

**Land Use Application
City of Wilsonville**

**Frog Pond West, Sub-District 1
Morgan Farm - 82 Lot Subdivision
Tax Lots 2400 2600 & 2700 T3S R1W 12D**

**February 14, 2018
Revised March 30, 2018 for Completeness
Revised April 25, 2018 for Completeness**

OWNER:

Jim Wolfston
c/o CollegeNET, Inc.
805 SW Broadway, Suite 1600
Portland, OR 97205
Contact: Jim Wolfston
Phone: 503-806-0526
Email: jim@collegenet.com

APPLICANT/DEVELOPER:

Pahlisch Homes, Inc.
15333 SW Sequoia Pkwy Suite 190
Portland, OR 97224
Contact: Mike Morse
Phone: Direct: 503-317-6500
Email: mikem@pahlischhomes.com

APPLICANT'S REPRESENTATIVES - DESIGN TEAM:

Pioneer Design Group, Inc.: Planning, Surveying, Civil Engineering
9020 SW Washington Square Road, Suite 170
Portland, OR 97223
Contact: Ben Altman, Senior Planner/Project Manager
Phone: 503-641-8311, Dir 971-708-6258
Email: baltman@pd-grp.com

Morgan Holen & Associates LLC, Arborist
3 Monroe Parkway, Suite P220
Lake Oswego, OR 97035
Contact: Morgan Holen
Phone: 971-409-9354
Email: morgan.holen@comcast.net

GeoPacific Engineering, Inc.
14835 SW 72nd Avenue
Portland, OR 97224
Contact: Ben Anderson
Phone: 503-598-8445
Email: banderson@geopacificeng.com

SWCA Environmental Consultants
1220 SW Morrison Street, Suite 700
Portland, OR 97205
Contact: Mirth Walker
Phone: 503-224-0333, ext. 6250
Email: cmwalker@swca.com

Percival Landscape Architecture
PO Box 14676
Portland, OR 97293
Contact: Joe Percival
Phones: 503-939-3547
Email: perlandscape@gmail.com



City of Wilsonville
EXHIBIT B1 DB18-0015 et al

APR 26 2018

Completeness Response

TECHNICAL MEMORANDUM

To: Kim Rydold, AICP, Associate Planner
City of Wilsonville

From: Ben Altman, Senior Planner/Project Manager
Pioneer Design Group, Inc.

Project: **Morgan Farm**
PDG No. 321-002

Date: May 11, 2018

RE: Revisions to Application to Comply with Storm LIDA design issues

Kim: Based on the meeting with the City and Brent last week, we have revised the Storm LIDA system. We have added some off-street LIDAs in Tracts A & F, and eliminated many of the smaller in-street LIDAs. The areas of the Preliminary Plans affected are reflected in the attached Exhibit 1 of 1, and **Hi-lited** in the Narrative revisions, below.

These changes result in revisions to the Open Space numbers as reflected in Table 3. Consequently, the narrative discussion is changed as follows, on pages 16 & 17:

Open Space

The SROZ area is to be set aside in Tract 'A' and dedicated to the City. This application includes an SRIR and SROZ Map refinement, based on the site specific survey (tree & topo) details. The refined SROZ boundary includes 300,782 square feet (6.91 acres), which equals 34.1% of the gross site area. Within the SROZ boundary there are three areas containing a total of 59,207 square feet is defined as Area of Limited Conflicting Use (ALCU).

In addition to the SROZ, the Code requires 10% of the net buildable area within the R5 districts to be provided in active and passive open space, or **38,512 square feet for Morgan Farm**. At least 50% of this open space must meet the "active use" criteria, see Table 3 below.

The proposed development meets the 10% open space requirement with landscaped open spaces including: Tracts, 'B,' 'C,' 'F,' and 'G.' In addition the Proposed Plan provides supplemental open space associated with the SROZ and trial heads, including specific "active use" (Tract 'F' & 'G') improvements.

The net site area, (minus the SROZ and street rights-of-way) is approximately 8.84 acres or 385,125 square feet. Therefore a minimum of 38,512 square feet of open space must be provided, which must include at least 19,256 square feet of "*usable or active*" play space.

As reflected in Table 3, the proposed preliminary plat provides a total of 39,654 square feet of general open space, outside of the SROZ. This equals 10.3% of the net developable area, thereby meeting code requirements.

The proposed “active use” area totals 41,952 square feet, which is actually 105.8% of the total general open space, which exceeds the 50% minimum requirement. The “active space” exceeds the general open space because it includes portions of the SROZ within Tract A, with trail and trail heads, while the general open space is all outside of the SROZ.

Tract ‘G’ include preservation of a very large 56 inch White Oak. Tract ‘G’ contains 4,941 square feet. Tract ‘F’, which contains 7,998 square feet. Both Tract ‘F’ and ‘G’ are proposed as “active open space” to be owned and maintained by the Home Owners Association (HOA).

**Table 3
Open Space Percent of Gross & Net Site Area**

Tract	Square Footage	Active Space SF	% Gross Site	% Net Site
‘A’ (SROZ)	300,782	8,353 Includes trail	34.1	
Tract ‘A’ Outside SROZ	19,281*	19,281** Includes trail		
‘B’	6,055			
‘C’	2,600	2,600		
Tract ‘F’	6,777	6,777**		
‘G’ (White Oak)	4,941	4,941		
Total Open Space	39,654			10.3
Total Active Space		41,952		105.8*** of General Open Space
Total SROZ & Open Space	347,745		39.67	
Gross Site			876,700 sf	
Net Site				385,125 sf

NOTES: * Tract A includes 25,369 square feet which is outside of the SROZ, including portions of the pathway.

** A portion of Tract A, outside of the SROZ, and a portion of Tract F are being used for storm LIDA, reducing the available general and “active open space” areas. This change results in active open space remaining at 105% of the total general open space.

***The Active Open Space exceeds the General Open Space, because it includes 8,353 square feet of SROZ, which is used for the regional trail.

Because of the exceptionally irregular topographic lines, the boundary of the SROZ has also been smoothed along the edges, to simplify mapping and legal descriptions.

The changes in Table 3 affect the narrative responses on pages 10, 35, 50, 53, 66, 79,110, and 140 relative to open space.

Full compliance with the open space requirements for General and Active space is maintained with these revisions. We have assumed that all of the LIDAs within Tracts A & F will be fenced, so we did not count them as open space. However, it is noted that in final construction design, some of the LIDAs may not need to be fenced.

In addition, the narrative on page 130, regarding storm LIDAs, is revised to read as follows:

RESPONSE: The landscaping plan provides a tree planting plan, consistent with these criteria and tree lists. Street trees along the Boeckman Road frontage will be installed by the City, with the road improvements.

