Intersection Summary			
Delay	7.3		
HCM Level of Service	A		
Intersection Capacity Utilization	19.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	3	51	1	1	60	13	0	0	1	18	0	9
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
Hourly flow rate (vph)	4	76	1	1	90	19	0	0	1	27	0	13
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					868							
pX, platoon unblocked												
vC, conflicting volume	109			78			201	198	77	190	189	99
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	109			78			201	198	77	190	189	99
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	97	100	99
cM capacity (veh/h)	1494			1534			748	699	990	771	707	962

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	82	110	1	40
Volume Left	4	1	0	27
Volume Right	1	19	1	13
cSH	1494	1534	990	826
Volume to Capacity	0.00	0.00	0.00	0.05
Queue Length 95th (ft)	0	0	0	4
Control Delay (s)	0.4	0.1	8.6	9.6
Lane LOS	A	A	A	A
Approach Delay (s)	0.4	0.1	8.6	9.6
Approach LOS			A	A

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	19.4%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix G Year 2016 Total Traffic Conditions Worksheets – Mitigated

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	32	0	15	11	0	12	7	1019	6	1	292	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	0	16	12	0	13	8	1108	7	1	317	8
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								992			883	
pX, platoon unblocked	0.32	0.32		0.32	0.32	0.32				0.32		
vC, conflicting volume	1460	1454	323	1467	1454	1111	326			1114		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1377	1356	323	1397	1358	292	326			302		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	4	100	98	68	100	95	99			100		
cM capacity (veh/h)	36	48	721	37	48	242	1244			409		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total	51	25	8	1114	326
Volume Left	35	12	8	0	1
Volume Right	16	13	0	7	8
cSH	52	67	1244	1700	409
Volume to Capacity	0.98	0.37	0.01	0.66	0.00
Queue Length 95th (ft)	108	35	0	0	0
Control Delay (s)	245.3	88.0	7.9	0.0	0.1
Lane LOS	F	F	A		A
Approach Delay (s)	245.3	88.0	0.1		0.1
Approach LOS	F	F			

Intersection Summary			
Average Delay	9.7		
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	13	0	15	4	0	7	12	514	11	17	1009	52
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	14	0	16	4	0	8	13	565	12	19	1109	57
Pedestrians		1			1							
Lane Width (ft)		12.0			12.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		0			0							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								992			883	
pX, platoon unblocked	0.25	0.25	0.22	0.25	0.25	0.93	0.22			0.93		
vC, conflicting volume	1775	1780	1138	1789	1803	572	1167			578		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1919	1940	0	1978	2029	497	0			504		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	0	100	93	59	100	99	96			98		
cM capacity (veh/h)	11	16	237	11	14	534	355			962		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total	31	12	9	581	1185
Volume Left	14	4	9	4	19
Volume Right	16	8	0	12	57
cSH	23	28	355	355	962
Volume to Capacity	1.34	0.43	0.04	0.04	0.02
Queue Length 95th (ft)	98	34	3	3	1
Control Delay (s)	554.1	207.2	15.5	1.0	0.7
Lane LOS	F	F	C	A	A
Approach Delay (s)	554.1	207.2	1.2		0.7
Approach LOS	F	F			

Intersection Summary			
Average Delay	11.6		
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	32	0	15	11	0	12	7	1019	6	1	292	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	0	16	12	0	13	8	1108	7	1	317	8
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type								None			TWLTL	
Median storage veh)											2	
Upstream signal (ft)								992			883	
pX, platoon unblocked	0.31	0.31		0.31	0.31	0.31				0.31		
vC, conflicting volume	1460	1454	323	1467	1454	1111	326			1114		
vC1, stage 1 conf vol	324	324		1126	1126							
vC2, stage 2 conf vol	1136	1129		341	328							
vCu, unblocked vol	1372	1351	323	1393	1353	247	326			258		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.2	5.5		6.1	5.5							
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	81	100	98	94	100	95	99			100		
cM capacity (veh/h)	185	191	721	204	194	247	1244			410		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total	51	25	8	1114	326
Volume Left	35	12	8	0	1
Volume Right	16	13	0	7	8
cSH	242	225	1244	1700	410
Volume to Capacity	0.21	0.11	0.01	0.66	0.00
Queue Length 95th (ft)	19	9	0	0	0
Control Delay (s)	23.8	23.0	7.9	0.0	0.1
Lane LOS	C	C	A		A
Approach Delay (s)	23.8	23.0	0.1		0.1
Approach LOS	C	C			

Intersection Summary				
Average Delay	1.2			
Intersection Capacity Utilization	65.0%	ICU Level of Service	C	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↰	↕			↕	
Volume (veh/h)	13	0	15	4	0	7	12	514	11	17	1009	52
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	14	0	16	4	0	8	13	565	12	19	1109	57
Pedestrians		1			1							
Lane Width (ft)		12.0			12.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		0			0							
Right turn flare (veh)												
Median type								None			TWLTL	
Median storage veh)											2	
Upstream signal (ft)								992			883	
pX, platoon unblocked	0.26	0.26	0.21	0.26	0.26	0.91	0.21			0.91		
vC, conflicting volume	1775	1780	1138	1789	1803	572	1167			578		
vC1, stage 1 conf vol	1176	1176		598	598							
vC2, stage 2 conf vol	599	604		1191	1204							
vCu, unblocked vol	1800	1821	0	1857	1908	483	0			489		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)	6.2	5.5		6.1	5.5							
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	92	100	93	97	100	99	96			98		
cM capacity (veh/h)	179	168	234	157	142	536	351			960		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total	31	12	9	581	1185
Volume Left	14	4	9	4	19
Volume Right	16	8	0	12	57
cSH	205	285	351	351	960
Volume to Capacity	0.15	0.04	0.04	0.04	0.02
Queue Length 95th (ft)	13	3	3	3	1
Control Delay (s)	25.7	18.2	15.7	1.0	0.7
Lane LOS	D	C	C	A	A
Approach Delay (s)	25.7	18.2	1.2		0.7
Approach LOS	D	C			

Intersection Summary				
Average Delay	1.4			
Intersection Capacity Utilization	80.0%	ICU Level of Service	D	
Analysis Period (min)	15			

PRELIMINARY STORMWATER REPORT

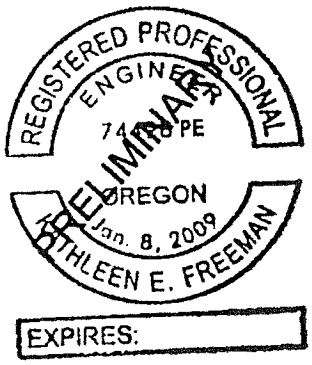
CHÊNE BLANC ESTATES

WEST LINN, OR

October 16, 2015

Prepared For:

18000 Midhill Drive, LLC
West Linn, OR



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EXECUTIVE SUMMARY

The existing site is located on private property at 18000 Upper Midhill Drive in West Linn, Oregon (See Figure 1 & Figure 2). The property (including offsite improvements) is approximately 6.84 acres and currently contains no structures, brush and several groves of mature trees. The proposed development will consist of subdividing the property to create 34 lots. Additionally, a 48-ft right of way with 24-ft street will be constructed and dedicated. The purpose of this storm water report is to describe the design of the stormwater management systems following the City of West Linn requirements.

Stormwater runoff from the proposed development will be conveyed to a detention pond for water quality treatment and detention. The pond has been sized to comply with the following requirements:

- Treat stormwater runoff using the City of Portland's requirement of 0.83 inches of precipitation for a 24-hour storm event.
- Capture and detain the 2, 5, 10 and 25-year, 24-hour post developed runoff rate to release at the 2, 5, 10 and 25-year, 24-hour existing runoff rate.

A geotechnical investigation was completed in August 2015 showing that infiltration rates on the site 1.2 in/hr at 5 feet below ground surface.

The purpose of this report is to describe the facilities being proposed and to show that the design follows the City of West Linn's Public Works Design Standards.

PROJECT DESCRIPTION

The existing site is located on private property at 18000 Upper Midhill Drive in West Linn, Oregon (See Figure 1 and 2).

The purpose of this report is to describe the facilities being proposed and show that the design follows the City of West Linn Public Works Design Standards in effect at the time of this report.

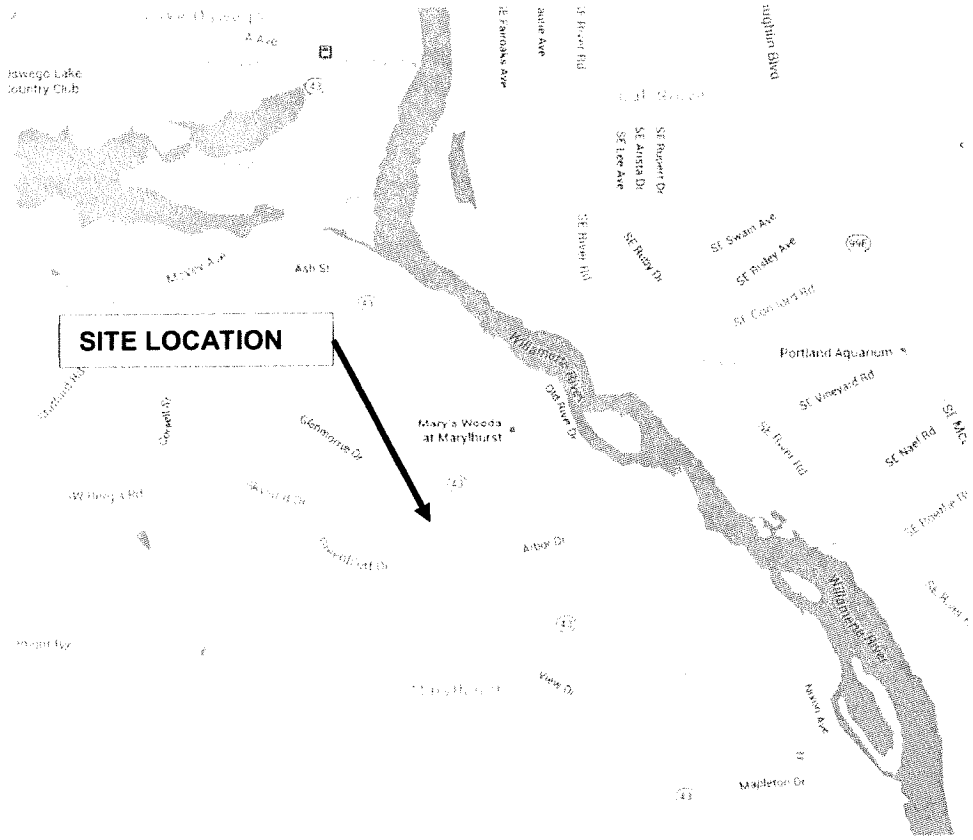

Figure 1 - Vicinity Map

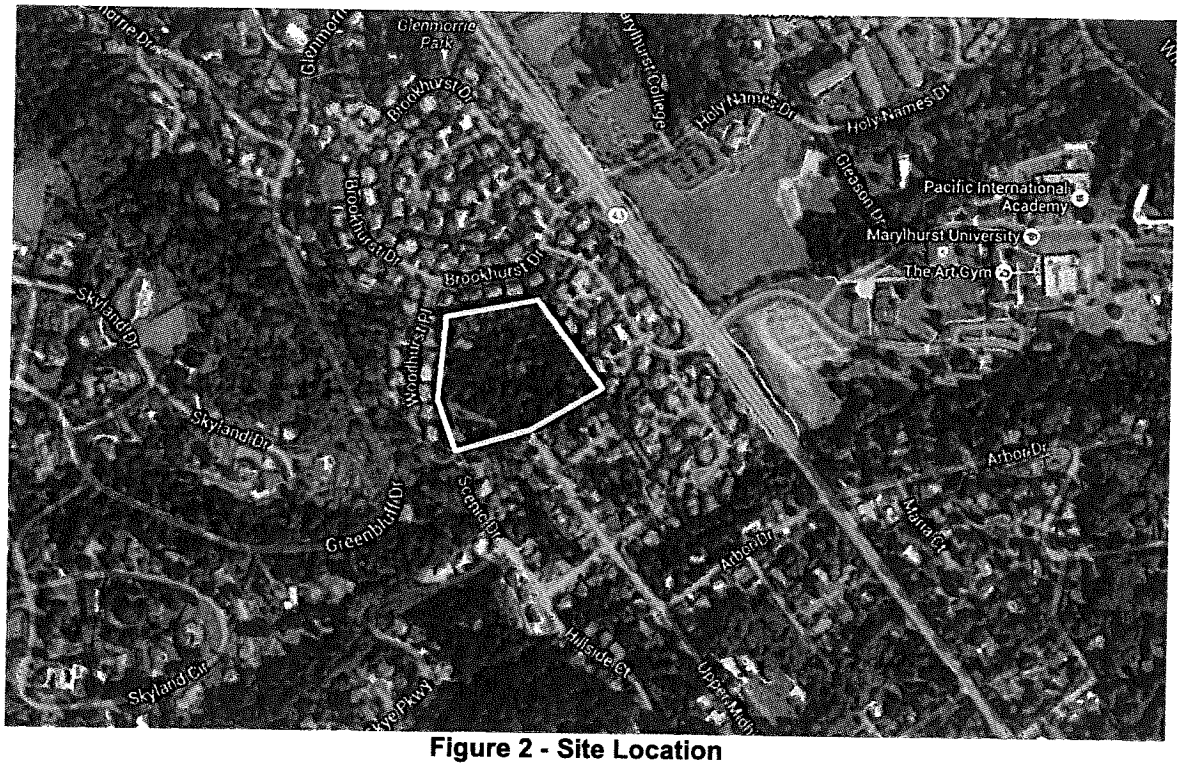

Figure 2 - Site Location

EXISTING CONDITIONS

Site

The property slopes toward east at grades ranging from 9% to 20%. Elevations range from a maximum of 350 feet on the southwest side of the property to a minimum of 238 feet on the southeast side. Currently no structures, brush and several groves of mature trees exist on the site.

Climate

The site is located in Clackamas County approximately 12 miles south of downtown Portland in the West Linn foothills. Average annual rainfall recorded in this area is 47 inches.

Flood Map

The flood plain map shows that the site resides in Zone X, where no base flood elevations have been determined (See Technical Appendix: Exhibits – FIRM Map Number 41005C0019D).

Site Geology

The soil type as classified by the United States Department of Agriculture Soil Survey of Clackamas County is identified in Table 1 (See Technical Appendix: Exhibits - Hydrologic Soil Group for Clackamas County Area, Oregon).

Soil Type	Hydrologic Group
Cascade Silt Loam	C

Table 1 - Soil Characteristics

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A geotechnical investigation was completed in August 2015 showing that infiltration rates on the site are 1.2 in/hr at 5 feet below ground surface (See Technical Appendix: Geotechnical Report).

Existing Drainage

Existing Onsite

An existing drainage ditch is located on the north and east sides of the property. The ditch outfalls into a 12 inch storm line leaving the property and draining towards the southeast through College View Drive.

Existing Offsite

The developed area to the west of the project site slopes towards the site and appears to utilize the existing onsite drainage ditch. An existing storm line system intercepts runoff on the east side of the property and conveys it north into the existing drainage system (See Technical Appendix: Figures 3 and 4).

Basin Areas

Table 2 shows the current impervious and pervious areas for the project site (See Technical Appendix: Exhibits – Existing Site Conditions).

Existing Onsite Basin Area	sq. ft.	acres
Impervious Area	0	0.00
Pervious Area	265,716	6.10
Total Existing Basin Area	265,716	6.10
Existing Offsite Basin Area	**sq. ft.**	**acres**
Impervious Area	0	0.00
Pervious Area	32,234	0.74
Total Existing Basin Area	32,234	0.74
Total Existing Project Site Area	**297,950**	**6.84**

Table 2 – Existing Basin Areas

Curve Number

The major factors for determining the CN values are hydrologic soil group, cover type, treatment, hydrologic condition, and antecedent runoff condition. The curve number represents runoff potential from the ground. Tables 2-2a and 2-2c in the TR-55 manual were used to determine the appropriate curve numbers (See Technical Appendix: Exhibits – Table 2-2a and 2-2c Runoff Curve Numbers).

The existing site consists of woods and brush with a corresponding curve number of 77. The post-developed pervious area was considered to be open space in fair condition (grass cover 50% to 75%) with a corresponding curve number of 79.

Time of Concentration

The time of concentration was calculated for the existing site using the TR-55 Method. The time of concentration of 18 minutes was calculated for the existing basin (See Technical Appendix: Calculations– Time of Concentration). The time of concentration for the post-developed conditions was assumed to be 5 minutes.

POST-DEVELOPED CONDITIONS

Post-Developed Site
Stormwater runoff from the site will be conveyed to a proposed water quality and detention pond in Tract C via catch basins and manholes. The outfall of the pond will be piped through Tract A in the southeastern corner of the site releasing into the existing drainage ditch.

Basin Areas
Table 3 shows the post-developed impervious and pervious areas (See Technical Appendix: Exhibits – Post-Developed Site Conditions). The project area will be approximately 45% impervious.

Post-Developed Total Basin Area	sq. ft.	acres
[1]Impervious Area	133,294	3.06
Pervious Area	164,657	3.78
Total Basin Area	297,950	6.84

[1]Assumes 2,400 sf per lot and includes proposed roads and sidewalks

Table 3 – Post-Developed Basin Areas

HYDROLOGIC ANALYSIS DESIGN GUIDELINES

Design Guidelines
The site is located within the jurisdiction of the City of West Linn, which follows the City of Portland's Stormwater Management Manual for the design of stormwater facilities. Stormwater runoff from the proposed development will be conveyed to a wet detention pond for water quality treatment and detention. The pond has been sized to comply with the following requirements:

- Treat stormwater runoff for water quality storm event (0.83 inches);
- Capture and detain the 2, 5, 10 and 25-year, 24-hour post developed runoff rates to the existing 2, 5, 10 and 25-year, 24-hour existing runoff rates.

An infiltration rate of 1.2 in/hr with a factor of safety of 4 was used for the bottom surface area of the pond.

Hydrograph Method
Naturally occurring rainstorms dissipate over long periods of time. An effective way of estimating storm rainfall is by using the hydrograph method. The Santa Barbara Unit Hydrograph (SBUH) method was used to develop runoff rates. The computer software Hydraflow was used to compute runoff rates and volumes.

Design Storm
The rainfall distribution to be used for this area is the design storm of 24-hour duration based on the standard Type 1A rainfall distribution. Table 4 shows total precipitation depths for the various storm events, which were used as a multiplier for the Type 1A 24-hour rainfall distribution.

Recurrence Interval (years)	Total Precipitation Depth (in.)
Water Quality	0.83
2	2.50
5	3.00
10	3.40
25	3.90
100	4.50

Table 4 - Design Storms

Basin Runoff

Table 5 shows the runoff rates for the existing and post-developed conditions and the allowable release rates after construction (See Technical Appendix: Hydrographs – Hydrograph Report: Existing and Post-Developed).

Recurrence Interval (years)	Existing Runoff Rate (cfs)	Post-Developed Runoff Rate (cfs)	Allowable Release Rate (cfs)
WQ	N/A	0.10	0.05
2	0.66	2.26	0.66
5	1.12	3.06	1.12
10	1.53	3.72	1.53
25	2.07	4.56	2.07

Table 5 - Basin Runoff Rates

HYDRAULIC ANALYSIS AND DESIGN CHARACTERISTICS

The stormwater conveyance system and flow control structure will be sized in the final design phase of the project.

WATER QUALITY/QUANTITY

Water Quality Guidelines

The stormwater facility design follows West Linn's design standards and the City of Portland's Stormwater Management Manual guidelines. The stormwater facility will be designed for flow control and pollution reduction. The City of Portland's performance approach was used to size an extended wet pond. The pond will detain the water quality volume for a minimum of 24 hours. The water quality volume (based on preliminary analysis) for the post-developed condition is 4,014 ft^3.

Water Quantity Guidelines

The pond has been designed to release flows at or below the required release rates (as described on the previous page) based on the Existing Runoff Rates shown in Table 5.

Wet detention Pond Volume

Table 6 shows the available storage capacity of the proposed pond. The table does not include the 0.5 feet of dead storage. The flow control structure and details will be provided in the final Stormwater Report.

Elevation (ft.)	Surface Area (ft^2)	Average Surface Area (ft^2)	Sectional Volume (ft^3)	Total Volume (ft^3)
262	2,894			
		3,330	3,330	
263	3,766			**3,330**
		4,233	4,233	
264	4,701			**7,563**
		5,031	5,031	
265	5,360			**12,593**
		5,531	5,531	
266	5,702			**18,124**
		6,423	6,423	
267	7,145			**24,548**

Table 6 – Proposed Pond Volume

SUMMARY

The stormwater design for the proposed Chêne Blanc Estates will meet or exceed the City of West Linn's requirements. All sizing of water quality/quantity facilities followed the City of Portland's Stormwater Management Manual.

3

TECHNICAL APPENDIX

Exhibits

- FIRM Map Number 41005C0019D
- Hydrologic Soil Group-Clackamas County Area, Oregon
- Table 2-2a and 2-2c Runoff Curve Numbers
- Figure 3
- Figure 4
- Existing Site Conditions
- Post-Developed Site Conditions

Hydrographs

- 2-Year through 25-Year Existing Runoff Hydrograph
- Water Quality through 25-YearPost Developed Runoff Hydrograph

Calculations

- Time of Concentration

Geotechnical Reports

- Geotechnical Engineering Report, GeoPacific Engineering, Inc, August 6, 2015

Operations and Maintenance

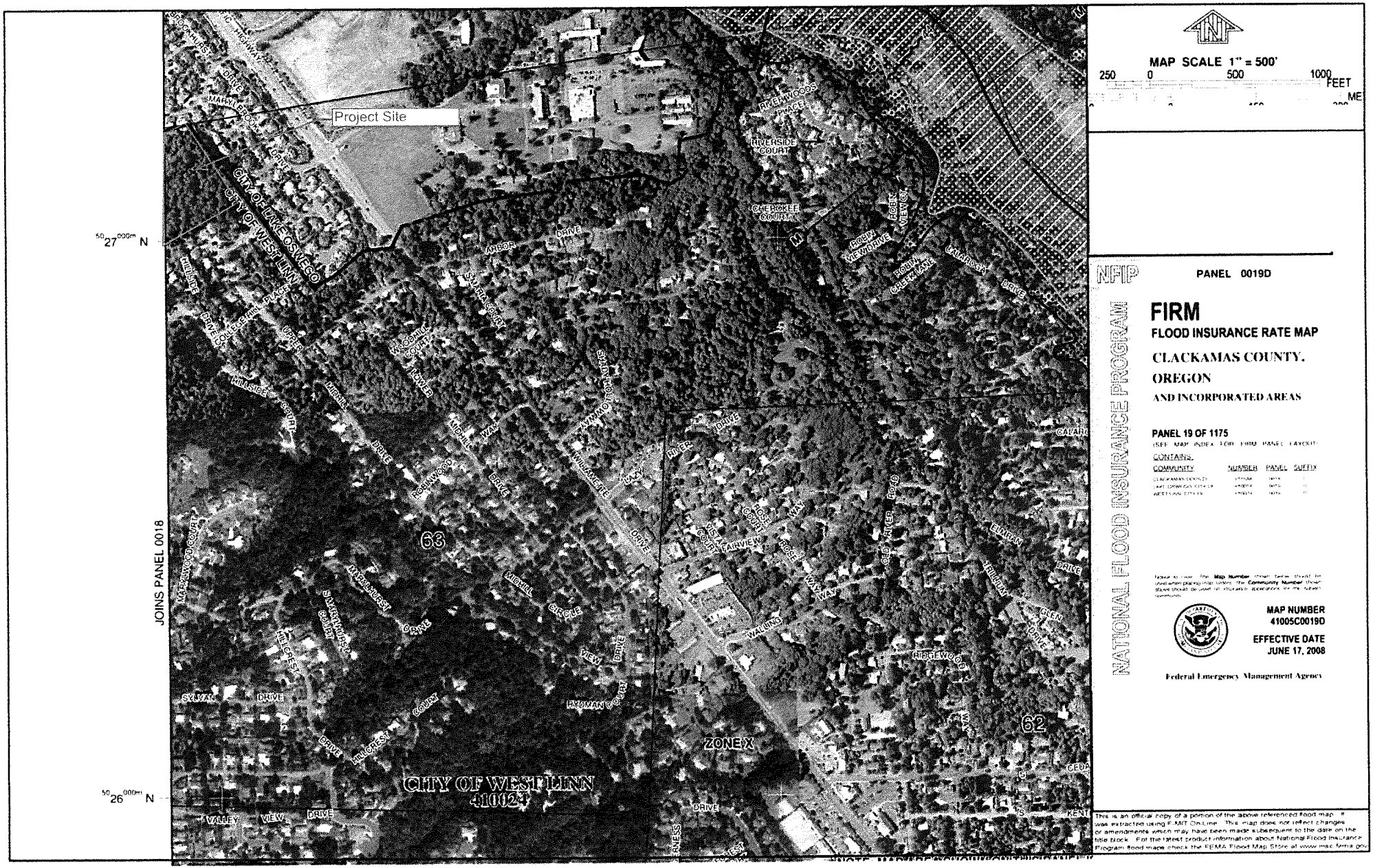
- Operations and Maintenance Plan for Stormwater Facilities - To be Completed with the Final Design

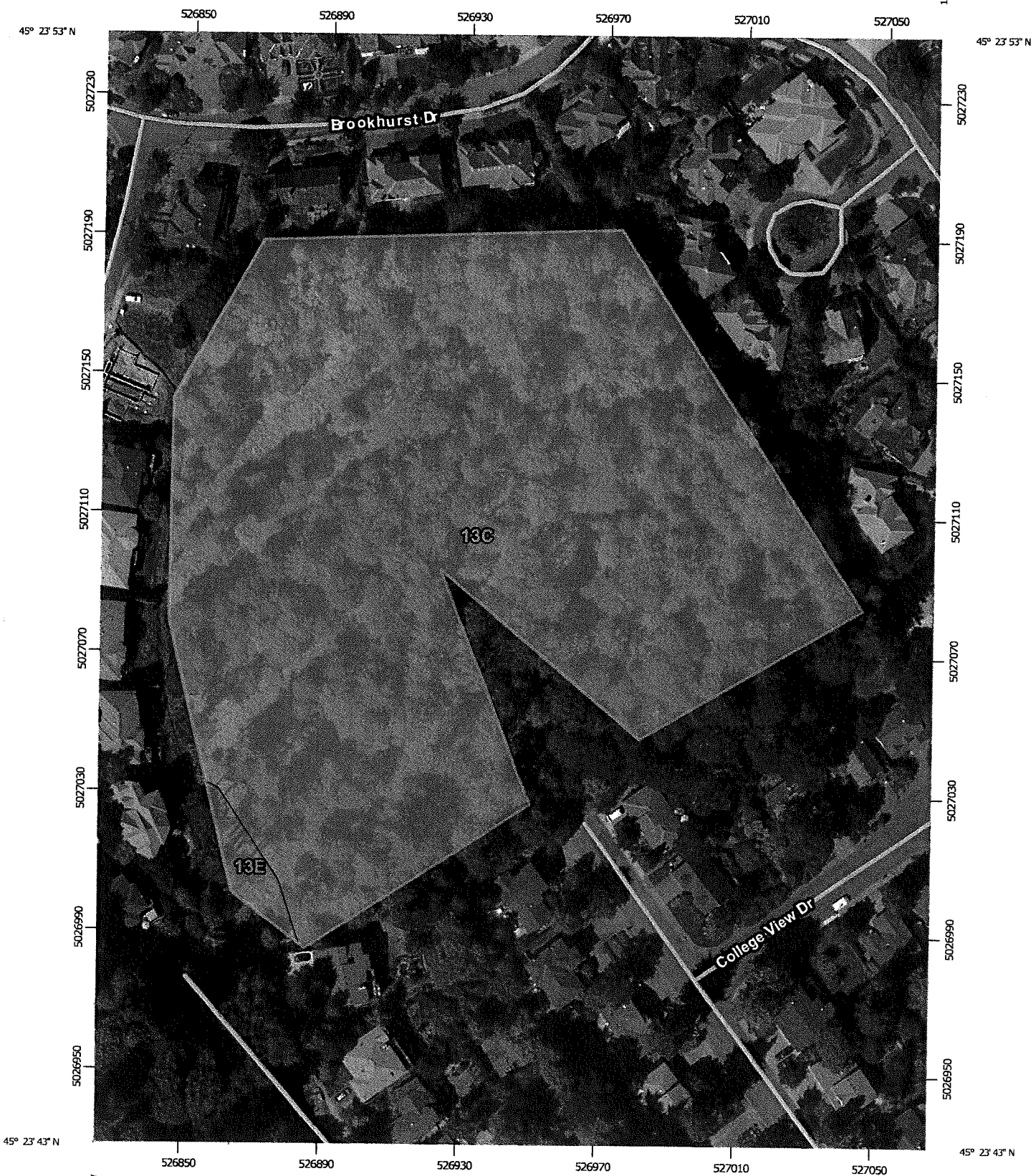
REFERENCES

1. City of West Linn's Public Works Design Standards Issued in 2010
2. City of Portland's Stormwater Management Manual Issued in January 2014
3. Soil Survey of Clackamas County Area. National Resource Conservation Service
4. Urban Hydrology for Small Watersheds – TR-55 Issued in June 1986 – U.S. Department of Agriculture, Natural Resources Conservation Service, Conservation Engineering Division
5. http://westlinnoregon.gov/publicworks/stormwater-fact-sheet

EXHIBITS

3


Project Site
MAP SCALE 1" = 500'
250 0 500 1000 FEET
NFIP
PANEL 0019D
FIRM
FLOOD INSURANCE RATE MAP
CLACKAMAS COUNTY, OREGON
AND INCORPORATED AREAS
PANEL 19 OF 1175
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
MAP NUMBER
41005C0019D
EFFECTIVE DATE
JUNE 17, 2008
Federal Emergency Management Agency
NATIONAL FLOOD INSURANCE PROGRAM
ZONE X
63
62
CITY OF WEST LINN
41002
JOINS PANEL 0018
50 27 000m N
50 26 000m N
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



Map Scale: 1:1,550 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Clackamas County Area, Oregon
Survey Area Data: Version 9, Sep 19, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 26, 2014—Sep 5, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Clackamas County Area, Oregon (OR610)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
13C	Cascade silt loam, 8 to 15 percent slopes	C	6.4	98.5%
13E	Cascade silt loam, 30 to 60 percent slopes	C	0.1	1.5%
Totals for Area of Interest			**6.5**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Table 2-2a Runoff curve numbers for urban areas [1]

Cover description		Curve numbers for hydrologic soil group			
Cover type and hydrologic condition	Average percent impervious area [2]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

[1] Average runoff condition, and $I_a = 0.2S$.

[2] The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

[3] CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

[4] Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

[5] Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2c Runoff curve numbers for other agricultural lands [1/]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. [2/]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. [3/]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 [4/]	48	65	73
Woods—grass combination (orchard or tree farm). [5/]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. [6/]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 [4/]	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

1 Average runoff condition, and $I_a = 0.2S$.

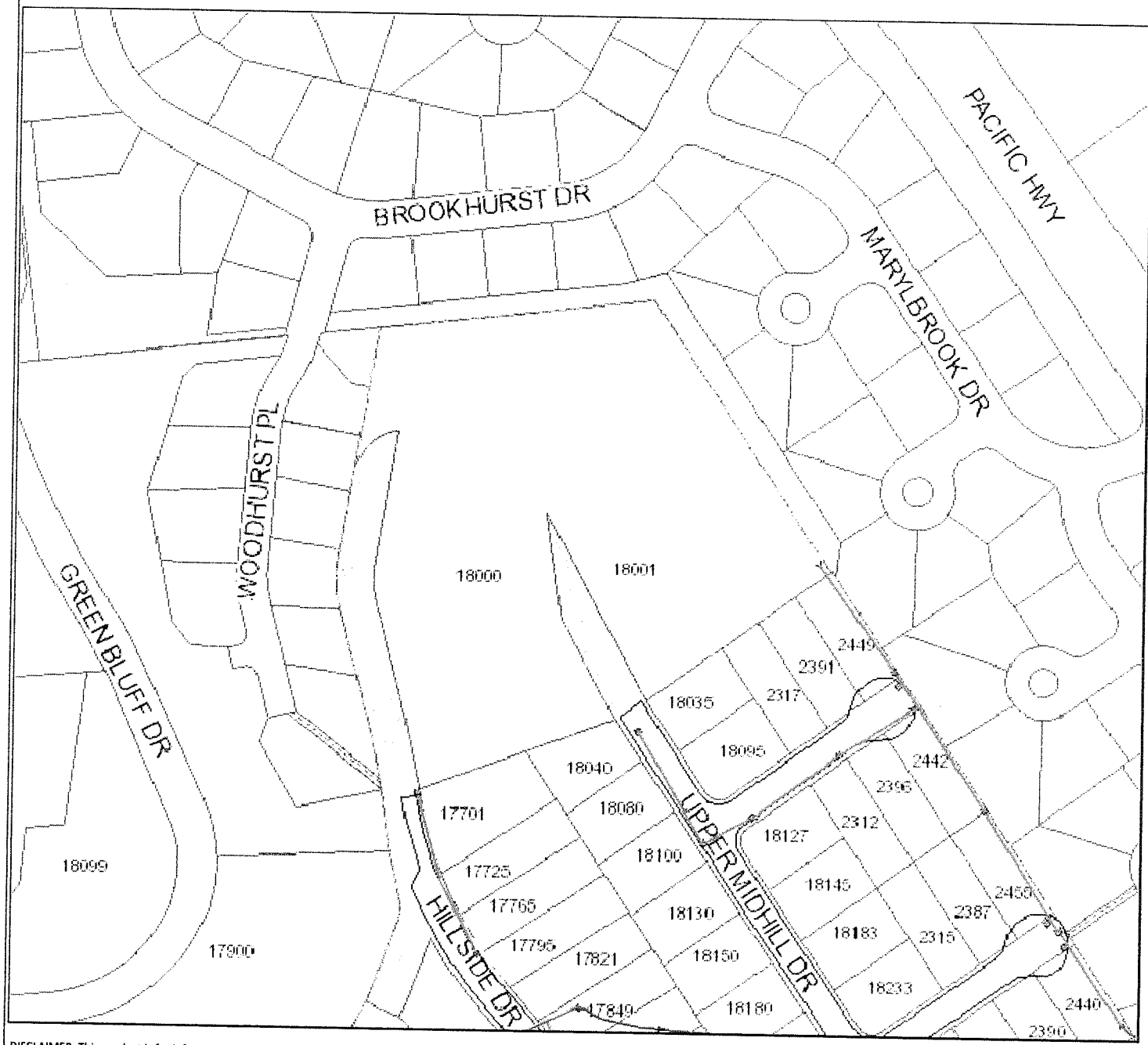
2 *Poor:* <50%) ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: > 75% ground cover and lightly or only occasionally grazed.

3 *Poor:* <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.

4 Actual curve number is less than 30; use CN = 30 for runoff computations.

5 CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.

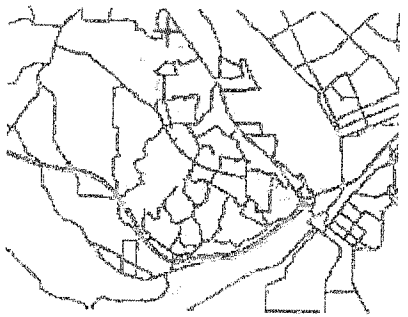
6 *Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.