The applicant has coordinated with West Hills Development (Stafford Meadows) to establish street trees for Primary Street (P5), which will be planted with American Linden. Primary Street (P1) will have *Zelkova serrata* as the assigned street tree.

The storm drainage system has been designed utilizing a combination of street-side LIDAs within the planter strips and off-street LIDAs, within Tract A and F, plus a few LIDAs to be provided on individual lots.

The LIDAs within the planter strips have include tree boxes to accommodate the required street trees and LIDA facilities. The boxes allow for the proper species to be placed within the LIDA, while protecting the drainage and filtration capacity and avoiding conflicts with utility lines.

Street trees for the local (non-primary) streets and the pathway connections have been selected from the lists above from the Master Plan. Table 4 provides a list of the street trees by specific streets.

Street lighting has been adjusted to meet spacing standards from trees and utilities.

With these revisions, we are providing an updated Plan Set, as most of the sheets are affected by the changes to some degree. The Landscaping Plans, related to street trees and LIDAs, and Tract F have also been revised.

We are providing CDs of these Revised Plans, and this Technical Memo.

If you need additional



CIVIL LAND USE PLANNING SURVEY
P 503.643.8286 F 844.715.4743 www.pd-grp.com
9020 SW Washington Square Rd Suite 170
Portland, Oregon 97223

April 25, 2018

Kimberly Rybold, Associate Planner
City of Wilsonville
29799 SW Town Center Loop E.
Wilsonville, OR 97070

RE: Morgan Farm – Response to Second Incomplete Application Notice, dated April 17, 2018 – DB18-0015 thru DB18-0021.
Pioneer Project No.: 338-001/321-002.

Dear Kimberly:

This letter summarizes responses to your second Incomplete Application Notice, dated April 17, 2018 regarding case file DB18-0015 thru DB18-0021.

I don't see any information in the submission about the materials proposed for use in any of the retaining walls.

RESPONSE: Retaining wall details have been added to the Preliminary Grading Plan, Sheet 6 of 13. A new Index Tab (Retaining Wall Details) has been added to the Notebook, providing design and color details for the proposed retaining walls.

Also, we need information on the color of the picnic shelter.

RESPONSE: Color detail for the picnic shelter has been added to Sheet L8. The color detail for the picnic shelter will be: **Roof Color:** Tudor Brown
Structure Color: Almond

See attached Poligon Park Architecture spec. sheet.

General

- *Illustrate the revised trail alignment on plans*

RESPONSE: The revised trail alignment, as approved by Steve Adams, is reflected on the Plans.

- *Clarify that open space square footage calculations on the preliminary plat match Table 3 in the narrative and other narrative references (Tract A and B are inconsistent, part of Tract B is in SROZ)*

RESPONSE: A separate “Active Open Space” Exhibit has been added to clearly identify the active use space counted to meet code requirements. The “active space” includes portions of Tract A, which are being used for the trail.

For general open space, Tract B has been revised, to terminate at the SROZ boundary. Terminating Tract B at the SROZ makes sense because the area to the west is within the steeper topography of the canyon, and will be within the construction zone of the Boeckman Bridge. Consequently the Tract B buffer landscaping, including the brick wall, is not appropriate in this area. The portion of Tract B that was previously shown with the SROZ will be part of Tract A, which will be dedicated to the City.

Subsequent to our last submittal, the pathway has been realigned. This revision, plus the change to Tract B result in minor revisions to the open space area, as reflected in Table 3. The Plans and the Narrative have been revised for consistency.

**Table 3
Open Space Percent of Gross & Net Site Area**

Tract	Square Footage	Active Space SF	% Gross Site	% Net Site
'A' (SROZ)	300,782	8,353 Includes trail	34.1	
Tract 'A' Outside SROZ	25,369*	25,369 Includes trail		
'B'	6,055			
'C'	2,600	2,600		
Tract 'F'	7,998	7,998		
'G' (White Oak)	4,941	4,941		
Total Open Space Total Active Space	46,963	49,261		12.19 105** of General Open Space
Total SROZ & Open Space	347,745		39.67	
Gross Site			876,700 sf	
Net Site				385,125 sf

NOTES: * Tract A includes 25,369 square feet which is outside of the SROZ, including portions of the pathway. Because of the exceptionally irregular topographic lines, the boundary of the SROZ has also been smoothed along the edges, to simplify mapping and legal descriptions.

** The total Active Open Space exceeds the General Open Space, because it includes 8,353 square feet of SROZ, which is used for the trail.

The SROZ contains 6.905 acres, or 300,782 square feet. In addition to the SROZ, the Code requires 10% of the net buildable area, within the R5 districts, to be provided in active and passive open space. Further, at least 50% of this open space must meet the "active use" criteria.

The net site area, (minus the SROZ and street rights-of-way) is approximately 8.84 acres or 385,125 square feet. Therefore a minimum of 38,512 square feet of open space must be provided, which must include at least 19,256 square feet of "usable or active" play space.

As reflected in Table 3, the proposed preliminary plat provides a total of 46,963 square feet of general open space, outside of the SROZ. This equals 12.19% of the net developable area, thereby meeting code requirements.

The proposed “active use” area totals 49,261 square feet, which is actually 105% of the total general open space, which exceeds the 50% minimum requirement.

Tract ‘G’ includes the preservation of a very large 56 inch White Oak. Tract ‘G’ contains 4,941 square feet. Tract ‘F’, which contains 7,998 square feet and Tract ‘G’ are proposed as “active open space” to be owned and maintained by the Home Owners Association (HOA).

The pathway connections and trail heads extending from Streets B, E and G are included in Tract ‘A’, for dedication to the City. Specific recreational improvements will be specified in the formal application, and coordinated with the trail head improvements.

- *Provide a digital copy of the arborist report, as this was not included in the digital plan set submitted on 3/31.*

RESPONSE: The Arborist Report has been included in the CD of all documents.

- *The updated compliance narrative submitted with the digital plans on 3/31 is incomplete in sections and does not match the printed materials. Please provide a digital copy of the compliance narrative that matches the printed version.*

RESPONSE: The updated compliance narrative has been included in the CD of all documents.

Preliminary Plat – Easements to be illustrated

- *The location of private stormwater facility easements should be shown*
- *Tract D – lists public utility easement (this is for franchise utilities) but does not specify a sanitary sewer or stormwater easement*
- *Tract A – lists public utility easement but does not specify stormwater easement*
- *Tract C – lists public utility easement but does not specify water and sanitary sewer easements*
- *Tracts F and G do not have public access easements noted despite being active open space tracts*

RESPONSE: Additional notes have been added to the Preliminary Plat to clarify the scope of the various easements.

Regarding Tracts F & G, these are proposed as “active space” for the homeowners. The two tracts will be owned and maintained by the HOA, and therefore not intended for general public access and use. Therefore, no public access easement is proposed over these two tracts.

Preliminary Plat – Other

- *On Lots 12 and 14, portions of the buildable lot area are shown within the Area of Conflicting Limited Use.*

RESPONSE: Portions of Lots 12 and 14 encroach into the 25 Foot Impact Area. However, for Lots 12 & 14, there is no encroachment into the ALCU. The encroachment is into the 25 Foot Impact Area, which is allowed, per Section 4.139.03 Administration. The SRIR has been amended to address Lot 12 & 14 encroachments into the SR Impact Area.

The City’s Natural Resource Manager noted that – “*The Impact Area definition, as related to development impacts, is based on the concept of avoidance, minimization and mitigation, subject to SRIR review. We typically don’t allow building footprints or other impervious area in the Impact Area.*”

- (.02) Impact Area. *The “Impact Area” is the area adjacent to the outer boundary of a Significant Resource within which development or other alteration activities may be permitted through the review of an SRIR (Significant Resource Impact Report). Where it can be clearly determined by the Planning Director that development is only in the Impact Area and there is no impact to the Significant Resource, development may be permitted without SRIR review. The impact area is 25 feet wide unless otherwise specified in this ordinance or by the decision making body. Designation of an Impact Area is required by Statewide Planning Goal 5. The primary purpose of the Impact Area is to ensure that development does not encroach into the SROZ.*

Section 4.139.04 **Uses and Activities Exempt from These Regulations**

A request for exemption shall be consistent with the submittal requirements listed under Section 4.139.06(.01)(B – I), as applicable to the exempt use and activity. [Added by Ord. # 674 11/16/09]

- (.17) *New Single-Family Dwelling. The construction of a new single family dwelling is exempt unless the building encroaches into the Impact Area and/or the SROZ.*
- A. *If the proposed building encroaches only into the Impact Area then an abbreviated SRIR may be required as specified in Section 4.139.05, unless it can be clearly determined by the Planning Director that the development proposal will have no impact on the Significant Resource. The primary purpose of the Impact Area is to insure that development does not encroach into the SROZ.*

The GeoTech Report indicates that development impacts within the 25 Foot Impact Area are acceptable, so long as they are setback at least 20 feet from the break in slope. The limited impacts related to Lots 12 & 14 confirm with this design guideline. The scope of encroachment is not specified in the Code, as to yard versus structure or impervious area.

The 25 Foot Impact Area and the pathway adjacent to these two lots ensures that there will be not direct encroachment or resulting development impact occurring within the SROZ, which is consistent with Section 4.139.04(.17). The SRIR has been amended to address the potential impacts for Lots 12 & 14.

In this case, complete avoidance of encroachment into the 25 foot Impact Area, would result in the loss of, at least 1 and maybe 2 lots. Based on the supplemental SRIR analysis, the applicant submits that the potential minor encroachments do not result in any significant physical or environmental impacts to the protected resources within the SROZ. Therefore the loss of lots is not justified.

The proposed potential encroachments (maximum building envelopes) are, in fact, minimized, with only a small portion of potential building structure encroachment for either lot:

- Lot 12 Maximum encroachment is a triangular portion of the building envelope measuring 5 x 50 feet, or 250 square feet; and setback 180 feet from the break in slope.

For Lot 12 there is an ornamental fence (Sheet L4 & L9) proposed along the west boundary, with native grass seeded within the remainder of the 25 Foot Impact Area and adjacent minor slopes of the SROZ.

- Lot 14 Maximum encroachment is a trapezoidal shaped portion of the building envelope measuring 10 x 50 feet, or 450 square feet; and setback 70 feet from the break in slope.

For Lot 14, the trail, which is adjacent to this lot, provides a 10 foot wide physical and horizontal buffer between the potential structure and the SROZ. There is an ornamental fencing proposed along the western boundary of the lot (Sheet L1).

Per the Geo-Tech Engineer's recommendation, these minor encroachments are setback significantly more than 20 feet from the break in slope (ALCU).

Consequently, there is no physical or environment impact into the SROZ resulting from the encroachment, which satisfies the impact avoidance criterion set by Section 4.139.04(.17).

Preliminary Streets Plan

- *Revise label for the dimension of Woonerf to 20' from 18'*

RESPONSE: Plan Sheet 7 has been corrected to reflect the 20 foot width for Street B.

Preliminary Utility Plan/Street Trees Landscape Plan

- *There are conflicts with the location of street trees as shown and utilities. Please refer to the City's Street Tree Spacing Standards to ensure that spacing requirements are met. In particular, I've noted that several street lights are located within 5-10 feet of street trees. Trees and street lights must be at least 10 feet apart. Likewise, street trees must be at least five feet from water laterals and water meters, including irrigation meters. Sanitary sewer laterals must also be five feet from street trees, however, the plan set does not include sanitary sewer lateral locations (please show).*

RESPONSE: The Preliminary Plans have been revised to ensure that street trees have a minimum of 5 foot separation from utilities, and 10 feet separation from street lights.

Based on the City's *Design Guidelines for Planting Strips*, the street trees, street lighting and storm facilities have been revised following the guidelines as follows:

"Layout street trees, service laterals, including water meters, and street lighting." Subsequently, adjustments between these elements should be made to eliminate conflicts before placing stormwater facilities in the planting strips."

The plans have been revised for tree and lighting spacing using the following methodology:

Street trees laid out first. Service laterals can be installed under LIDA swales and do not cause conflicts. Water meters will be installed with a 5 foot separation from street trees, and behind driveway wings, or in driveways to avoid conflicts. Street lights have been designed for 10 foot separation from street trees and can be installed in LIDA swales. LIDA swales have been designed around street tree and driveway locations to treat the stormwater runoff for the streets and lots adjacent to the swales.

Plan Sheets 9 of 12, L10, E1.0 & E1.1 have been revised accordingly.

- *Natural resources staff noted that some of the LIDA facilities in the planting strip are quite small in size, and could potentially be consolidated by shifting some street tree locations (thereby potentially reducing some conflicts). They also advised looking for opportunities in the open space tracts, particularly Tract F, to provide planter facilities.*

RESPONSE: The street lighting has been adjusted for proper spacing from street trees and utilities, per City Guidelines.

We have not made any significant changes to the LIDA facilities at this time. We have, however, provided an alternative solution, see attached Technical Memorandum.

This alternative removes several of the small street LIDAs and replaces them with two large off-street LIDAs. With the alternative off-street LIDAs the result will be a more varied and attractive streetscape throughout the development. There will be a combination of standard planter strips, with street trees and street-side LIDAs, with street trees, in boxes, and the two larger off-street LIDAs.

The off-street LIDAs will remove 9,966 square feet of “active open space” (2,884 sf south of Lot 76; 5,345 sf west of Lot 12; and 1,734 from Tract F). This still leaves 39,298 square feet of “active space” or 65% of the general open space, maintaining compliance with the open space standards.