City of West Linn

FIGURE 3

Scale 1:2,400 - 1 in = 200 ft
Scale is based on 8-1/2 x 11 paper size



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WEST LINN GIS

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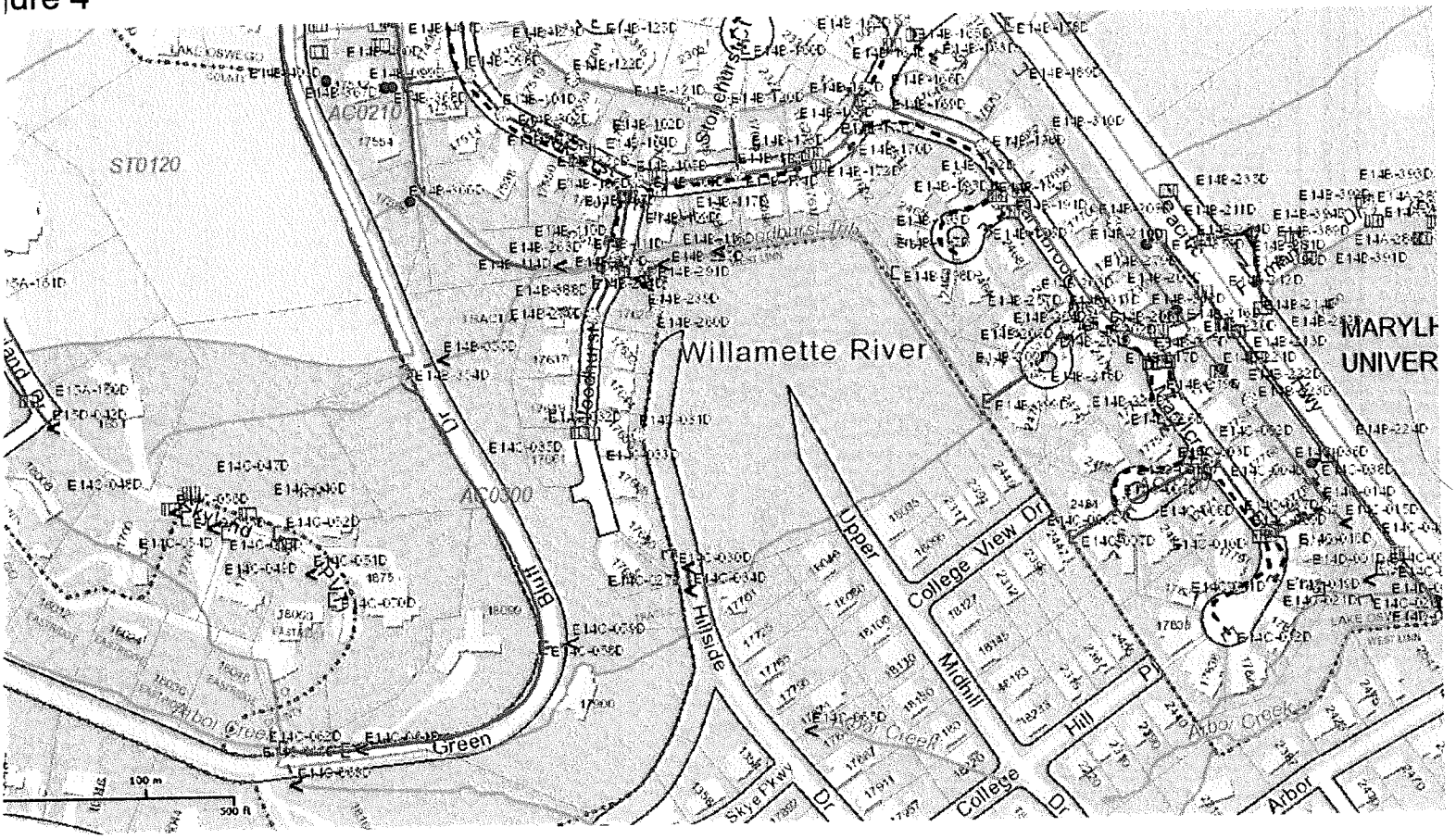

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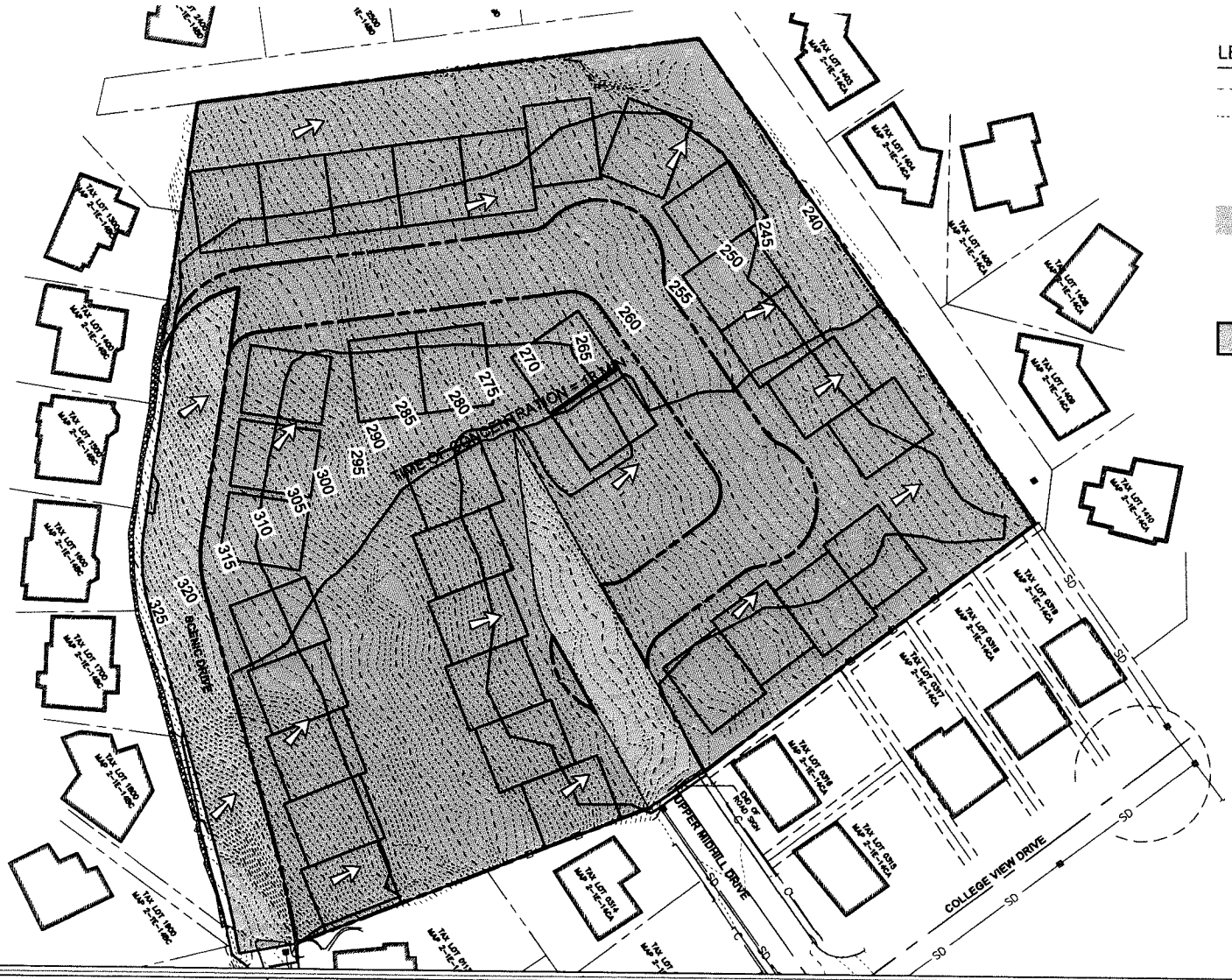


LEGEND

100 EXISTING MAJOR CONTOUR

EXISTING MINOR CONTOUR

SURFACE RUN-OFF FLOW ARROW

EXISTING SITE AREA = 6.10 AC
IMPERVIOUS AREA = 0.00 AC
PERVIOUS AREA = 6.10 AC
PERVIOUS CURVE NUMBER = 77
TIME OF CONCENTRATION = 18 MIN

EXISTING OFFSITE AREA = 0.74 AC
IMPERVIOUS AREA = 0.00 AC
PERVIOUS AREA = 0.74 AC
PERVIOUS CURVE NUMBER = 77
TIME OF CONCENTRATION = 18 MIN

N

Scale: 1 inch = 80 feet

80 40 0 40 80

3J CONSULTING, INC

CIVIL ENGINEERING
WATER RESOURCES
LAND USE PLANNING

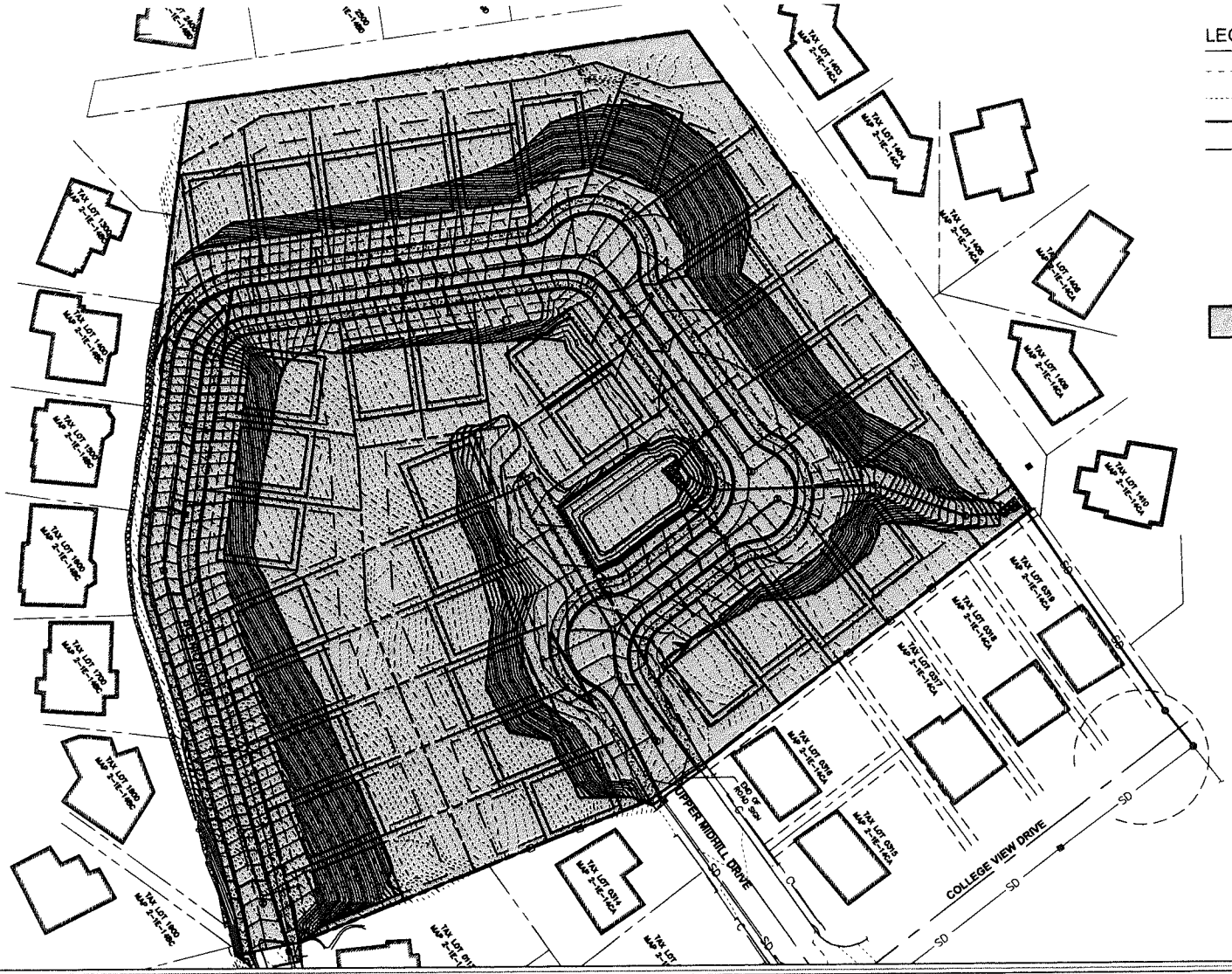
EXISTING SITE CONDITIONS
CHÊNE BLANC ESTATES

Stormwater Report

Exhibit 1

Date:10/09/15

By: KEF



LEGEND

- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR

POST-DEV PROJECT AREA = 6.84 AC
IMPERVIOUS AREA = 3.06 AC
PERVIOUS AREA = 3.78 AC
PERVIOUS CURVE NUMBER = 79
TIME OF CONCENTRATION = 5 MIN

Scale: 1 inch = 80 feet

80 40 0 40 80

3J CONSULTING, INC

CIVIL ENGINEERING
WATER RESOURCES
LAND USE PLANNING

POST-DEVELOPED SITE CONDITIONS
CHÊNE BLANC ESTATES

Stormwater Report

Exhibit 2

Date:10/09/15 By: KEF

HYDROGRAPHS

Hydrograph Report

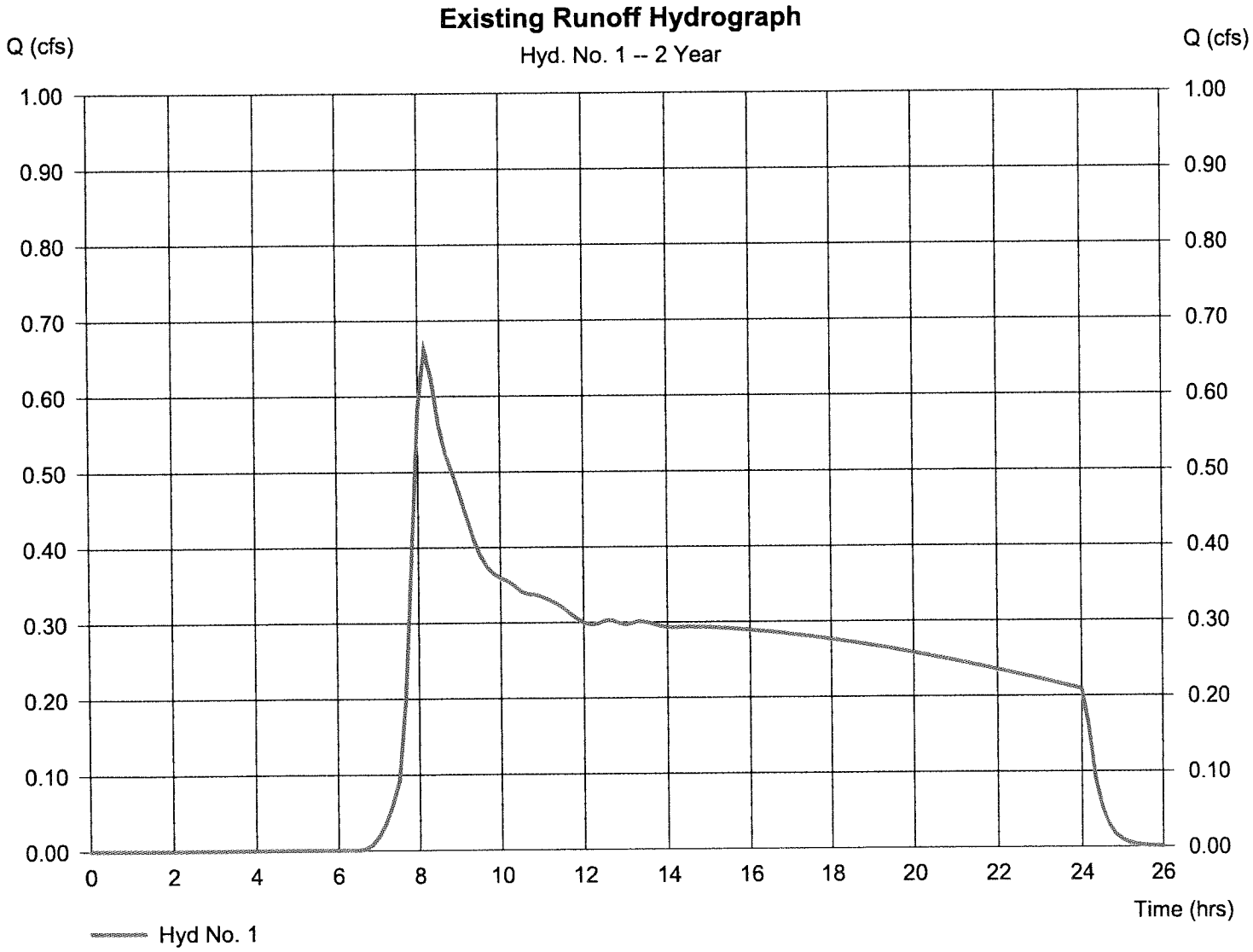
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Tuesday, 09 / 29 / 2015

Hyd. No. 1

Existing Runoff Hydrograph

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.662 cfs
Storm frequency	= 2 yrs	Time to peak	= 8.17 hrs
Time interval	= 10 min	Hyd. volume	= 18,382 cuft
Drainage area	= 6.840 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 2.50 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(6.100 x 77) + (0.740 x 77)] / 6.840



Hydrograph Report

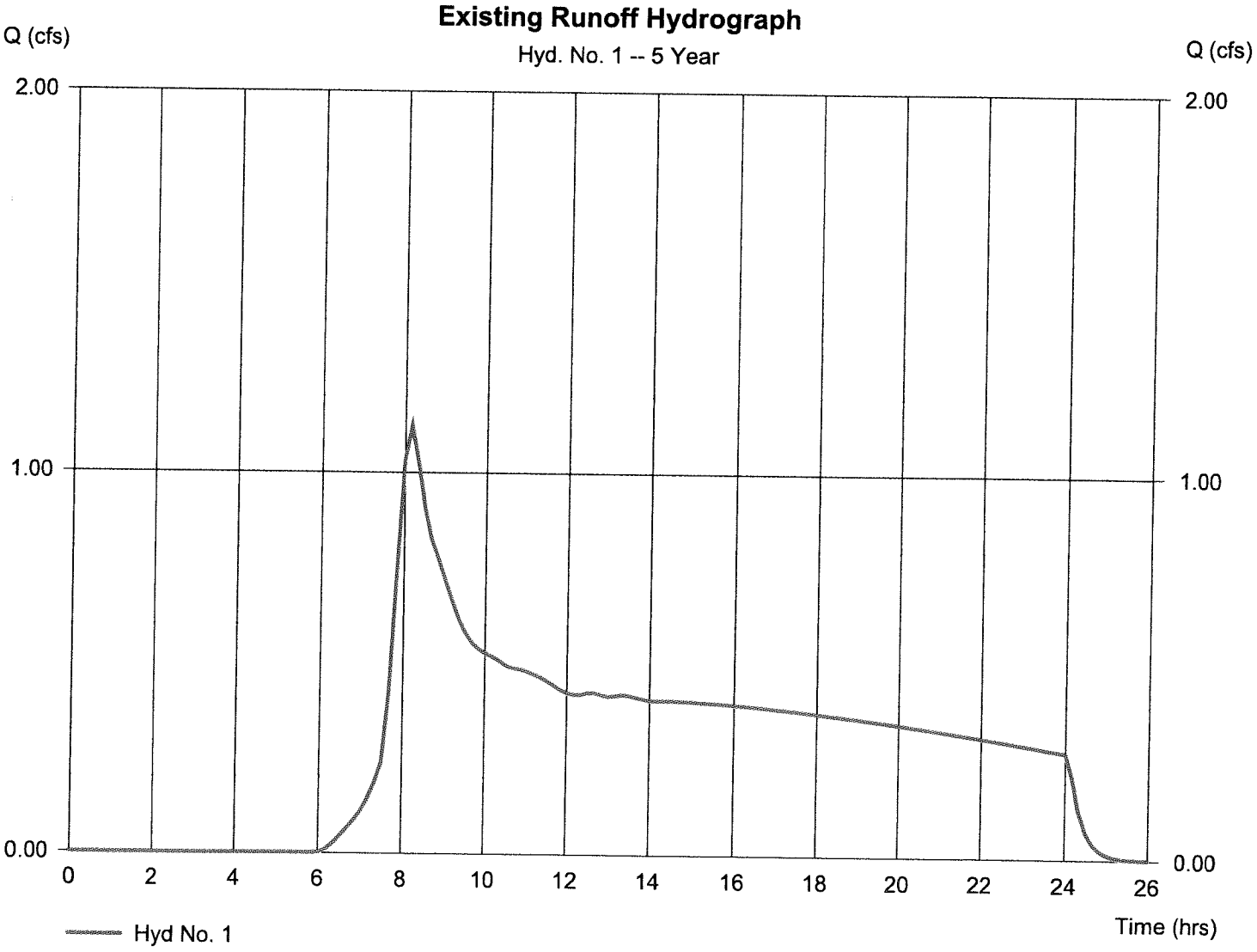
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Tuesday, 09 / 29 / 2015

Hyd. No. 1

Existing Runoff Hydrograph

Hydrograph type	= SBUH Runoff	Peak discharge	= 1.122 cfs
Storm frequency	= 5 yrs	Time to peak	= 8.17 hrs
Time interval	= 10 min	Hyd. volume	= 26,593 cuft
Drainage area	= 6.840 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 3.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(6.100 x 77) + (0.740 x 77)] / 6.840



Hydrograph Report

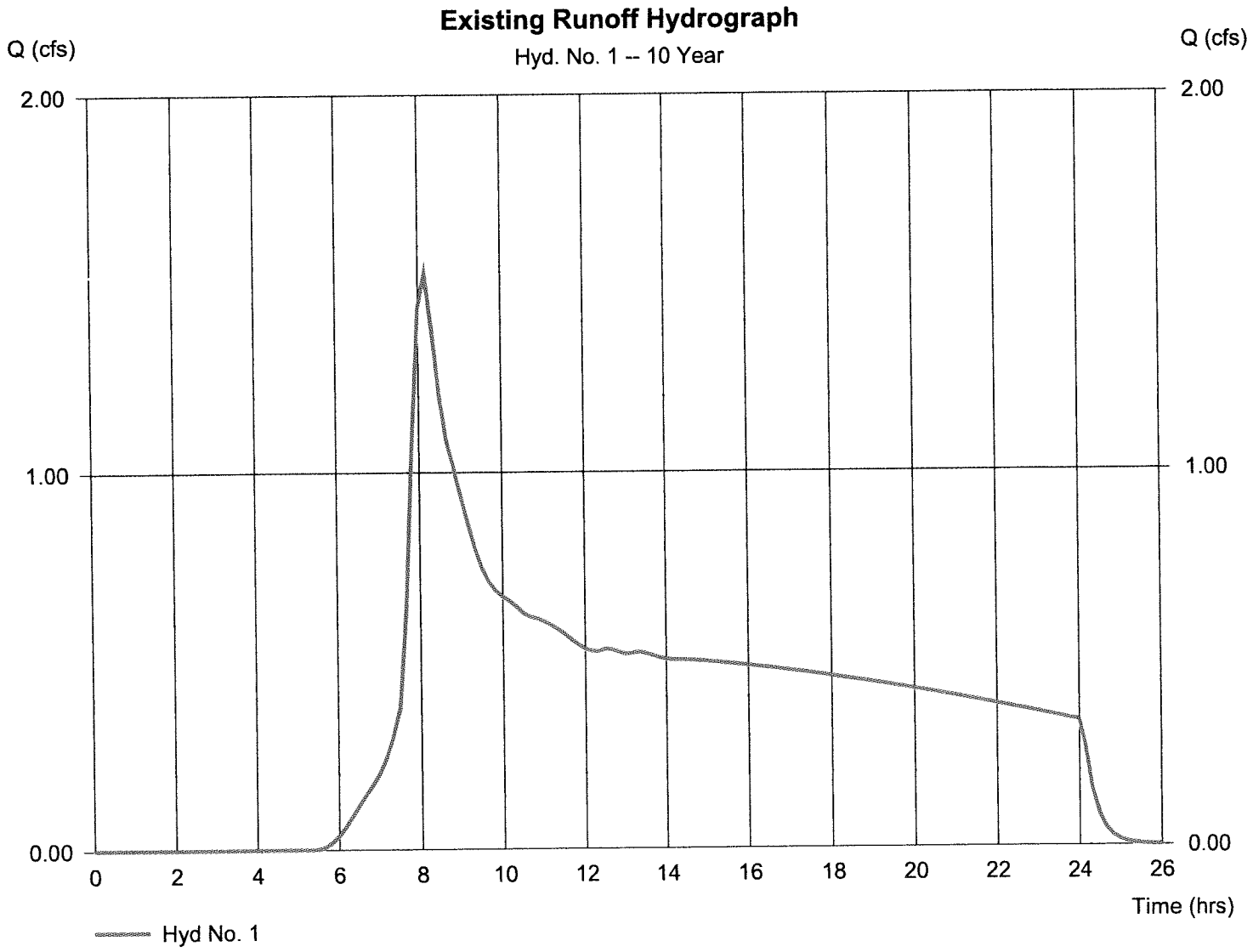
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Tuesday, 09 / 29 / 2015

Hyd. No. 1

Existing Runoff Hydrograph

Hydrograph type	= SBUH Runoff	Peak discharge	= 1.528 cfs
Storm frequency	= 10 yrs	Time to peak	= 8.17 hrs
Time interval	= 10 min	Hyd. volume	= 33,685 cuft
Drainage area	= 6.840 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 3.40 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(6.100 x 77) + (0.740 x 77)] / 6.840



Hydrograph Report

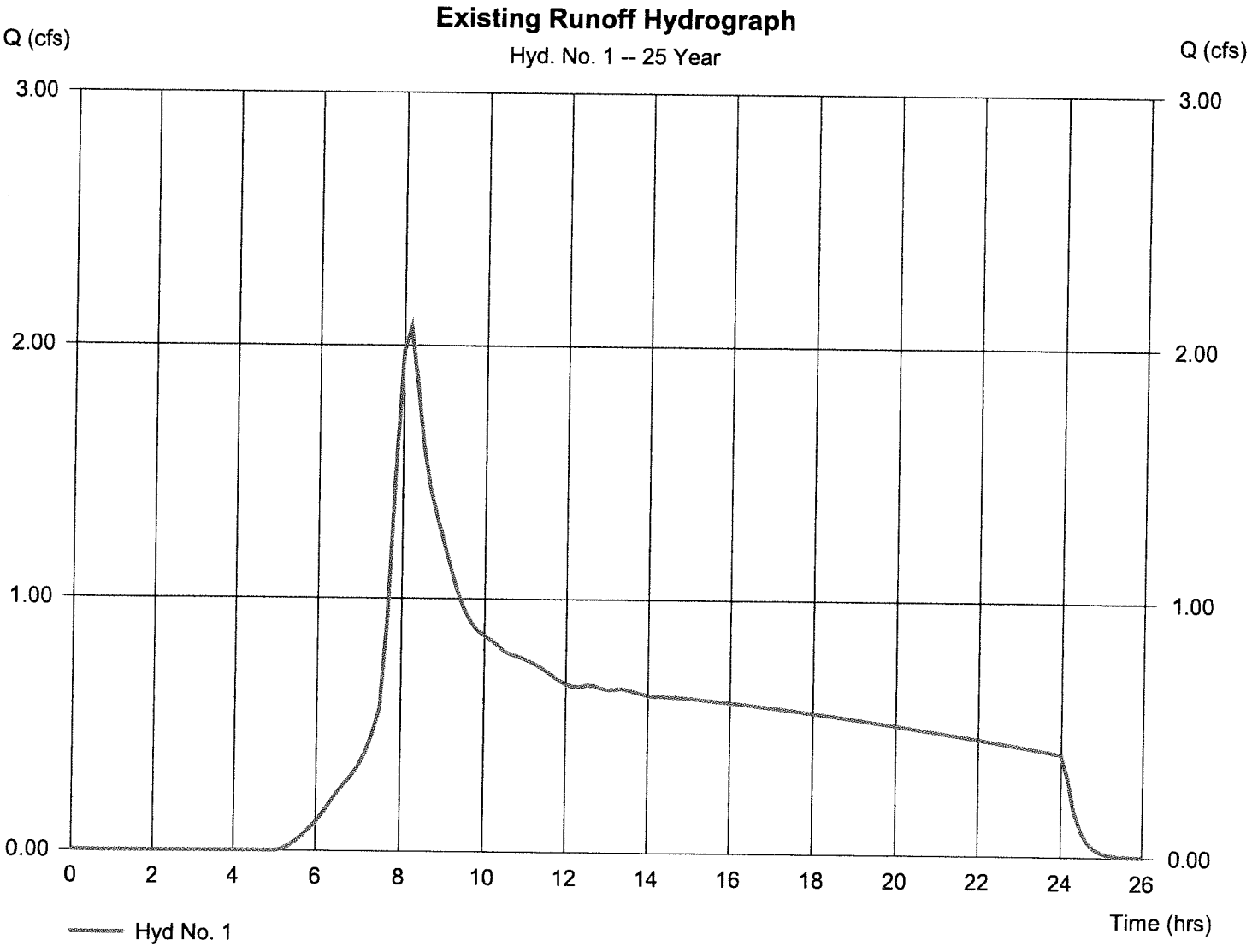
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Tuesday, 09 / 29 / 2015

Hyd. No. 1

Existing Runoff Hydrograph

Hydrograph type	= SBUH Runoff	Peak discharge	= 2.072 cfs
Storm frequency	= 25 yrs	Time to peak	= 8.17 hrs
Time interval	= 10 min	Hyd. volume	= 43,058 cuft
Drainage area	= 6.840 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 3.90 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(6.100 x 77) + (0.740 x 77)] / 6.840



Hydrograph Report

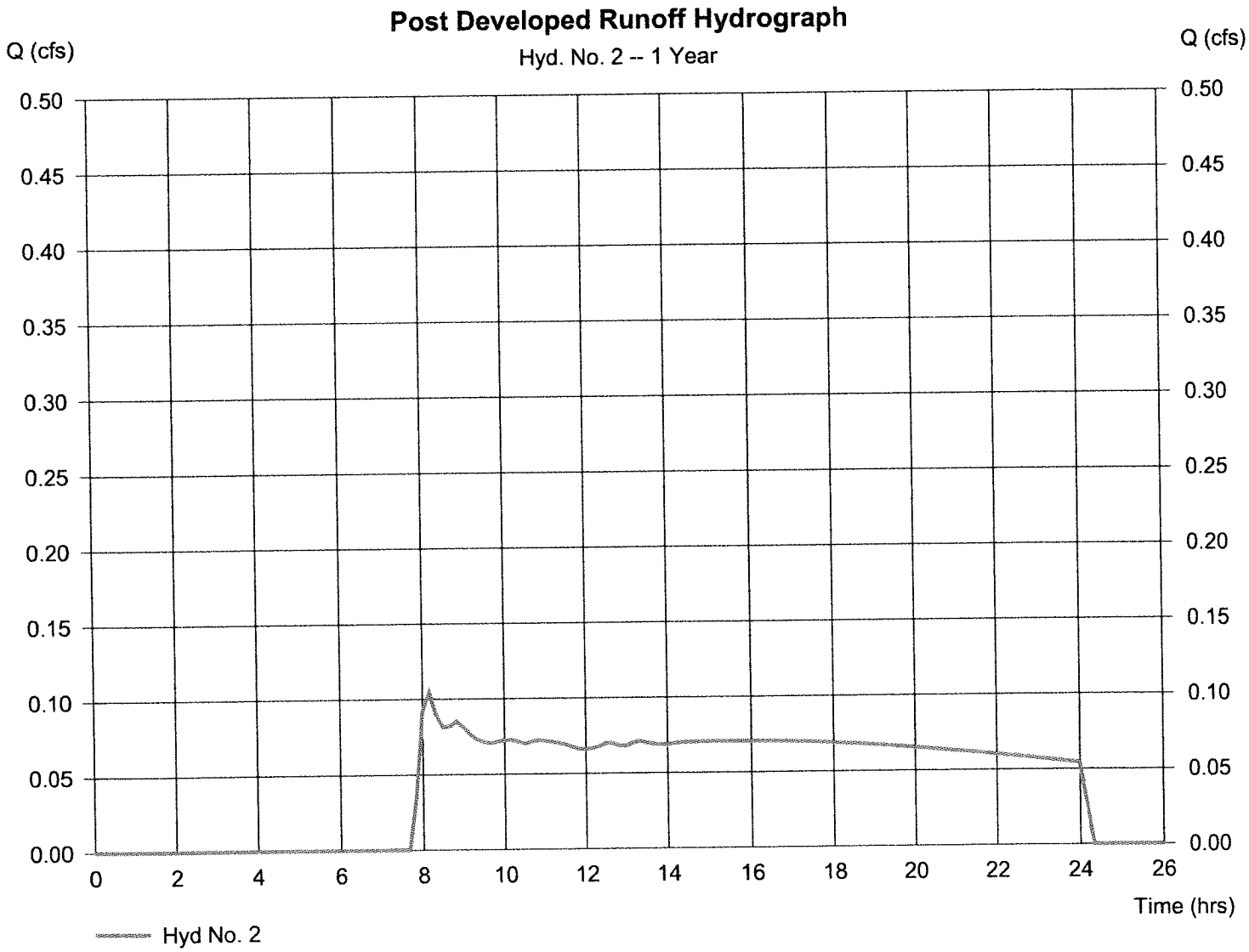
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Tuesday, 09 / 29 / 2015

Hyd. No. 2

Post Developed Runoff Hydrograph

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.104 cfs
Storm frequency	= ~~1 yrs~~ Water Quality	Time to peak	= 8.17 hrs
Time interval	= 10 min	Hyd. volume	= 4,014 cuft
Drainage area	= 6.840 ac	Curve number	= 88*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 0.83 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(3.060 x 98) + (3.780 x 79)] / 6.840



Hydrograph Report

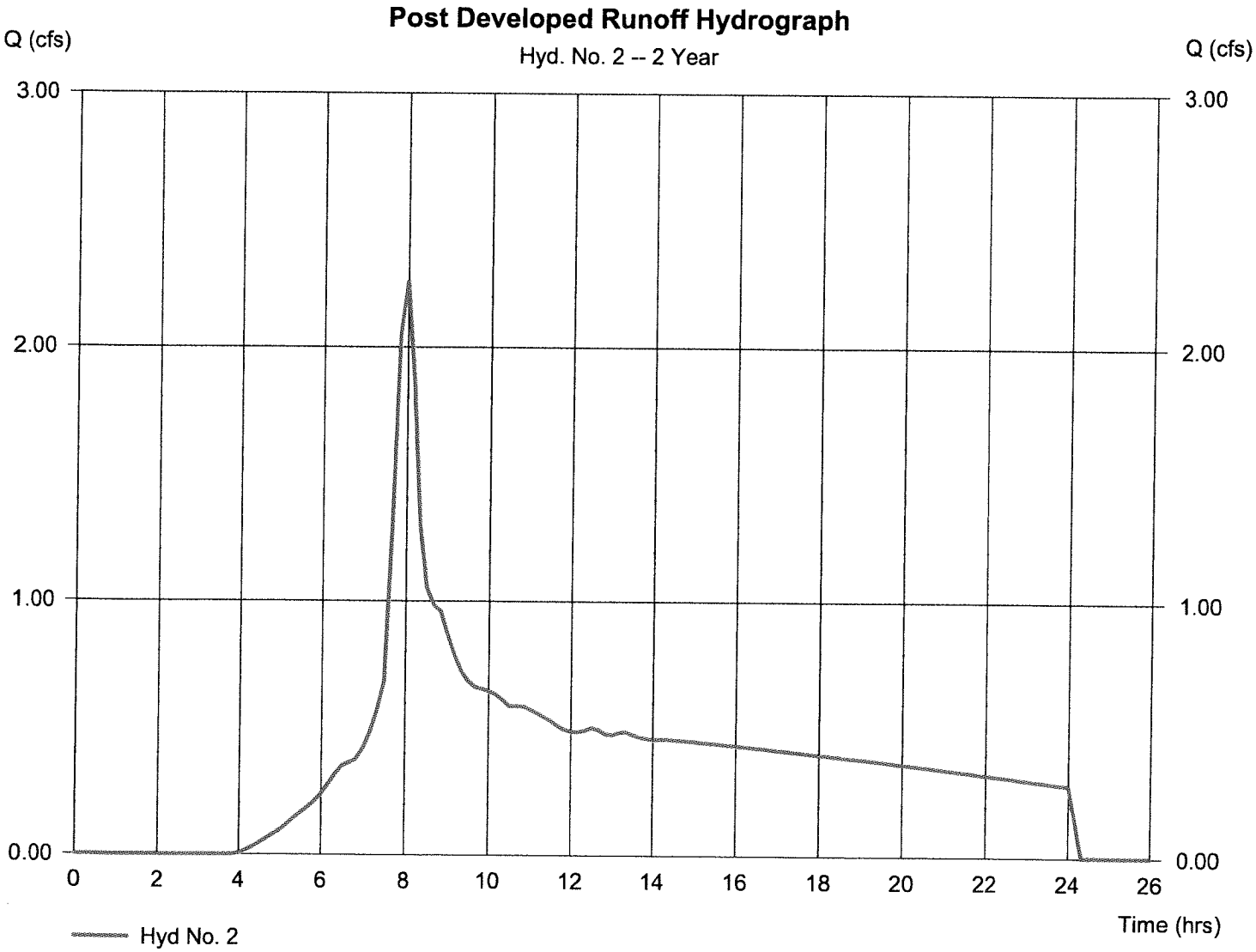
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Tuesday, 09 / 29 / 2015

Hyd. No. 2

Post Developed Runoff Hydrograph

Hydrograph type	= SBUH Runoff	Peak discharge	= 2.261 cfs
Storm frequency	= 2 yrs	Time to peak	= 8.00 hrs
Time interval	= 10 min	Hyd. volume	= 34,301 cuft
Drainage area	= 6.840 ac	Curve number	= 88*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.50 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(3.060 x 98) + (3.780 x 79)] / 6.840



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

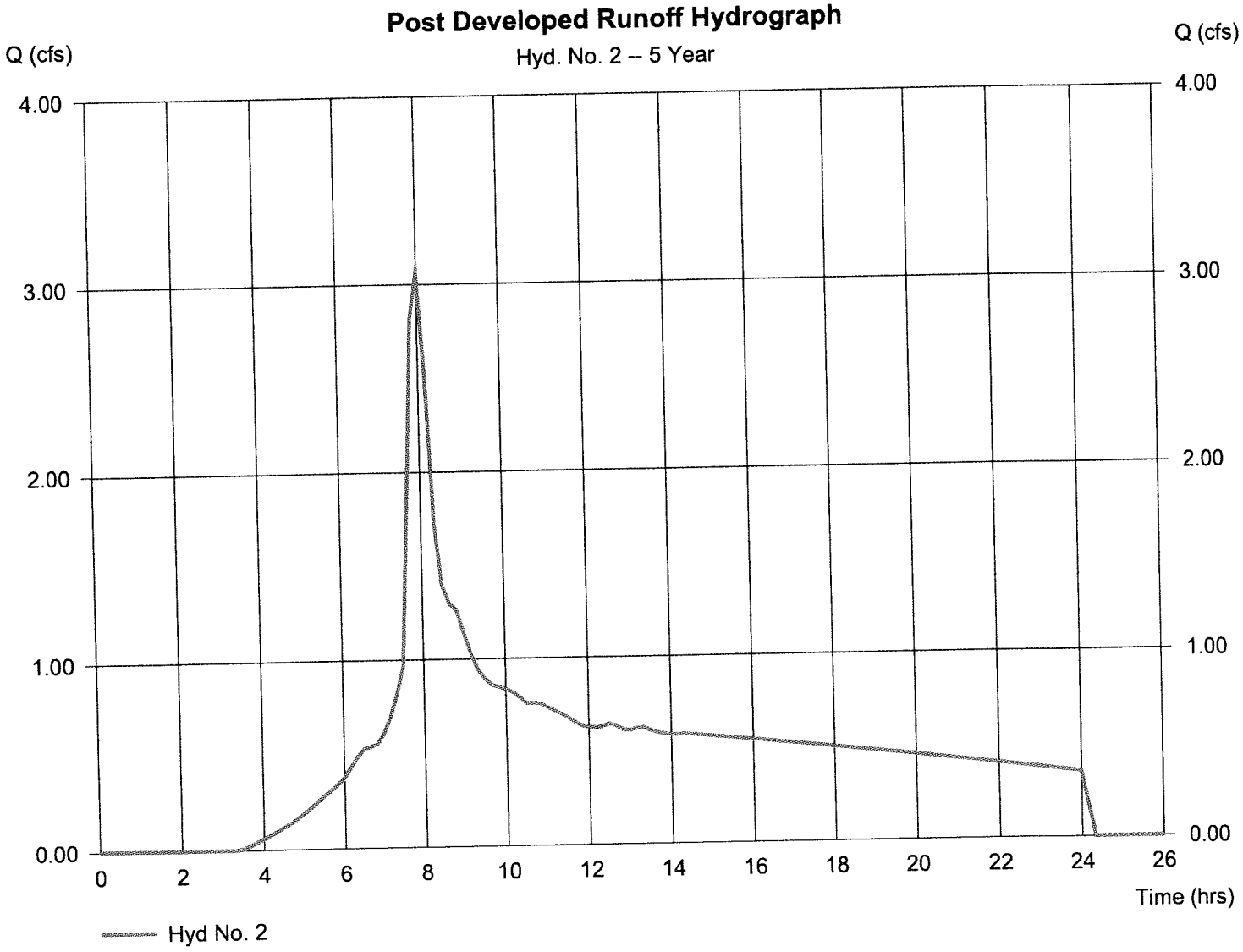
Tuesday, 09 / 29 / 2015

Hyd. No. 2

Post Developed Runoff Hydrograph

Hydrograph type	= SBUH Runoff	Peak discharge	= 3.064 cfs
Storm frequency	= 5 yrs	Time to peak	= 8.00 hrs
Time interval	= 10 min	Hyd. volume	= 45,144 cuft
Drainage area	= 6.840 ac	Curve number	= 88*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(3.060 x 98) + (3.780 x 79)] / 6.840



Hydrograph Report

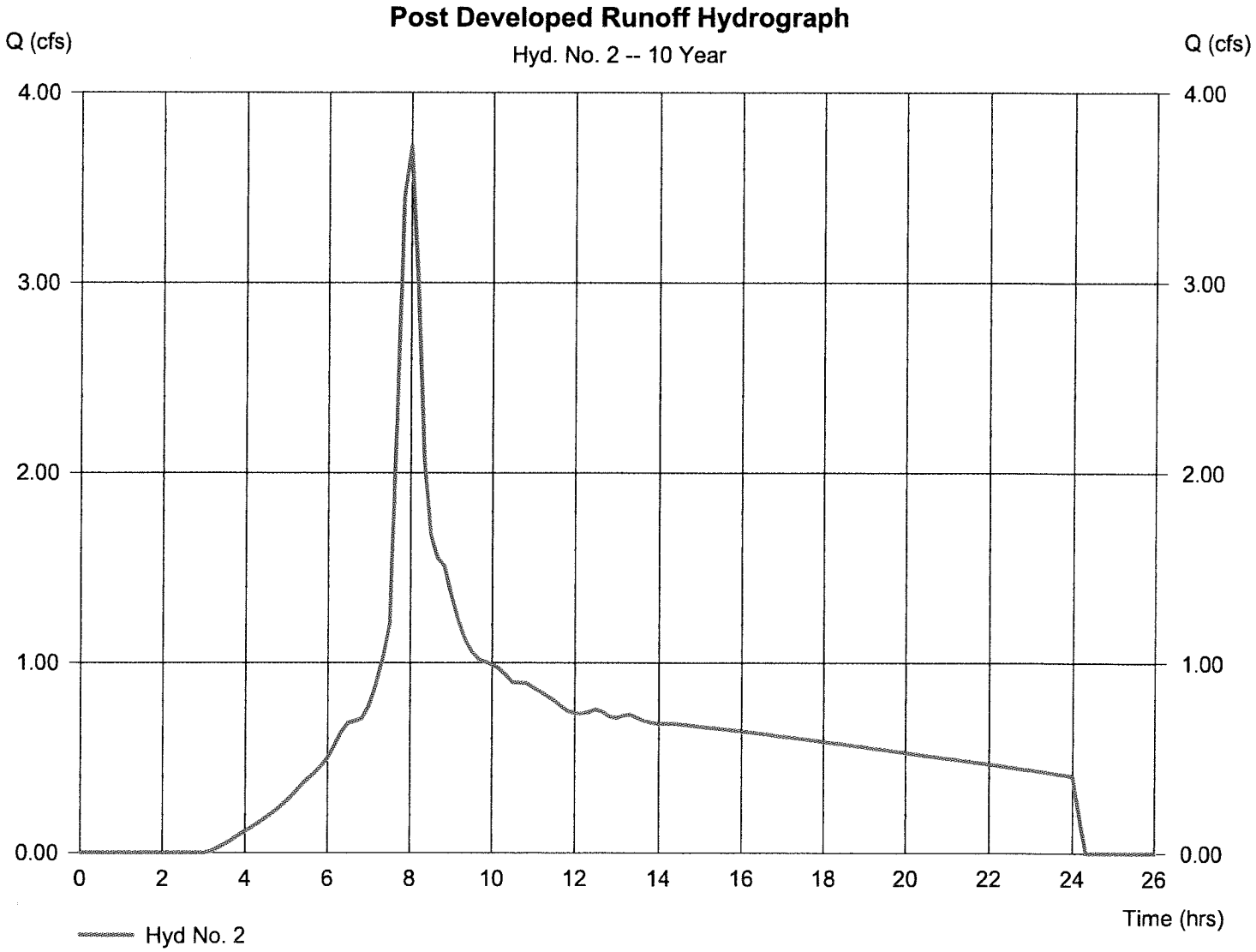
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Tuesday, 09 / 29 / 2015

Hyd. No. 2

Post Developed Runoff Hydrograph

Hydrograph type	= SBUH Runoff	Peak discharge	= 3.724 cfs
Storm frequency	= 10 yrs	Time to peak	= 8.00 hrs
Time interval	= 10 min	Hyd. volume	= 54,070 cuft
Drainage area	= 6.840 ac	Curve number	= 88*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.40 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(3.060 x 98) + (3.780 x 79)] / 6.840



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

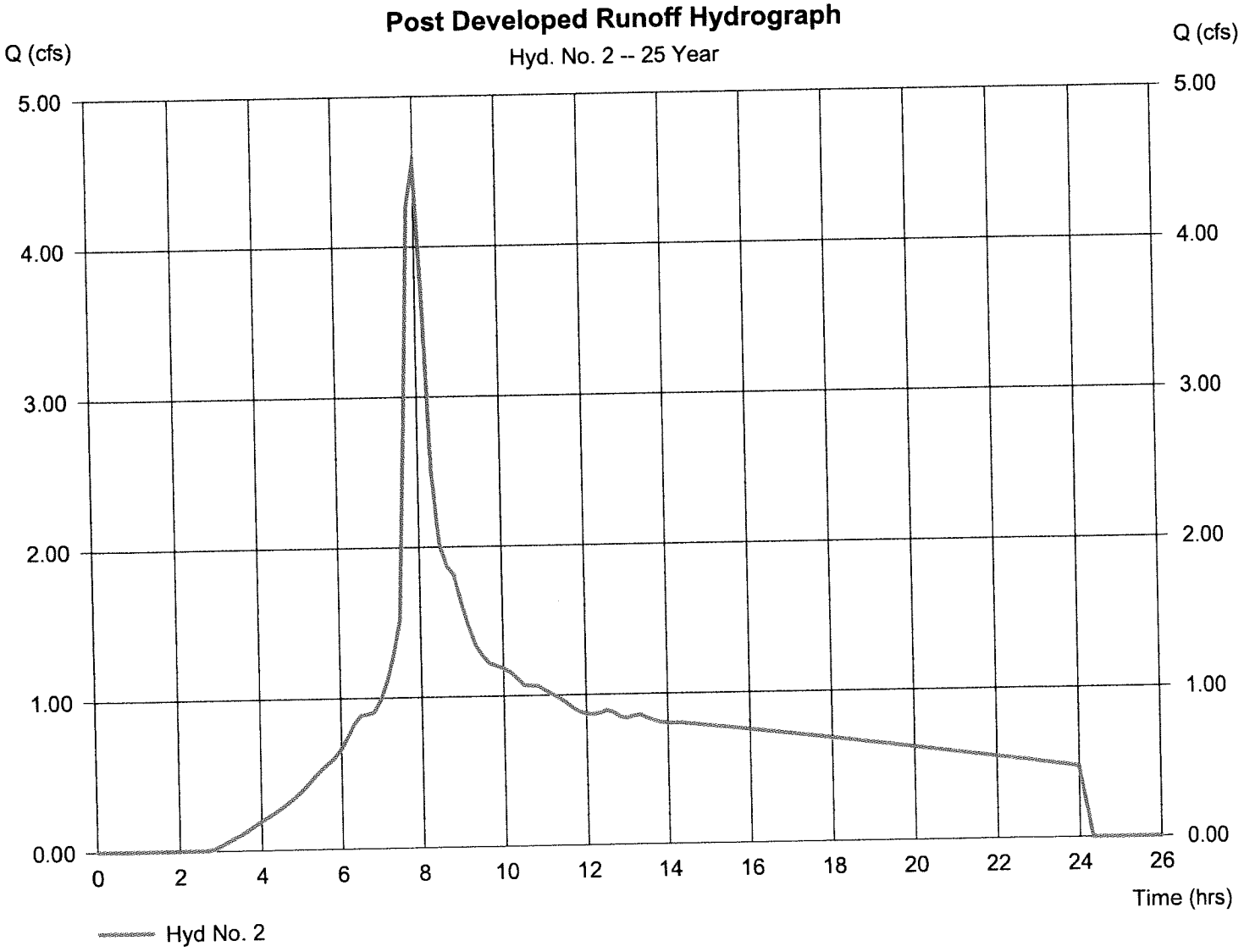
Tuesday, 09 / 29 / 2015

Hyd. No. 2

Post Developed Runoff Hydrograph

Hydrograph type	= SBUH Runoff	Peak discharge	= 4.563 cfs
Storm frequency	= 25 yrs	Time to peak	= 8.00 hrs
Time interval	= 10 min	Hyd. volume	= 65,455 cuft
Drainage area	= 6.840 ac	Curve number	= 88*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.90 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(3.060 x 98) + (3.780 x 79)] / 6.840



CALCULATIONS

Time of Concentration

PROJECT NO.	15266	BY	kef	DATE	9/6/2015

	Existing Pre Dev		
SHEET FLOW			
INPUT	**VALUE**	**VALUE**	**VALUE**
Surface Description	**Type 6 Grass (dense)**	**Type 6 Grass (dense)**	**Type 5 Grass (short prairie)**
Manning's "n"	**0.24**	**0.24**	**0.15**
Flow Length, L	300 ft	ft	0 ft
2-Yr 24 Hour Rainfall, P_2	2.5 in	2.5 in	2.5 in
Land Slope, s	0.1558 ft/ft	0.02 ft/ft	0.0025 ft/ft
OUTPUT			
Travel Time	0.29 hr	0.00 hr	0.00 hr
SHALLOW CONCENTRATED FLOW			
INPUT	**VALUE**	**VALUE**	**VALUE**
Surface Description	Unpaved	Paved	Unpaved
Flow Length, L	346 ft	ft	0 ft
Watercourse Slope*, s	0.0987 ft/ft	0.11 ft/ft	0.027 ft/ft
OUTPUT			
Average Velocity, V	5.07 ft/s	6.74 ft/s	2.65 ft/s
Travel Time	0.019 hr	0.000 hr	0.000 hr
CHANNEL FLOW			
INPUT	**VALUE**	**VALUE**	**VALUE**
Cross Sectional Flow Area, a	0.0 ft^2	1.77 ft^2	15.05 ft^2
Wetted Perimeter, P_w	0.0 ft	4.741 ft	7.69 ft
Channel Slope, s	0.0 ft/ft	0.09 ft/ft	0.00 ft/ft
Manning's "n"	0.24	0.013	0.24
Flow Length, L	0 ft	ft	0 ft
OUTPUT			
Average Velocity	0.03 ft/s	17.83 ft/s	0.53 ft/s
Hydraulic Radius, r = a / P_w	1.00 ft	0.37 ft	1.96 ft
Travel Time	0.00 hr	0.00 hr	0.00 hr
Watershed or Subarea T_c =	**0.30 hr**	**0.00 hr**	**0.00 hr**
Watershed or Subarea T_c =	**18 minutes**	**0 minutes**	**0 minutes**

GEOTECHNICAL REPORTS

3

GeoPacific Engineering, Inc.

Real-World Geotechnical Solutions
Investigation • Design • Construction Support

Preliminary Geotechnical Engineering Report & Landslide Hazard Study

Reesman Property

Upper Midhill Drive - 2S1E14CA 00200
Portland, Oregon 97229

GeoPacific Engineering, Inc. Job No. 15-3849
August 6, 2015

14835 SW 72nd Avenue
Portland, Oregon 97224
Tel (503) 598-8445
Fax (503) 941-9281

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August 6, 2015
Project No. 15-3849

Ryan Zygar
Upper Midhill Estates, LLC
931 SW King Avenue
Portland, Oregon 97205
Email: ryan@zygar.com

Cc: Andrew Tull, 3J Consulting Engineers, andrew.tull@3j-consulting.com

SUBJECT: PRELIMINARY GEOTECHNICAL ENGINEERING REPORT
REESMAN PROPERTY
UPPER MIDHILL DRIVE - 2S1E14CA 00200
WEST LINN, OREGON

PROJECT INFORMATION

This report presents the results of a preliminary geotechnical engineering study conducted by GeoPacific Engineering, Inc. (GeoPacific) for the above-referenced project. The purpose of our investigation was to evaluate subsurface conditions at the site and to provide geotechnical recommendations for site development. This geotechnical study was performed in accordance with GeoPacific Proposal No. P-506, revised May 21, 2015, and your subsequent authorization of our proposal and *General Conditions for Geotechnical Services*. This report is considered preliminary because no grading or development plans have yet been finalized. GeoPacific should be consulted to review the proposed grading and development plans and to provide specific recommendations for the proposed plans prior to construction.

Location:	Upper Midhill Drive 2S1E14CA 00200 West Linn, Oregon (see Figure 1)
Property Owner:	Ryan Zygar Upper Midhill Estates, LLC 931 SW King Avenue Portland, Oregon 97205
Developer:	Same as Property Owner
Jurisdictional Agency:	City of West Linn, Oregon
Prepared By:	GeoPacific Engineering, Inc 14835 SW 72nd Avenue Portland, Oregon 97224 Tel (503) 598-8445 Fax (503) 941-9281

SITE AND PROJECT DESCRIPTION

The subject site is an irregularly shaped parcel located at the northern terminus of Upper Midhill Drive in the City of West Linn, Clackamas County, Oregon. The property is approximately 6.1 acres in size. Topography in the northeast portion of the site slopes down to the northeast at an average grade of approximately 15 percent or less. Topography in the southwest portion of the site slopes down to the northeast at an average grade of approximately 25 percent or less. Small areas of the site, such as in the far southwest corner of the site, slope down to the east at grades of up to approximately 50 percent. The site is currently undeveloped and vegetation consists primarily of short grasses and dense to sparse trees.

Preliminary site plans indicate that the proposed development will consist of a 34 lot subdivision for single family home construction, new streets, driveways, stormwater management facilities, and associated underground utilities. A grading plan has not been provided for our review, but we anticipate maximum cuts and fills will be on the order of about 7 feet or less.

SITE GEOLOGY

Regionally, the subject site lies within the Willamette Valley/Puget Sound lowland, a broad structural depression situated between the Coast Range on the west and the Cascade Range on the east. A series of discontinuous faults subdivide the Willamette Valley into a mosaic of fault-bounded, structural blocks (Yeats et al., 1996). Uplifted structural blocks form bedrock highlands, while down-warped structural blocks form sedimentary basins. Valley-fill sediment in the adjacent basin achieves a maximum thickness of 1,500 feet and overlies Miocene Columbia River Basalt at depth (Madin, 1990; Yeats et al., 1996).

Geologic mapping indicates that the near-surface soils in the northeastern half of the site consist of Willamette Formation soils. The Willamette Formation is a quaternary age (last 1.6 million years) catastrophic flood deposit associated with repeated glacial outburst flooding of the Willamette Valley (Yeats et al., 1996). The last of these outburst floods occurred about 10,000 years ago. These deposits typically consist of horizontally layered, micaceous, silt to coarse sand forming poorly-defined to distinct beds less than 3 feet thick. Regional studies indicate that the Willamette Formation soils on the subject site decreases in thickness to the southwest and taper out completely in the central portion of the site.

Underlying the Willamette Formation soils in the northeast portion of the site and directly underlying the ground surface in the southwest portion of the stie is the Columbia River Basalt Formation (Madin, 1990). The Miocene aged (about 14.5 to 16.5 million years ago) Columbia River Basalts are a thick sequence of lava flows which form the crystalline basement of the Tualatin Valley. The basalts are composed of dense, finely crystalline rock that is commonly fractured along blocky and columnar vertical joints. Individual basalt flow units typically range from 25 to 125 feet thick and interflow zones are typically vesicular, scoriaceous, brecciated, and sometimes include sedimentary rocks.

LIDAR images reviewed for this study show ancient debris flows which moved downslope to the northeast. During our field reconnaissance, we observed signs of two debris on the site, indicated by the presence of corresponding scarps, benches, and slightly bulged terrain. Groundwater

seepage was observed in test pit TP-11, indicating the presence of a seep or spring. The approximate extents of the two debris flows observed on the site are shown Figure 3.

REGIONAL SEISMIC SETTING

At least three major fault zones capable of generating damaging earthquakes are thought to exist in the vicinity of the subject site. These include the Portland Hills Fault Zone, the Gales Creek-Newberg-Mt. Angel Structural Zone, and the Cascadia Subduction Zone.

Portland Hills Fault Zone

The Portland Hills Fault Zone is a series of NW-trending faults that include the central Portland Hills Fault, the western Oatfield Fault, and the eastern East Bank Fault. These faults occur in a northwest-trending zone that varies in width between 3.5 and 5.0 miles. The combined three faults reportedly vertically displace the Columbia River Basalt by 1,130 feet and appear to control thickness changes in late Pleistocene (approx. 780,000 years) sediment (Madin, 1990). The Portland Hills Fault occurs along the Willamette River at the base of the Portland Hills, and is located approximately 1.5 miles northeast of the site. The Oatfield Fault occurs along the western side of the Portland Hills, and is located approximately 0.67 miles southwest of the site. The East Bank Fault occurs along the eastern margin of the Willamette River, and is located approximately 3.25 miles northeast of the site. The accuracy of the fault mapping is stated to be within 500 meters (Wong, et al., 2000).

According to the USGS Earthquake Hazards Program, the fault was originally mapped as a down-to-the-northeast normal fault, but has also been mapped as part of a regional-scale zone of right-lateral, oblique slip faults, and as a steep escarpment caused by asymmetrical folding above a south-west dipping, blind thrust fault. The Portland Hills fault offsets Miocene Columbia River Basalts, and Miocene to Pliocene sedimentary rocks of the Troutdale Formation. No fault scarps on surficial Quaternary deposits have been described along the fault trace, and the fault is mapped as buried by the Pleistocene aged Missoula flood deposits. No historical seismicity is correlated with the mapped portion of the Portland Hills Fault Zone, but in 1991 a M3.5 earthquake occurred on a NW-trending shear plane located 1.3 miles east of the fault (Yelin, 1992). Although there is no definitive evidence of recent activity, the Portland Hills Fault Zone is assumed to be potentially active (Geomatrix Consultants, 1995).

Gales Creek-Newberg-Mt. Angel Structural Zone

The Gales Creek-Newberg-Mt. Angel Structural Zone is a 50-mile-long zone of discontinuous, NW-trending faults that lies about 19 miles southwest of the subject site. These faults are recognized in the subsurface by vertical separation of the Columbia River Basalt and offset seismic reflectors in the overlying basin sediment (Yeats et al., 1996; Werner et al., 1992). A geologic reconnaissance and photogeologic analysis study conducted for the Scoggins Dam site in the Tualatin Basin revealed no evidence of deformed geomorphic surfaces along the structural zone (Unruh et al., 1994). No seismicity has been recorded on the Gales Creek Fault or Newberg Fault (the fault closest to the subject site); however, these faults are considered to be potentially active because they may connect with the seismically active Mount Angel Fault and the rupture plane of the 1993 M5.6 Scotts Mills earthquake (Werner et al. 1992; Geomatrix Consultants, 1995).

According to the USGS Earthquake Hazards Program, the Mount Angel fault is mapped as a high-angle, reverse-oblique fault, which offsets Miocene rocks of the Columbia River Basalts, and Miocene and Pliocene sedimentary rocks. The fault appears to have controlled emplacement of the Frenchman Spring Member of the Wanapum Basalts, and thus must have a history that predates the Miocene age of these rocks. No unequivocal evidence of deformation of Quaternary deposits has been described, but a thick sequence of sediments deposited by the Missoula floods covers much of the southern part of the fault trace.

Cascadia Subduction Zone

The Cascadia Subduction Zone is a 680-mile-long zone of active tectonic convergence where oceanic crust of the Juan de Fuca Plate is subducting beneath the North American continent at a rate of 4 cm per year (Goldfinger et al., 1996). A growing body of geologic evidence suggests that prehistoric subduction zone earthquakes have occurred (Atwater, 1992; Carver, 1992; Peterson et al., 1993; Geomatrix Consultants, 1995). This evidence includes: (1) buried tidal marshes recording episodic, sudden subsidence along the coast of northern California, Oregon, and Washington, (2) burial of subsided tidal marshes by tsunami wave deposits, (3) paleoliquefaction features, and (4) geodetic uplift patterns on the Oregon coast. Radiocarbon dates on buried tidal marshes indicate a recurrence interval for major subduction zone earthquakes of 250 to 650 years with the last event occurring 300 years ago (Atwater, 1992; Carver, 1992; Peterson et al., 1993; Geomatrix Consultants, 1995). The inferred seismogenic portion of the plate interface lies approximately along the Oregon Coast at depths of between 20 and 40 kilometers below the surface.

FIELD EXPLORATION AND SUBSURFACE CONDITIONS

Our site-specific exploration for this report was conducted on June 10, 2015 and June 18, 2015. A total of 11 exploratory test pits (designated TP-1 through TP-11) were excavated to depths ranging from 10 to 17 feet at the locations shown on Figures 2 and 3. Test pit locations were determined in the field by pacing or taping distances from property corners and other site features discernible in aerial photographs. As such, the locations of the explorations should be considered approximate.

A representative of the GeoPacific engineering staff continuously monitored the field exploration program and logged the test pits. Soils observed in the explorations were classified in general accordance with the Unified Soil Classification System. Rock hardness was classified in accordance with the below table (Table 1), which was modified from the ODOT Rock Hardness Classification Chart.

Table 1 - Rock Hardness Classification Chart

ODOT Rock Hardness Rating	Field Criteria	Unconfined Compressive Strength	Typical Equipment Needed For Excavation
Extremely Soft (R0)	Indented by thumbnail	<100 psi	Small excavator
Very Soft (R1)	Scratched by thumbnail, crumbled by rock hammer	100-1,000 psi	Small excavator
Soft (R2)	Not scratched by thumbnail, indented by rock hammer	1,000-4,000 psi	Medium excavator (slow digging with small excavator)
Medium Hard (R3)	Scratched or fractured by rock hammer	4,000-8,000 psi	Medium to large excavator (slow to very slow digging), typically requires chipping with hydraulic hammer or mass excavation)
Hard (R4)	Scratched or fractured w/ difficulty	8,000-16,000 psi	Slow chipping with hydraulic hammer and/or blasting
Very Hard (R5)	Not scratched or fractured after many blows, hammer rebounds	>16,000 psi	Blasting

During our explorations, geotechnical conditions such as soil consistency, moisture and groundwater conditions were also noted. For additional information pertaining to subsurface conditions at specific location, refer to the attached test pit logs. It should be noted that subsurface conditions can vary between exploration locations, as discussed in the *Uncertainty and Limitations* section of this report. The following sections discuss the subsurface conditions encountered in our test pit explorations.

Soils

The underlying soils encountered in our explorations consisted of topsoil, undocumented fill, buried topsoil, residual soil, and the Columbia River Basalt Formation:

Topsoil Horizon: Directly underlying the ground surface in all test pits except test pit TP-4, we low to moderately organic SIL T(ML-OL) with fine to medium roots throughout. The topsoil layer was generally soft and extended to depths of 8 to 14 inches, with an average depth of approximately 12 inches. However, in test pit TP-6 the topsoil layer extended to a depth of 30 inches.

Undocumented Fill: Directly underlying the ground surface in test pit TP-4, we observed undocumented fill material. The fill material generally consisted of boulders in a matrix of clayey silt and extended to a depth of approximately 4.5 feet, overlying buried topsoil. We observed boulders up to 3 feet in diameter.

Buried Topsoil: Underlying the undocumented fill material in test pit TP-4, we observed a layer of buried topsoil material. The layer of buried topsoil consisted of moderately organic SILT (ML-OL) with significant amounts of organic debris, including branches and roots. The layer of buried topsoil extended to a depth of 6 feet in test pit TP-4.

Ancient Debris Flow Materials: Underlying the topsoil in test pits TP-5, TP-7, TP-9, TP-10, and TP-11, we observed material derived from an ancient debris flow of native residual soil. The debris flow materials generally consisted of clayey SILT (ML) to silty CLAY (CL). However, the debris flow materials encountered in test pits TP-7 and TP-10 contained some angular gravel to cobble size angular basalt fragments. Also, at the bottom of the debris flow materials in test pits TP-5, TP-9, and TP-10, and underlying the topsoil layer in test pit TP-11, the debris flow materials consisted of highly plastic CLAY (CH). The ancient debris flow materials were generally stiff to very stiff.

Laboratory tests indicated that this material has a plasticity index of 56 and liquid limit of 83, which indicates a very high plasticity. We subcontracted Northwest Testing, Inc. to perform expansion index testing on this soil. A representative sample taken at a depth of 7 feet in test pit TP-5 exhibited an expansion index of 110, indicating a very high potential for shrinkage and swelling with changes in moisture. The layer of highly expansive clay may be the ancient slide plane for the debris flow. Debris flow materials extended to depths of 8 feet in test pits TP-5 and TP-7, and to depths of 13, 3.5, and 8 feet in test pits TP-9, TP-10, and TP-11, respectively.

Willamette Formation: Underlying the topsoil layer in test pits TP-1 and TP-2, and underyling debris flow materials in test pits TP-10 and TP-11, we observed material belonging to the Willamette Formation. These soils generally consisted of silty to sandy GRAVEL and COBBLES, but varied from gravelly SILT (ML) to sandy GRAVEL (GP). Slight to moderately cemented sandstone was observed from 5 to 6 feet in test pit TP-10. Also, large boulders up to 2.5 feet in diameter were encountered in test pit TP-2

Willamette Formation soils extended to a depth of 3.5 feet in test pit TP-1, beyond the maximum depth of exploration in test pit TP-2 (12 feet), beyond the maximum depth of exploration in test pit TP-10 (14 feet), and beyond the maximum depth of exploration in test pit TP-11 (10 feet).

Residual Soil: Underlying the Willamette Formation soils in test pit TP-1, the topsoil layer in test pit TP-3, TP-6, and TP-8, the buried topsoil layer in test pit TP-4, and debris flow materials in test pit TP-5, TP-7, and TP-9 we observed residual soil derived from the in-place weathering of the underlying Columbia River Basalt Formation without any lateral movement. The residual soil generally consisted of silty CLAY (CL) to clayey SILT (ML) and was characterized by a stiff to very stiff consistency. However, highly plastic CLAY (CH) was observed below a depth of 16 feet in test pit TP-8, and below 13 feet in test pit TP-9. Residual soil extended beyond the maximum depths of our explorations in test pits TP-1, TP-3, TP-4, TP-6, TP-7, TP-8, and TP-9. Residual soils extended to a depth of 11 feet in test pit TP-5, below which depth the residual soil transitioned to less weathered basalt bedrock as discussed below.

Columbia River Basalt: Underlying the residual soil in test pit TP-5, we observed gray basalt belonging to the Columbia River Basalt Formation. The basalt encountered in test pit TP-5 was extremely soft (R0) to very soft (R1) with trace reddish-brown silty clay to clayey silt. Extremely

soft to very soft basalt (R0-R1) extended beyond the maximum depth of exploration in test pit TP-5 (12 feet).

Soil Moisture and Groundwater

On June 10 and 18, 2015 the soil moisture conditions observed in test pits were damp to very moist. However, groundwater seepage was encountered in test pit TP-11 from 1 to 4 feet beneath the ground surface. The seepage rate in test pit TP-11 was visually estimated at less than 1 gallon per minute. Very slow groundwater seepage was also encountered in test pit TP-5 during infiltration testing at a depth of 5 feet. Experience has shown that temporary storm related perched groundwater within the near surface soils often occur over fine-grained native deposits such as those beneath the site during the wet season. It is anticipated that groundwater conditions will vary depending on the season, local subsurface conditions, changes in site utilization, and other factors. According to the *Estimated Depth to Groundwater in the Portland, Oregon Area, (United States Geological Survey, Snyder, 2014 website)*, groundwater is present at an approximate depth of 100 feet below the ground surface, with a moderate level of uncertainty.

INFILTRATION TESTING

On June 10, 2015, a representative of GeoPacific Engineering, Inc. (GeoPacific) performed one pushed-pipe, falling head infiltration test at a depth of 11 feet in test pit TP-1 and one open hole, falling head infiltration test at a depth of 5 feet in test pit TP-2. The tests were conducted in native soils at the bottom of the test pits. During the tests, water levels were measured over regular intervals until three successive measurements showing a consistent infiltration rate were achieved. Descriptions of the soils encountered in the test locations are presented on the following table. Approximate test locations are shown in Figure 2. Table 2 presents a summary of our infiltration test measurement results.

Table 2 - Results of Infiltration Testing

Location	Depth (ft)	Soil Description	Infiltration Rate (in/hr)
TP-1	11	Silty CLAY (CL) – Residual Soil	Groundwater Seepage Observed
TP-2	5	Silty GRAVEL and COBBLES (GM) – Willamette Formation	1.2

Very slow groundwater seepage was observed in the infiltration test in TP-2 at a depth of 5 feet, indicating that subsurface infiltration of stormwater into the residual soils in the vicinity of test pit TP-5 is not feasible. The test results indicate that infiltration rates in the native Willamette Formation soils are low. The measured rates in test pit TP-2 reflect bother vertical and horizontal flow pathways.

PRELIMINARY CONCLUSIONS AND RECOMMENDATIONS

Our site investigation indicates that the proposed construction is geotechnically feasible, provided that the recommendations of this report are incorporated into the design and construction phases

of the project. In our opinion, there are three main geotechnical issues for project completion. The first main geotechnical issue is the presence of ancient debris flow materials on the site. Two ancient debris flows were identified on the site during our geologic reconnaissance and subsurface investigation. The ancient debris flow materials appear to be relatively shallow (generally less than 8 feet, but up to 13 feet deep in test pit TP-9). We recommend that site grading be planned in such a way as to reduce slope instability hazards by unloading the ancient debris flows or by completely removing them.

The second main geotechnical issue for project development is the presence of undocumented fill material and buried topsoil. Undocumented fill material was encountered to a depth of 4.5 feet in test pit TP-4 and consisted of loose boulders up to 2.5 feet in diameter. Buried topsoil extended to a depth of 6 feet in test pit TP-4.

The third main geotechnical issue is the presence of expansive clay on the site. Highly plastic, potentially expansive clay was observed in test pits TP-5, TP-8, TP-9, TP-10, and TP-11. Expansion index testing of clay material from test pit TP-5 indicates the highly plastic clay on the site has a high potential for expansion and shrinkage. This material should be removed from within 5 feet vertically beneath foundations and replaced with compacted, engineered fill as indicated in this report. The highly plastic clay material should also be removed 5 feet horizontally beyond the building envelopes. Other areas of potentially expansive clay may exist on the site outside our explorations. The proposed on site public streets are comprised of flexible pavements that are not significantly impacted by expansive soils, therefore no soil removal is recommended within the streets.

Other alternatives may be considered for addressing the presence of potentially expansive soils on the site, depending on the final grading plan. Alternatives may include placing at least 5 feet of engineered fill over the layer of potentially expansive soil or treating the potentially expansive soil with lime and recompacting it. It may also be possible to remove the potentially expansive soils from beneath foundations and use it as a pond liner in the stormwater quality facility. Additional measures may include installation of footing perimeter drains, elimination of deep-rooted plants and irrigation systems adjacent to structures, and placement of additional reinforcing steel in footings and floor slabs. GeoPacific should be contacted for further recommendations if deeper or more prevalent pockets of expansive soils are encountered near final grades during site grading.

The following report sections provide recommendations for site development and construction in accordance with the current applicable codes and local standards of practice. These recommendations are considered preliminary because no grading or development plans have yet been finalized. GeoPacific should be consulted to review the proposed grading and development plans and to provide specific recommendations for the proposed plans prior to construction.

General Slope Stability and Mass Grading

Based on the results of our geotechnical investigation, the site is generally underlain by stiff to hard residual soil and medium dense to dense Willamette Formation soils, with basalt bedrock at relatively shallow depths. However, we identified two ancient debris flows on the site, consisting of native residual soils which moved downslope. The approximate extents of the ancient debris flows observed on the site are shown on Figure 3. As observed in test pit TP-10 and TP-11, and shown

on the attached geologic cross sectional drawing (Figure 4), the ancient debris flow materials moved downslope over the Willamette Formation soils in the central portion of the site.

We recommend that mass grading of the site be planned in such a way as to improve slope stability in the vicinity of the ancient debris flows. In our opinion, this can be done by either completely removing the ancient debris flow material, or by unloading the top of the debris flow and buttressing the toe of the debris flow with engineered fill. GeoPacific should be consulted to review the proposed grading plan for the site prior to construction. Provided that the recommendations of this report are incorporated into the design and construction phases of the project, it is our opinion that potential for slope instability resulting in damage to the proposed development is considered to be low, and no further evaluation of the slope instability hazard will be necessary.

It should be noted that this evaluation is based on limited observation of surficial features, the backhoe test pits performed, and review of available geologic literature. Also, the presence of hillside springs has a potential to negatively affect slope stability if not address properly. Discussions pertaining to this issue follow in the *Subsurface Drainage* section of this report.

Site Preparation Recommendations

Areas of proposed buildings, streets, and areas to receive fill should be cleared of vegetation and any organic and inorganic debris. Inorganic debris should be removed from the site. Organic materials from clearing should either be removed from the site or placed as landscape fill (in areas not planned for structures, driving lanes, or parking areas).

Organic-rich topsoil should then be stripped from construction areas of the site or where engineered fill is to be placed. In general, the estimated necessary depth of removal in undisturbed areas for moderately organic soils is 10 to 12 inches. However, the topsoil layer extended to a depth of 30 inches in test pit TP-6 and it should be noted that the necessary depth of topsoil removal in treed areas of the site may be up to 12 to 18 inches. Large trees are present at the site and deeper stripping to remove large roots or other organics may be necessary in localized areas. The final depth of soil removal will be determined on the basis of a site inspection after the stripping/excavation has been performed. Stripped topsoil should be stockpiled only in designated areas and stripping operations should be observed and documented by the geotechnical engineer (or representative).

Any remaining disturbed native soils, undocumented fills, buried topsoil, potentially expansive clay soils, and subsurface structures (tile drains, basements, driveway and landscaping fill, old utility lines, septic leach fields, etc.) should be removed and the excavations backfilled with engineered fill. Undocumented fill material was encountered to a depth of 4.5 feet in test pit TP-4. Buried topsoil was encountered underlying the undocumented fill material in test pit TP-4 to a total depth of 6 feet beneath the ground surface. Highly plastic, potentially expansive clay soils were encountered in test pits TP-5, TP-8, TP-9, TP-10, and TP-11. Highly plastic clay soils may be reused as an impermeable clay liner for the stormwater management facility, if desired.

GeoPacific should be consulted during site preparation to determine whether or not the existing undocumented fill material may be used as engineered fill. Based on the results of our exploration, we anticipate that the fill material encountered in TP-4 will not be suitable for reuse as engineered

fill due to the significant amount of large boulders it contains. Reuse of the existing undocumented fill as engineered fill may require sorting operations.

Once stripping of a particular area is approved, the area must be ripped or tilled to a depth of 12 inches, moisture conditioned, root-picked, and compacted in-place prior to the placement of engineered fill or crushed aggregate base for pavement. Exposed subgrade soils should be evaluated by the geotechnical engineer. For large areas, this evaluation is normally performed by proof-rolling the exposed subgrade with a fully loaded scraper or dump truck. For smaller areas where access is restricted, the subgrade should be evaluated by probing the soil with a steel probe. Soft/loose soils identified during subgrade preparation should be compacted to a firm and unyielding condition, over-excavated and replaced with engineered fill (as described below), or stabilized with rock prior to placement of engineered fill. The depth of overexcavation, if required, should be evaluated by the geotechnical engineer at the time of construction.

Subsurface Drainage

Proposed cuts, particularly those above existing wetlands, are likely to expose seasonal or year round groundwater seeps. Some cuts will be supported by engineered retaining walls and additional drainage measures can be implemented in the wall design. Sloping cuts may require additional drainage measures such as shallow cutoff trench drains. The necessity and location of cutoff trench drains will depend on conditions encountered during site grading. GeoPacific should observe cut slope excavations and make specific recommendations for subsurface drains based on actual conditions exposed.

Engineered Fill

In general, we anticipate that nonexpansive soils from planned cuts and utility trench excavations will be suitable for use as engineered fill provided they are adequately moisture conditioned prior to compacting. All grading for the proposed construction should be performed as engineered grading in accordance with the applicable building code at time of construction with the exceptions and additions noted herein. Areas proposed for fill placement should be prepared as described in the site preparation section. Surface soils should then be scarified and recompacted prior to placement of structural fill. Proper test frequency and earthwork documentation usually requires daily observation and testing during stripping, rough grading, and placement of engineered fill. Imported fill material must be approved by the geotechnical engineer prior to being imported to the site. Oversize material greater than 6 inches in size should not be used within 3 feet of foundation footings, and material greater than 12 inches in diameter should not be used in engineered fill.

Engineered fill should be compacted in horizontal lifts not exceeding 8 inches using standard compaction equipment. We recommend that engineered fill be compacted to at least 90 percent of the maximum dry density determined by ASTM D1557 (Modified Proctor) or equivalent. Field density testing should conform to ASTM D2922 and D3017, or D1556. All engineered fill should be observed and tested by the project geotechnical engineer or his representative. Typically, one density test is performed for at least every 2 vertical feet of fill placed or every 500 yd^3, whichever requires more testing. Because testing is performed on an on-call basis, we recommend that the earthwork contractor be held contractually responsible for test scheduling and frequency. Site earthwork will be impacted by soil moisture and shallow groundwater conditions.