If our alternative is acceptable, our intent is to make the revision at the time of preparation of Construction Plans. Consequently, we are requesting that a Condition of Approval be attached that allows for the alternative LIDA design, subject to Planning and Engineering approval.

- *The utility plan shows a 21” sanitary sewer line extending all the way to Street A. Steve Adams will provide further information on how far along Boeckman Road that sewer line is to be extended, as it may only be to Tract C.*

RESPONSE: In coordination with Steve Adams, the 21” sanitary sewer line has been revised to extend just to Tract C, rather than all the way to Street A, Sheet 9 of 13. A 12” line is extended through Tract C into the development.

- *Zelkova and Red Sunset Maple trees are missing from the plan.*

RESPONSE: Sheet L10 has been replaced, and now includes the appropriate tree symbols for the street trees on Streets A & D.

We also noted that some of the retaining walls, particularly along Street D, reach a fairly significant height and would require steps for pedestrian access from the homes to the sidewalk. Steve thought it was important to pass along that public utility easements cannot have any footing encroachments, which could potentially affect the footprint of the house. Since these are local streets, a PUE of 6 feet is required.

RESPONSE: The Preliminary Grading Plan has been revised, which reduces the height of the retaining wall along the north side of Street D, but increases the height of the wall along the north side Street B.

To avoid PUE conflicts with the wall footings, the PUE (franchise utilities) has been relocated to the Tract E Alley. We understand that we must coordinate with Franchise companies to remove PUEs. However, we believe such coordination can be adequately addressed as part of preparation of construction plans, and addressed as a Condition of Approval.

Re-Submittal

With this Re-Submittal, we have provided replacement pages and plan sheets, and a Replacement CD for the 3 copies submitted for Completeness Review. In addition, we are providing 7 complete copies, including CDs, for distribution to the DRB.

With these revisions, we believe the application will be Complete.

Sincerely,

Pioneer Design Group, Inc.



Ben Altman

Senior Planner/Project Manager

Cc: Jim Wolfston, Property Owner
Mike Morse, Pahlisch Home

Colors shown are for reference only. Actual color may vary. Please request actual color samples for a true color representation at samples@portercorp.com (mailto:samples@portercorp.com).

Select the swatches on the right to color the steel or shingle roof and frame.

Roof Color: Tudor Brown
Structure Color: Almond



STEEL ROOF COLOR



SHINGLE ROOF COLOR



T&G STAIN (NOT SHOWN ON SHELTER)



FRAME COLOR



* Premium colors are available with a slight upcharge

Consult factory for pricing and lead time

** Also available in Textured Poli-5000 finish



4240 136th Ave
Holland, MI 49424
Phone 616.888.3500



(https://www.facebook.com/Poligon)



(https://www.flickr.com/photos/14491100120/sets/735115718720/)



(https://www.surveygizmo.com/s3/3/Survey)

RECENT PHOTOS

(HTTPS://WWW.FLICKR.COM/PHOTOS/POLIGONBYPORTEF)



To: Steve Adams
City of Wilsonville

From: Pioneer Design Group, Inc.

Project: Morgan Farm
PDG No. 321-002

Date: April 25, 2018

RE: Stormwater Management Alternatives

City Design Goals: The direction provided to us by the City of Wilsonville was that the goal is to provide stormwater treatment and detention in a combination of on-street LIDA swales and individual lot LIDA planters. The intent was to treat and detain the stormwater at the source, located primarily in the planter strip of the street instead of a regional stormwater facility.

Design Challenges: The requested design goals come with several substantial challenges for the Morgan Farm subdivision stormwater management plan. The biggest challenge is that there are many different items competing for space in the planter strips where the LIDA would be logically located. The driveway approaches with 6 foot wings, street trees, street lights, water meters and sanitary and storm laterals are all competing with the LIDA swales for space in the planter strips. This gets compounded with this project because Morgan Farm is within the R-5 district of the Frog Pond Master Plan Area. Due to the smaller lots, there is less space between driveways drops as may be available in less dense zoning districts. To provide a 2-car garage having an 18 foot driveway with wings requires 30 feet of street frontage from lots averaging between 40-45 feet in width. There is very little room left between driveways for the other competing items. An additional challenge is that the comprehensively selected street trees in the Frog Pond Area cannot be planted in the vegetated swales. This causes each street tree to have a tree well (7.5' x 6.5' on average) when located in a swale, which removes valuable treatment area.

Existing Design: Pioneer Design Group understands the amount of new impervious area within the overall north and south basins that needs to be treated and detained in each basin and is providing an excess of on-street LIDA swales and individual lot LIDA planters for treatment. Even though there are several sub-basins that do not meet the treatment requirements, stormwater is being over-treated in the overall basin as a whole. This design provides the City with as much LIDA swales as possible to treat the stormwater at the source as directed while avoiding larger stormwater facilities.

Alternative Design 1: This alternative would be to change the type of street tree in the smaller lot district to a type of tree that can be planted within the LIDA swales. In the existing plan, there are 116 street trees which remove at least 5,655 square feet of possible treatment area due to the required tree wells. A change in street tree will increase the treatment areas in the sub-basins that are short. Though it will not fix the shortage alone in the sub-basins, it will drastically improve the situation.

This design change would allow for maximum detention and treatment at the source as detailed by the City.

Alternative Design 2: Comments from the City indicated a request to remove some of the smaller LIDA planters between driveways and instead provide larger off-street LIDA planters in the open space areas to treat the stormwater. Attached is an Off-Street LIDA Facility Exhibit that shows areas for possible use of off-street facilities within Open Space Tracts 'A' and 'F'. In the south basin, there is approximately 5,345 square feet of available area for treatment. This area could replace the treatment area of all the small LIDA swales along the south side of Street D, the west side of Street C, the swales behind the mountable curb on the south side of Street B, and all the individual lot planters in the South Basin. In the North Basin, there is approximately 2,884 square feet of available area in Tract 'A' a larger off-street LIDA facility. Also, by meandering the sidewalk on the north side of Tract 'F', we could provide approximately 1,734 square feet of additional treatment area. These areas would replace all of the small LIDA planters from the north side of Street E, the west side of Street F and the south side of Street G and treat all the impervious area from these basins. The left over treatment area in the off-street facilities will replace as many of the individual lot planters from the north basin as possible.

This design would offer a combination of on-street LIDA swales, individual lot LIDA planters and larger off-street LIDA facilities while using the selected street tree for the Frog Pond Master Plan Area. This would also increase the variety of visual elements along the street frontages, as some streets will have vegetated swales and some will have driveway drops with landscape strips.

Conclusion: With the many competing elements in the planter strips of the R-5 district, we must be creative in our stormwater management approaches. It is the opinion of Pioneer Design Group that these are reasonable and potential solutions to treat and detain the stormwater from the Morgan Farm Subdivision.

Attached: "Off-Street LIDA Facility Exhibit"

Ben Altman

From: Rybold, Kim <rybold@ci.wilsonville.or.us>
Sent: Tuesday, April 17, 2018 3:55 PM
To: Ben Altman
Subject: Morgan Farm - second submission

Ben,
I've had a chance to review the resubmission and it generally looks like we have most of what we need from a completeness standpoint. There are a few outstanding items related to site design review that we still need before we are able to consider this application package complete. I don't see any information in the submission about the materials proposed for use in any of the retaining walls. Also, we need information on the color of the picnic shelter.

The remaining items I'll list are things we've noted should be adjusted in the plan set and narrative materials prior to our distribution to other agencies and the DRB. I've tried to group these for ease of reference. For us to stay on track with a May 31 DRB hearing date, we will need to have a set of plans we can distribute no later than Friday, April 27.

General

- Illustrate the revised trail alignment on plans
- Clarify that open space square footage calculations on the preliminary plat match Table 3 in the narrative and other narrative references (Tract A and B are inconsistent, part of Tract B is in SROZ)
- Provide a digital copy of the arborist report, as this was not included in the digital plan set submitted on 3/31.
- The updated compliance narrative submitted with the digital plans on 3/31 is incomplete in sections and does not match the printed materials. Please provide a digital copy of the compliance narrative that matches the printed version.

Preliminary Plat – Easements to be illustrated

- The location of private stormwater facility easements should be shown
- Tract D – lists public utility easement (this is for franchise utilities) but does not specify a sanitary sewer or stormwater easement
- Tract A – lists public utility easement but does not specify stormwater easement
- Tract C – lists public utility easement but does not specify water and sanitary sewer easements
- Tracts F and G do not have public access easements noted despite being active open space tracts

Preliminary Plat – Other

- On Lots 12 and 14, portions of the buildable lot area are shown within the Area of Conflicting Limited Use.

Preliminary Streets Plan

- Revise label for the dimension of Woonerf to 20' from 18'

Preliminary Utility Plan/Street Trees Landscape Plan

- There are conflicts with the location of street trees as shown and utilities. Please refer to the City's [Street Tree Spacing Standards](#) to ensure that spacing requirements are met. In particular, I've noted that several street lights are located within 5-10 feet of street trees. Trees and street lights must be at least 10 feet apart. Likewise, street trees must be at least five feet from water laterals and water meters, including irrigation meters. Sanitary sewer laterals must also be five feet from street trees, however, the plan set does not include sanitary sewer lateral locations (please show).
- Natural resources staff noted that some of the LIDA facilities in the planting strip are quite small in size, and could potentially be consolidated by shifting some street tree locations (thereby potentially reducing some

conflicts). They also advised looking for opportunities in the open space tracts, particularly Tract F, to provide planter facilities.

- The utility plan shows a 21" sanitary sewer line extending all the way to Street A. Steve Adams will provide further information on how far along Boeckman Road that sewer line is to be extended, as it may only be to Tract C.
- Zelkova and Red Sunset Maple trees are missing from the plan.

We also noted that some of the retaining walls, particularly along Street D, reach a fairly significant height and would require steps for pedestrian access from the homes to the sidewalk. Steve thought it was important to pass along that public utility easements cannot have any footing encroachments, which could potentially affect the footprint of the house. Since these are local streets, a PUE of 6 feet is required.

Please let me know if you have any questions about these items. I, along with other related City staff, would be happy to answer any questions you have.

Thank you,

Kimberly Rybold, AICP
Associate Planner
City of Wilsonville

503.570.1583
rybold@ci.wilsonville.or.us
www.ci.wilsonville.or.us



29799 SW Town Center Loop East, Wilsonville, OR 97070

Disclosure Notice: Messages to and from this e-mail address may be subject to the Oregon Public Records Law.

March 29, 2018

Kimberly Rybold, Associate Planner
City of Wilsonville
29799 SW Town Center Loop E.
Wilsonville, OR 97070

RE: Morgan Farm – Response to Incomplete Application Notice, dated March 13, 2018 – DB18-0015 thru DB18-0021.
Pioneer Project No.: 338-001/321-002.

Dear Kimberly:

This letter summarizes responses to the Incomplete Application Notice, dated March 13, 2018 regarding case file DB18-0015 thru DB18-0021.

General

1. *Inclusion of water meter locations on the Preliminary Utility Plan. See Subsections 4.035 (.04) and 4.210 (.01) B. WC.*

RESPONSE: Water meter locations have been added to the Preliminary Utilities Plan.

2. *Draft Bylaws and/or CC&Rs. See Subsection 4.210 (.01) B. 19. WC.*

RESPONSE: The developer has not prepared, at this time, a draft of the proposed CC&Rs for Morgan Farm. However, Pahlisch Homes understands that the final CC&Rs must appropriately address ownership and maintenance responsibilities for the HOA relative to the common open space tracts and general landscaping.

Findings have been added in the Compliance Narrative acknowledging that the HOA will own and maintain all common open spaces, recreational equipment and tracts within the development, but not including Tract A. Tract A will be owned and maintained by the City of Wilsonville.

3. *Inclusion of the right-of-way dedication from the West Linn-Wilsonville School District property within the annexation request. Section 4.700 WC.*

RESPONSE: The dedication form and legal description for the right-of-way dedication by the School District was submitted to Steve Adams in January 2018. The legal description was approved by the City January 16, 2018. We have included the Title Report for the District property with this re-submittal, as well as providing a copy directly to Steve Adams, emailed 3-28-18.

We have also revised the Annexation legal description and Exhibit to reflect inclusion of the District dedication. The Petition has been revised to include signature for the District, and we secured the District's signature of the District Superintendent on the Petition.

4. General location and type/purpose of anticipated easements to be shown on Preliminary Plat. Among the various easements, include public access easements over tracts with bicycle and pedestrian facilities. See Subsection 4.210 (.01) B. 16. WC.

RESPONSE: The locations, type & Purpose of anticipated easements have been shown on the Preliminary Plat.

5. As noted in the submitted Tree Maintenance and Protection Plan, written consent of adjoining property owner for removal of trees #7572, #7573, #7576, #7577, #7578, #7579, #7581, #7582, and #7585 along the northern boundary line. See Subsection 4.035 (.04) WC.

RESPONSE: The applicant is in the process of obtaining written consent from the adjacent property owner to the north (Maureen O'Hogan) to authorize removing the off-site trees identified within the street right-of-way for Street G (P5). City staff indicated that a Condition of Approval to obtain consent prior to development permit will be included in their recommendations.

Landscape Plans

6. Indicate the location of utilities on landscape plans, along with a utility key and scale. See Subsections 4.199.50 (.01) E. and 4.440 (.01) B. WC.