Keyways, Benching, and Subdrains for Fill Slopes

Engineered fill placed on existing sloped areas inclining steeper than an approximately twenty percent grade should be constructed on a keyway and benches in accordance with the typical designs shown in the attached Fill Slope Detail (Figure 5). Keyways should have a minimum depth of three feet, and a minimum width of eight feet. Additional removal of weakened or soft soils may be required depending on the conditions observed during construction. Benches and keyways should be roughly horizontal in the down slope direction, but may slope up to a 10 percent grade along a topographic contour. Keyways sloping more than a 20 percent grade along a topographic contour should be benched or configured as approved by the geotechnical engineer or his designated representative. Cut slopes should be no steeper than 2H:1V.

If groundwater seepage is observed during excavation, keyways should include a subdrain consisting of a minimum 4-inch-diameter, ADS Heavy Duty Grade (or equivalent), perforated plastic pipe enveloped in a minimum of 4 cubic feet per lineal foot of 2"- ½", open-graded gravel drain rock wrapped with geotextile filter fabric (Mirafi 140N or equivalent). Figure 4 shows a typical keyway subdrain. A minimum 0.5 percent gradient should be maintained throughout all subdrain pipes and outlets. GeoPacific should inspect keyways, subdrains and benching prior to fill placement. Subdrains may be eliminated at the discretion of the geotechnical engineer.

Excavating Conditions and Utility Trench Backfill

We anticipate that on-site soils can be excavated using conventional heavy equipment. Maintenance of safe working conditions, including temporary excavation stability, is the responsibility of the contractor. Actual slope inclinations at the time of construction should be determined based on safety requirements and actual soil and groundwater conditions. All temporary cuts in excess of 4 feet in height should be sloped in accordance with U.S. Occupational Safety and Health Administration (OSHA) regulations (29 CFR Part 1926), or be shored. The existing native soils classify as Type B Soil and temporary excavation side slope inclinations as steep as 1H:1V may be assumed for planning purposes. This cut slope inclination is applicable to excavations above the water table only.

Shallow, perched groundwater may be encountered during the wet weather season and should be anticipated in excavations and utility trenches. Vibrations created by traffic and construction equipment may cause some caving and raveling of excavation walls. In such an event, lateral support for the excavation walls should be provided by the contractor to prevent loss of ground support and possible distress to existing or previously constructed structural improvements.

PVC pipe should be installed in accordance with the procedures specified in ASTM D2321 and the City of Portland standards. We recommend that structural trench backfill be compacted to at least 90 percent of the maximum dry density obtained by Modified Proctor (ASTM D1557) or equivalent. Initial backfill lift thicknesses for a ¾"-0 crushed aggregate base may need to be as great as 4 feet to reduce the risk of flattening underlying flexible pipe. Subsequent lift thickness should not exceed 1 foot. If imported granular fill material is used, then the lifts for large vibrating plate-compaction equipment (e.g. hoe compactor attachments) may be up to 2 feet, provided that proper compaction is being achieved and each lift is tested. Use of large vibrating compaction equipment

should be carefully monitored near existing structures and improvements due to the potential for vibration-induced damage.

Adequate density testing should be performed during construction to verify that the recommended relative compaction is achieved. Typically, at least one density test is taken for every 4 vertical feet of backfill on each 200-lineal-foot section of trench.

New Pavement Sections for Proposed Streets

We understand that the proposed development will consist of paved roadways that will be surfaced with asphalt pavement. Table 3 presents the recommended section thicknesses for the proposed pavement areas that are to be completed as part of the project, under dry weather construction conditions. In our opinion, this pavement section is suitable to support the anticipated levels of traffic.

Table 3 - Recommended Minimum Dry-Weather Pavement Section for Light-Duty Roadways

Material Layer	Section Thickness (in)	Compaction Standard
Asphaltic Concrete (AC)	3	91%/ 92% of Rice Density AASHTO T-209
Crushed Aggregate Base ¾"-0 (leveling course)	2	95% of Modified Proctor AASHTO T-180
Crushed Aggregate Base 1½"-0	8	95% of Modified Proctor AASHTO T-180
Competent Subgrade	12	Approved native or 90% of Modified Proctor AASHTO T-180

Any pockets of organic debris or loose fill encountered during subgrade preparation should be removed and replaced with engineered fill (see *Site Preparation* Section). In order to verify subgrade strength, we recommend proof-rolling directly on subgrade with a loaded dump truck during dry weather and on top of base course in wet weather. Soft areas that pump, rut, or weave should be stabilized prior to paving.

If pavement areas are to be constructed during wet weather, the subgrade and construction plan should be reviewed by the project geotechnical engineer at the time of construction so that condition specific recommendations can be provided. The moisture sensitive subgrade soils make the site a difficult wet weather construction project. General recommendations for wet weather pavement sections are provided below.

During placement of pavement section materials, density testing should be performed to verify compliance with project specifications. Generally, one subgrade, one base course, and one asphalt compaction test is performed for every 100 to 200 linear feet of paving.

Wet Weather Construction Pavement Section

This section presents our recommendations for wet weather pavement sections, which are for construction of on-site driving lanes and parking areas. These wet weather pavement section recommendations are intended for use in situations where it is not feasible to compact the subgrade soils to Clackamas County requirements, due to wet subgrade soil conditions, and/or construction during wet weather.

Based on our site review, we recommend a wet weather section with a minimum subgrade deepening of 6 inches to accommodate a working subbase of additional 1½"-0 crushed rock. Geotextile fabric, Mirafi 500x or equivalent, should be placed on subgrade soils prior to placement of base rock.

In some instances it may be preferable to use Special Treated Base (STB) in combination with overexcavation and increasing the thickness of the rock section. GeoPacific should be consulted for additional recommendations regarding use of STB in wet weather pavement sections if it is desired to pursue this alternative. Cement treatment of the subgrade may also be considered instead of overexcavation. For planning purposes, we anticipate that treatment of the on-site soils would involve mixing cement powder to approximately 6 percent cement content and a mixing depth on the order of 12 inches.

With implementation of the above recommendations, it is our opinion that the resulting pavement sections will provide equivalent or greater structural strength than the dry weather pavement section currently planned. However, it should be noted that construction in wet weather is challenging, and the performance of pavement subgrade depend on a number of factors including the weather conditions, the contractor's methods, and the amount of traffic the areas are subjected to. There is a potential that soft spots may develop even with implementation of the wet weather provisions recommended in this letter. If soft spots in the subgrade are identified during roadway excavation, or develop prior to paving, the soft spots should be over-excavated and backfilled with additional crushed rock.

During subgrade excavation, care should be taken to avoid disturbing the subgrade soils. Removals should be performed using an excavator with a smooth-bladed bucket. Truck traffic should be limited until an adequate working surface has been established. We suggest that the crushed rock be spread using bulldozer equipment rather than dump trucks, to reduce the amount of traffic and potential disturbance of subgrade soils.

Care should be taken to avoid over-compaction of the base course materials, which could create pumping, unstable subgrade soil conditions. Heavy and/or vibratory compaction efforts should be applied with caution. Following placement and compaction of the crushed rock to project specifications (95% of AASHTO T-180), a finish proof-roll should be performed before paving.
The above recommendations are subject to field verification. GeoPacific should be on-site during construction to verify subgrade strength and to take density tests on the engineered fill, base rock and asphaltic pavement materials.

Spread Foundations

The proposed residential structures may be supported on shallow foundations bearing on competent undisturbed, native soils and/or engineered fill, appropriately designed and constructed as recommended in this report. Foundation design, construction, and setback requirements should conform to the applicable building code at the time of construction. For maximization of bearing strength and protection against frost heave, spread footings should be embedded at a minimum depth of 18 inches below exterior grade. Minimum footing widths should be determined by the project engineer/architect in accordance with applicable design codes.

The anticipated allowable soil bearing pressure is 2,000 lbs/ft^2 for footings bearing on competent, native soil and/or engineered fill. A maximum chimney and column load of 30 kips is preliminarily recommended for the site. The recommended maximum allowable bearing pressure may be increased by 1/3 for short-term transient conditions such as wind and seismic loading. For heavier loads, the geotechnical engineer should be consulted. The coefficient of friction between on-site soil and poured-in-place concrete may be taken as 0.45, which includes no factor of safety. The maximum anticipated total and differential footing movements (generally from soil expansion and/or settlement) are 1 inch and ¾ inch over a span of 20 feet, respectively. We anticipate that the majority of the estimated settlement will occur during construction, as loads are applied. Excavations near structural footings should not extend within a 1H:1V plane projected downward from the bottom edge of footings.

Footing excavations should penetrate through topsoil and any loose soil to competent subgrade that is suitable for bearing support. All footing excavations should be trimmed neat, and all loose or softened soil should be removed from the excavation bottom prior to placing reinforcing steel bars. Due to the moisture sensitivity of on-site native soils, foundations constructed during the wet weather season may require over-excavation of footings and backfill with compacted, crushed aggregate.

Footing and Roof Drains

If the proposed structures will have a raised floor, and no concrete slab-on-grade floors are used, perimeter footing drains would not be required based on soil conditions encountered at the site and experience with standard local construction practices. Where it is desired to reduce the potential for moist crawl spaces, footing drains may be installed. If concrete slab-on-grade floors are used, perimeter footing drains should be installed as recommended below.

Where used, perimeter footing drains should consist of 3 or 4-inch diameter, perforated plastic pipe embedded in a minimum of 1 ft^3 per lineal foot of clean, free-draining drain rock. The drain pipe and surrounding drain rock should be wrapped in non-woven geotextile (Mirafi 140N, or approved equivalent) to minimize the potential for clogging and/or ground loss due to piping. Water collected from the footing drains should be directed to the local storm drain system or other suitable outlet. A minimum 0.5 percent fall should be maintained throughout the drain and non-perforated pipe outlet. The footing drains should include clean-outs to allow periodic maintenance and inspection. In our opinion, footing drains may outlet at the curb, or on the back sides of lots where sufficient fall is not available to allow drainage to the street.

Construction should include typical measures for controlling subsurface water beneath the homes, including positive crawlspace drainage to an adequate low-point drain exiting the foundation, visqueen covering the exposed ground in the crawlspace, and crawlspace ventilation (foundation vents). The homebuyers should be informed and educated that some slow flowing water in the crawlspaces is considered normal and not necessarily detrimental to the home given these other design elements incorporated into its construction. Appropriate design professionals should be consulted regarding crawlspace ventilation, building material selection and mold prevention issues, which are outside GeoPacific's area of expertise.

Down spouts and roof drains should collect roof water in a system separate from the footing drains in order to reduce the potential for clogging. Roof drain water should be directed to an appropriate discharge point well away from structural foundations. Grades should be sloped downward and away from buildings to reduce the potential for ponded water near structures.

Stormwater Management Facilities

We understand that plans for project development may include stormwater management facilities, such as stormwater quality ponds in the northeast or southeast corners of the site. We also understand that it is desired to incorporate subsurface disposal of stormwater through infiltration. Groundwater seepage was observed during the infiltration test at a depth of 5 feet in test pit TP-1, indicating that subsurface infiltration is not feasible in the residual soils in the vicinity of test pit TP-1. Infiltration rates in native silty GRAVEL and COBBLES (GM) encountered in test pit TP-2 are on the order of 1.2 inches per hour.

We typically suggest a factor of safety ranging from 2 to 4 depending on many factors including the type and location of the facility, regulatory stipulations, and the ability to safely convey potential overflow to an appropriate discharge point.

Systems should be constructed as specified by the designer and/or in accordance with jurisdictional design manuals. Stormwater exceeding storage capacities will need to be directed to a suitable surface discharge location. Stormwater management systems may need to include overflow outlets, surface water control measures and/or be connected to the street stormdrain system, if available.

Seismic Design

Structures should be designed to resist earthquake loading in accordance with the methodology described in the 2012 International Residential Code (IRC) for One- and Two-Family Dwellings, with applicable Oregon Structural Specialty Code (OSSC) revisions (*current 2014*). We recommend Site Class D be used for design per the OSSC, Table 1613.5.2 and as defined in ASCE 7, Chapter 20, Table 20.3-1. Design values determined for the site using the USGS (United States Geological Survey) *2014 Seismic Design Maps Summary Report* are summarized in Table 4.

Table 4 - Recommended Earthquake Ground Motion Parameters (2015 USGS)

Parameter	Value
Location (Lat, Long), decimal	45.397, -122.656
Probabilistic Ground Motion Values, 2% Probability of Exceedance in 50 yrs	
Short Period, S_s	0.974 g
1.0 Sec Period, S_1	0.417 g
Soil Factors for Site Class D:	
F_a	1.110
F_v	1.583
Residential Site Value = 2/3 x F_a x S_s	0.721 g
Residential Seismic Design Category	D

Soil liquefaction is a phenomenon wherein saturated soil deposits temporarily lose strength and behave as a liquid in response to earthquake shaking. Soil liquefaction is generally limited to loose, granular soils located below the water table. After development, the on-site soils will consist predominantly of engineered fill, stiff to hard residual soil, medium dense to dense Willamette Formation soils, and hard rock, and are not considered susceptible to liquefaction. Therefore, it is our opinion that special design or construction measures are not required to mitigate the effects of liquefaction.

UNCERTAINTIES AND LIMITATIONS

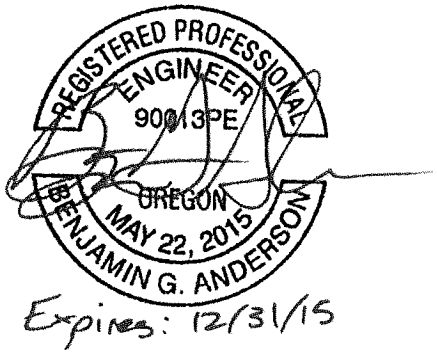
We have prepared this report for the owner and his/her consultants for use in design of this project only. The conclusions and interpretations presented in this report should not be construed as a warranty of the subsurface conditions. Experience has shown that soil and groundwater conditions can vary significantly over small distances. Inconsistent conditions can occur between explorations that may not be detected by a geotechnical study. If, during future site operations, subsurface conditions are encountered which vary appreciably from those described herein, GeoPacific should be notified for review of the recommendations of this report, and revision of such if necessary.

Within the limitations of scope, schedule and budget, GeoPacific executed these services in accordance with generally accepted professional principles and practices in the fields of geotechnical engineering and engineering geology at the time the report was prepared. No warranty, express or implied, is made. The scope of our work did not include environmental assessments or evaluations regarding the presence or absence of wetlands or hazardous or toxic substances in the soil, surface water, or groundwater at this site.

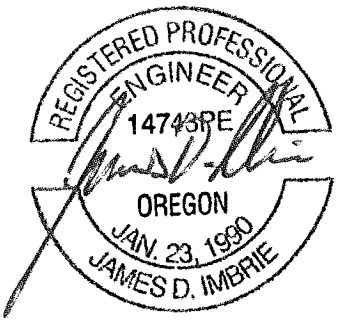
We appreciate this opportunity to be of service.

Sincerely,

GEOPACIFIC ENGINEERING, INC.



Benjamin G. Anderson, P. E.
Project Engineer



EXPIRES: 06/30/2017

James D. Imbrie, G.E., C.E.G.
Principal Geotechnical Engineer

REFERENCES

Alder Geotechnical Services, *Geotechnical Investigation Report, Proposed Edmondson/Thorne Residence, 2520 NW 83rd Place, Portland, Oregon*, dated April 26, 2012.

Atwater, B.F., 1992, Geologic evidence for earthquakes during the past 2,000 years along the Copalis River, southern coastal Washington: Journal of Geophysical Research, v. 97, p. 1901-1919.

Carver, G.A., 1992, Late Cenozoic tectonics of coastal northern California: American Association of Petroleum Geologists-SEPM Field Trip Guidebook, May, 1992.

Burns, W.J., Madin, I.P., Mickelson, K.A., and Drazba, M.C., 2011 Landslide Inventory Maps of the Linnton Quadrangle, Multnomah and Washington Counties, Oregon.

Geomatrix Consultants, 1995, Seismic Design Mapping, State of Oregon: unpublished report prepared for Oregon Department of Transportation, Personal Services Contract 11688, January 1995.

Goldfinger, C., Kulm, L.D., Yeats, R.S., Appelgate, B, MacKay, M.E., and Cochrane, G.R., 1996, Active strike-slip faulting and folding of the Cascadia Subduction-Zone plate boundary and forearc in central and northern Oregon: in Assessing earthquake hazards and reducing risk in the Pacific Northwest, v. 1: U.S. Geological Survey Professional Paper 1560, P. 223-256.

Ma, L., Madin, I.P., Duplantis, S., and Williams, K.J., 2012, Lidar-based Surficial Geologic Map and Database of the Greater Portland, Oregon, Area, Clackamas, Columbia, Marion, Multnomah,Washington, and Yamhill Counties, Oregon, and Clark County, Washington, DOGAMI Open-File Report O-12-02

Mabey, M.A., Madin, I.P., and Black G.L., 1996, Relative Earthquake Hazard Map of the Lake Oswego Quadrangle, Clackamas, Multnomah and Washington Counties, Oregon: Oregon Department of Geology and Mineral Industries

Madin, I.P., 1990, Earthquake hazard geology maps of the Portland metropolitan area, Oregon: Oregon Department of Geology and Mineral Industries Open-File Report 0-90-2, scale 1:24,000, 22 p.

Open-file report 0-08-06, *Preliminary Geologic Map of the Linnton 7.5' Quadrangle, Multnomah and Washington Counties, Oregon, (State of Oregon Department of Geology and Mineral Industries, (McConnell, Vicki S, 2008)*,

Oregon Department of Geology and Mineral Industries, Madin, Ian P., Ma, Lina, and Niewendorp, Clark A., *Open-File Report 0-08-06, Preliminary Geologic Map of the Linnton 7.5' Quadrangle, Multnomah and Washington Counties*, Oregon, 2008.

Oregon Department of Geology and Mineral Industries, Hull, Donald A., *Relative Earthquake Hazard Map of the Linnton Quadrangle, Multnomah and Washington Counties, Oregon,* 1996.

Peterson, C.D., Darioenzo, M.E., Burns, S.F., and Burris, W.K., 1993, Field trip guide to Cascadia paleoseismic evidence along the northern California coast: evidence of subduction zone seismicity in the central Cascadia margin: Oregon Geology, v. 55, p. 99-144.

United States Geological Survey, USGS Earthquake Hazards Program Website (earthquake.usgs.gov).

Unruh, J.R., Wong, I.G., Bott, J.D., Silva, W.J., and Lettis, W.R., 1994, Seismotectonic evaluation: Scoggins Dam, Tualatin Project, Northwest Oregon: unpublished report by William Lettis and Associates and Woodward Clyde Federal Services, Oakland, CA, for U. S. Bureau of Reclamation, Denver CO (in Geomatrix Consultants, 1995).

Washington Department of Natural Resources, Phillips, William M., *Geologic Map of the Vancouver Quadrangle, Washington and Oregon*, 1987.

Web Soil Survey, Natural Resources Conservation Service, United States Department of Agriculture *2014 website.* (http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm.).

Werner, K.S., Nabelek, J., Yeats, R.S., Malone, S., 1992, The Mount Angel fault: implications of seismic-reflection data and the Woodburn, Oregon, earthquake sequence of August, 1990: Oregon Geology, v. 54, p. 112-117.

Wong, I. Silva, W., Bott, J., Wright, D., Thomas, P., Gregor, N., Li., S., Mabey, M., Sojourner, A., and Wang, Y., 2000, Earthquake Scenario and Probabilistic Ground Shaking Maps for the Portland, Oregon, Metropolitan Area; State of Oregon Department of Geology and Mineral Industries; Interpretative Map Series IMS-16

Yeats, R.S., Graven, E.P., Werner, K.S., Goldfinger, C., and Popowski, T., 1996, Tectonics of the Willamette Valley, Oregon: in Assessing earthquake hazards and reducing risk in the Pacific Northwest, v. 1: U.S. Geological Survey Professional Paper 1560, P. 183-222, 5 plates, scale 1:100,000.

Yelin, T.S., 1992, An earthquake swarm in the north Portland Hills (Oregon): More speculations on the seismotectonics of the Portland Basin: Geological Society of America, Programs with Abstracts, v. 24, no. 5, p. 92.

Snyder, D.T., 2008, Estimated Depth to Ground Water and Configuration of the Water Table in the Portland, Oregon Area: U.S. Geological Survey Scientific Investigations Report 2008–5059, 41 p., 3 plates.

FIGURES

14835 SW 72nd Avenue
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Fax (503) 941-9281

GeoPacific Engineering, Inc.
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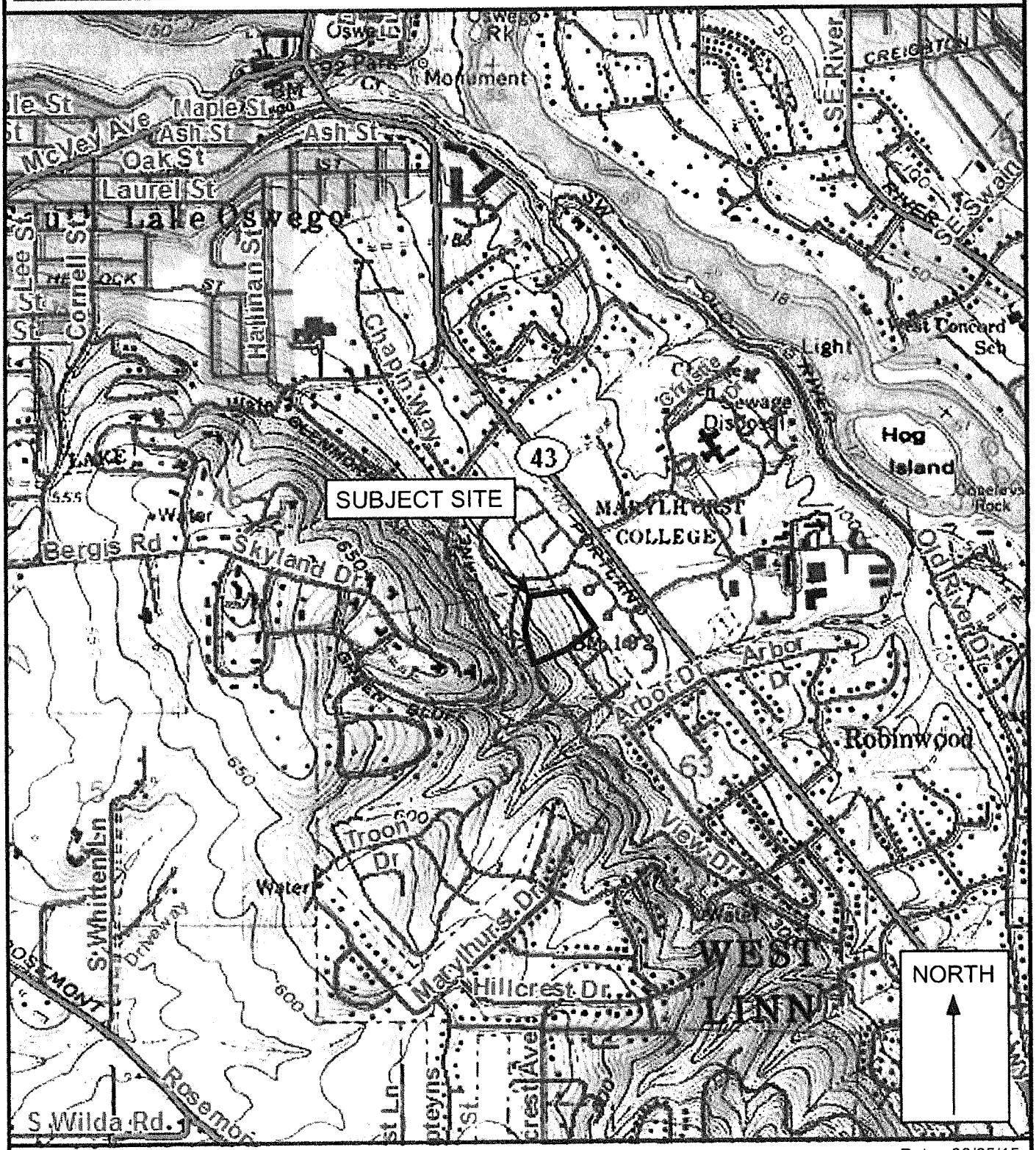
VICINITY MAP



Legend

Approximate Scale 1 in = 1,400 ft

Date: 08/05/15
Drawn by: BGA

Base maps: National Geographic TOPO!, Tele Atlas, Oregon, 1990.

Project: Reesman Property West Linn, Oregon	Project No. 15-3849	FIGURE 1

GeoPacific Engineering, Inc.
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Portland, Oregon 97224
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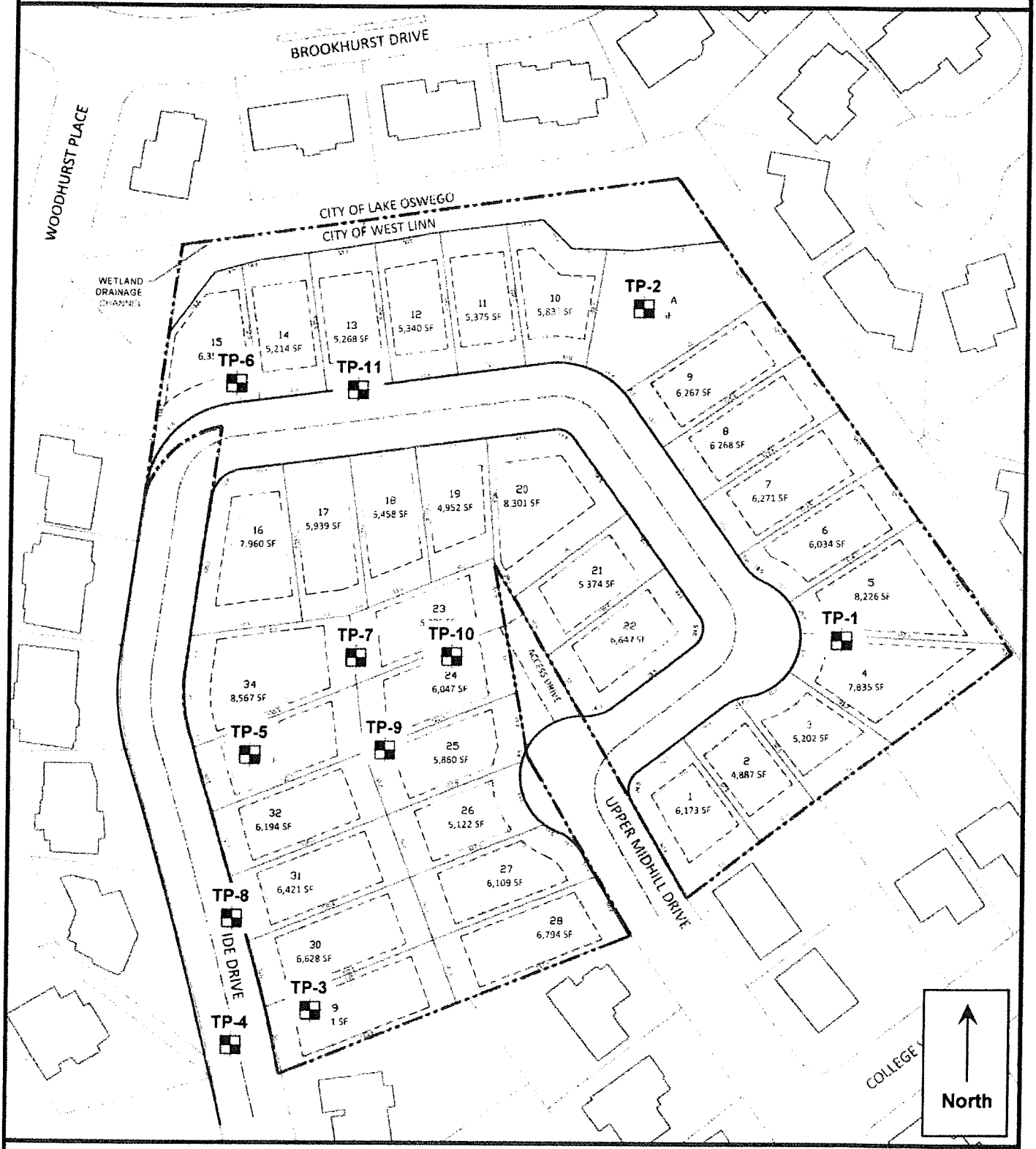
SITE PLAN AND EXPLORATION LOCATIONS



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TP-1
Test Pit Designation and Approximate Location

0 200'
APPROXIMATE SCALE 1"=200'

Date: 07/01/15
Drawn by: BGA

Project: Reesman Property West Linn, Oregon	Project No. 15-3849	FIGURE 2

GeoPacific Engineering, Inc.
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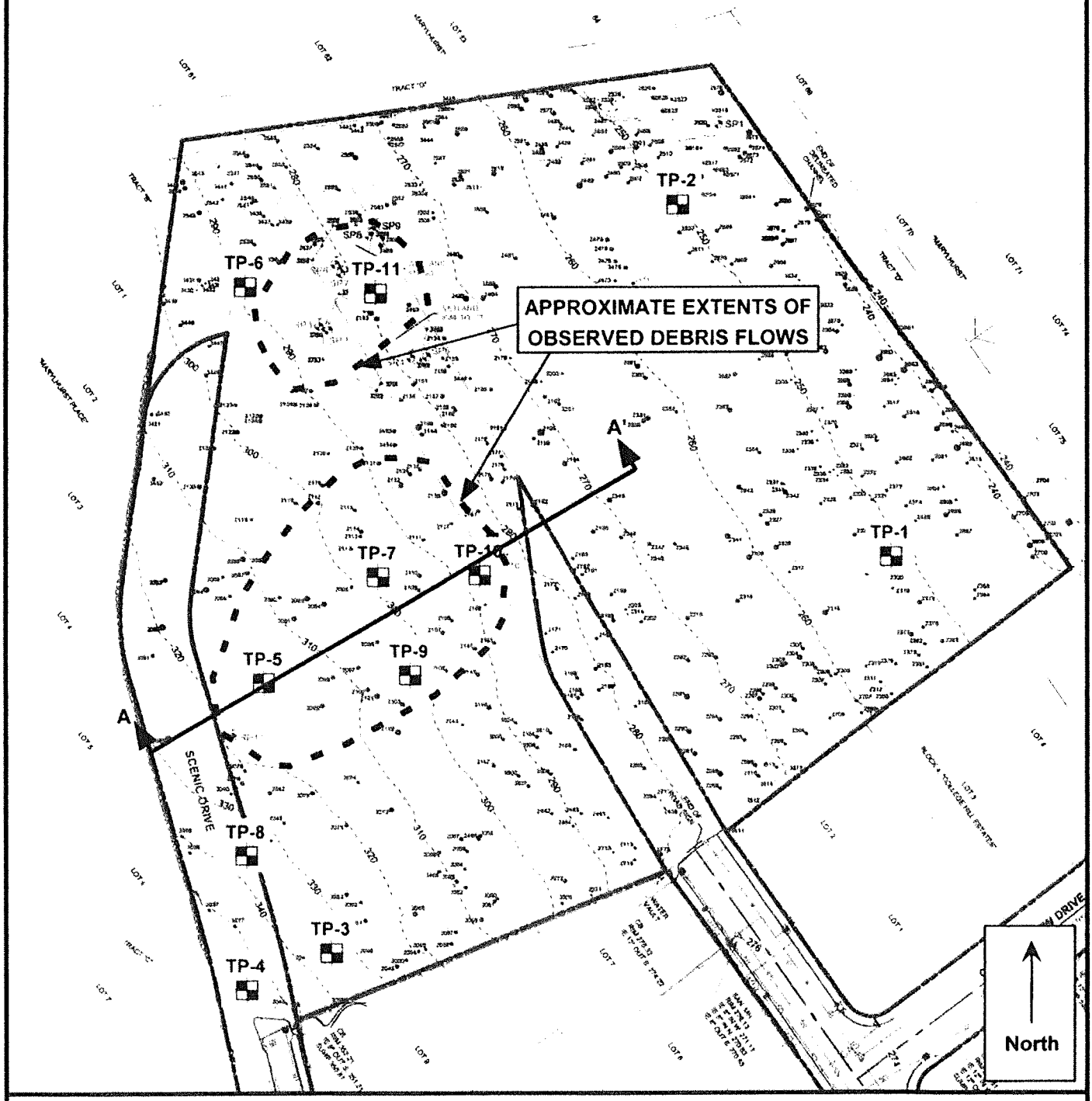
SITE TOPOGRAPHIC MAP AND EXPLORATION LOCATIONS



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TP-1
Test Pit Designation and Approximate Location

0 100'
APPROXIMATE SCALE 1"=100'

Date: 07/30/15
Drawn by: BGA

Project: Reesman Property West Linn, Oregon	Project No. 15-3849	FIGURE 3

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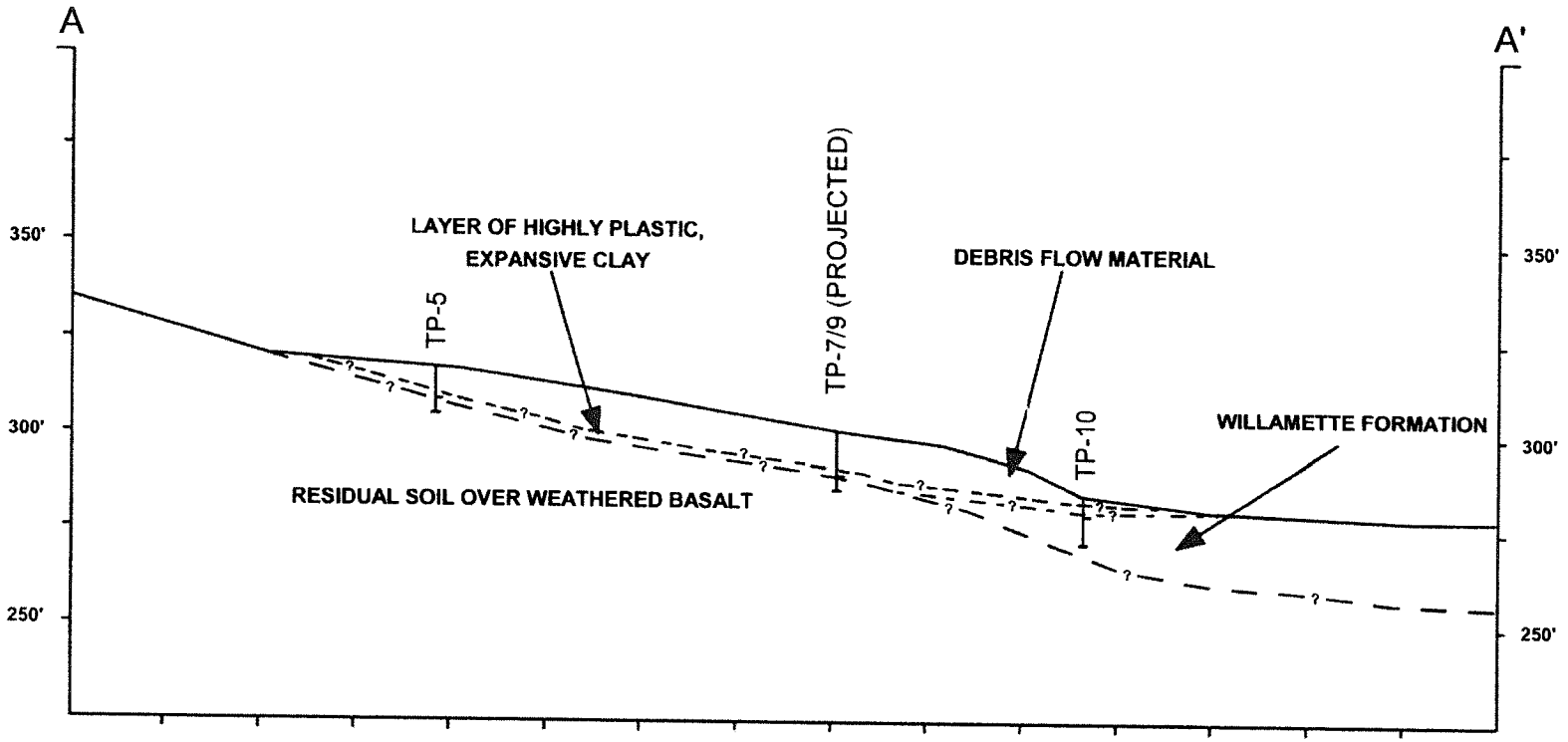
Geologic Cross Section



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EXPLORATORY TEST PIT

0 50'

APPROXIMATE SCALE 1"=50'

Date: 08/03/15
Drawn by: BGA

Project: Reesman Property West Linn, Oregon	Project No. 15-3849	FIGURE 4

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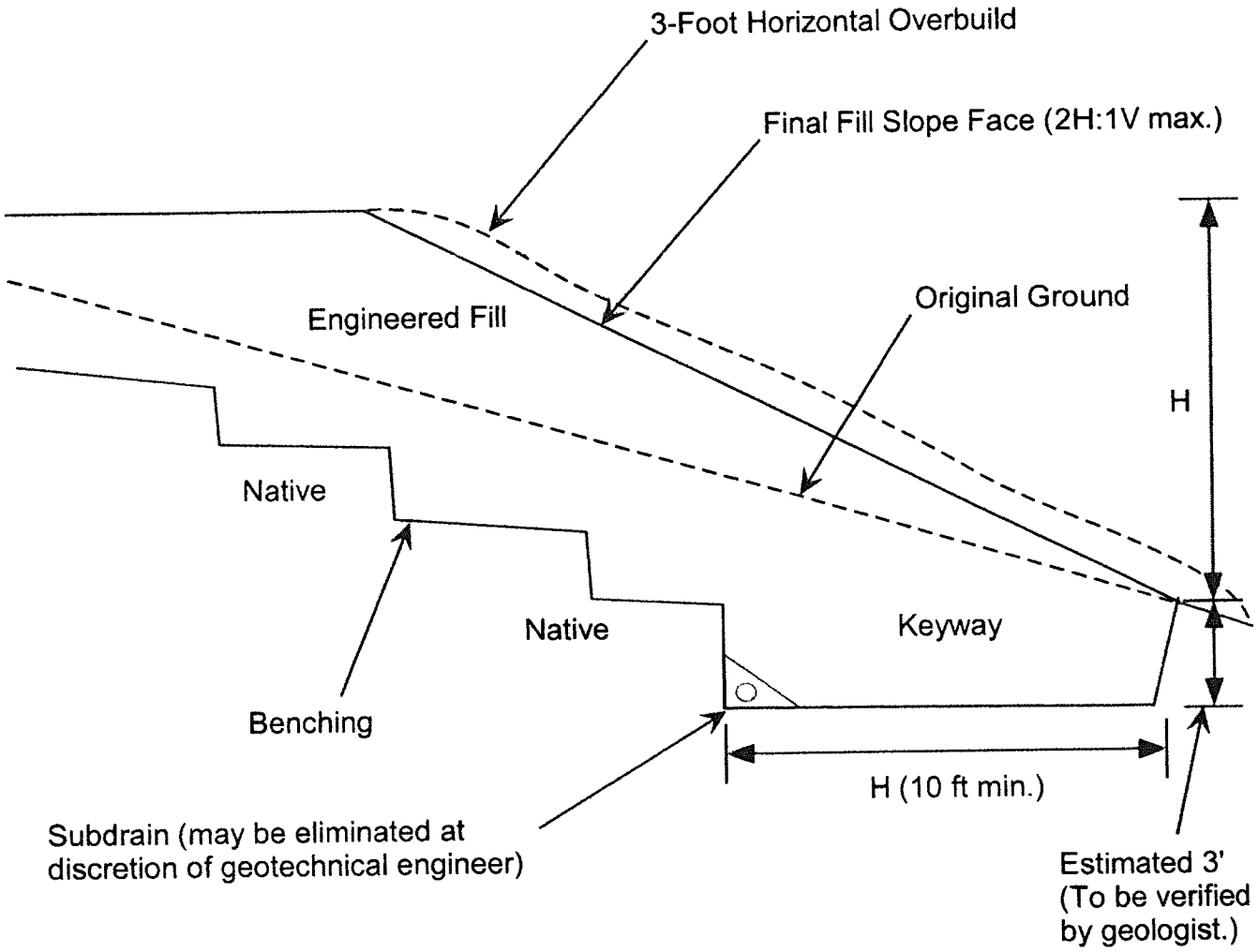
FILL SLOPE DETAIL

TYPICAL KEYWAY, BENCHING & FILL SLOPE DETAIL



Recommended subdrain is minimum 3-inch-diameter ADS Heavy Duty grade (or equivalent), perforated plastic pipe enveloped in a minimum of 3 cubic feet per lineal foot of 2" to 1/2" open-graded gravel drain rock wrapped with geotextile filter fabric (Mirafi 140N or equivalent).

Project: Reesman Property West Linn, Oregon	Project No. 15-3849	FIGURE 5

GeoPacific Engineering, Inc.
Real-World Geotechnical Solutions
Investigation • Design • Construction Support

EXPLORATION LOGS

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TEST PIT LOG

Project: Reesman Property West Linn, Oregon	Project No. 15-3849	Test Pit No. **TP- 1**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	In-Situ Dry Density (lb/ft³)	Moisture Content (%)	Water Bearing Zone	Material Description
1						Soft, low organic SILT (ML), brown, with fine to medium roots throughout, dry to damp (Topsoil)
2		100 to 1,000 g				Medium stiff, gravelly SILT (ML), brown, with some cobbles up to 6 inches in diameter, gravel and cobbles are rounded, damp (Willamette Formation)
3						Medium dense, silty GRAVEL (GM), brown, with occasional cobbles, damp (Willamette Formation)
4						Stiff to very stiff, clayey SILT (ML) to silty CLAY (CL), dark gray, moist (Residual Soil) Grades to light gray below 4.5 feet
5		100 to 1,000 g				Grades to with black and yellow mineral deposits
6						
7		100 to 1,000 g				
8						
9						Grades to light brown and clayey
10		100 to 1,000 g				
11						Test pit terminated at 11 feet
12						
13						Notes: No seepage or static groundwater encountered Infiltration test performed at 11 feet
14						
15						
16						
17						

LEGEND

Bag Sample

Bucket Sample


Shelby Tube Sample


Seepage


Water Bearing Zone


Water Level at Abandonment

Date Excavated: 06/10/15
Logged By: BGA
Surface Elevation:

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TEST PIT LOG

Project: Reesman Property
West Linn, Oregon

Project No. 15-3849

Test Pit No. **TP-2**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	In-Situ Dry Density (lb/ft³)	Moisture Content (%)	Water Bearing Zone	Material Description
1						14" soft, low organic SILT (OL-ML), dark gray, with fine to medium roots throughout, dry to damp (Topsoil)
2						Medium dense, silty GRAVEL and COBBLES (GM), brown, with occasional boulders, damp to moist (Willamette Formation)
3						
4						
5		100 to 1,000 g				
6						
7						
8						
9		100 to 1,000 g				Grades to sandy and with trace silt
10						
11						Grades to with large boulders up to 2.5 feet in diameter and very dense
12						
13						Test pit terminated at 12 feet
14						
15						Notes: No seepage or static groundwater encountered Infiltration test performed at 5 feet
16						
17						

LEGEND

Bag Sample

Bucket Sample


Shelby Tube Sample


Seepage


Water Bearing Zone


Water Level at Abandonment

Date Excavated: 06/10/15
Logged By: BGA
Surface Elevation:

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TEST PIT LOG

Project: Reesman Property West Linn, Oregon	Project No. 15-3849	Test Pit No. **TP-3**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	In-Situ Dry Density (lb/ft³)	Moisture Content (%)	Water Bearing Zone	Material Description
1						12" moderately organic SILT (ML-OL), brown, with fine to medium roots throughout, moist (Topsoil)
	3.0					Very stiff, clayey SILT (ML) to silty CLAY (CL), light reddish brown, trace black staining, damp to moist (Residual Soil)
2	3.0					
3	3.5					
4	3.0					
5						
6						
7						
8						
9						
10						Grades to hard and with increased black staining
11						Test pit terminated at 11 feet
12						
13						Note: No seepage or groundwater encountered
14						
15						
16						
17						

LEGEND

Bag Sample

Bucket Sample


Shelby Tube Sample


Seepage


Water Bearing Zone


Water Level at Abandonment

Date Excavated: 06/10/15
Logged By: BGA
Surface Elevation:

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TEST PIT LOG

Project: Reesman Property
West Linn, Oregon

Project No. 15-3849

Test Pit No. **TP-4**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	In-Situ Dry Density (lb/ft³)	Moisture Content (%)	Water Bearing Zone	Material Description
1–4						Loose BOULDERS in a matrix of reddish brown clayey silt, boulders up to 2.5 feet in diameter, damp (Undocumented Fill)
5						Soft, moderately organic SILT (ML-OL), dark brown, with significant amounts of organic debris (branches and roots), moist (Buried Topsoil)
6–11						Stiff to very stiff, clayey SILT (ML) to silty CLAY (CL), reddish brown, moist (Residual Soil) Increased plasticity below 9.5 feet
12–17						Test pit terminated at 11.5 feet Notes: No seepage or static groundwater encountered

LEGEND

Bag Sample

Bucket Sample


Shelby Tube Sample


Seepage


Water Bearing Zone


Water Level at Abandonment

Date Excavated: 06/10/15
Logged By: BGA
Surface Elevation:

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TEST PIT LOG

Project: Reesman Property
West Linn, Oregon

Project No. 15-3849

Test Pit No. **TP-5**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	In-Situ Dry Density (lb/ft³)	Moisture Content (%)	Water Bearing Zone	Material Description
0						Soft, moderately organic SILT (OL-ML), dark gray, with fine roots throughout, moist (Topsoil)
1	3.0					Stiff to very stiff, clayey SILT (ML) to silty CLAY (CL), dark gray, moist (Ancient Debris Flow Material)
2						
3	4.0					
4	4.0					Grades to light brown
5						
6						Stiff, highly plastic CLAY (CH), light brown, very moist (Ancient Debris Flow Materials - Possible Slide Plane?)
7		100 to 1,000 g				
8		100 to 1,000 g				Stiff to very stiff, clayey SILT (ML) to silty CLAY (CL), dark gray, moist (Residual Soil)
9						
10						
11						Extremely soft to very soft (R0-R1), highly weathered BASALT, trace reddish-brown matrix of silty clay to clayey silt, light gray, black staining, damp to moist (Columbia River Basalt)
12						Test pit terminated at 12 feet
13						
14						Notes: No seepage or static groundwater encountered
15						
16						
17						

LEGEND

100 to 1,000 g — Bag Sample
5 Gal Bucket — Bucket Sample
Shelby Tube Sample
Seepage
Water Bearing Zone
Water Level at Abandonment

Date Excavated: 06/10/15
Logged By: BGA
Surface Elevation:

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TEST PIT LOG

Project: Reesman Property
West Linn, Oregon

Project No. 15-3849

Test Pit No. **TP-6**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	In-Situ Dry Density (lb/ft³)	Moisture Content (%)	Water Bearing Zone	Material Description
1						Highly organic SILT (OL-ML), dark brown, roots throughout, loose, 2 inch thick root mat, damp to moist (Topsoil)
2						Grades to moderately organic, dark gray, and with fine to large roots throughout
3	2.5					Below 30 inches, very stiff, clayey SILT (ML) to silty CLAY (CL), reddish brown, micaceous, trace roots throughout, black staining, damp (Residual Soil)
	4.5					
4	>4.5					
5						
6						
7						Grades to hard
8						
9						
10						
11						
12						Test pit terminated at 11.5 feet
13						
14						Note: Very slow groundwater seepage observed at 11 feet Seepage visually estimated at less than 1 gallon per minute
15						
16						
17						

LEGEND

Bag Sample

Bucket Sample


Shelby Tube Sample


Seepage


Water Bearing Zone


Water Level at Abandonment

Date Excavated: 06/10/15
Logged By: BGA
Surface Elevation:

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TEST PIT LOG

Project: Reesman Property West Linn, Oregon	Project No. 15-3849	Test Pit No. **TP-7**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	In-Situ Dry Density (lb/ft³)	Moisture Content (%)	Water Bearing Zone	Material Description
0						Highly organic SILT (OL-ML), dark brown, roots throughout, loose, moist (Topsoil)
1						Stiff to very stiff, clayey SILT (ML) to silty CLAY (CL), reddish brown, with occasional gravel and cobble size basalt fragments, disturbed texture, moist (Ancient Debris Flow Material)
2	2.5					
	4.5					
3	>4.5					
4						
5						
6						
7						
8						Very stiff, clayey SILT (ML) to silty CLAY (CL), light brown, with black staining, undisturbed texture, moist (Residual Soil)
9						
10						
11						
12						Test pit terminated at 12 feet
13						
14						Notes: No seepage or static groundwater encountered
15						
16						
17						

LEGEND

Bag Sample

Bucket Sample


Shelby Tube Sample


Seepage


Water Bearing Zone


Water Level at Abandonment

Date Excavated: 06/10/15
Logged By: BGA
Surface Elevation:

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TEST PIT LOG

Project: Reesman Property
West Linn, Oregon

Project No. 15-3849

Test Pit No. **TP-8**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	In-Situ Dry Density (lb/ft³)	Moisture Content (%)	Water Bearing Zone	Material Description
1						16" soft, moderately organic SILT (OL-ML), dark gray, with fine roots throughout, dry (Topsoil)
2	3.0					Very stiff, clayey SILT (ML) to silty CLAY (CL), brown, with orange mottling, with occasional gravel size weathered basalt clasts, damp (Residual Soil)
3	4.0					
4	4.0					Remnant roots observed
5						Grades to brown, moist, basalt clasts are angular
6						Grades to reddish brown and very moist
7						
8						
9						
10						Grades to less altered, with more intact rock
11						
12						
13						Grades to with decreased shear strength, increased moisture, less altered, dominant clayey matrix
14						
15						
16						
17						Stiff, highly plastic CLAY (CH), reddish brown, with orange and gray mottling, very moist (Residual Soil)
						Test pit terminated at 17 feet Notes: No seepage or static groundwater encountered

LEGEND

Bag Sample

Bucket Sample


Shelby Tube Sample


Seepage


Water Bearing Zone


Water Level at Abandonment

Date Excavated: 06/18/15
Logged By: BGA
Surface Elevation:

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TEST PIT LOG

Project: Reesman Property
West Linn, Oregon

Project No. 15-3849

Test Pit No. **TP-9**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	In-Situ Dry Density (lb/ft³)	Moisture Content (%)	Water Bearing Zone	Material Description
1						Decayed stump and tree roots with soft, moderately organic CLAY (CL-OL), brown, with orange mottling, with roots throughout, dry to damp (Topsoil)
2						Very stiff, clayey SILT (ML) to silty CLAY (CL), brown, with orange mottling, damp (Ancient Debris Flow Material)
3						
4						Grades to with orange and gray mottling
5						
6						
7						
8						
9						
10						Stiff, highly plastic CLAY (CH), reddish brown with gray pockets, with some small roots, with occasional fine gravel size rounded basalt clasts, very moist (Ancient Debris Flow Materials - Possible Slide Plane?)
11						
12						
13						Stiff, highly plastic CLAY (CH), layered gray and brown, with some small roots, very moist (Residual Soil)
14						
15						
16						Test pit terminated at 16 feet
17						Notes: No seepage or static groundwater encountered

LEGEND

Bag Sample

Bucket Sample


Shelby Tube Sample


Seepage


Water Bearing Zone


Water Level at Abandonment

Date Excavated: 06/18/15
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Surface Elevation:

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TEST PIT LOG

Project: Reesman Property
West Linn, Oregon

Project No. 15-3849

Test Pit No. **TP-10**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	In-Situ Dry Density (lb/ft³)	Moisture Content (%)	Water Bearing Zone	Material Description
1						8" soft, low organic CLAY (OL-CL), dark brown, with fine to medium roots throughout, dry to damp (Topsoil)
2						Very stiff, clayey SILT (ML) to silty CLAY (CL), brown, with orange mottling, with occasional angular gravel to cobble size weathered basalt clasts up to 8 inches in diameter, damp (Ancient Debris Flow Material)
3						
4						Stiff, highly plastic CLAY (CH), brown, with some roots, very moist (Ancient Debris Flow Materials - Possible Slide Plane?)
5						Medium dense to dense, COBBLES and BOULDERS, brown, boulders up to 2.5 feet in diameter, moist (Willamette Formation)
6						Hard, slight to moderately cemented sandstone, fine to medium grain size (Willamette Formation)
7						Dense COBBLES in a silt matrix, lightly cemented, subrounded, damp to moist (Willamette Formation)
8						2.5-foot diameter boulder encountered at 7.5 feet
9						Dense, silty SAND (SM), light brown, with gravel, cobbles, and boulders, not cemented, subrounded, dry to damp (Willamette Formation)
10						
11						
12						
13						
14						
15						Test pit terminated at 14 feet
16						Notes: No seepage or static groundwater encountered
17						

LEGEND

Bag Sample

Bucket Sample


Shelby Tube Sample


Seepage


Water Bearing Zone


Water Level at Abandonment

Date Excavated: 06/18/15
Logged By: BGA
Surface Elevation:

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TEST PIT LOG

Project: Reesman Property
West Linn, Oregon

Project No. 15-3849

Test Pit No. **TP-11**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	In-Situ Dry Density (lb/ft³)	Moisture Content (%)	Water Bearing Zone	Material Description
1						Very soft, highly organic CLAY (OL-CL), dark gray, with fine to medium roots throughout, dry to damp (Topsoil)
2	1.5					Soft, silty CLAY (CH), blue gray, highly plastic, wet (Ancient Debris Flow Material)
3	1.5					
4	1.0					Very stiff, clayey SILT (ML) to silty CLAY (CL), brown, with orange mottling, damp (Ancient Debris Flow Materials - Possible Slide Plane?)
5						
6						
7						
8						Dense COBBLES in a silt matrix, lightly cemented, subrounded, damp to moist (Willamette Formation)
9						
10						Test pit terminated at 10 feet
11						
12						Notes: Groundwater seepage encountered from 1 to 4 feet Seepage rate visually estimated at less than 1 gallon per minute
13						
14						
15						
16						
17						

LEGEND

Bag Sample

Bucket Sample


Shelby Tube Sample


Seepage


Water Bearing Zone


Water Level at Abandonment

Date Excavated: 06/18/15
Logged By: BGA
Surface Elevation:

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LABORATORY TEST RESULTS

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Northwest Testing, Inc.
A Division of Northwest Geotech, Inc
9120 SW Pioneer Court Suite B • Wilsonville, Oregon 97070 503/682-1880 FAX 503/682-2753

TECHNICAL REPORT

Report To:	Mr. Ben Anderson GeoPacific Engineering, Inc. 14835 SW 72nd Avenue Portland, Oregon 97224	**Date:** **Lab No.:**	6/24/15 15-138
Project:	Laboratory Testing – Reesman Property (OR 15-3849)	**Project No.:**	2684.1.1

Report of: Expansion index of soil

Sample Identification

As requested, NTI completed expansion index testing on a sample delivered to our laboratory on June 19, 2015 by a GeoPacific Engineering, Inc. representative. All testing was performed in general accordance with the methods indicated. Our laboratory's test results are summarized on the following table.

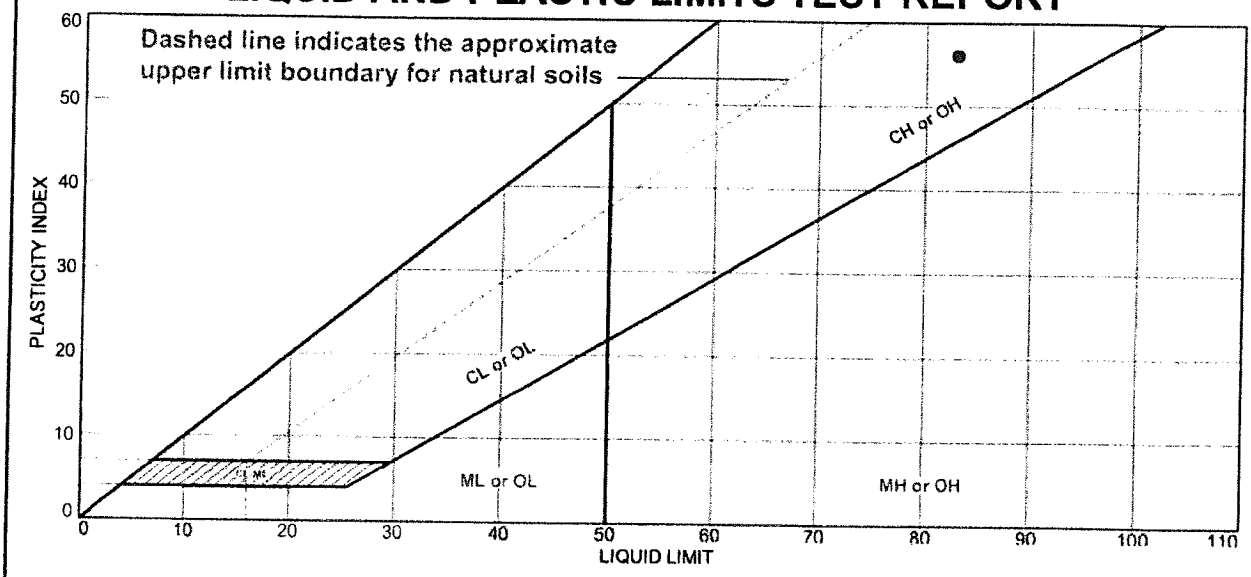
Laboratory Test Results

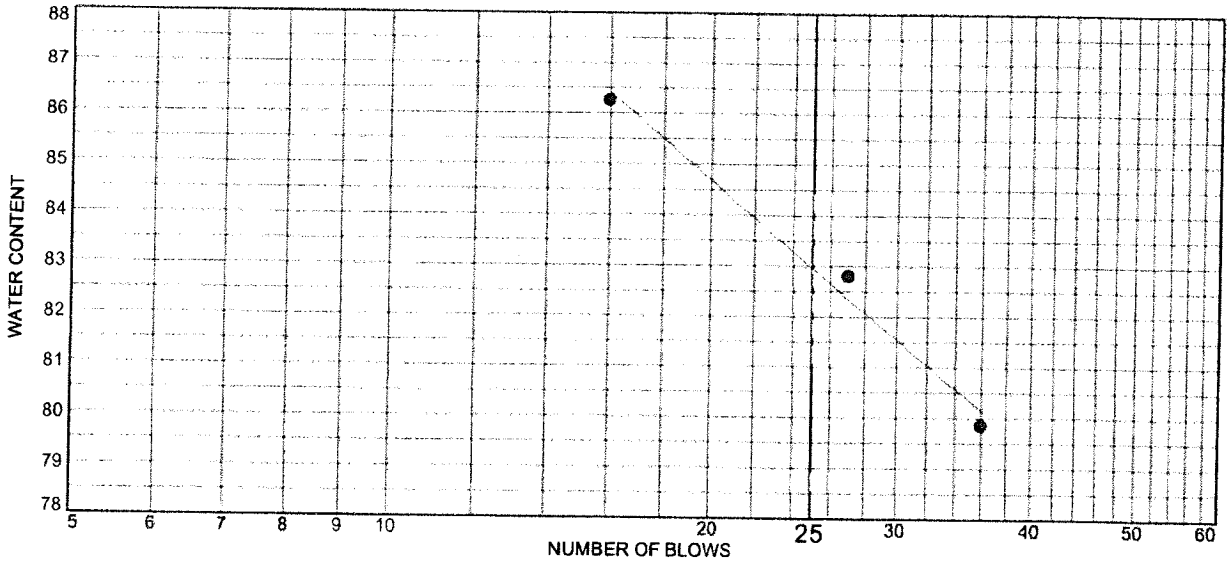
Expansion Index of Soils (ASTM D 4829)	
Test	**Test Results TP-5 @ 7 ft.**
Initial Moisture Content, (%)	16.9
Initial Dry Unit Weight, (pcf)	88.7
Initial Height of Specimen, (inches)	1.00
Initial Degree of Saturation, (%)	50.7
Final Moisture Content, (%)	31.6
Expansion Index, *EI*	110

Copies: Addressee

 BKA

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Fat Clay	83	27	56			

Project No. 15-3849 **Client:** Upper Midhill Estates, LLC

Project: Reesman Property

Sample Number: TP-5 **Depth:** 7'

Remarks:
●S15-107

GEOPACIFIC ENGINEERING, INC.

Figure

Tested By: SJC **Checked By:** MTB

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SITE RESEARCH

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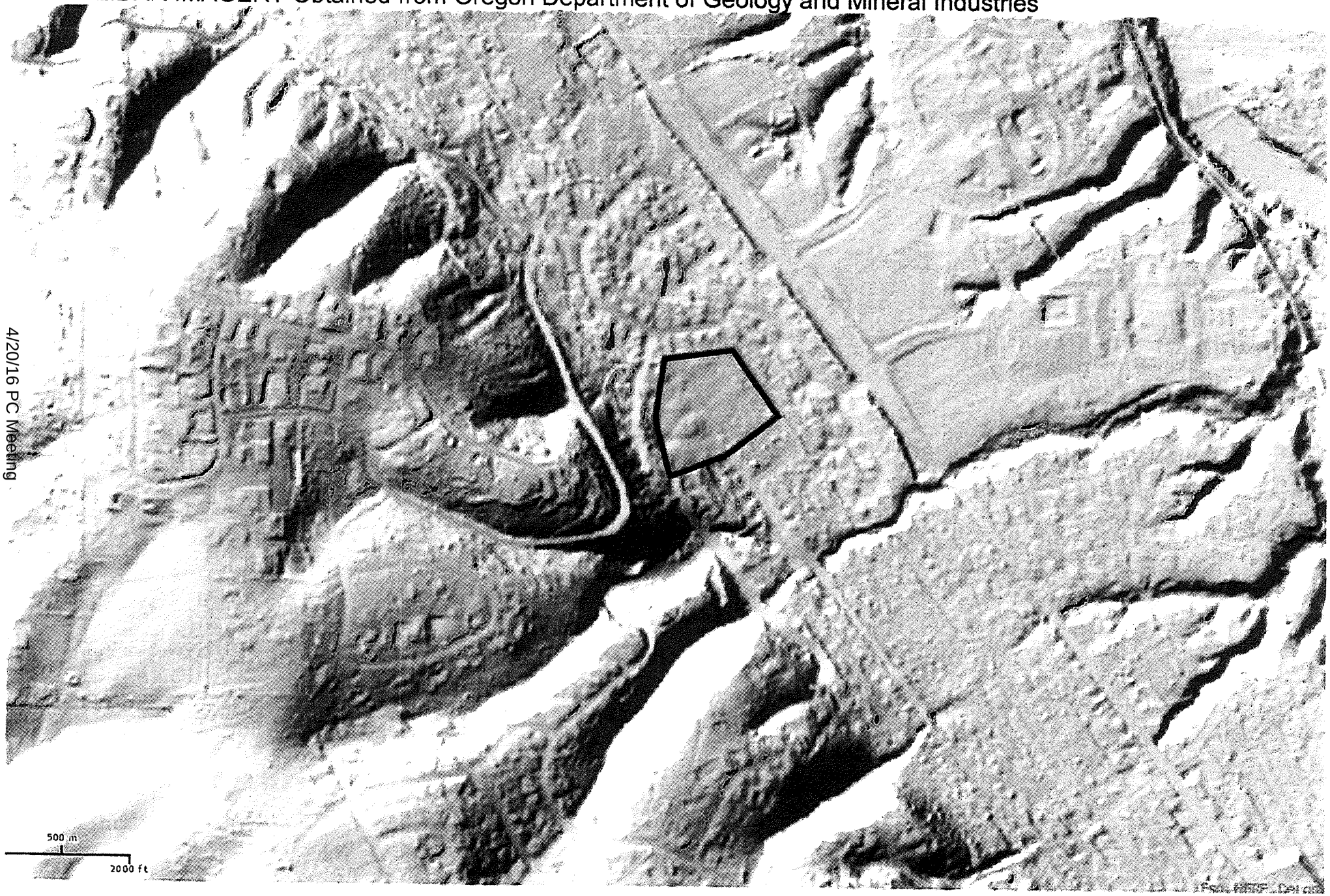
LIDAR IMAGERY Obtained from Oregon Department of Geology and Mineral Industries



USGS Design Maps Detailed Report

ASCE 7-10 Standard (45.39686°N, 122.65579°W)

Site Class D – "Stiff Soil", Risk Category I/II/III

Section 11.4.1 — Mapped Acceleration Parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain S_S) and 1.3 (to obtain S_1). Maps in the 2010 ASCE-7 Standard are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 11.4.3.

From Figure 22-1 [1] $S_S = 0.974$ g

From Figure 22-2 [2] $S_1 = 0.417$ g

Section 11.4.2 — Site Class

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class D, based on the site soil properties in accordance with Chapter 20.

Table 20.3-1 Site Classification

Site Class	$\bar{v}_s$	$\bar{N}$ or $\bar{N}_{ch}$	$\bar{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the characteristics: • Plasticity index PI > 20, • Moisture content $w \geq 40\%$, and • Undrained shear strength $\bar{s}_u$ < 500 psf		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Section 11.4.3 — Site Coefficients and Risk-Targeted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Parameters

Table 11.4-1: Site Coefficient F_a

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at Short Period				
	$S_S \le 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \ge 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of S_S

For Site Class = D and S_S = 0.974 g, F_a = 1.110

Table 11.4-2: Site Coefficient F_v

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at 1-s Period				
	$S_1 \le 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \ge 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of S_1

For Site Class = D and S_1 = 0.417 g, F_v = 1.583

Equation (11.4-1): $S_{MS} = F_a S_S = 1.110 \times 0.974 = 1.082$ g

Equation (11.4-2): $S_{M1} = F_v S_1 = 1.583 \times 0.417 = 0.660$ g

Section 11.4.4 — Design Spectral Acceleration Parameters

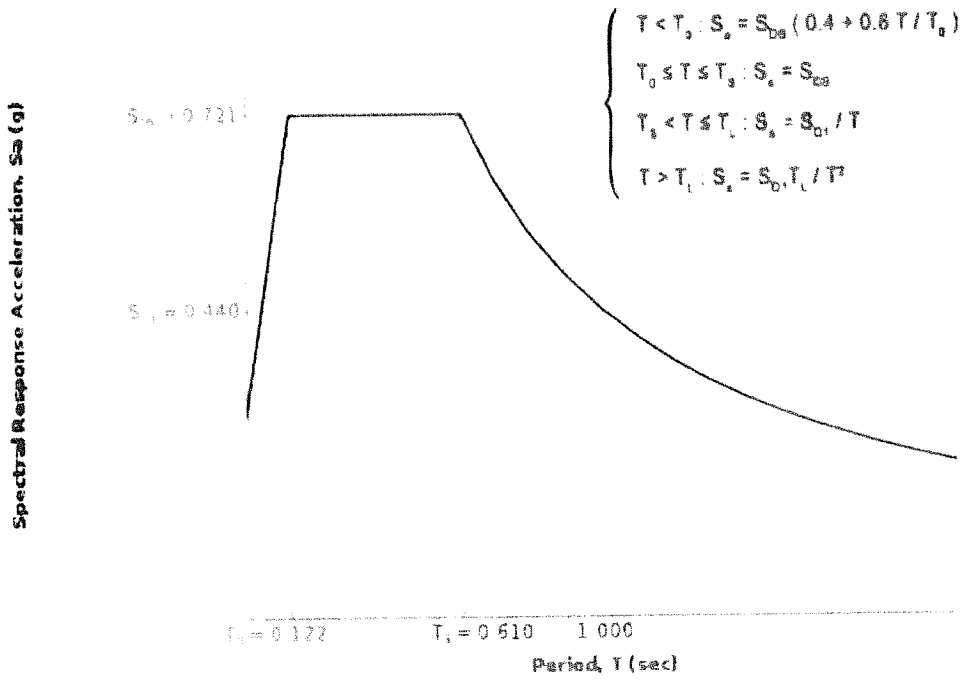
Equation (11.4-3): $S_{DS} = \frac{2}{3} S_{MS} = \frac{2}{3} \times 1.082 = 0.721$ g

Equation (11.4-4): $S_{D1} = \frac{2}{3} S_{M1} = \frac{2}{3} \times 0.660 = 0.440$ g

Section 11.4.5 — Design Response Spectrum

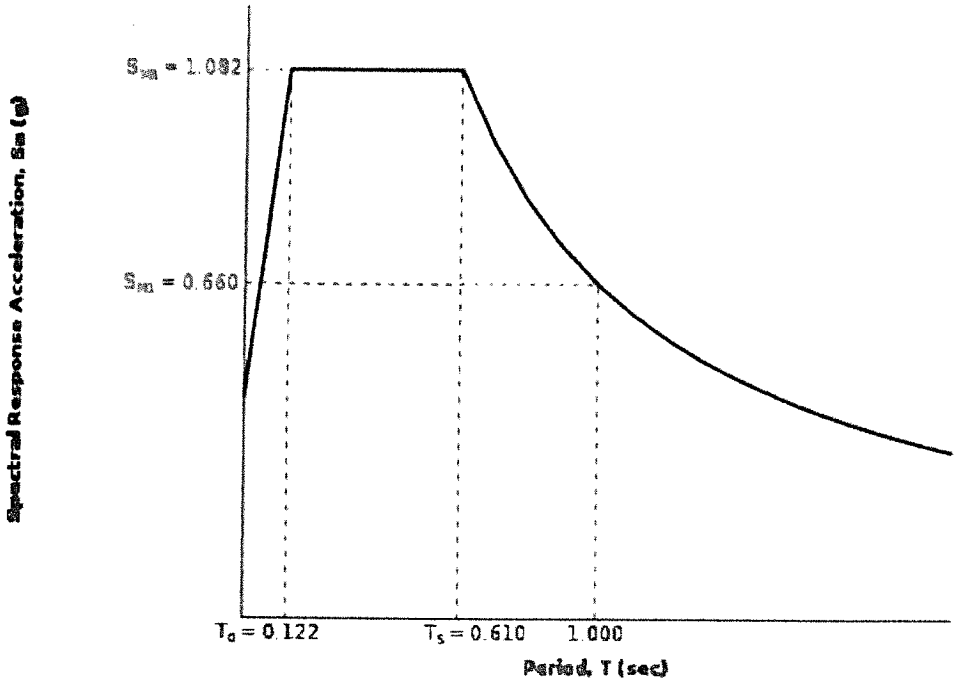
From Figure 22-12 [3] $T_L = 16$ seconds

Figure 11.4-1: Design Response Spectrum



Section 11.4.6 — Risk-Targeted Maximum Considered Earthquake (MCE_R) Response Spectrum

The MCE_R Response Spectrum is determined by multiplying the design response spectrum above by 1.5.



Section 11.8.3 — Additional Geotechnical Investigation Report Requirements for Seismic Design Categories D through F

From Figure 22-7 [4] PGA = 0.421

Equation (11.8-1): $PGA_M = F_{PGA}PGA = 1.079 \times 0.421 = 0.454$ g

Table 11.8-1: Site Coefficient F_{PGA}

Site Class	Mapped MCE Geometric Mean Peak Ground Acceleration, PGA				
	PGA ≤ 0.10	PGA = 0.20	PGA = 0.30	PGA = 0.40	PGA ≥ 0.50
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of PGA

For Site Class = D and PGA = 0.421 g, F_{PGA} = 1.079

Section 21.2.1.1 — Method 1 (from Chapter 21 - Site-Specific Ground Motion Procedures for Seismic Design)

From Figure 22-17 [5] C_{RS} = 0.907

From Figure 22-18 [6] C_{R1} = 0.873

Section 11.6 — Seismic Design Category

Table 11.6-1 Seismic Design Category Based on Short Period Response Acceleration Parameter

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \le S_{DS} < 0.33g$	B	B	C
$0.33g \le S_{DS} < 0.50g$	C	C	D
$0.50g \le S_{DS}$	D	D	D

For Risk Category = I and S_{DS} = 0.721 g, Seismic Design Category = D

Table 11.6-2 Seismic Design Category Based on 1-S Period Response Acceleration Parameter

VALUE OF S_{D1}	RISK CATEGORY		
	I or II	III	IV
$S_{D1} < 0.067g$	A	A	A
$0.067g \le S_{D1} < 0.133g$	B	B	C
$0.133g \le S_{D1} < 0.20g$	C	C	D
$0.20g \le S_{D1}$	D	D	D

For Risk Category = I and S_{D1} = 0.440 g, Seismic Design Category = D

Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is **E** for buildings in Risk Categories I, II, and III, and **F** for those in Risk Category IV, irrespective of the above.

Seismic Design Category ≡ "the more severe design category in accordance with Table 11.6-1 or 11.6-2" = D

Note: See Section 11.6 for alternative approaches to calculating Seismic Design Category.

References

1. *Figure 22-1*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-1.pdf
2. *Figure 22-2*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-2.pdf
3. *Figure 22-12*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-12.pdf
4. *Figure 22-7*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-7.pdf
5. *Figure 22-17*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-17.pdf
6. *Figure 22-18*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-18.pdf

GeoPacific Engineering, Inc.
Real-World Geotechnical Solutions
Investigation • Design • Construction Support

PHOTOGRAPHIC LOG

14835 SW 72nd Avenue
Portland, Oregon 97224

Tel (503) 598-8445
Fax (503) 941-9281

REESMAN PROPERTY
GEOTECHNICAL SITE INVESTIGATION
PHOTOGRAPHIC LOG

Fill Material Consisting of Boulders in Test Pit TP-4

REESMAN PROPERTY
GEOTECHNICAL SITE INVESTIGATION
PHOTOGRAPHIC LOG

Subcontractor Excavating Test Pit TP-5, View to the South

REESMAN PROPERTY
GEOTECHNICAL SITE INVESTIGATION
PHOTOGRAPHIC LOG

Relatively Level Bench at Top of Debris Flow, View to the North

OPERATIONS AND MAINTENANCE

To be Completed with Final Design

WETLAND DELINEATION / DETERMINATION REPORT COVER FORM

This form must be included with any wetland delineation report submitted to the Department of State Lands for review and approval. A wetland delineation report submittal is not "complete" unless the fully completed and signed report cover form and the required fee are submitted. Attach this form to the front of an unbound report or include a hard copy of the completed form with a CD/DVD that includes a single PDF file of the report cover form and report (minimum 300 dpi resolution) and submit to: **Oregon Department of State Lands, 775 Summer Street NE, Suite 100, Salem, OR 97301-1279.** A single PDF attachment of the completed cover from and report may be e-mailed to **Wetland_Delineation@dsl.state.or.us**. For submittal of PDF files larger than 10 MB, e-mail instructions on how to access the file from your ftp or other file sharing website. Fees can be paid by check or credit card. Make the check payable to the Oregon Department of State Lands. To pay the fee by credit card, call 503-986-5200.

☒ Applicant ☒ Owner Name, Firm and Address: **David Chiddix** **18000 Midhill Drive LLC** **1235 North Dutton Ave, Suite E** **Santa Rosa CA 95401**	Business phone # **360.798.4838 (Ryan Zygar-Rep)** Mobile phone # (optional) E-mail: **ryan@zygar.com**
☒ Authorized Legal Agent, Name and Address: **Schott and Associates** **PO Box 589** **Aurora, OR 97002**	Business phone # **503.678.6007** Mobile phone # E-mail: **caric@schottandassociates.com**

I either own the property described below or I have legal authority to allow access to the property. I authorize the Department to access the property for the purpose of confirming the information in the report, after prior notification to the primary contact.

Typed/Printed Name: David Chiddix Signature: EAD2708C72DC41D...

Date: 8/12/2015 | 9:28 AM PDT Special instructions regarding site access:

Project and Site Information (using decimal degree format for lat/long., enter centroid of site or start & end points of linear project)

Project Name: **Reesman Property**	Latitude: **45.2347** Longitude: **122.3921**
Proposed Use:	Tax Map # **14 2S 1E**
Project Street Address (or other descriptive location): **18000/18001 Upper Midhill Drive**	Township **2S** Range **1E** Section **14** QQ **CA** Tax Lot(s) **200**
City: **West Linn** County: **Clackamas**	Waterway: River Mile: NWI Quad(s):

Wetland Delineation Information

Wetland Consultant Name, Firm and Address: **Schott and Associates Attn Cari Cramer** PO Box 589 Aurora, OR 97002	Phone # **503.678.6007** Mobile phone # E-mail: caric@schottandassociates.com

The information and conclusions on this form and in the attached report are true and correct to the best of my knowledge.