RESPONSE: Utilities locations have been added to the Landscaping Plans, together with index keys and scale. The street LIDAs have been redesigned with street tree boxes to accommodate the required street trees consistent with adjoining developments. The storm report has been revised to adjust for the reduced in-street LIDAs, with the treatment loss made up by individual lot LIDAs.

7. Specific information about the irrigation systems required to maintain trees and plant materials in each of landscape areas throughout the site. Where irrigation is proposed near trees, insure that recommendations of project arborist are followed. See Subsection 4.176 (.07) C. WC.

RESPONSE: Irrigation system information has been added to the Landscaping Plans.

Site Design Review

8. *Information on design and materials of all retaining walls, ornamental fences, wooden fences, and the Boeckman Road wall. See Figure 11 of Frog Pond West Master Plan and Subsection 4.440 (.01) WC.*

RESPONSE: Design details including materials for all retaining walls, ornamental fences, wooden fences, etc. are included in the resubmittal.

The applicant has further coordinated the design detail for the Boeckman Road buffer wall (Figure 11 of Frog Pond West Master Plan) and foundation planting with OTAK and the Stafford Meadows development proposed by West Hills Development. The revisions have been added to the Landscaping Plans. The coordinated design specifies the type and color of brick and the standard spacing for columns, and the wrought iron top railing.

9. *Information on design and materials for trail entry markers, exercise clusters, the picnic shelter, tables, benches, and other structures located on open space tracts. See Subsection 4.440 (.01) WC.*

RESPONSE: Design details including materials for trail entry markers, exercise equipment, picnic shelter, tables, benches, and other structures located on open space tracts have been added to the Landscaping Plans or separate cut sheets.

Frog Pond West Master Plan Compliance

10. *Information on street light design and location, as well as pathway lighting consistent with the Frog Pond West Master Plan. See Public Lighting Plan beginning on page 77, and Figure 42 of the Frog Pond West Master Plan and Subsection 4.034 (.05) WC.*

Address all of the following:

- ✧ *Local Streets*
- ✧ *Pedestrian Connections and Trailhead Lighting*

RESPONSE: Information on street light locations, including pathway lighting, consistent with the Frog Pond West Master Plan, has been added to the Streets and Utilities Plans and coordinated with the Landscaping Plan. The spacing for street lights has been carefully coordinated to ensure no conflicts with street trees or other utilities within the LIDAs.

Pathway lighting is required at trailheads and accessways only, not the entire length of the trail system.

11. *Information showing conformance with the street tree rules in the Frog Pond West Master Plan. In particular Streets A and G must demonstrate conformance with the Primary Streets street tree requirements and other streets the Neighborhood Streets requirements. See Figure 43 and Table 2 of the Frog Pond West Master Plan, Subsections 4.034 (.05) and 4.440 (.01) WC as well as City "Document Design Guidelines for Planting Strips in Subdivisions."*

RESPONSE: The applicant has coordinated design details for street trees, particularly for Street G (Primary Street 5) with West Hills Development (Stafford Meadows), with American Linden selected to ensure consistency for the full length of the street in compliance with the Frog Pond Master Plan.

12. *Information demonstrating coordination of the Frog Master Plan design elements for the Boeckman Road frontage, street sign cap, and street trees along Street G with West Hills Land Development, who has proposed a subdivision along Boeckman Road to the east of the school district property. See page 27 under Coordinated and cohesive development, page 28 under Master Plan Intent, page 82 under Primary Streets street trees, and page 92 under Monuments and Signs of the Frog Pond West Master Plan.*

RESPONSE: The applicant has coordinated design details for the buffer wall and foundation landscaping along the Boeckman Road frontage with West Hills Development (Stafford Meadows) to ensure consistency and compatibility of plantings and for compliance with the Frog Pond Master Plan.

A standard street sign "topper" design has also been coordinated with the West Hills project.

Pahlisch Homes is not proposing any Morgan Farm monument sign.

In addition to the incompleteness items 1-12 listed above, the following questions and comments regarding compliance came to City staff's attention while reviewing the materials for completeness. Please respond and/or incorporate into updated materials as appropriate.

A. Clarify site acreage measurements so that they are consistent throughout the project narrative. References are made to the project site being both 20.13 acres in size and 21.13 acres in size.

RESPONSE: The Compliance Narrative, zone change legal descriptions and Plans have been revised to reflect consistent site acreage of 20.13 acres. The area of the SROZ has also been corrected.

B. Clarify references to the proposed zoning district within the narrative and supporting materials. The correct zoning designation is "RN" or "Residential Neighborhood."

RESPONSE: The applicant understands that the general zoning for Morgan Park will be NR, Neighborhood Residential, but that the development is further subject to the R-5, sub-district standards, applicable to Sub-Area 1. The Compliance Narrative has been edited accordingly to clarify the general zoning, with the applicable sub-district standards.

C. Lot 76 does not meet minimum lot width standards, and the proposed driveway exceeds the maximum allowed width when combined with Lot 77. Adjust the eastern property line of Lot 76 to meet the minimum lot frontage requirement and separate Lots 76 and 77 into two separate driveways.

RESPONSE: Lots 76 and 77 have been revised to provide the minimum 35 foot lot width at the street, and the single driveway for Lots 76 & 77 has been separated into two driveways.

D. To provide pedestrian access to the future school site at the intersection of Street A and Street E, curb extensions were previously discussed with the City's Engineering Division. Please indicate these curb extensions within the plan set.

RESPONSE: Morgan Farm will not be constructing a full street, only the half-street (3/4 section) of Street A. The School District will complete the east side of the street when they build the new school.

Therefore, we have added curb extensions at the intersection of Street A & E on the west side of Street A, and are showing a "shadow section" for the District's portion, which reflects the curb extensions on the east side. The shadowed frontage improvements will be provided by the School District at the time the school is constructed.

E. Provide a bicycle-friendly connection from the southern trailhead of the Boeckman Creek Trail to Street B. Provide a bicycle-friendly connection from the central trailhead of the Boeckman Creek Trail to Street E.

RESPONSE: The plans have been revised to provide a bicycle-friendly connection from the southern trailhead of the Boeckman Creek Trail to Street B; and from the central trailhead of the Boeckman Creek Trail to Street E.

F. On Street A and Street G, the cross-slope needs to be reduced to 2.5 percent.

RESPONSE: The Preliminary Streets Plan has been revised to reflect the cross-slope reduced to 2.5 percent for Streets A & G.

G. LIDA facilities for individual lots should be placed near the sidewalk at the front of each lot.

RESPONSE: Compliance with this design criterion has been noted for Construction Design. The Preliminary Plans show a typical individual LIDA facility, which is to be located on each lot to accommodate maintaining the PUE behind the sidewalk.