Consultant Signature: Cari Cramer Date: 8/31/15

Primary Contact for report review and site access is ☒ Consultant ☐ Applicant/Owner ☐ Authorized Agent

Wetland/Waters Present? ☒ Yes ☐ No Study Area size: **6.12AC** Total Wetland Acreage: **0.09**

Check Box Below if Applicable: **Fees:$406.00**

☐ R-F permit application submitted	☒ Fee payment submitted **$ 406.00**
☐ Mitigation bank site	☐ Fee ($100) for resubmittal of rejected report
☐ Wetland restoration/enhancement project (not mitigation)	☐ No fee for request for reissuance of an expired report
☐ Industrial Land Certification Program Site	
☐ Reissuance of a recently expired delineation	
Previous DSL # Expiration date ____	

Other Information:	Y	N	
Has previous delineation/application been made on parcel?	☐	☐	If known, previous DSL #
Does LWI, if any, show wetland or waters on parcel?	☐	☒	

For Office Use Only

DSL Reviewer: _____ Fee Paid Date: ____ / ____ / ____ DSL WD # _____

Date Delineation Received: ___ / ___ / ___ DSL Project # _____ DSL Site # _____

Scanned: ☐ Final Scan: ☐ DSL WN # _____ DSL App. # _____

Form Updated 01/03/2013

SCHOTT & ASSOCIATES
Ecologists & Wetlands Specialists
21018 NE Hwy 99E • P.O. Box 589 • Aurora, OR 97002 • (503) 678-6007 • FAX: (503) 678-6011

JURISDICTIONAL WETLAND DELINEATION FOR

Reeseman Property Located in West Linn, Oregon

Prepared for:

David Chiddix
18000 Midhill Drive LLC
1235 North Dutton Ave, Suite E
Santa Rosa, CA 95401

Prepared by:

Schott and Associates

Date:

July 2015

Project #: 2373

TABLE OF CONTENTS

LIST OF FIGURES

(A) Landscape Setting and Land Use

The approximate 6.12 acre subject property is located north of the dead end of Upper Midhill Drive, Clackamas County, West Linn, Oregon (T2S, R1E, Sec. 14CA, TL 200). The subject property is bordered by residential homes on all sides.

The property is gently east sloping and consisted of a large grove of Oregon white oak (*Quercus garryana*) mixed with Oregon ash (*Fraxinus latifolia*) with scattered Douglas fir trees (*Pseudotsuga menziesii*) and bigleaf maple (*Acer macrophyllum*). The understory was mainly facultative grasses with areas that contained large patches of Himalayan blackberry (*Rubus armeniacus*) or English ivy (*Hedera helix*). Also observed were scattered English hawthorn (*Crataegus monogyna*), vine maple (*Acer circinatum*) and clusters of snowberry (*Symphoricarpos albus*).

A drainage ditch borders the northern property boundary and a portion of the eastern property boundary. This area is thickly vegetated with English ivy. The ditch is connected to a water quality pond, which serves the development west of the site.

(B) Site Alterations

There were two culverts installed, one at the northwest corner of the property and one at the southeast corner of the property. A shallow ditch was dug along the northern property boundary as well as the east property boundary that dissipates approximately a third of the way down on the east side. The northern culvert exits a stormwater pond located just offsite to the west. The ditch appears to have been dug for the purpose of draining water away from the water quality facility.

(C) Precipitation Data and Analysis

The site was visited on June 10, 2015. Precipitation was recorded at 0.00 inches by the West Linn weather station that day (accuweather.com). Total precipitation recorded in the two weeks prior to the site visit was 0.00 inches. Precipitation for the month of May was 1.32 inches at 53% of average and just below WETS range. Precipitation for April was also below average at 56% of average. February and March were within normal range at 112% and 116% of average respectively according to the N Willamette Exp Stn WETS table. Between October 1st, 2014 and May 31, 2015 a total of 35.47 inches of precipitation was recorded. This is 95% percent of the water year average.

Table 1. Precipitation Summary and WETS Averages

Month	2014-2015 Precipitation	WETS Average	WETS Range	Percent of Average
February	5.69	5.07	3.26-6.11	112
March	4.96	4.28	3.26-4.98	116
April	1.77	3.14	2.10-3.75	56

May	1.32	2.50	1.59-3.02	53
Water Year	35.47	37.52		95

(D) Site Specific Methods

Prior to visiting, site information was gathered, including recent and historical aerial photographs provided by Google Earth, the soil survey (NRCS web soil survey), the Local Wetland Inventory and National Wetland Inventory. The USGS topography map was also reviewed prior to site visits.

This was the third visit to the site by Schott & Associates. The first visit was about 10 years ago when Centex homes was considering acquiring the property. The second site visit was one years ago, when another developer was considering acquiring the site. The entire site was walked on both of the previous site visits. Prior to starting the delineation Schott and Associates initially walked the subject property to assess the presence or absence of onsite wetlands and waters , and to see if the conditions had changed since the previous site visits. The site was visited and sample plots established in May 2014. The site was visited again and wetland delineation field work was conducted on June 10, 2015. The *1987 Manual* and *Regional Supplement to the Corps of Engineers Delineation Manual: Western Mountains, Valleys, and Coast Region* were used to determine presence or absence of State of Oregon wetland boundaries and the Federal jurisdictional wetlands.

Sample plots were placed where geomorphic location or vegetation indicated the possibility of wetlands. For each sample plot, data on vegetation, hydrology and soils was collected, recorded in the field and later transferred to data forms (Appendix B). Where a wetland was present paired plots were located in the adjacent upland to document the transition.

(E) Description of All Wetlands and Other Non-Wetland Waters

Based on soil, vegetation and hydrology data taken in the field two small PEM/sloped wetlands of 877sf and 3,086sf were delineated. Both wetlands were close together and located at the northwest end of the property, south of a drainage. Herbaceous vegetation in both the wetlands was dominated by velvet grass (*Holcus lanatus*) (sp2,4,6,8) and also consisted of some soft rush (*Juncus effusus*) (sp2), meadow foxtail (*Alopecurus pratensis*) (sp6), tall fescue (*Schedonorus arundinaceus*) (sp2), bentgrass (*Agrostis sp.*) (sp4,8), camas (*Camassia quamash*) (sp6) and a geranium species (sp4,6). Oregon ash and Himalayan blackberry (sp2,4,8) were also observed within the wetland sample plots. Soils met the Redox Dark Surface (F6) or Depleted Dark Surface (F7) hydric soil indicators throughout the wetland. Secondary hydrology indicators were present in all but one plot which had a sulfide odor (sp6). In May of 2014 hydrology was observed in sample plots 2, 4 and 6 ranging from 6" from the top to surface saturation.

The adjacent upland was also dominated by velvet grass in the herbaceous layer. Also observed was a geranium species, meadow foxtail, bentgrass and Himalayan blackberry. The overstory was mainly Oregon ash (sp5). Soils and hydrology criteria were not met.

A sample plot was taken at the very lowest part of the property in the northeast corner (sp1). The herbaceous layer was almost entirely English ivy. The overstory consisted of Oregon white oak, English hawthorn and bigleaf maple with some snowberry and vine maple observed in the understory. Soils were a 10YR 3/3 and no hydrology was observed.

Two more sample plots were taken in flat areas on terraces. The overstory consisted of Douglas fir (sp10) and Himalayan blackberry (sp10,11) with an herbaceous layer made up of facultative grasses. Soils were a 10YR 3/3 (sp11) or 10YR 3/2 0-10" and 10YR 3/2 with redox at 10-18" (sp 10). No hydrology was observed.

A ditch was located on the property starting in the northwest corner of the property. The ditch parallels the entire north property line, sometimes running just offsite, and a small portion of the east property boundary before the defined channel ends. Water entered the ditch thru a culvert in the northwest corner of the property. The culvert drained a water quality facility. Water was observed in the ditch May 5, 2014 and June 10, 2015. An additional site visit was made July 17, 2015 and the ditch was observed to be dry. Within the defined drainage channel it was mostly bare. Ivy mainly bordered it on each side and rooted within the drainage in sections of the ditch. Water flows in the ditch whenever water enters the water quality facility, and dries up soon after the water stops entering the water quality facility.

(F) Deviation from LWI or NWI

There is a West Linn Local Wetland Inventory (LWI) but no wetlands or waterways are mapped on it. There are no wetlands or waterways mapped for the subject property on the NWI. The onsite wetlands are very small and both the drainage and wetlands are under a canopy blocking out visibility. The drainage is also manmade. This is likely why they are not documented.

(G) Mapping Method

The wetland and sample plots were flagged by Schott and Associates and surveyed by Compass Land surveyors, Professional Land Surveyors (PLS).

(H) Additional Information

None.

(I) Results and Conclusions

Based on soil, vegetation and hydrology data taken in the field, two small PEM wetlands totaling 0.09 acres were delineated on site. Vegetation was dominated by facultative grasses, mainly velvet grass. Soils were found to be hydric and hydrology was observed by way of secondary indicators except one sample plot that had a sulfur odor. Soils were observed to be saturated in May of 2014.

A defined ditch was observed on the site starting at the northwest corner, paralleling the northern property boundary and a portion of the eastern property boundary. Water was observed entering the drainage through a culvert from a water quality facility on two occasions and was observed to by dry on a third. The ditch was dug to carry water away from the water quality facility. It does not connect to another water body, and there is not a wetland at the lower end of the ditch.

The soil survey map for Clackamas County mapped Cascade silt loam on the property. Cascade silt loam is not considered hydric.

The West Linn LWI and NWI did not show any wetlands or waters on the subject property.

The topographic map showed a gently east sloping site.

(J) Disclaimer

This report documents the investigation, best professional judgment and the conclusions of the investigator. It is correct and complete to the best of my knowledge. It should be considered a Preliminary Jurisdictional Determination of wetlands and other waters and used at your own risk unless it has been reviewed and approved in writing by the Oregon Department of State lands in accordance with OAR 141-090-0005 through 141-090-005.

Appendix A: Maps

FIGURE 1. LOCATION MAP

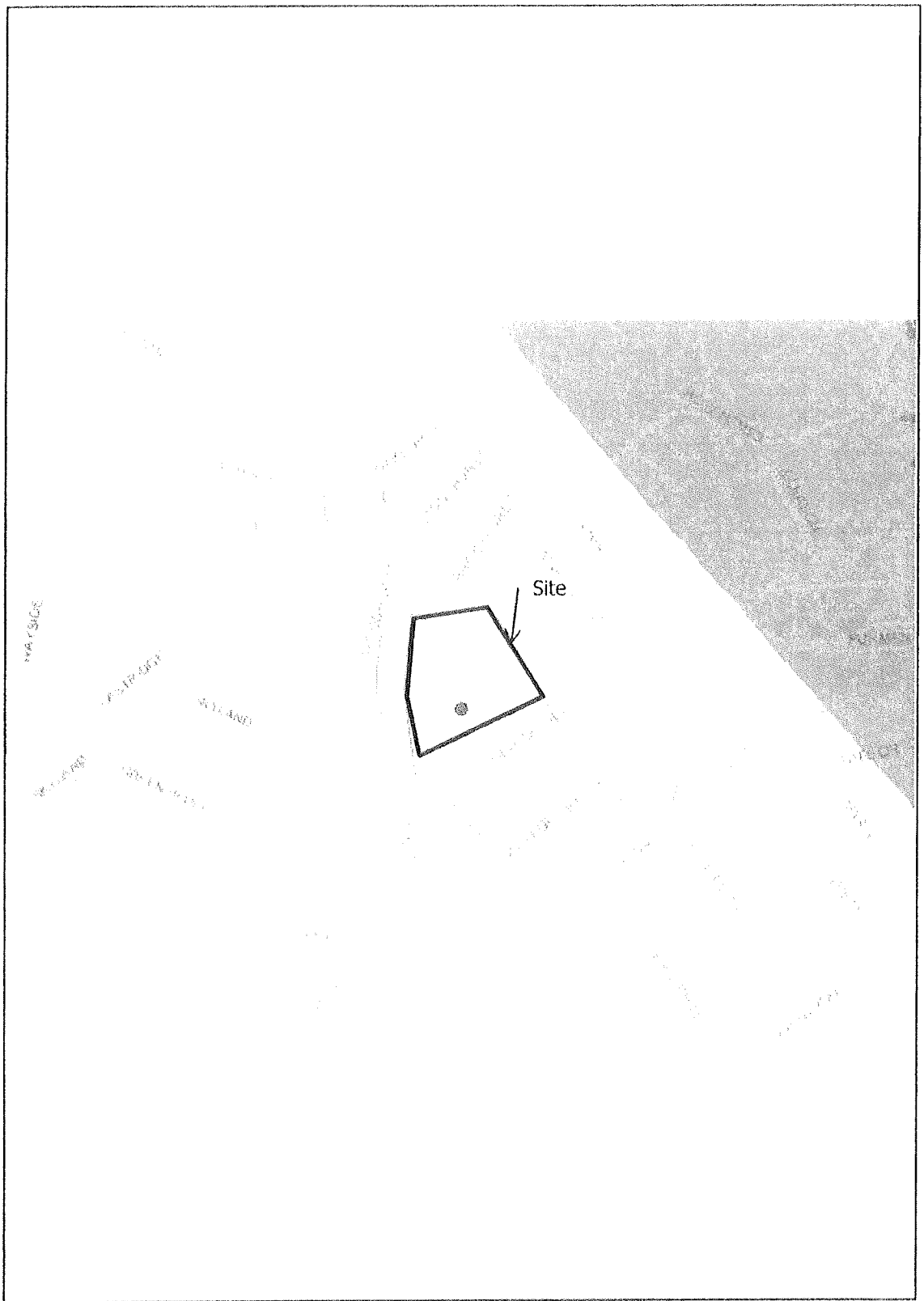


Figure 1: Location Map
Reeseman Property
S&A 2373

Schott & Associates
P.O. Box 589
Aurora, OR. 97002
503.678.6007

FIGURE 2. TAX MAP

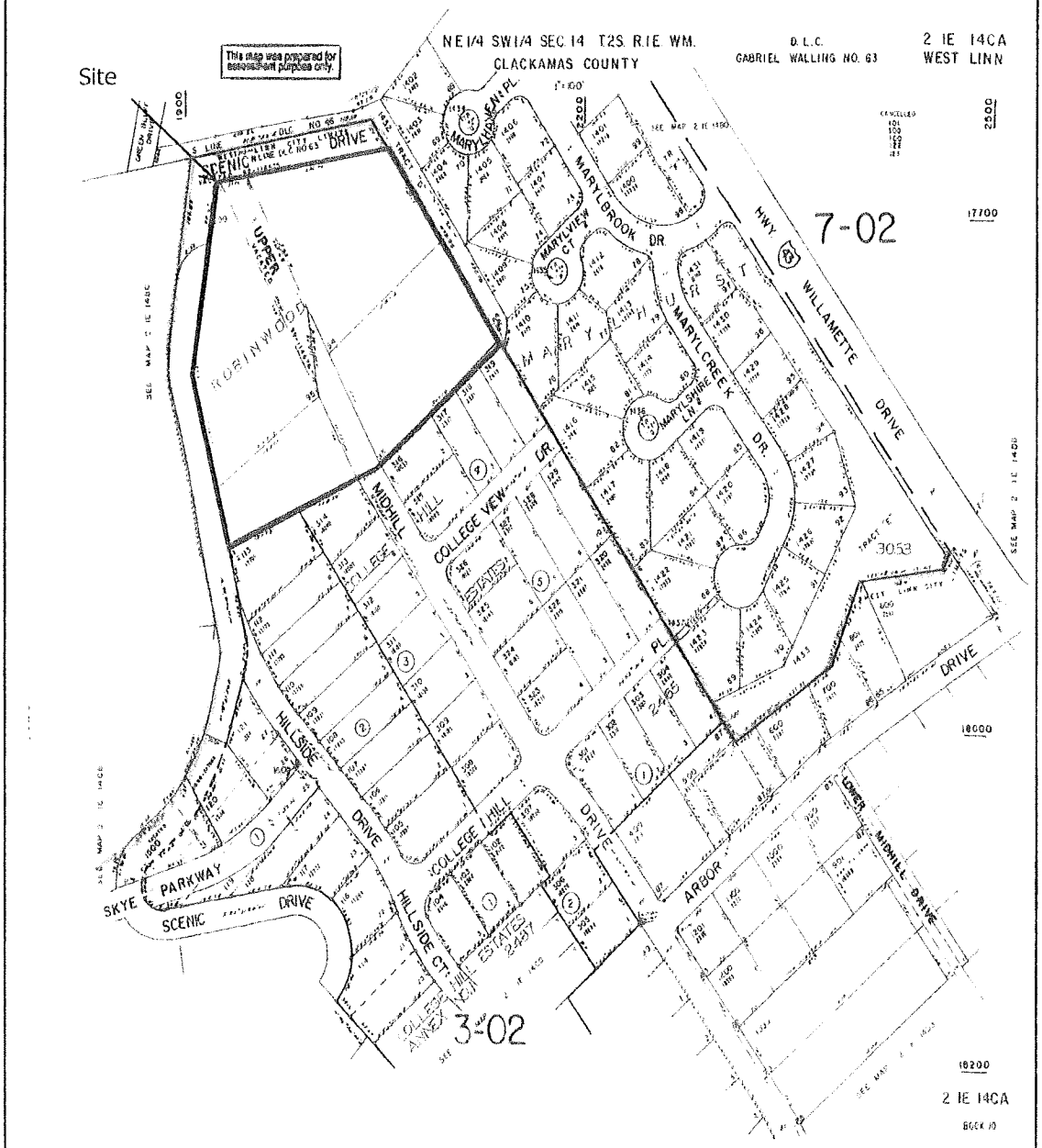


Figure 2: Tax Map (2 1E 14CA TL 200)
Reeseman Property
S&A 2373

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Aurora, OR. 97002
503.678.6007

FIGURE 3. LWI MAP

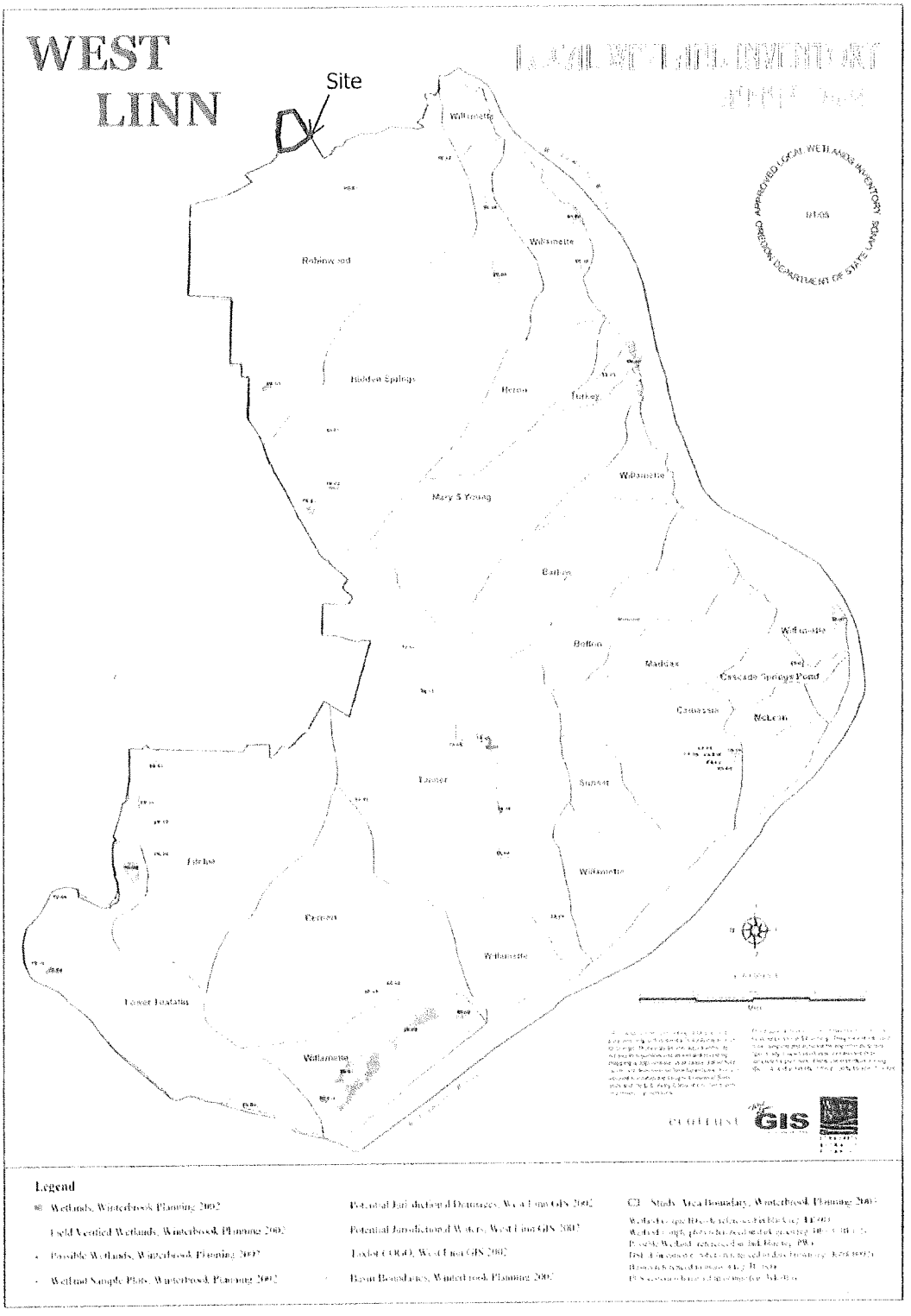

Figure 3: West Linn LWI
Reeseman Property
S&A 2373

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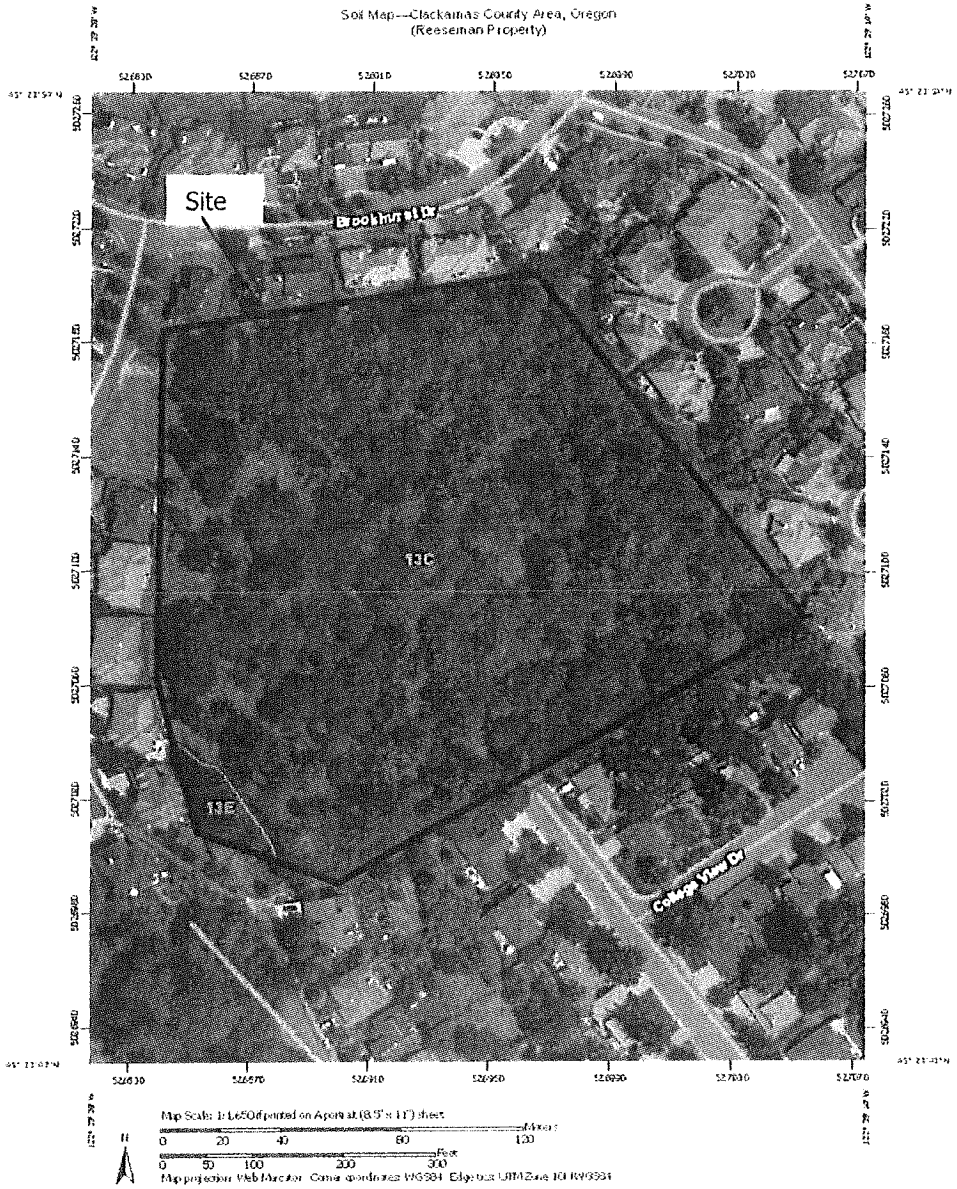
FIGURE 4. SOIL SURVEY MAP



Map Unit Legend

Clackamas County Area, Oregon (OR610)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
13C	Cascade silt loam, 8 to 15 percent slopes	7.5	98.2%
13E	Cascade silt loam, 30 to 60 percent slopes	0.1	1.8%
Totals for Area of Interest		7.7	100.0%

Figure 4: Soils map
Reeseman Property
S&A 2373

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503.678.6007

FIGURE 5. AERIAL PHOTOGRAPH

Figure 5: Aerial Photograph
Reeseman Property
S&A 2373

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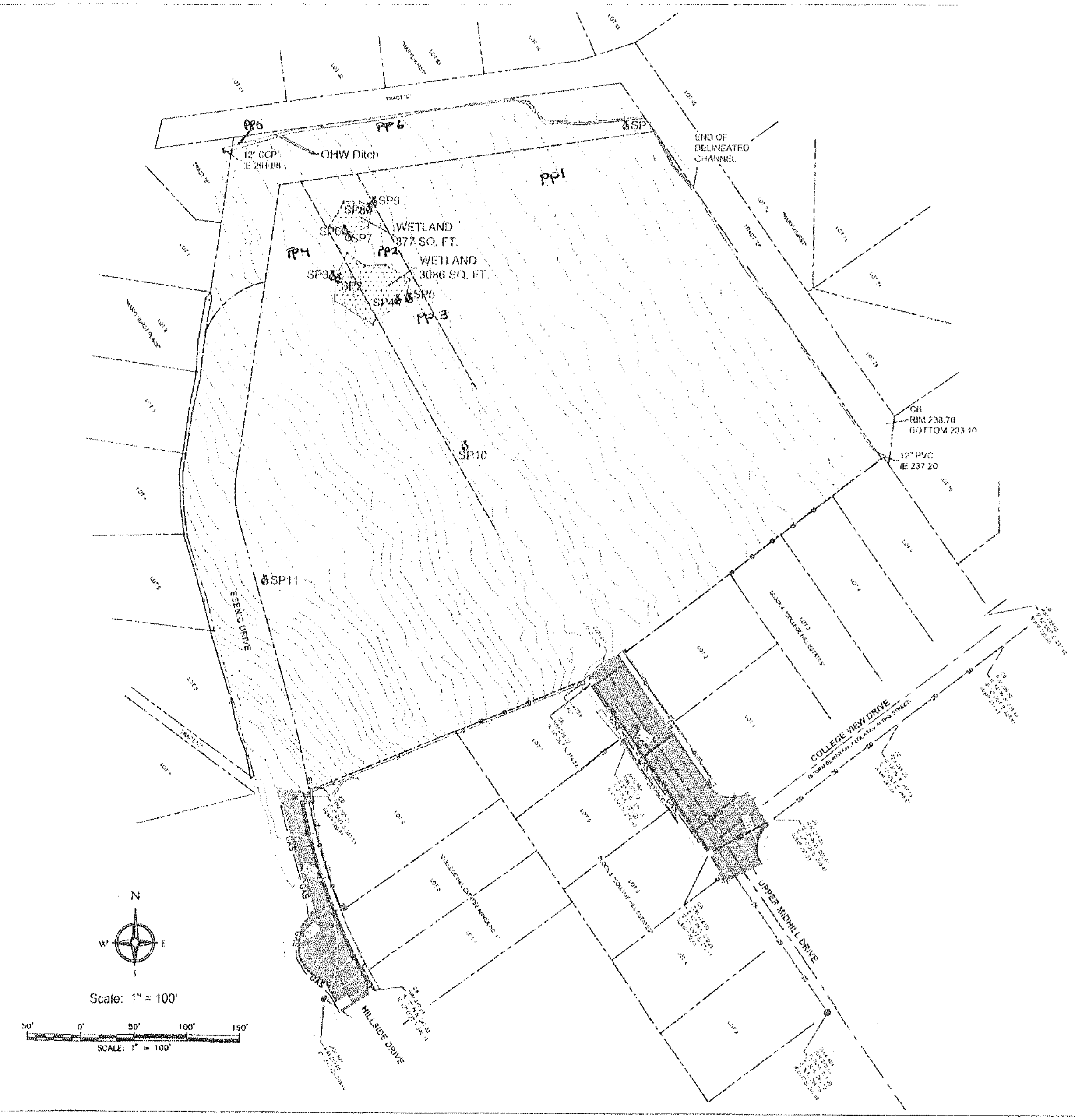
Aurora, OR. 97002
503.678.6007

FIGURE 6. WETLAND MAP



Notes:

1. UTILITY INFORMATION SHOWN ON THIS MAP IS BASED UPON OBSERVED FEATURES, RECORD DATA AND TONE MARKS PROVIDED BY PUBLIC UTILITY LOCATION SERVICES. NO WARRANTIES ARE MADE REGARDING THE ACCURACY OR COMPLETENESS OF THE UTILITY INFORMATION SHOWN. ADDITIONAL UTILITIES MAY EXIST. INTERESTED PARTIES ARE HEREBY ADVISED THAT UTILITY LOCATIONS SHOULD BE VERIFIED PRIOR TO DESIGN OR CONSTRUCTION OF ANY CRITICAL ITEMS.

2. VERTICAL DATUM: NAVD'88 UTILIZING GPS POSITIONING TIED TO THE ORGN WITH REAL TIME CORRECTORS REFERENCED TO DATUM NAD 83(2011) EPOCH 2010.00. THIS DATUM REALIZATION WAS VERIFIED THROUGH DIRECT OBSERVATION TO NGS CONTROL POINT Q723 HAVING A POINT IDENTIFICATION OF RD1491. THIS POINT IS DESCRIBED AS A STAINLESS STEEL ROD W/ SLEEVE NEAR THE INTERSECTION OF STATE HIGHWAY 224 AND LAKE ROAD. THE ELEVATION OF THIS POINT IS PUBLISHED AS 31.131 AND WAS ESTABLISHED BY NGS THROUGH DIFFERENTIAL LEVELING AND ADJUSTED BY THE NATIONAL GEODETIC SURVEY IN JUNE 1991 AND HAS A VERTICAL ORDER OF FIRST CLASS II.

3. BASIS OF BEARINGS: CENTERLINE OF UPPER MIDHILL DRIVE AS PER THE PLAT OF "COLLEGE HILL ESTATES"

4. CONTOUR INTERVAL IS TWO FEET.

5. TOPOGRAPHIC FEATURES SHOWN ON THIS MAP WERE LOCATED USING STANDARD PRECISION TOPOGRAPHIC MAPPING PROCEDURES. THIRD PARTY USERS OF DATA FROM THIS MAP PROVIDED VIA AUTOCAD DRAWING FILES OR DATA EXCHANGE FILES SHOULD NOT RELY ON ANY AUTOCAD GENERATED INFORMATION WHICH IS BEYOND THE LIMITS OF PRECISION OF THIS MAP. THIRD PARTIES USING DATA FROM THIS MAP IN AN AUTOCAD FORMAT SHOULD VERIFY ANY ELEMENTS REQUIRING PRECISE LOCATIONS PRIOR TO COMMENCEMENT OF ANY CRITICAL DESIGN OR CONSTRUCTION. CONTACT COMPASS LAND SURVEYORS FOR FURTHER INFORMATION. FURTHERMORE, COMPASS LAND SURVEYORS WILL NOT BE RESPONSIBLE NOR HELD LIABLE FOR ANY DESIGN OR CONSTRUCTION RELATED PROBLEMS THAT ARISE OUT OF THIRD PARTY USAGE OF THIS MAP (IN AUTOCAD OR OTHER FORMAT) IN ANY MANNER INCONSISTENT WITH THIS STATEMENT.

6. UNDERGROUND PIPE SIZES AND MATERIAL TYPES ARE BASED UPON RECORD DRAWINGS, INFORMATION PROVIDED BY UTILITY LOCATORS AND FIELD OBSERVATIONS AT MANHOLES AND CATCH BASIN RIMS AND SHOULD BE VERIFIED.

7. WETLAND BOUNDARIES AND SAMPLE PLOTS LOCATED BY SCHOTT AND ASSOCIATES, AND SURVEYED BY COMPASS LAND SURVEYORS.

8. SEE SHEET 2 FOR TREE LIST.

Legend:

- EDGE OF PAVEMENT
- OVERHEAD POWER LINE
- RIGHT OF WAY LINE
- PROJECT BOUNDARY
- ADJACENT PROPERTY LINE
- CURB
- GAS — GAS LINE
- SS — SANITARY SEWER LINE
- SD — STORM DRAIN LINE
- T — TELECOMMUNICATION LINE
- WATER LINE
- UNDERGROUND POWER LINE
- OHP — OVERHEAD POWER LINE
- CONCRETE
- ASPHALT
- DL — DRIP LINE (RADIUS)
- MAILBOX
- PHONE PEDESTAL
- LIGHT POLE
- WATER VALVE
- WATER METER
- TRAFFIC SIGN
- SP — SAMPLE PLOT
- PP — Photo Point

DRAWN: MAW	CHECK: DG		
SCALE: 1" = 50'	DATE: JUNE 2015		
PLAN: 7276 TOPO.DWG			
DATE	NO	REVISION	

COMPASS Land Surveyors
4107 SE International Way, Suite 705
Milwaukie, Oregon 97222 503-653-9093

REESMAN PROPERTY EXISTING CONDITIONS MAP
TL 200 IN NE 1/4 OF SW 1/4 SEC. 14, T.2S., R.1E., W.M.
CITY OF WEST LINN, CLACKAMAS COUNTY, OREGON

1 / 2

Appendix B: Data Forms

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Reeseman Property City/County: West Linn/Clackamas Sampling Date: 6/10/15
Applicant/Owner: Upper Midhill Estates/Ryan Zygar State: OR Sampling Point: 1
Investigator(s): CC, JT Section, Township, Range: 14 2S 1E
Landform (hillslope, terrace, etc.): Bottom of hillslope Local relief (concave, convex, none): none Slope (%): 1%
Subregion (LRR): A Lat: 45.2347 Long: 122.3921 Datum:
Soil Map Unit Name: Cascade silt loam NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ Significantly disturbed? Are "Normal Circumstances" present? Yes x No ___
Are Vegetation ___, Soil ___, or Hydrology ___ Naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No x	**Is the Sampled Area within a Wetland?** Yes ___ No x
Hydric Soil Present?	Yes ___	No x	
Wetland Hydrology Present?	Yes ___	No x	

Remarks: northeast corner of site in low area

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Crataegus monogyna	40	X	FAC
2. Acer macrophyllum	20	X	FACU
3. Quercus garryana	20	X	FACU
4.			
	80	= Total Cover	

Sapling/Shrub Stratum (Plot size: 5')			
1. Acer circinatum	2		FAC
2. Symphoricarpos albus	5	X	FACU
3.			
4.			
5.			
	5	= Total Cover	

Herb Stratum (Plot size: 5')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
		= Total Cover	

Woody Vine Stratum (Plot size: 5')			
1. Hedera helix	80	X	FACU
2.			
	80	= Total Cover	

% Bare Ground in Herb Stratum 20

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 5 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 20 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	___	x 1 =	___
FACW species	___	x 2 =	___
FAC species	___	x 3 =	___
FACU species	___	x 4 =	___
UPL species	___	x 5 =	___
Column Totals:	___ (A)		___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:
___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No x

Remarks:

SOIL

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-16	10YR3/3	100					CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ___ No x

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No x Depth (inches): _____

Water Table Present? Yes ___ No x Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No x Depth (inches): _____

Wetland Hydrology Present? Yes ___ No x

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Reeseman Property City/County: West Linn/Clackamas Sampling Date: 6/10/15
Applicant/Owner: Upper Midhill Estates/Ryan Zygar State: OR Sampling Point: 2
Investigator(s): CC, JT Section, Township, Range: 14 2S 1E
Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): 2
Subregion (LRR): A Lat: 45.2347 Long: 122.3921 Datum:
Soil Map Unit Name: Cascade silt loam NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ Significantly disturbed? Are "Normal Circumstances" present? Yes x No ___
Are Vegetation ___, Soil ___, or Hydrology ___ Naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes x No ___
Hydric Soil Present? Yes x No ___
Wetland Hydrology Present? Yes x No ___

Is the Sampled Area within a Wetland? **Yes x No ___**

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	___ = Total Cover		
Sapling/Shrub Stratum (Plot size: 5)			
1. Rubus armeniacus	5	X	FACU
2. Fraxinus latifolia saplings	20	X	FACW
3.			
4.			
5.			
	25 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Holcus lanatus	70	X	FAC
2. Juncus effusus	25	X	FACW
3. Gallium aparine	5	X	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
	___ = Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species ___	x 1 =	___
FACW species ___	x 2 =	___
FAC species ___	x 3 =	___
FACU species ___	x 4 =	___
UPL species ___	x 5 =	___
Column Totals: ___	(A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:
___ 1 - Rapid Test for Hydrophytic Vegetation
x 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes x No ___**

Remarks: RUAR problematic and only 5% so not used. Dominance test met either way.