H. Stormwater outfalls should be placed near the low water elevation.

RESPONSE: Based on guidance provided by Steve Adams, the Preliminary Utilities Plan has been revised to show the two outfalls, with energy dissipation below the ordinary high water elevation. Based on recommendations from the Project Biologist, the outfalls are further designed to re-direct the outfall flows parallel to and downstream to the creek channel, with energy dissipation riprap. Outfalls are located at the flattest areas below the ordinary high water line.

We are proposing that the at-grade HDPE pipe goes below grade near the creek to outfall to a 5 foot deep ditch inlet (per COW detail 2120). The stormwater will then rise and bubble out of the grate and be dispersed over a Class 50 rip rap pad and slowly flow into the existing creek.

I. Provide sanitary sewer service for Lots 1-7 without placing a sanitary sewer line in Boeckman Road, as this location is reserved for a future 21-inch main.

RESPONSE: The plans have been revised to provide sanitary sewer laterals to Lots 1-7 consistent with this design item, without lines in Boeckman Road.

J. Trees #5129 and #5994 are identified within the Tree Maintenance and Protection Plan as being reduced in height and left as snags. For the purpose of calculating overall removal fees and mitigation, these trees are considered to be a removal.

RESPONSE: The Arborist's Report has been revised to clarify that the two snags are counted as being removed, even though retained, for wildlife habitat, and do not counted for mitigation credit.

K. Provide confirmation from the project arborist that the river stone proposed underneath preserved trees in Tracts A and G will not be too heavy for the trees' roots.

RESPONSE: The project Arborist has provided design guidance relative to the river rock under the tree canopies in Tracts A & G. The landscaping plan has been revised to remove the river rock and provide a fabric barrier with soil amendments. The fabric will allow the soil to breathe, while helping to kill existing grasses and make weed removal much easier. A layer of the amended soil will cover the fabric below an organic amendment.

L. Sheet 10A, note 2 discusses tree protection fencing. The proposed 5-foot steel fencing on concrete blocks does not meet the City's Public Works Standards for tree protection fencing, which specify steel or aluminum posts 6 feet in height driven 2 feet into the ground. Please revise this note consistent with the City's Public Works Standards.

RESPONSE: Sheet 10A and the Arborist's Report have been revised to specify the correct tree protection fencing details.

M. For the purposes of evaluating garage width, duplexes should be measured using the garage wall standard, pursuant to Subsection 4.127 (.015) 3. B. a. The provided duplex example is not measured in this manner. While these are preliminary examples, at the time of building plan review it will be necessary for the duplex garages to be measured consistent with this provision.

RESPONSE: The City has interpreted the Code to consider "duplex" and attached single family as equal in the NR zone. Therefore (.15)B.3.a is applicable for Lots 23/24, 39/40 and 61/62, as Lots 31/32, 239/40 are alley loaded units. Pahlisch Homes will need to provide revised unit designs complying with the garage width standard at the time of building permit review.

N. Revise findings for Site Design Review to address project elements subject to Site Design Review, rather than entire development. Specific project elements subject to Site Design Review include:

- ✦ Tracts and their landscaping*
- ✦ Landscaping in the public right-of-way*
- ✦ Boeckman Road wall*

RESPONSE: The Site Design Review section of the Narrative has been revised to eliminate discussion of architectural provisions, and just addresses landscaping details.

O. In Tract A southeast of Lot 76, channel restoration work shall be required prior to dedication of the tract to the City. A Phase I Environmental Site Assessment will also be required.

RESPONSE: A Phase I Environmental Assessment has been prepared for the entire development site, including Tract A, which is to be dedicated to the City. Copies of the report have been submitted to the City Engineering Department.

The Compliance Narrative and the Preliminary Plans have been revised to address that channel restoration within Tract A will be required prior to dedication to the City. Specific details related to such restoration will be provided with the Construction Plans, following preliminary approval.

P. As noted in the Frog Pond Master Plan, the applicant will need to enter into a Development Agreement with the City for the construction of off-site sanitary sewer improvements.

RESPONSE: The Developer, Pahlisch Homes LLC, has initiated the Development Agreement and is coordinating final editing of a Draft with the City of Wilsonville. The Agreement will be finalized with the City prior to construction of the off-site sanitary sewer within Beockman Road.

S1. Per Steve Adams 3-16-18 email, Tualatin Valley Fire & Rescues raised a concern about the pavement width for Street B (Woonerf), being less than 20 feet.

RESPONSE: Based on guidance from TVF&R and Steve Adams, this street section has been revised to provide 20 feet of pavement, not counting the curb width.

We have provided 3 copies of the complete revised documents incorporating the responses herein, including an electronic copy.

With these revisions, including School District Signature on Annexation Petition, we believe the application will be Complete.

Sincerely,
Pioneer Design Group, Inc.



Ben Altman
Senior Planner/Project Manager

Cc: Jim Wolfston, Property Owner
Mike Morse, Pahlisch Homes



March 13, 2018

Jim Wolfston
CollegeNet, Inc.
805 SW Broadway, Suite 1600
Portland, OR 97205

Application Numbers: DB18-0015 through DB18-0021 Morgan Farm
Legal: The property described as Tax Lots 2400, 2600, 2700, Section 12D, Township 3 South, Range 1 West, Willamette Meridian, Clackamas County, Oregon.

Status: Notice that Your Application IS NOT COMPLETE.

Dear Mr. Wolfston:

You are listed as the applicant on a City of Wilsonville Site Development Application form submitted regarding the property described above. The city received your applications on February 15, 2018 for Annexation, a Zone Map Amendment, Stage I Master Plan, Stage II Final Plan, Site Design Review, Tentative Subdivision Plat, Type C Tree Plan, SRIR Review, and SROZ Boundary Verification.

The applications submitted are incomplete, based on the applicable provisions of ORS 227.178(2) and Subsection 4.035(.05) Wilsonville Code ("WC"), due to the following missing items 1-12:

General

1. Inclusion of water meter locations on the Preliminary Utility Plan. See Subsections 4.035 (.04) and 4.210 (.01) B. WC.
2. Draft Bylaws and/or CC&Rs. See Subsection 4.210 (.01) B. 19. WC.
3. Inclusion of the right-of-way dedication from the West Linn-Wilsonville School District property within the annexation request. Section 4.700 WC.
4. General location and type/purpose of anticipated easements to be shown on Preliminary Plat. Among the various easements, include public access easements over tracts with bicycle and pedestrian facilities. See Subsection 4.210 (.01) B. 16. WC.

5. As noted in the submitted Tree Maintenance and Protection Plan, written consent of adjoining property owner for removal of trees #7572, #7573, #7576, #7577, #7578, #7579, #7581, #7582, and #7585 along the northern boundary line. See Subsection 4.035 (.04) WC.