SOIL

Sampling Point: 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-16	10YR 5/1	80	10YR 4/6	20	C	M	CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- x Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes x No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- x Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No x Depth (inches): ___

Water Table Present? Yes ___ No x Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No x Depth (inches): ___

Wetland Hydrology Present? Yes x No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: On May 5, 2014 the hydrology was checked at this sample point and it was saturated 6" to the surface with water in the hole at 12"

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Reeseman Property City/County: West Linn/Clackamas Sampling Date: 6/10/15
Applicant/Owner: Upper Midhill Estates/Ryan Zygar State: OR Sampling Point: 3
Investigator(s): CC, JT Section, Township, Range: 14 2S 1E
Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): convex Slope (%): 3
Subregion (LRR): A Lat: 45.2347 Long: 122.3921 Datum:
Soil Map Unit Name: Cascade silt loam NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ Significantly disturbed? Are "Normal Circumstances" present? Yes x No ___
Are Vegetation ___, Soil ___, or Hydrology ___ Naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes x	No ___	**Is the Sampled Area within a Wetland?**	**Yes ___ No x**
Hydric Soil Present?	Yes ___	No x		
Wetland Hydrology Present?	Yes ___	No x		

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	___ = Total Cover		
Sapling/Shrub Stratum (Plot size: 5)			
Fraxinus latifolia saplings	5	x	FACW
2.			
3.			
4.			
5.			
	5 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Juncus effusus	10		FACW
2. Holcus lanatus	85	X	FAC
3. Dactylis glomerata	5		FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
	___ = Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	___	x 1 =	___
FACW species	___	x 2 =	___
FAC species	___	x 3 =	___
FACU species	___	x 4 =	___
UPL species	___	x 5 =	___
Column Totals:	___ (A)		___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:
___ 1 - Rapid Test for Hydrophytic Vegetation
x 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes x No ___

Remarks:

SOIL

Sampling Point: 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-18	7.5YR 3/3	90	10YR 4/2	5	c	m	Clay	Rock mixed in
			10YR 3/6	5	c	m		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No x

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No x Depth (inches): _____

Water Table Present? Yes ___ No x Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No x Depth (inches): _____

Wetland Hydrology Present? Yes ___ No x

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Reeseman Property City/County: West Linn/Clackamas Sampling Date: 6/10/15
Applicant/Owner: Upper Midhill Estates/Ryan Zygar State: OR Sampling Point: 4
Investigator(s): CC, JT Section, Township, Range: 14 2S 1E
Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): concave Slope (%): 2
Subregion (LRR): A Lat: 45.2347 Long: 122.3921 Datum:
Soil Map Unit Name: Cascade silt loam NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ Significantly disturbed? Are "Normal Circumstances" present? Yes x No ___
Are Vegetation ___, Soil ___, or Hydrology ___ Naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes x	No ___	**Is the Sampled Area within a Wetland?** **Yes x No ___**
Hydric Soil Present?	Yes x	No ___	
Wetland Hydrology Present?	Yes x	No ___	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 5)			
Rubus armeniacus	5	X	FACU
2.			
3.			
4.			
5.			
	5 = Total Cover		

Herb Stratum (Plot size: 5')			
1. Holcus lanatus	70	X	FAC
2. Geranium sp	5		FACU
3. Galium aparine	2		FACU
4. Vicia Americana	10		FAC
5. Agrostis sp	15		FAC
6. Typha latifolia	T		FACW
7.			
8.			
9.			
10.			
11.			
	102 = Total Cover		

Woody Vine Stratum (Plot size: ___)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	___	x 1 =	___
FACW species	___	x 2 =	___
FAC species	___	x 3 =	___
FACU species	___	x 4 =	___
UPL species	___	x 5 =	___
Column Totals:	___ (A)		___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:
___ 1 - Rapid Test for Hydrophytic Vegetation
x 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes x No ___**

Remarks: RUAR is problematic and only 5% so not using

SOIL

Sampling Point: 4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR 4/1	85	10YR 4/4	15	C	M	CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- x Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes x No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- x Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No x Depth (inches): _____

Water Table Present? Yes ___ No x Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No x Depth (inches): _____

Wetland Hydrology Present? Yes x No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: May 5, 2014 Hydrology was observed in this sample plot as saturation at 2" from the top

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Reeseman Property City/County: West Linn/Clackamas Sampling Date: 6/10/15
pplicant/Owner: Upper Midhill Estates/Ryan Zygar State: OR Sampling Point: 5
nvestigator(s): CC, JT Section, Township, Range: 14 2S 1E
Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): convex Slope (%): 3
Subregion (LRR): A Lat: 45.2347 Long: 122.3921 Datum:
Soil Map Unit Name: Cascade silt loam NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ Significantly disturbed? Are "Normal Circumstances" present? Yes x No ___
Are Vegetation ___, Soil ___, or Hydrology ___ Naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No X	**Is the Sampled Area within a Wetland?** Yes ___ No X
Hydric Soil Present?	Yes ___	No X	
Wetland Hydrology Present?	Yes ___	No x	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1. Quercus garryana	40	X	FACU
2.			
3.			
4.			
	40	= Total Cover	

Sapling/Shrub Stratum (Plot size: 5)			
Rubus armeniacus	15	X	FACU
2.			
3.			
4.			
5.			
	15	= Total Cover	

Herb Stratum (Plot size: 5')			
1. Festuca arundinacea	5		FAC
2. Geranium sp	20	x	FACU
3. Galium aparine	5		FACU
4. Alopecurus pratensis	20	x	FAC
5. Agrostis sp	25	x	FAC
6.			
7.			
8.			
9.			
10.			
11.			
	75	= Total Cover	

Woody Vine Stratum (Plot size: ___)		
1.		
2.		
	___	= Total Cover

% Bare Ground in Herb Stratum 25(10%litter)

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 5 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 40 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	___	x 1 =	
FACW species	___	x 2 =	
FAC species	___	x 3 =	
FACU species	___	x 4 =	
UPL species	___	x 5 =	
Column Totals:	___ (A)		___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:
___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No x

Remarks:

SOIL

Sampling Point 5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-18	10YR 3/3	100					CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No x

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No x Depth (inches): _____

Water Table Present? Yes ___ No x Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No x Depth (inches): _____

Wetland Hydrology Present? Yes ___ No x

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Reeseman Property City/County: West Linn/Clackamas Sampling Date: 6/10/15
Applicant/Owner: Upper Midhill Estates/Ryan Zygar State: OR Sampling Point: 6
Investigator(s): CC, JT Section, Township, Range: 14 2S 1E
Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): concave Slope (%): 2
Subregion (LRR): A Lat: 45.2347 Long: 122.3921 Datum:
Soil Map Unit Name: Cascade silt loam NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ Significantly disturbed? Are "Normal Circumstances" present? Yes x No ___
Are Vegetation ___, Soil ___, or Hydrology ___ Naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes x No ___
Hydric Soil Present? Yes x No ___
Wetland Hydrology Present? Yes x No ___

Is the Sampled Area within a Wetland? Yes X No ___

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 5)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5')			
1. Festuca arundinacea	5		FAC
2. Geranium sp	15		FACU
3. Holcus lanatus	25	X	FAC
4. Camassia quamash	15		FACW
5. Alopecurus pratensis	40	x	FAC
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	___	x 1 =	___
FACW species	___	x 2 =	___
FAC species	___	x 3 =	___
FACU species	___	x 4 =	___
UPL species	___	x 5 =	___
Column Totals:	___ (A)		___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:
___ 1 - Rapid Test for Hydrophytic Vegetation
x 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes x No ___

Remarks:

SOIL

Sampling Point 6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-18	10YR 3/1	95	10YR 4/6	5	C	M	CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- x Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** x **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- x Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- x Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No x Depth (inches): _____

Water Table Present? Yes ___ No x Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No x Depth (inches): _____

Wetland Hydrology Present? **Yes** x **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: May 5, 2014 this sample plot was observed to have hydrology –surface saturation

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Reeseman Property City/County: West Linn/Clackamas Sampling Date: 6/10/15
pplicant/Owner: Upper Midhill Estates/Ryan Zygar State: OR Sampling Point: 7
nvestigator(s): CC, JT Section, Township, Range: 14 2S 1E
Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): convex Slope (%): 3
Subregion (LRR): A Lat: 45.2347 Long: 122.3921 Datum:
Soil Map Unit Name: Cascade silt loam NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ Significantly disturbed? Are "Normal Circumstances" present? Yes x No ___
Are Vegetation ___, Soil ___, or Hydrology ___ Naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No x	**Is the Sampled Area within a Wetland?** Yes ___ No x
Hydric Soil Present?	Yes ___	No x	
Wetland Hydrology Present?	Yes ___	No x	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	___ = Total Cover		

Sapling/Shrub Stratum (Plot size: 5)			
1. Rubus armeniacus	15	x	FACU
2.			
3.			
4.			
5.			
	15 = Total Cover		

Herb Stratum (Plot size: 5)			
1. Agrostis sp	10		FAC
2. Holcus lanatus	50	X	FAC
3. Dactylis glomerata	20	x	FACU
4. Geranium sp	2		FACU
5. Galium aparine	3		FACU
6.			
7.			
8.			
9.			
10.			
11.			
	85 = Total Cover		

Woody Vine Stratum (Plot size: ___)			
1.			
2.			
	___ = Total Cover		

% Bare Ground in Herb Stratum 15 litter

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 33 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	___	x 1 =	___
FACW species	___	x 2 =	___
FAC species	___	x 3 =	___
FACU species	___	x 4 =	___
UPL species	___	x 5 =	___
Column Totals:	___ (A)		___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:
___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No x

Remarks:

Sampling Point: 7

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-18	7.5YR 3/4	95	7.5YR 4/6	5	C	M	CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No x

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No x Depth (inches): _____

Water Table Present? Yes ___ No x Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No x Depth (inches): _____

Wetland Hydrology Present? Yes ___ No x

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Reeseman Property City/County: West Linn/Clackamas Sampling Date: 6/10/15
pplicant/Owner: Upper Midhill Estates/Ryan Zygar State: OR Sampling Point: 8
nvestigator(s): CC, JT Section, Township, Range: 14 2S 1E
Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): concave Slope (%): 2
Subregion (LRR): A Lat: 45.2347 Long: 122.3921 Datum:
Soil Map Unit Name: Cascade silt loam NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ Significantly disturbed? Are "Normal Circumstances" present? Yes x No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ Naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes x No ___
Hydric Soil Present? Yes x No ___
Wetland Hydrology Present? Yes x No ___

Is the Sampled Area within a Wetland? Yes x No ___

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 5)			
Rubus armeniacus	T		FACU
2. Fraxinus latifolia saplings	5	X	FACW
3.			
4.			
5.			
	5 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Holcus lanatus	50	X	FAC
2. Agrostis sp	35	X	FAC
3. Galium aparine	10		FACU
4. Dactylis glomerata	5		FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	___	x 1 =	___
FACW species	___	x 2 =	___
FAC species	___	x 3 =	___
FACU species	___	x 4 =	___
UPL species	___	x 5 =	___
Column Totals:	___	(A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:
___ 1 - Rapid Test for Hydrophytic Vegetation
x 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes x No ___

Remarks:

SOIL

Sampling Point: 8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-6	10YR 3/2	100					CL	
6-18	10YR3/2	90	10YR3/4	10	C	M	CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- x Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes x No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- x Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No x Depth (inches): ___

Water Table Present? Yes ___ No x Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No x Depth (inches): ___

Wetland Hydrology Present? Yes x No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: dry time of year, low end of wetland, secondary indicators, BPJ, other criteria met

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Reeseman Property City/County: West Linn/Clackamas Sampling Date: 6/10/15
Applicant/Owner: Upper Midhill Estates/Ryan Zygar State: OR Sampling Point: 9
Investigator(s): CC, JT Section, Township, Range: 14 2S 1E
Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): convex Slope (%): 3
Subregion (LRR): A Lat: 45.2347 Long: 122.3921 Datum:
Soil Map Unit Name: Cascade silt loam NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ Significantly disturbed? Are "Normal Circumstances" present? Yes x No ___
Are Vegetation ___, Soil ___, or Hydrology ___ Naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No x	**Is the Sampled Area within a Wetland?** Yes ___ No x
Hydric Soil Present?	Yes ___	No x	
Wetland Hydrology Present?	Yes ___	No x	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Quercus garryana	20	X	FACU
2.			
3.			
4.			
	20	= Total Cover	

Sapling/Shrub Stratum (Plot size: 5)			
1. Rubus armeniacus	20	x	FACU
2. Fraxinus latifolia	5		FACW
3. Symphoricarpos albus	5		FACU
4.			
5.			
	30	= Total Cover	

Herb Stratum (Plot size: 5)			
1.			
2. Agrostis sp	10	X	FAC
3. Galium aparine	10	x	FACU
4. Dactylis glomerata	5	x	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	25	= Total Cover	

Woody Vine Stratum (Plot size: 5)			
1. Rubus ursinus	10	X	FACU
2.			
	10	= Total Cover	

% Bare Ground in Herb Stratum 60

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 6 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 17 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	___	x 1 =	___
FACW species	___	x 2 =	___
FAC species	___	x 3 =	___
FACU species	___	x 4 =	___
UPL species	___	x 5 =	___
Column Totals:	___	(A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:
___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No x

Remarks:

SOIL

Sampling Point: 9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-10	10YR 3/2	100					CL	
10-18	10YR3/2	90					CL	1/8" blk concretions
								Not redox

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** x

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No x Depth (inches): _____

Water Table Present? Yes ___ No x Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No x Depth (inches): _____

Wetland Hydrology Present? **Yes** ___ **No** x

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Reeseman Property City/County: West Linn/Clackamas Sampling Date: 6/10/15
Applicant/Owner: Upper Midhill Estates/Ryan Zygar State: OR Sampling Point: 10
Investigator(s): CC, JT Section, Township, Range: 14 2S 1E
Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): convex Slope (%): 3
Subregion (LRR): A Lat: 45.2347 Long: 122.3921 Datum:
Soil Map Unit Name: Cascade silt loam NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ Significantly disturbed? Are "Normal Circumstances" present? Yes x No ___
Are Vegetation ___, Soil ___, or Hydrology ___ Naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No x	**Is the Sampled Area within a Wetland?** Yes ___ No x
Hydric Soil Present?	Yes ___	No x	
Wetland Hydrology Present?	Yes ___	No x	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pseudotsuga menziesii	30	X	FACU
2.			
3.			
4.			
	30	= Total Cover	

Sapling/Shrub Stratum (Plot size: 5)			
Rubus armeniacus	20	x	FACU
2.			
3.			
4.			
5.			
	20	= Total Cover	

Herb Stratum (Plot size: 5)			
1.			
2. Poa pratensis	10		FAC
3. Holcus lanatus	80	x	FAC
4. Geranium sp	5		FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	95	= Total Cover	

Woody Vine Stratum (Plot size: 5)			
1. Rubus ursinus	10	X	FACU
2.			
	10	= Total Cover	

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 25 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	___	x 1 =	___
FACW species	___	x 2 =	___
FAC species	___	x 3 =	___
FACU species	___	x 4 =	___
UPL species	___	x 5 =	___
Column Totals:	___ (A)		___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:
___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No x

Remarks:

SOIL

Sampling Point: 10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-10	10YR 3/2	100					CL	
10-18	10YR3/2	93	10YR3/4	7	C	M	CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No x

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No x Depth (inches): _____

Water Table Present? Yes ___ No x Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No x Depth (inches): _____

Wetland Hydrology Present? Yes ___ No x

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Reeseman Property City/County: West Linn/Clackamas Sampling Date: 6/10/15
Applicant/Owner: Upper Midhill Estates/Ryan Zygar State: OR Sampling Point: 11
Investigator(s): CC, JT Section, Township, Range: 14 2S 1E
Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): convex Slope (%): 3
Subregion (LRR): A Lat: 45.2347 Long: 122.3921 Datum:
Soil Map Unit Name: Cascade silt loam NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ Significantly disturbed? Are "Normal Circumstances" present? Yes x No ___
Are Vegetation ___, Soil ___, or Hydrology ___ Naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes x	No ___	**Is the Sampled Area within a Wetland?** Yes ___ No x
Hydric Soil Present?	Yes ___	No x	
Wetland Hydrology Present?	Yes ___	No x	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	___ = Total Cover		
Sapling/Shrub Stratum (Plot size: 5)			
Rubus armeniacus	10	x	FACU
2.			
3.			
4.			
5.			
	10 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Festuca arundinacea	40	x	FAC
2. Holcus lanatus	15		FAC
3. Alopecurus pratensis	20	x	FAC
4. Vicia sp	20	x	FAC
5. Galium aparine	5		FACU
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
	___ = Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	___	x 1 =	___
FACW species	___	x 2 =	___
FAC species	___	x 3 =	___
FACU species	___	x 4 =	___
UPL species	___	x 5 =	___
Column Totals:	___ (A)		___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:
___ 1 - Rapid Test for Hydrophytic Vegetation
x 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes x No ___

Remarks:

SOIL

Sampling Point: 11

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-16	10YR3/3	100					CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No x

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No x Depth (inches): _____

Water Table Present? Yes ___ No x Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No x Depth (inches): _____

Wetland Hydrology Present? Yes ___ No x

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Appendix C: Ground Level Photographs

Photo Point 1 facing east, northeast

Photo point 2 facing northeast

Appendix C: Ground Level Photographs
Reeseman Property
S&A 2373

Schott & Associates
P.O. Box 589
Aurora, OR 97002
503.678.6007

Photo Point 2 facing northwest

Photo Point 3 facing north, northwest

Appendix C: Ground Level Photographs Reeseman Property S&A 2373	Schott & Associates P.O. Box 589 Aurora, OR. 97002 503.678.6007

Photo Point 4 facing northeast

Photo Point 4 facing southeast

Appendix C: Ground Level Photographs
Reeseman Property
S&A 2373

Schott & Associates
P.O. Box 589
Aurora, OR. 97002
503.678.6007

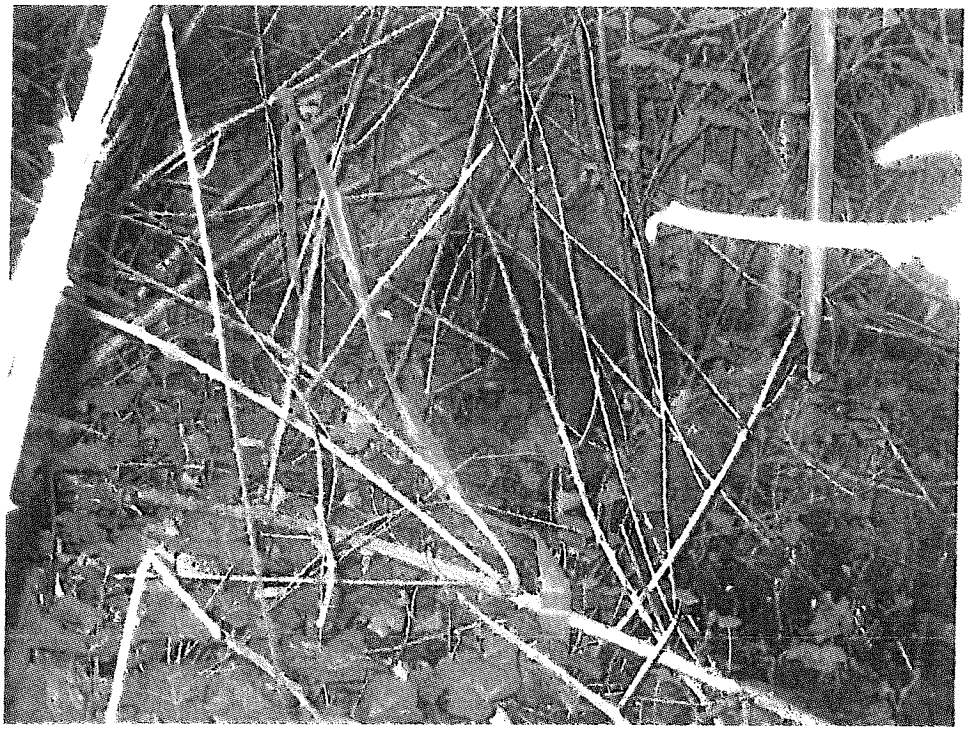


Photo Point 5 at entrance to culvert in nw corner of property

Photo Point 6 showing drainage channel

Appendix C: Ground Level Photographs Reeseman Property S&A 2373	Schott & Associates P.O. Box 589 Aurora, OR. 97002 503.678.6007

Appendix D: References

Environmental Laboratory, 1987. *Corps of Engineers Wetlands Delineation Manual,* Technical Report Y-87-1, U.S. Army Engineers Waterways Experiment Station, Vicksburg, MS.

Environmental Laboratory, 2010. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys and Coast Region (Version 2.0),* Wetlands Regulatory Assistance Program ERDC/EL TR-10-3 U.S. Army Engineer Research and Development Center. Vicksburg, MS.

Federal Interagency Committee for Wetland Delineation, 1989. *Federal Manual for Identifying and Delineating Jurisdictional Wetlands*, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, and U.S.D.A. Soil Conservation Service, Washington, D.C. Cooperative technical publication. 138 pp.

Federal Register, 1980. 40 CFR Part 230: Section 404(b)(1), *Guidelines for Specification of Disposal Sites of Dredged or Fill Material,* Vol. 45, No. 249, pp. 85352-85353, U.S. Govt. Printing Office, Washington, D.C.

Federal Register, 1982. Title 33, *Navigation and Navigable Waters; Chapter II, Regulatory Programs of the Corps of Engineers.* Vol. 47, No. 138, p. 31810, U.S. Govt. Printing Office, Washington, D.C.

Federal Register, 1986. 33 CFR Parts 320 through 330, *Regulatory Programs of the Corps of Engineers; Final Rule,* Vol. 51, No. 219 pp. 41206-41259, U.S. Govt. Printing Office, Washington, D.C.

Kollmorgen Corporation, 1975. *Munsell Soil Color Charts.* Macbeth Division of Kollmorgen Corporation, Baltimore, MD.

U.S. Army Corps of Engineers – Cold Regions Research and Engineering Laboratory (CRREL). 2012. *State of Oregon NWPL – Final Draft Ratings*

U.S. Department of Agriculture, Web Soil Survey *Soil Survey of Clackamas County, Oregon.* U.S.D.A. Soil Conservation Service, Washington, D.C.,

PC-4 TUALATIN VALLEY FIRE & RESCUE COMMENTS

Tualatin Valley Fire & Rescue

October 29, 2015

Peter Spir - Associate Planner
City of West Linn
22500 SW Salamo Road.
West Linn, OR 97068

Re: SUB-15-03

Dear Peter,

Thank you for the opportunity to review the proposed site plan surrounding the above named development project. Tualatin Valley Fire & Rescue endorses this proposal predicated on the following criteria and conditions of approval:

FIRE APPARATUS ACCESS:

1. **FIRE APPARATUS ACCESS ROAD DISTANCE FROM BUILDINGS:** Access roads shall be within 150 feet of all portions of the exterior wall of the first story of the building as measured by an approved route around the exterior of the building or facility. An approved turnaround is required if the remaining distance to an approved intersecting roadway, as measured along the fire apparatus access road, is greater than 150 feet. (OFC 503.1.1))

2. **ADDITIONAL ACCESS ROADS – ONE- OR TWO-FAMILY RESIDENTIAL DEVELOPMENTS:** Developments of one- or two-family dwellings, where the number of dwelling units exceeds 30, shall be provided with separate and approved fire apparatus access roads and shall meet the requirements of Section D104.3. Exception: Where there are more than 30 dwelling units on a single public or private fire apparatus access road and all dwelling units are equipped throughout with an approved automatic sprinkler system in accordance with section 903.3.1.1, 903.3.1.2, or 903.3.1.3 of the International Fire Code, access from two directions shall not be required. (OFC D107)

3. **MULTIPLE ACCESS ROADS SEPARATION:** Where two access roads are required, they shall be placed a distance apart equal to not less than one half of the length of the maximum overall diagonal dimension of the area to be served (as identified by the Fire Code Official), measured in a straight line between accesses. (OFC D104.3) Exception: Buildings equipped throughout with an approved automatic fire sprinkler system (the approval of this alternate method of construction shall be accomplished in accordance with the provisions of ORS 455.610(5).

4. **FIRE APPARATUS ACCESS ROAD WIDTH AND VERTICAL CLEARANCE:** Fire apparatus access roads shall have an unobstructed driving surface width of not less than 20 feet (26 feet adjacent to fire hydrants (OFC D103.1)) and an unobstructed vertical clearance of not less than 13 feet 6 inches. The fire district will approve access roads of 12 feet for up to three dwelling units and accessory buildings. (OFC 503.2.1 & D103.1)

5. **NO PARKING SIGNS:** Where fire apparatus roadways are not of sufficient width to accommodate parked vehicles and 20 feet of unobstructed driving surface, "No Parking" signs shall be installed on one or both sides of the roadway and in turnarounds as needed. Signs shall read "NO PARKING - FIRE LANE" and shall be installed with a clear space above grade level of 7 feet. Signs shall be 12 inches wide by 18 inches high and shall have red letters on a white reflective background. (OFC D103.6)

6. **NO PARKING:** Parking on emergency access roads shall be as follows (OFC D103.6.1-2):
   1. 20-26 feet road width – no parking on either side of roadway
   2. 26-32 feet road width – parking is allowed on one side
   3. Greater than 32 feet road width – parking is not restricted

7. **PAINTED CURBS:** Where required, fire apparatus access roadway curbs shall be painted red (or as approved) and marked "NO PARKING FIRE LANE" at 25 foot intervals. Lettering shall have a stroke of not less than one inch wide by six inches high. Lettering shall be white on red background (or as approved). (OFC 503.3)

8. **FIRE APPARATUS ACCESS ROADS WITH FIRE HYDRANTS:** Where a fire hydrant is located on a fire apparatus access road, the minimum road width shall be 26 feet and shall extend 20 feet before and after the point of the hydrant. (OFC D103.1)

9. **TURNING RADIUS:** The inside turning radius and outside turning radius shall not be less than 28 feet and 48 feet respectively, measured from the same center point. (OFC 503.2.4 & D103.3)

10. **ACCESS ROAD GRADE:** Fire apparatus access roadway grades shall not exceed 12%. When fire sprinklers* are installed, a maximum grade of 15% will be allowed.

0-12%	Allowed
13-15%	Special consideration with submission of written Alternate Methods and Materials request. Ex: Automatic fire sprinkler (13-D) system* in lieu of grade.
16-18%	Special consideration on a case by case basis with submission of written Alternate Methods and Materials request Ex: Automatic fire sprinkler (13-D) system* plus additional engineering controls in lieu of grade.
Greater than18%	Not allowed**

*The approval of fire sprinklers as an alternate shall be accomplished in accordance with the provisions of ORS 455.610(5) and OAR 918-480-0100 and installed per section 903.3.1.1, 903.3.1.2, or 903.3.1.3 of the Oregon Fire Code (OFC 503.2.7 & D103.2)

** See Forest Dwelling Access section for exceptions

11. **GATES:** Gates securing fire apparatus roads shall comply with all of the following (OFC D103.5, and 503.6):
   1. Minimum unobstructed width shall be not less than 20 feet (or the required roadway surface width), or two 10 foot sections with a center post or island.
   2. Gates serving three or less single-family dwellings shall be a minimum of 12 feet in width.
   3. Gates shall be set back at minimum of 30 feet from the intersecting roadway or as approved.
   4. Electric gates shall be equipped with a means for operation by fire department personnel
   5. Electric automatic gates shall comply with ASTM F 2200 and UL 325.

12. **ACCESS DURING CONSTRUCTION:** Approved fire apparatus access roadways shall be installed and operational prior to any combustible construction or storage of combustible materials on the site. Temporary address signage shall also be provided during construction. (OFC 3309 and 3310.1)

13. **TRAFFIC CALMING DEVICES:** Shall be prohibited on fire access routes unless approved by the Fire Code Official. See Application Guide Appendix A for further information. (OFC 503.4.1).

FIREFIGHTING WATER SUPPLIES:

14. **MUNICIPAL FIREFIGHTING WATER SUPPLY EXCEPTIONS:** The requirements for firefighting water supplies may be modified as approved by the fire code official where any of the following apply: (OFC 507.5.1 Exceptions)
   1. Buildings are equipped throughout with an approved automatic fire sprinkler system (the approval of this alternate method of construction shall be accomplished in accordance with the provisions of ORS 455.610(5)).
   2. There are not more than three Group R-3 or Group U occupancies.

15. **SINGLE FAMILY DWELLINGS - REQUIRED FIRE FLOW:** The minimum available fire flow for one and two-family dwellings served by a municipal water supply shall be 1,000 gallons per minute. If the structure(s) is (are) 3,600 square feet or larger, the required fire flow shall be determined according to OFC Appendix B. (OFC B105.2)

16. **FIRE FLOW WATER AVAILABILITY:** Applicants shall provide documentation of a fire hydrant flow test or flow test modeling of water availability from the local water purveyor if the project includes a new structure or increase in the floor area of an existing structure. Tests shall be conducted from a fire hydrant within 400 feet for commercial projects, or 600 feet for residential development. Flow tests will be accepted if they were performed within 5 years as long as no adverse modifications have been made to the supply system. Water availability information may not be required to be submitted for every project. (OFC Appendix B)

17. **WATER SUPPLY DURING CONSTRUCTION:** Approved firefighting water supplies shall be installed and operational prior to any combustible construction or storage of combustible materials on the site. (OFC 3312.1)

FIRE HYDRANTS:

18. **FIRE HYDRANTS – ONE- AND TWO-FAMILY DWELLINGS:** Where a portion of a structure is more than 600 feet from a hydrant on a fire apparatus access road, as measured in an approved route around the exterior of the structure(s), on-site fire hydrants and mains shall be provided. (OFC 507.5.1)

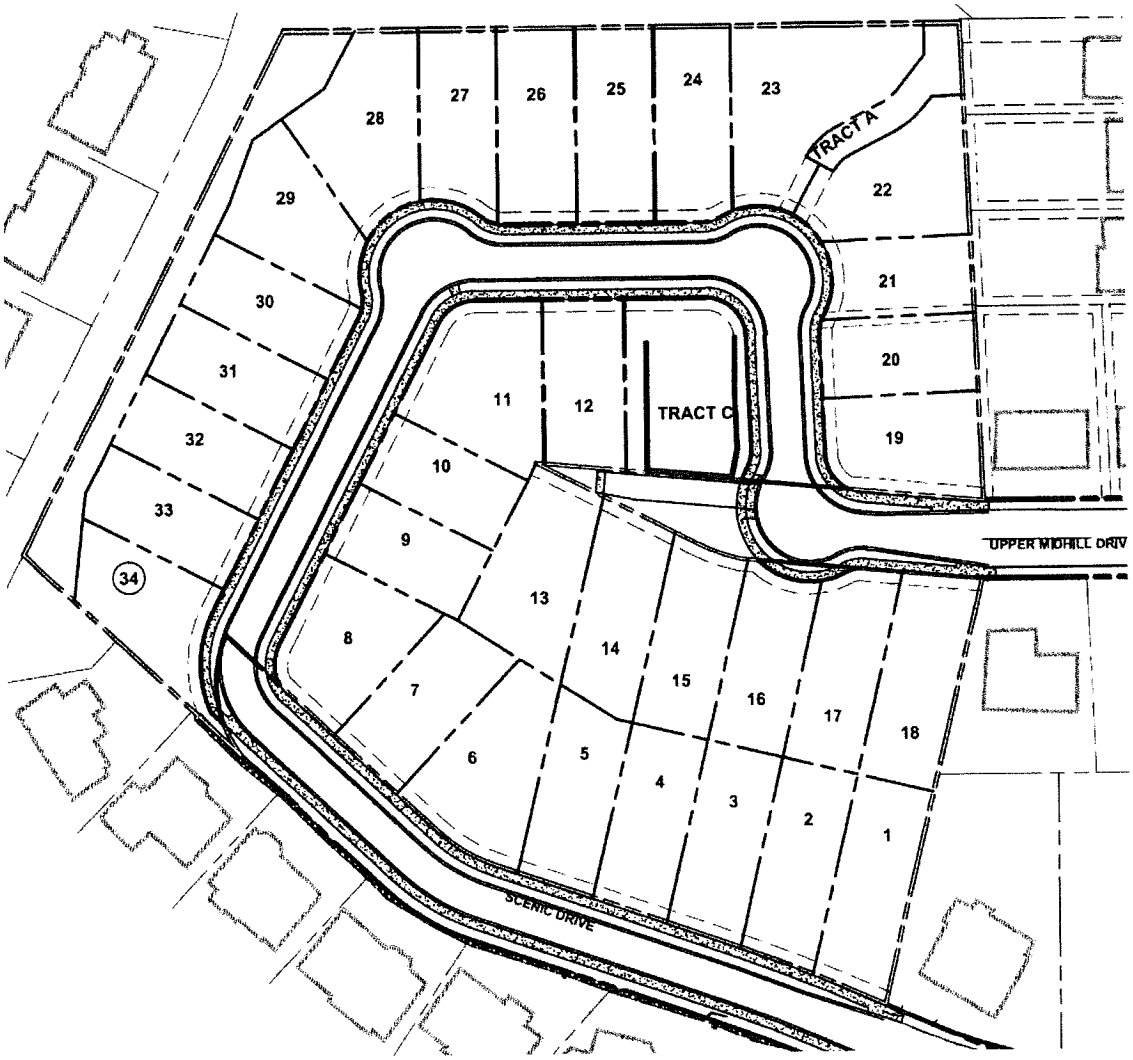
If you have questions or need further clarification, please feel free to contact me at (503) 649-8577.

Sincerely,

Ty Darby

Ty Darby
Deputy Fire Marshal

Cc: file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PC-5 PUBLIC COMMENTS

(Public comments are those received through 1pm. April 6, 2016. Subsequent comments will be distributed to the Planning Commission as an addendum)

Chad P. Seber and Lacy Seber
17620 Woodhurst Place
Lake Oswego, OR 97304

To the West Linn Planning Commission:

I am a resident of the Marylhurst Place Homeowners Association. My wife, Lacy Seber and I reside at the above referenced address. We respectfully submit the flowing opposition to the proposed development known as 18000 Upper Midhill, File No. SUB-15-03 and WAP-16-03, for the following reasons:

1. The Applicant's proposed development drastically impacts a Water Resource Area (WRA) as identified under Chapter 32[1] at seq. and violates numerous provisions therein and the Clean Water Act. The following is non-inclusive list of those violations.

   Chapter 32 sets forth certain standards for which development must comply with in order to proceed. Several are violated by the proposed development including: preventing erosion and minimize sedimentation by protecting vegetation on steep slopes; protection of vegetated areas surrounding wetlands that, together with the wetland, provide vital habitat for birds, amphibians, and other species; minimize construction of structures and improvements where they are at risk of flooding, to enable natural stream migration and channel dynamics, and protect water resources from the potential harmful impacts of development; provide for uses and activities in WRAs that have negligible impact on such areas; and to provide for other uses that must be located in such areas in a way that will avoid or, when avoidance is not possible, minimize potential impacts. (Ord. 1623 § 1, 2014) See 31.010.

   The proposed development and application identifies that there are two WRAs on the proposed project site. However; it summarily and inaccurately claims that one of the WRA, a wetland, is not impacted and further that it cannot avoid impact to the other wetlands. The proposed development is prohibited under Section 32.030.

   Additionally applicant claims that no on-site migration can be performed. This is in error. The application does not protect/minimize impacts and the development is not proposed to be constructed in a manner that will "avoid or, if avoidance is not possible, minimize adverse impact on WRA." Therefore the application for proposed development must be denied. See Section 32.060. The applicant has not shown that it is impossible to avoid the WRAs nor have they established that the wetlands provide "minimal benefit" as they claim.

[1] Please note that unless otherwise stated all citations are to the "WEST LINN COMMUNITY DEVELOPMENT CODE"

It is unclear how proposed development will not create illegal discharge into waters of the State and or drastically increase illegal storm water discharges.

The proposed off-mitigation is not a proper replacement for on-site mitigation per section 32.090. Also the re-vegetation requirements under Chapter 32.100 have not been satisfied. Over 77% of all vegetation will be stripped from the site and this will destroy vital habitat.

2. The proposed development is not in accordance with the homes surrounding it on all four sides. On the Lake Oswego side the zoning is R-10 and R-15 (as per the City of Lake Oswego Zoning Map https://www.ci.oswego.or.us/sites/default/files/lo_zoning_map.pdf?t=1459830654946) and on the West Linn side the zoning is R-10 (as per the city of West Linn Zoning Map http://westlinnoregon.gov/sites/default/files/gis/zoning_11x17.pdf) . This creates an island of high density, smaller home sites surrounded by larger lots and homes bordering the proposed development.
    a. This results in multiple locations on the Marylhurst side where there will be two lots in the proposed development backing up to a single lot from Marylhurst. There is even one instance where three proposed lots will be backing up to one lot on the Marylhurst side. This high density is not in accordance with Ch. 85.010 B6

3. The street layout of the proposed development extends Hillside Drive right up against the back yards of seven of the homes on Woodhurst Place. This places two lanes of traffic immediately behind the existing homes, creating noise, nighttime headlight glare, pedestrian traffic etc. all adjacent to homes where residents currently enjoy the peaceful setting of their backyards. This is no adequate mitigation for this. This also not in accordance with Ch. 85.010 B6.

4. The photometrics plan for the proposed subdivision clearly shows the extensive illumination of the street lamps on Hillside Drive spilling onto five of the back yards of homes on Woodhurst Place. No one in these homes wants to have their back yards illuminated all night long. Once again, this is not in accordance with Ch. 85.010 B6.

5. The proposed development at this point only constitutes the groundwork in preparation for sales of lots to multiple builders; not a planned neighborhood from a single builder. The developer has stated that construction will likely (under best case scenarios) extend for 2 ½ years. This estimate could potentially run longer if sales of the initial homes do not take place soon enough for the builders to recoup their costs. A prolonged period of construction for many years is not acceptable to the surrounding homeowners who purchased their homes for the peace and quiet afforded by their distance from noisy thoroughfares. 2 ½ + years of incessant construction noise from early morning to early evening, six and sometimes seven days a week will ruin the existing atmosphere of the surrounding neighborhoods.

6. Filling in the center of surrounding R-10 and R-15 neighborhoods with R-4.5 lots and homes has the potential of lowering property values in the surrounding neighborhoods. Generally we see the opposite occurring in both West Linn and Lake Oswego where smaller homes are being displaced by new construction of larger homes that elevate the neighboring home valuations. This proposed development would likely have the opposite effect.

The proposed development at 18000 Upper Midhill is entirely out of character with the longstanding neighborhoods on all four sides and will constitute a very real threat to the peaceful environment that attracted all of the current homeowners to this area. Further the proposed development violates the Chapters 85 and 32 as referenced herein.

We respectfully request that the West Linn Planning Commission reject the proposed development.

4-5-16

Chad P. Seber Date

4-5-16

Lacy C. Seber Date

Spir, Peter

From: David A. Goldenberg <lilcarlover@aol.com>
Sent: Wednesday, April 06, 2016 1:50 PM
To: Spir, Peter
Subject: Planning Commission (18000 Upper Midhill Drive)

Dear Peter,

I am a resident of the Upper Midhill neighborhood and wanted to voice my concerns regarding the proposed new construction project at 18000 Upper Midhill Drive. I have a lot of concern regarding traffic issues and possible future home depreciation if this project goes through and greatly increases traffic volume in an area that is already under heavy usage from existing residents. The additional of a good sized apartment complex just south of us off Highway 43 will undoubtedly factor in to this as well. The intersection of Arbor Drive/Highway 43 is nearly impossible to negotiate during peak traffic times and I have witnessed several near-miss collisions at that intersection, especially since there is no traffic light there. Please consider the negative impact these homes will have on those of us who must endure.

Thanks very much.

Regards,

David A. Goldenberg
David A. Goldenberg Enterprises
16066 Boones Ferry Rd. Suite F
Lake Oswego, OR 97035
(503)539-6609 Voice
(503)699-6564 FAX
Est. 1989
Member OIADA
NADA Guides Market Analyst

April 5, 2016

Re: Written testimony opposing 18000 Upper Midhill proposed development

To: West Linn Planning Commission

My family and I are adamantly opposed to the proposed development at 18000 Upper Midhill (File No. SUB-15-03 and WAP-16-03) for the following reasons:

- **Zoning**: The R4.5 zoning is not in line with the zoning on all four sides surrounding the property. On the three Lake Oswego sides the zoning is R-10 and R-15 and on the single West Linn side the zoning is R-10. Allowing this development to go in as proposed would create a high-density area in the middle of a long established low-density neighborhood. This would create an excessive amount of noise, traffic, nighttime illumination, etc. in a very quiet neighborhood.
- **Layout**: The proposed layout extends Hillside Drive right against the backyards of seven homes including ours. We do not want vehicle and pedestrian traffic up against our back yard. This aspect of the development is not in accordance with Ch. 85.010 B6.
- **Street lighting**: the proposed photometrics plan would cast light into at least five back yards of homes on Woodhurst Place. This is unacceptable as we have bedrooms and living spaces facing our back yard. We do not want to have this space illuminated all night, every night.
- **Timeframe**: The developer has stated that the start to finish time period will be at least 2 ½ years. This is an unacceptable period to endure the high-decibel din of tree cutting, bulldozers, cement trucks, delivery trucks, framers, finishers, etc. A house was built next door to us over a 7 month period in 2014/15 and the amount of noise and neighborhood disturbance was unimaginable. No matter what amount of pre-construction assurances are given by the builder beforehand, contractors, sub-contractors and delivery drivers do not care about homeowner's interests. They will arrive pre- and post-curfew hours and commence their activities on their own terms.
- **Property devaluation**: we are concerned with the potential of property devaluation where the placement of a large quantity of smaller, lesser priced homes in the middle of larger homes on larger lots will drag down the current valuations.

One of the reasons we originally bought into this neighborhood years ago was the peaceful setting. An oversized development in the midst of Marylhurst and Robinwood will forever alter the current conditions we all love.

If development of this parcel of land is inevitable then it should at a minimum be rezoned to match the surrounding lots & houses. Larger lots and houses befitting the existing neighborhood is only fair to the surrounding homeowners. And retaining as much of the existing growth of trees would be an ideal way to continue masking Hwy. 43 noise as much as possible.

Sincerely,

Scot & Lizelle Chandler
17632 Woodhurst Place
Lake Oswego, OR
97034

Spir, Peter

From: deskyj@comcast.net
Sent: Wednesday, April 06, 2016 12:55 PM
To: Spir, Peter
Subject: Planning Commission proposed development Upper Midhill Estates

April 6, 2016

To Planning Commission:

I am writing the planning commission today in regards to the proposed 1800 Upper Midhill Drive 34 lot subdivisiion development. I am the joint owner of the property 2317 College View Drive West Linn OR which directly connects to the proposed project at the fence line of the back oft the property.
We are a 3 person household which includes our 12 year old daughter and have lived on this property for over 12 years.

Below are some of our concerns regarding this proposed development as well as issues that should be addressed:
1. Size of proposed lots. Per applicant submittal 34 lot sized homes are being proposed at 4,500 square feet. When looking at the existing lots in this neighborhood which are located as part of the Robinwood Neighborhood Association, these proposed lot sizes are significantly smaller than the lots in the surrounding area. Most home lots in this Upper Midhill area are about 10,000 square feet which would make them less than 1/2 the size of the existing neighborhood. Per the Robinwood Neighborhood Plan last adopted and posted on the City of West Linn's site. Goal 1 of the RNA neighborhood plan is to maintain the current residential character of the neighborhood and goal 3 is to preserve the character of the existing style. By proposing 1/2 the lot sizes as well as 34 lots this is not harmonious or compatible with current Robinwood Neighborhood Association Plan approved by

the City of West Linn as part of their comprehensive plan..It will significantly affect the density of the midhill area as well as the look and feel of the neighborhood as there will be approximately 2 new houses for every existing house in an area.

2.Access and traffic: Per proposed development paperwork their will be 2 main access points into and out of property. One an extension of upper midhill another at Scenic Drive. As you are aware much of the exiting property borders Lake Oswego and there are no current access points to enter or exit on these sides of the proposed development. So traffic will be funneled through an extension on upper midhill and then a very small narrow existing street now called Scenic drive. This will have a significant impact on a neighborhood with many new residents with young children taking school buses in the am and pm as well as increased traffic due to new proposed homes and residents, By the traffic analysis impact study submitted with this proposal they are estimating an average of 323 average daily trips (ADT) or about 9 per household. This impact should be reviewed on short and long term impacts of neighborhood and work/school commuter time. Additionally safety for children with parents helping them on buses all up and down upper midhill in the am and pm. With less then 5 new houses recently built on skye way roads became in very poor shape with construction vehicles coming in gravel and pot holes appeared reguarly due to wear and tear.

3.Trees and environmental impact:Per the arborist report submitted as part of this package their are a total of 502 trees on this property with 65% being White Oak and Douglas and 90% being in good condition. 169 of these trees are considered significant or over 30%. Per what the current standard it is recommended that 112 trees are retained with 50 of these being significant trees.Just over 20% of trees will be retained which my understanding is allowable

under current code. As a planing body I ask that you explore this and how this will impact current habitats and species that live here along with at least one wetland area that was discovered during this process.Also since West Linn' s logo prides itself with trees. What is the cost benefit analysis of destroying @ 400 trees for 34 homes.

Finally, in closing while some of these issues are Ok under current code etc. It seems as leaders of our community that we need to work together to mitigate the impact of a neighborhood and community where some residents have lived over 25 years and others are new to the neighborhood and have young growing families. All will be impacted significantly by this Upper Midhill Estates 34 house development. The land has access issues and other constrains which will cause burdens and safety issues in this neighborhood.

Finally as they say a picture is worth a 1,000 words I encourage all who are involved with this project to come view property directly.

I greatly appreciate your attention to this matter.
With Sincere Thanks
Joanne Desky
2317 college view drive west linn oregon 97068
deskyj@comcast.net

Spir, Peter

From: Sheridan Corrie <sheridancorrie@gmail.com>
Sent: Wednesday, April 06, 2016 12:36 PM
To: Spir, Peter
Subject: Planning Commission

TO: Peter Spire
Associate Planner
City of West LInn

FROM: Sheridan Corrie
Resident Address:
17821 Hillside Drive
West Linn, OR

SUBJECT: Upper Midhill Estates

18000 Upper Midhill Drive 34-Lot Subdivision

Dear Planning Commission,

I am writing to provide additional insights for your decision regarding the proposed development at 18000 Upper Midhill Drive.

While I understand that development of the property is inevitable, I have a few concerns that I do not believe have been addressed in the current submission.

1. The current zoning maps show the existing College Hill Estates as zoned for R4.5. However, the actual lot division was done consistent with the adjacent neighborhood zoning of R10. Therefore, I encourage the Planning Commission to approve the quantity of lots in Upper Midhill Estates based on the actual character and density of the surrounding neighborhood. This is not obvious on a plot map. I encourage the Planning Commission to urge the developer to adjust the lot sizes and reduce the number of homes proposed.

2. The existing traffic study accurately addresses many of the issues related to added traffic, however it leaves one busy intersection at Hillside Drive and SkyeParkway unaddressed. Hillside Dr. is currently a dead end street, comprised of eight homes. This street could potentially face a traffic increase of 2.5x based on the standard traffic calculations of 9 car trips per house each day. Some right of way and road width improvements for Hillside Dr have been proposed, however, one issue has been missed. Hillside Dr intersects with SkyeParkway, which is a main thoroughfare for access to homes in the Skyline Ridge neighborhood as well as access to Rosemont Road. This is a busy intersection for our little neighborhood with only a single yield sign. It seems that an additional traffic study should be conducted to ensure adequate traffic control at this intersection given the additional traffic to come from the proposed development.
We have spent many sunny days watching cars speed through and cut the corner of this intersection with concerns for safety with the existing traffic. The proposed increase could turn this intersection into a true hazard. Please consider requiring additional analysis prior to approval.

Thank you very much for your consideration in this matter.

Sincerely,
Sheridan Corrie

Spir, Peter

From: jim moore <jimmo777@gmail.com>
Sent: Wednesday, April 06, 2016 12:36 PM
To: Spir, Peter
Subject: Planning Commission

We are writing to put ourselves on record in opposition to the planned development at 18000 Upper Midhill Drive.

One of our primary concerns is the amount of traffic that would be using Upper Midhill Dr. The area between Marylhurst and Arbor Drives is very narrow allowing barely enough room for 2 vehicles to pass one another. Arbor Drive, in its current state, gives difficult access to Hwy 43, especially heading north. This makes Upper Midhill the better option as it gives access to the light at Marylhurst and Hwy 43. This is not a suitable option considering the increase in vehicles that would come with 34 new homes.

A further concern is the nature of the Upper Midhill blocks which are home to many small children and Midhill Park. There are no curbs or sidewalks, very little room for off-road parking except driveways and therefore no safe zones for neighborhood kids and visitors to the park. This development would create a major change from a quiet neighborhood street to a much busier thoroughfare.

Our other concern is the number of proposed lots. The size of the proposed lots is completely out of character with the size of lots in the surrounding area. It's simply too many houses in such a small space.

Please reject the development proposal in it's current form. New development should not be in contrast to the neighborhood, and should not create traffic issues for the long-time residents of the area.

Thanks you,

Anne Moore
James Moore
18580 Upper Midhill Drive

Spir, Peter

From: Doug and Dorianne Palmer <cooperdel2@msn.com>
Sent: Wednesday, April 06, 2016 11:25 AM
To: Spir, Peter
Subject: Planning Commission

Hello,

My name is Dorianne Palmer, and I have lived with my family on College View Drive for ten years. When we bought, we were told by both real estate agents (as were many
others,) the property directly behind our homes could never be built on.
How wrong they were.

I am sure you are familiar with the property, and the surrounding neighborhoods.
We have many concerns regarding the proposed development as it stands, but beyond emotional concerns, there are some very real problems this development will cause our quiet neighborhood.

34 homes are proposed, and the traffic alone will negatively impact our neighborhood
in many ways. 34 x an estimated nine car trips a day = 306 more car trips daily.
Trying to get on to Hwy 43 at Arbor Drive is already extremely difficult. I understand we are not able to have a light installed at that intersection. Imagine the traffic trying to leave our neighborhood at peak driving hours? Pretty quickly, people may figure out they can drive down Upper Midhill and turn left on Marylhurst to go to the stoplight, backing up that street as well. From Midhill Park to Marylhurst, it is extremely difficult for two cars to pass each other. I have to pull over almost every time I drive down Upper Midhill to let opposing traffic pass. The road simply is not able to function with that amount of traffic. What would a backup on Upper Midhill look like if even five cars were trying to drive it in opposite directions? Now picture hundreds of car trips down that road daily.

This development, as it is proposed, does not match the character, or density of the surrounding neighborhoods. Our lot is 10,361 Sqft. Many of the lots proposed are significally smaller than homes surrounding it...some as low as the 4,000's. Also, because the owner is selling off the lots separately, there is no guarantee of price point matching the neighborhood, or home size. The R4.5 designation is not appropriate for that property, as it does not match the zoning of all of the surrounding properties and neighborhoods.

While we do realize development is inevitable at some point, the density of this proposed development would be detrimental to the surrounding neighborhoods.
The number of homes allowed should be lowered to maintain the integrity, and safety of the Robinwood neighborhood.
Please take these crucial points into consideration, and reject this development as proposed.

Thank you for your time.

Best,
Dorianne Palmer

Spir, Peter

From: Scot <scotchandler@hotmail.com>
Sent: Wednesday, April 06, 2016 10:08 AM
To: Spir, Peter
Subject: Re: WL Planning Commission agenda item
Attachments: Resolution.docx

Peter:

Attached is a formal resolution from the Marylhurst Place Homeowners Association in opposition to the proposed development known as 18000 Upper Midhill, File No. SUB-15-03 and WAP-16-03. The Marylhurst Place HOA represents residents with homes immediately adjacent to the proposed development.

Please distribute copies of this resolution to each of the planning commission members in advance of the April 20th hearing.

Sincerely,

Scot Chandler
President, Marylhurst Homeowners Association

From: Spir, Peter <Pspir@westlinnoregon.gov>
Sent: Monday, April 4, 2016 8:21 PM
To: 'Scot'
Subject: RE: WL Planning Commission agenda item

Scot
If you would like to testify at the hearing, there are forms that can be filled out when you get there on April 20. We do not collect testimony forms prior to the hearing. You are welcome to submit written testimony (letter, email etc.) into the record prior to, and at the hearing. If you submit written testimony prior to his Thursday (April 7) they will be incorporated into the staff report as an exhibit which would provide Planning Commission members with the opportunity to properly read and review your comments. Written testimony received on April 7 or later will be compiled and sent to the Planning Commission as an addendum or given to them at the April 20 hearing. Last minute submittals are somewhat problematic since the Planning Commission members have limited time to read and review the material.
Best regards
Peter

Peter Spir
Associate Planner
22500 Salamo Rd.
West Linn, Oregon 97068
Pspir@westlinnoregon.gov
westlinnoregon.gov
Phone (503) 723-2539

Resolution

Marylhurst Place Homeowners Association

To the West Linn Planning Commission:

The Marylhurst Place Homeowners Association respectfully submits the following resolution in opposition to the proposed development known as 18000 Upper Midhill, File No. SUB-15-03 and WAP-16-03, for the following reasons:

1. The proposed development is not in accordance with the homes surrounding it on all four sides. On the Lake Oswego side the zoning is R-10 and R-15 (as per the City of Lake Oswego Zoning Map https://www.ci.oswego.or.us/sites/default/files/lo_zoning_map.pdf?t=1459830654946) and on the West Linn side the zoning is R-10 (as per the city of West Linn Zoning Map http://westlinnoregon.gov/sites/default/files/gis/zoning_11x17.pdf) . This creates an island of high density, smaller home sites surrounded by larger lots and homes bordering the proposed development.
    a. This results in multiple locations on the Marylhurst side where there will be two lots in the proposed development backing up to a single lot from Marylhurst. There is even one instance where three proposed lots will be backing up to one lot on the Marylhurst side. This high density is not in accordance with Ch. 85.010 B6

2. The street layout of the proposed development extends Hillside Drive right up against the back yards of seven of the homes on Woodhurst Place. This places two lanes of traffic immediately behind the existing homes, creating noise, nighttime headlight glare, pedestrian traffic etc. all adjacent to homes where residents currently enjoy the peaceful setting of their backyards. This also is not in accordance with Ch. 85.010 B6.

3. The photometrics plan for the proposed subdivision clearly shows the extensive illumination of the street lamps on Hillside Drive spilling onto five of the back yards of homes on Woodhurst Place. No one in these homes wants to have their back yards illuminated all night long. Once again, this is not in accordance with Ch. 85.010 B6.

4. The proposed development at this point only constitutes the groundwork in preparation for sales of lots to multiple builders; not a planned neighborhood from a single builder. The developer has stated that construction will likely (under best case scenarios) extend for 2 ½ years. This estimate could potentially run longer if sales of the initial homes do not take place soon enough for the builders to recoup their costs. A prolonged period of construction for many years is not acceptable to the surrounding homeowners who

purchased their homes for the peace and quiet afforded by their distance from noisy thoroughfares. 2 ½ + years of incessant construction noise from early morning to early evening, six and sometimes seven days a week will ruin the existing atmosphere of the surrounding neighborhoods.

5. Filling in the center of surrounding R-10 and R-15 neighborhoods with R-4.5 lots and homes has the potential of lowering property values in the surrounding neighborhoods. Generally we see the opposite occurring in both West Linn and Lake Oswego where smaller homes are being displaced by new construction of larger homes that elevate the neighboring home valuations. This proposed development would likely have the opposite effect.

It is the position of the Marylhurst Place Homeowners Association that the proposed development at 18000 Upper Midhill is entirely out of character with the longstanding neighborhoods on all four sides and will constitute a very real threat to the peaceful environment that attracted all of the current homeowners to this area.

We respectfully request that the West Linn Planning Commission reject the proposed development.

Passed and approved on the 5th of April, 2016.

Scot Chandler

President, Marylhurst Place Homeowners Association

"Yes" votes: 19 "No" votes: 0 Abstentions: 0

Spir, Peter

From: Pat Crane <pdcrane@comcast.net>
Sent: Wednesday, April 06, 2016 11:19 AM
To: Spir, Peter
Subject: Big concerns over proposed project for 18000 Upper Midhill Drive

Dear Peter Spir,

We are residents at 17586 Brookhurst Drive, Lake Oswego, and our property backs up to the proposed project site for 34 new homes. There will be two houses located behind our home, and the density of this project is certainly concerning and not in keeping with the zoning for the neighboring homes in Lake Oswego or West Linn. The added street lighting behind our home will definitely disturb us. The length of time to complete the project will bring us 2 to 3 years of construction noise.

Another concern is the impact on the traffic on Hwy 43. It is already heavily crowded, especially during rush hours, and the exit from Arbor onto Hwy 43 will be a nightmare if there are 34 more households with cars trying to come and go. Mary's Woods is also planning a huge expansion, which will further impact this highly congested highway.

A final concern is the very high number of trees that are marked for removal. Many of these trees are significant. One that is marked to go is a beautiful Madrone (2516), which apparently is in the way of a house. The Red-tailed Hawks nest in the project site, and the taking down of trees would definitely affect them. In fact a tree with nesting Red-tailed Hawks can not legally be removed.

This project seems like a definite overreach for the area involved without concern for the neighbors, for traffic congestion, or for the environment. A more modest project with fewer houses and more saved trees would be much more acceptable.

Sincerely,
James and Patricia Crane

Date: 4-5-16

Patricia Crane, resident of 17586 Brookhurst Drive, left a voice mail to express opposition to Chene Blanc subdivision based upon:

- Density is too high
- Traffic impacts upon area streets
- Lighting impacting them
- Loss of trees, (especially Madrone tree 2516)

PS

April 5, 2016

Planning Commission Members:

I live at 17668 Woodhurst Place, Lake Oswego, OR. Our home is on the western boundary of the subject proposed development. I am writing to oppose this development in its present form for the following reasons:

*** Density and compatibility with existing homes surrounding the proposed development.**

The proposed 6.10 acre site is currently vacant. It is an urban forest with over 500 trees that are mostly Douglas Fir and Oregon White Oak. The site is a finger of West Linn from the South and is surrounded on the East, West and North by Lake Oswego. It is surrounded by fully developed neighborhoods with lot sizes from 8000 sq. ft to 15, 000 sq. ft. The subject site is zoned R 4.5. I assume this zoning goes back before the surrounding neighborhoods in West Linn and Lake Oswego were developed. I know the subject site was privately owned for many years to prevent any development and preserve the urban forest. *My point is R 4.5 zoning in the middle of established neighborhoods with lot sizes from 8000 sq. ft. and 15,000 sq. ft. is not compatible.*

***Tree removal/retention**

In order for this proposed development to achieve the 34 lots approximately 80% of the 500+ trees have to be removed for street right of way and homes. The only trees left on the site are mostly along the north and east boundary. The western boundary is left with no trees. The city of West Linn has a comprehensive community tree ordinance that ensures the benefits provided by an urban forest will continue. That ordinance conflicts with this proposed development. Changing the zoning from R 4.5 to R 10 would provide for fewer homes, but homes more in concert with those already built and surrounding the site. *IT WOULD ALSO SAVE TREES!*

***Traffic/Noise**

Less density will reduce the amount of traffic and resulting noise for us and our neighbors.

Thank you for your attention and consideration for our concerns.

Sincerely,

Jerry Marlow

Spir, Peter

From: Friedrich Baumann <baumannfw@googlemail.com>
Sent: Tuesday, April 05, 2016 2:00 PM
To: Spir, Peter
Cc: friedrich.baumann@daimler.com; Annette Baumann; scotchandler@hotmail.com; clseber@sbcglobal.net; jmarlow@teleport.com
Subject: Written testimony - 18000 Midhill Drive proposed development project, File No. SUB-15-03 and WAP-16-03

Annette and Friedrich Baumann

17680 Woodhurst Place

Lake Oswego, OR 97034

(503) 655-8118

afbaumann@comcast.net

baumannfw@gmail.com

April 5,201

Subject: **Written testimony - 18000 Midhill Drive proposed development project, File No. SUB-15-03 and WAP-16-03**

Dear Mr. Spir and City of West Linn Planning Commission members,

please find following our concerns and thus objections against the above listed proposed development project. We have studied the entire supplemental pre-application submittal incl. several traffic analyses and traffic counts as well as the submitted arborist report.

We are Lake Oswego neighbors within the Marylhurst Place neighborhood located at the South West end of the property under discussion. Our concerns re: the proposed plans are as follows:

- **Zoning:** The proposed R-4.5 zoning does not match all neighboring property sizes. The majority of the proposed lot sizes are just meeting the minimum lot size of 4,500 sqft - which is less than 50% the size of the average surrounding lots in the Marylhurst, Marylhurst Place and Robinwood neighborhood. An R-10 zoning would be much more appropriate for this site and the entire surrounding neighboring lots. Major devaluation for all surrounding and impacted properties will be the result of the execution of the development as proposed.

- **Traffic:** We disagree with the findings of the submitted traffic study: First off, several counts were taken in low traffic times of the year (in June and August and early September of 2015 during school Summer break); I am a regular commuter on Hwy 43 during the hours of 6.30 and 8 am as well as 5 and 6.30 pm year round and the traffic frequency during the typical school months (incl. school bus traffic plus parents driving their kids to school) is much, much higher than during the months of the provided study. In addition, the crash risk at the intersection of Arbor and Hwy 43 will increase significantly during the busy morning and evening hours, as motorists will grow impatient to take a safe left turn. Also, we are very concerned about the traffic noise originating from the planned development behind our home, since there will be a slope for the proposed extension of Hillside Drive, which will require cars to shift down leaving the proposed neighborhood via Hillside Drive, which will add to the expected traffic noise.

- **Hillside Drive Extension:** It is not clear to us (and the proposed application is not clear on this point) how the sidewalk and planting strips are planned for the west end of the Hillside extension. We are also not agreeing to having the proposed street lighting of Hillside to partially light up our backyard and back of our home, since all bedrooms are located on that side of the house. In addition, there should a solid retaining wall be built between our properties and the proposed road in order to avoid any potential mud slide activity due to the slopes and wet grounds in this area. Please keep in mind, that we had a major mudslide with resulting home loss on our street during the 2008/2009 winter season.

- **Run Down Waters:** Related to chapter 32 (WRA protection), it seems that no consideration has been given to the rundown water from our neighborhood as well as the Skyland neighborhood onto the site of 18000 Upper Midhill. Where and how are these waters being directed?

- **Street Width:** In the application (pg 35) it is stated that the street width planned meets the minimum allowed. Do you really think this is a wise decision given the planned density of the development plan and the expected number of cars driving through and kids potentially living in the proposed neighborhood?

- **Habitat and Amount of Tree Removal:** As we all appreciate, the site in its current state has become a habitat for wild life (dear and coyotes, wild birds and rare species like owls, woodpeckers, hawks,...) which of course have to look for a new habitat, but I sincerely doubt that "streets, driveways, building pads, lots and utilities have been carefully laid out so as to avoid significant trees and clusters with particular attention to the vegetation around the boundary of the site" - as stated on pg. 52 of the application. 77% of the existing tree population (388 of 502) will be removed as a result of this proposal and the majority of the remaining trees will remain on the North and East outer borders of the site - where they do not post any obstacle to the massive development plan. The removal of the vast majority of the green belt will - in addition to the destruction of the wild life habitat - also lead to major noise level increases caused by unfiltered noise transfer from Hwy 43 and Gladstone/Milwaukie traffic. I'll ask that the healthy majority of the green belt be maintained and the two major fir trees behind our property will be maintained and become part of the required planting strip of Hillside Drive.

- **Development Execution and Building Timeframe:** We also question, if the developer requesting approval for this development is qualified to execute a project of this magnitude; it should be in everybody's interest to minimize the time between start and finish of this development. We sincerely doubt, that with dividing the lots between several builders over time, that this development will be finished within 24 months or so, which should be a reasonable request relative to the anticipated additional noise during construction from development of the property to building the homes.

In conclusion, we request to not approve the application in its current form and seriously re-consider the planning for this site and re-zone to an R-10 incl. the requirement to preserve a majority of the existing tree population and find a solution that matches all neighboring properties while reducing expected traffic increase to a minimum in the name of the safety of all neighboring families.

Thank you for your attention.

Annette and Friedrich Baumann

--
Friedrich-W. Baumann

+49 (711) 5188-5761 - home
+49 (160) 867-5563 - cell

John & Lily Crowder
17625 Woodhurst Place
Lake Oswego, OR 97036

Phone: 770-375-1567
Email: johncrowder@me.com

April 5, 2016

To: Peter Spir and West Hills Planning Commission
Re: Upper Midhill Estates Proposed Development

Dear Mr. Spir et al.

Firstly, thank you for your time in hearing the concerns of neighbors and surrounding homeowner associations regarding the proposed development of Upper Midhill Estates. We are members of the Marylhurst Place HOA, which lies in immediate proximity to the site in question, and we appreciate the Planning Commission's attention in meriting a deeper consideration on this matter.

We would respectfully like to voice our opposition to the development proposed at this time at 18000 Upper Midhill, File No. SUB-15-03 and WAP-16-03, due to a number of potential negative impacts which could result from the project's apparent conflict with existing general land division provisions in Chapter 85 of the West Linn Community Development Code. These specific provisions are stated in a separate resolution from the entire Marylhurst HOA. But we would like to lend a personal voice of support to that resolution in requesting the Commission reject the proposed development.

Primarily, we are concerned about the density of the development. Besides the added noise and glare, potential strain on traffic, addition of more crowded infrastructure, and the prolonged tumult of construction – the small size of the closely-packed homes does not match the character of surrounding developments. This can result in decreased property values for many existing homeowners and a drastic change of atmosphere to quiet communities that are presently rather uniform in home size and value.

As the goal of city planning is to guide development in such a way that furthers the welfare of current and future residents, we feel the land in question could be utilized in a different way that creates a convenient, equitable, healthful, efficient and attractive environment. Unfortunately, the existing proposal for Upper Midhill Estates does not fit such criteria as it is currently proposed.

Sincerely,

John & Lily Crowder
Members, Marylhurst Place Homeowners Association

Spir, Peter

From: vrothfin@aol.com
Sent: Tuesday, April 05, 2016 12:02 PM
To: Spir, Peter
Subject: Planning Commission

To: West Linn Planning Commission

From: Michael Finigan and Veronica Roth-Finigan
17725 Hillside Drive

Our concerns regarding the request for a 34-Lot Subdivision and Water Resource Area permit at 18000 Upper Midhill Drive

1. Increased traffic on Upper Midhill, Hillside Dr., College Hill and Arbor Dr. Has a traffic study been completed? Currently, at certain times of the day (morning and evening rush hour) it is very difficult to get onto Highway 43 from Arbor Drive. We understand there may be 306 additional cars per day with this new development traveling on these streets to get to Highway 43. This situation will be untenable, and many cars will decide to travel on down Upper Midhill to get to Marylhurst Drive which has a signal at Highway 43. Upper Midhill from Arbor to Marylhurst would have to be widened and shoulders improved and sidewalks added to accommodate this excess traffic and keep pedestrians safe. We are also concerned that West Linn alone will have to bear the expenses for the increased traffic flow, in turn increasing our property taxes.

2. We are concerned about the value of the homes in our neighborhood given the plan for higher density in the new development and smaller lot size, and the lack of control of home size and price point given that the lots will be sold individually to developers. We are concerned that the process as planned will unfold over a period of many years and keep the neighborhood in flux with construction, making it difficult for anyone in the current neighborhood to sell their house at a reasonable price. Will there be a plan to control the character of the new neighborhood and keep values of current homes from diminishing?

3. We are concerned about keeping the character of the neighborhood with its many old and beautiful trees in a city that is known for its trees.

4. We believe there is an issue also that must be addressed with water and drainage in this area that will be aggravated by this intense development.

5. We have lived in our house on Hillside Drive since 1989, and are some of the original neighbors who worked very hard several years ago to keep this area from being developed in a way that will be detrimental to the existing neighborhood. We continue to be concerned that increased traffic, density, and the character of the new neighborhood will change drastically what is now a very peaceful and beautiful neighborhood and in a way that is unfair to the present owners who will really be paying the price for a long and drawn out process.

Thank you for your consideration of our concerns.

Spir, Peter

From: sharonyuriko@aol.com
Sent: Tuesday, April 05, 2016 11:29 AM
To: Spir, Peter
Subject: 18000 Upper Midhill dr

I live within a block of the proposed development, my biggest concern is the safety of the children who catch the bus in the morning and return in the afternoon. They have to cross the same streets that construction vehicles will be traveling on.

Spir, Peter

From: Stephen Morrison <elevenvalses@gmail.com>
Sent: Tuesday, April 05, 2016 4:23 AM
To: Spir, Peter
Subject: proposed development for 18000 Upper Midhill

To: Planning Commission

I would like to express my concern for the proposed development at 18000 Upper Midhill Dr., West Linn. the current road design for exit onto Hwy. 43 is not nearly sufficient to warrant this kind of development. The only traffic light enabling cars to enter the Highway is on Marylhurst Dr. This would require that all vehicles associated with the development, some 300 a day, would have to drive all the way down Upper Midhill, essentially turning it into a cross-through street. This is an extremely narrow and intimate street with tens of pedestrians and children using it daily. Dog walkers, senior citizens, children on bikes and tricycles can been seen enjoying the narrow space every day. As a driver I can attest that quite often one must stop and move over to allow the opposite driving car to pass. To intentionally turn this space into a cross -through street would be a gross form of negligence and ill-informed planning.

Thank you for listening.

Stephen Morrison
18590 Upper Midhill Dr.

CITY OF West Linn **PLANNING COMMISSION**

Each agenda item requires separate form

PLEASE PRINT

ANY INFORMATION PROVIDED MAY BE CONSIDERED PUBLIC RECORD AND SUBJECT TO DISCLOSURE

NAME Scot Chandler DATE 4-3-16

***BELOW INFORMATION REQUIRED TO RECEIVE STANDING, RECEIVE ADDITIONAL NOTICE OR COPY OF FINAL DECISION**

STREET ADDRESS* 17632 Woodhurst Place

CITY* Lake Oswego STATE* OR ZIP* 97034

Email (optional) ScotChandler@hotmail.com

Please include if you would like to be added to the City's listerv

COMPLETE AND LEGIBLE_____

☐ I wish to speak on a non-agenda related item.

☑ I wish to testify on the agenda item listed below

☐ I do not wish to testify orally but request standing on the agenda item and subject listed below.

AGENDA # AND SUBJECT Subject = SUB-15-03 18000 Upper Midhill Dr.

IN SUPPORT ___ NEITHER FOR NOR AGAINST ___ IN OPPOSITION X

NAME OF ORGANIZATION (if applicable) _____

*If group, please list people you represent. Please list additional names on back of sheet.

_____ _____

_____ _____

_____ _____

PLEASE BE PREPARED TO IDENTIFY THE SPECIFIC APPROVAL CRITERIA YOU ARE ADDRESSING.

PLEASE NOTE: Testimony or information on any agenda item shall be heard only during the time set aside for public hearings. The Chair will control the time of testimony and may vary procedures. A majority vote of the Hearing body (i.e., Planning Commission, Historic Review Board, City Council) may permit variance from standard procedures. Testimony or information on non-agenda items may be accepted for placement on a future agenda.

Spir, Peter

From: Dorianne Palmer <updates4u2@gmail.com>
Sent: Thursday, March 31, 2016 7:06 PM
To: Spir, Peter
Subject: Planning Comission

Dear Mr. Spir. I am writing to voice my strong objection to the land use change for the lot at 18000 upper midhill. Please review my specific objections below.

1. The 4.5 lot sizes do match our neighborhood footprint and as we presented 15 years ago, they also do not actually match criteria for the Metro in fill requirements. Those specifics may have since changed from the original proposal, but the blending into neighborhood has not.

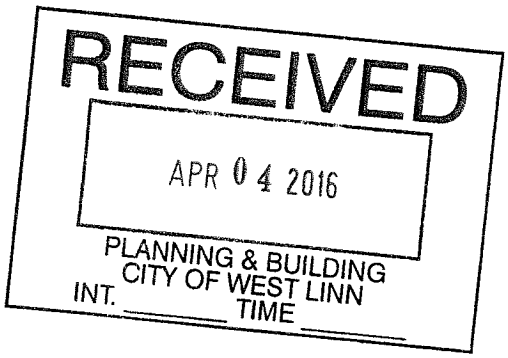
2. The lack of traffic mitigation is just plain irresponsible by the city if the entire stretch of upper Midhill is not improved with proper sidewalks and curbs.

3. I believe the developers are still contending that there would only be 300 traffic trips per day. That is just not even close to the real impact on the surface streets . I believe an "independent" (not a survey group paid for by developers) would bring that number closer to 500. I have lived on this street do 25 years and will testify to any traffic questions you may have.

4. The style of proposed units and the allotted parking is just plain not compatible with an established neighborhood. I believe many of these will be rental units in a very short Tim.

In summary, please just follow our city guidelines and reject this unnecessary and non conforming development.
Steve McClellan

Sent from XFINITY Connect Mobile App



Re: Hyper Midhill Estates Proposed Development
17656 Woodhurst Place

Dear Peter,
I am Lei Cui,the homeowner of 17656 Woodhurst Palce. I am writing to express opinion regarding the new development near my house.

My wife and I moved here last May.One of most important reason I bought this house is the beautiful wood scenery in my backyard.I often can see squirrels and deer and all kinds of birds.As the new development are built, beautiful ecological environment is destroyed, and all the animals will be homeless. It is sad.

Secondly.I think the density of the development does not match that of the properties on all four sides surrounding it. 34 houses will be built on 6 acres of land, the density is too big.How crowded it will be a community.It will be very unsafe.

Thirdly.The new street will be adjacent to the back property line for those of us on the east side of the street on Woodhurst Place. The street is too near our houses.Everyday there are a lot of motor vehicles and pedestrians pass beside our backyard, that will affect our lives very much, especially at night.

Lastly. The developer is carving out the lots to different construction contrators. According to them, the construction of the whole project time will last two and a half years. This will caused great impact on our life.

In a word,i feel that some aspects of the new development is very unreasonable.I plead West Linn planning commission could take full account of my suggestions.

Thank you very much!

Best regards

Lei Cui and Ting Xu

CITY OF West Linn PLANNING COMMISSION

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PLEASE PRINT

ANY INFORMATION PROVIDED MAY BE CONSIDERED PUBLIC RECORD AND SUBJECT TO DISCLOSURE

NAME Lei Cui DATE 04/01/2016

*BELOW INFORMATION REQUIRED TO RECEIVE STANDING, RECEIVE ADDITIONAL NOTICE OR COPY OF FINAL DECISION

STREET ADDRESS* 17656 woodhurst pl

CITY* Lake oswego STATE* OR ZIP* 97034

Email (optional)_____

Please include if you would like to be added to the City's listerv

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AGENDA # AND SUBJECT_____

IN SUPPORT ___ NEITHER FOR NOR AGAINST ___ IN OPPOSITION ___

NAME OF ORGANIZATION (if applicable) _____

*If group, please list people you represent. Please list additional names on back of sheet.

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Spir, Peter

From: Kazi Ahmed <presidentrna@gmail.com>
Sent: Monday, April 04, 2016 7:35 PM
To: Spir, Peter
Subject: RE: Looking for information

Thank you. -Kazi

On Apr 4, 2016 7:16 AM, "Spir, Peter" <Pspir@westlinnoregon.gov> wrote:

Hi Kazi

The traffic report is part of the applicants submittal:

http://westlinnoregon.gov/sites/default/files/fileattachments/planning/project/10331/supplemental_submittal_2-1-16.pdf

the report starts on page 76 of 185 pages.

Best regards

Peter

From: Kazi Ahmed [mailto:presidentrna@gmail.com]
Sent: Friday, April 01, 2016 11:20 AM
To: Spir, Peter <Pspir@westlinnoregon.gov>
Subject: Looking for information

Peter:

I was asked by several of our neighbors bordering the 18000 Upper Midhill Drive if there was a Traffic Study completed and/or submitted by the developer who is planning to put in 34 homes in 6.1 acres. If such a thing exist, where would I be able to access it for our neighbors review. Please let me know.

Thanks and best regards,

Kazi Ahmed