Landscape Plans

6. Indicate the location of utilities on landscape plans, along with a utility key and scale. See Subsections 4.199.50 (.01) E. and 4.440 (.01) B. WC.
7. Specific information about the irrigation systems required to maintain trees and plant materials in each of landscape areas throughout the site. Where irrigation is proposed near trees, insure that recommendations of project arborist are followed. See Subsection 4.176 (.07) C. WC.

Site Design Review

8. Information on design and materials of all retaining walls, ornamental fences, wooden fences, and the Boeckman Road wall. See Figure 11 of Frog Pond West Master Plan and Subsection 4.440 (.01) WC.
9. Information on design and materials for trail entry markers, exercise clusters, the picnic shelter, tables, benches, and other structures located on open space tracts. See Subsection 4.440 (.01) WC.

Frog Pond West Master Plan Compliance

10. Information on street light design and location, as well as pathway lighting consistent with the Frog Pond West Master Plan. See Public Lighting Plan beginning on page 77, and Figure 42 of the Frog Pond West Master Plan and Subsection 4.034 (.05) WC.
Address all of the following:
 - Local Streets
 - Pedestrian Connections and Trailhead Lighting
11. Information showing conformance with the street tree rules in the Frog Pond West Master Plan. In particular Streets A and G must demonstrate conformance with the Primary Streets street tree requirements and other streets the Neighborhood Streets requirements. See Figure 43 and Table 2 of the Frog Pond West Master Plan, Subsections 4.034 (.05) and 4.440 (.01) WC as well as City "Document Design Guidelines for Planting Strips in Subdivisions."
12. Information demonstrating coordination of the Frog Master Plan design elements for the Boeckman Road frontage, street sign cap, and street trees along Street G with West Hills Land Development, who has proposed a subdivision along Boeckman Road to the east of the school district property. See page 27 under Coordinated and cohesive development, page 28 under Master Plan Intent, page 82 under Primary Streets street trees, and page 92 under Monuments and Signs of the Frog Pond West Master Plan.

In addition to the incompleteness items 1-12 listed above, the following questions and comments regarding compliance came to City staff's attention while reviewing the materials for completeness. Please respond and/or incorporate into updated materials as appropriate.

- A. Clarify site acreage measurements so that they are consistent throughout the project narrative. References are made to the project site being both 20.13 acres in size and 21.13 acres in size.
- B. Clarify references to the proposed zoning district within the narrative and supporting materials. The correct zoning designation is "RN" or "Residential Neighborhood."
- C. Lot 76 does not meet minimum lot width standards, and the proposed driveway exceeds the maximum allowed width when combined with Lot 77. Adjust the eastern property line of Lot 76 to meet the minimum lot frontage requirement and separate Lots 76 and 77 into two separate driveways.
- D. To provide pedestrian access to the future school site at the intersection of Street A and Street E, curb extensions were previously discussed with the City's Engineering Division. Please indicate these curb extensions within the plan set.
- E. Provide a bicycle-friendly connection from the southern trailhead of the Boeckman Creek Trail to Street B. Provide a bicycle-friendly connection from the central trailhead of the Boeckman Creek Trail to Street E.
- F. On Street A and Street G, the cross-slope needs to be reduced to 2.5 percent.
- G. LIDA facilities for individual lots should be placed near the sidewalk at the front of each lot.
- H. Stormwater outfalls should be placed near the low water elevation.
- I. Provide sanitary sewer service for Lots 1-7 without placing a sanitary sewer line in Boeckman Road, as this location is reserved for a future 21-inch main.
- J. Trees #5129 and #5994 are identified within the Tree Maintenance and Protection Plan as being reduced in height and left as snags. For the purpose of calculating overall removal fees and mitigation, these trees are considered to be a removal.
- K. Provide confirmation from the project arborist that the river stone proposed underneath preserved trees in Tracts A and G will not be too heavy for the trees' roots.
- L. Sheet 10A, note 2 discusses tree protection fencing. The proposed 5-foot steel fencing on concrete blocks does not meet the City's Public Works Standards for tree protection fencing, which specify steel or aluminum posts 6 feet in height driven 2 feet into the ground. Please revise this note consistent with the City's Public Works Standards.
- M. For the purposes of evaluating garage width, duplexes should be measured using the garage wall standard, pursuant to Subsection 4.127 (.015) 3. B. a. The provided duplex example is not measured in this manner. While these are preliminary examples, at the time of building plan

review it will be necessary for the duplex garages to be measured consistent with this provision.

N. Revise findings for Site Design Review to address project elements subject to Site Design Review, rather than entire development. Specific project elements subject to Site Design Review include:

- Tracts and their landscaping
- Landscaping in the public right-of-way
- Boeckman Road wall

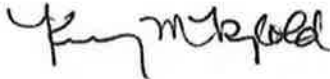
O. In Tract A southeast of Lot 76, channel restoration work shall be required prior to dedication of the tract to the City. A Phase I Environmental Site Assessment will also be required.

P. As noted in the Frog Pond Master Plan, the applicant will need to enter into a Development Agreement with the City for the construction of off-site sanitary sewer improvements.

Incompleteness items 1-12 need addressing in order to complete the applications. Please provide 3 copies of the revised project narrative, findings, and reduced 11" by 17" plans, full sheet plans drawn to scale and folded plus an electronic copy of the project narrative, findings, and plans. When you have resubmitted the application materials, staff will have up to 30 days to determine whether the application is complete. ORS 227.178. Upon determination the application is complete please provide 7 additional copies of the materials listed above. If there are revisions please provide 10 copies of the final set of plans and other materials, both paper copies and cd's.

If you have any questions, please contact me at 503-682-4960, or at rybold@ci.wilsonville.or.us

Sincerely,



Kimberly Rybold, AICP
Associate Planner
City of Wilsonville

cc via email

Ben Altman, Pioneer Design Group
Matt Sprague, Pioneer Design Group



March 13, 2018

Dear Mr. Wolfston:

As indicated in the attached correspondence, your applications:

Case File DB18-0015 through DB18-0021: ~~Stafford Meadows~~ **MORGAN FARM**

have been deemed incomplete.

You must acknowledge, in writing, your intent to provide the material required to complete the application, as identified in the attached correspondence, dated March 13, 2018. To do this, please sign below and return this acknowledgment by March 27, 2018, to:

Kimberly Rybold
City of Wilsonville Planning Division
29799 SW Town Center Loop Drive E
Wilsonville, OR 97070

If you indicate your intent to complete the application, you will have 180 days from the date of the submittal (Feb 15, 2018) to provide the required material. If you fail to submit the required material within 180 days (August 14, 2018), your application will be deemed void. The case files regarding the applications will then be closed.

If you do not return this acknowledgment, such action will be considered a refusal under the meaning accorded in ORS 227.178(2). Your applications will then be processed based upon the information you have previously submitted. Note that failure to submit sufficient evidence or material to demonstrate compliance with the applicable criteria is grounds for denial of the application.

Acknowledgement

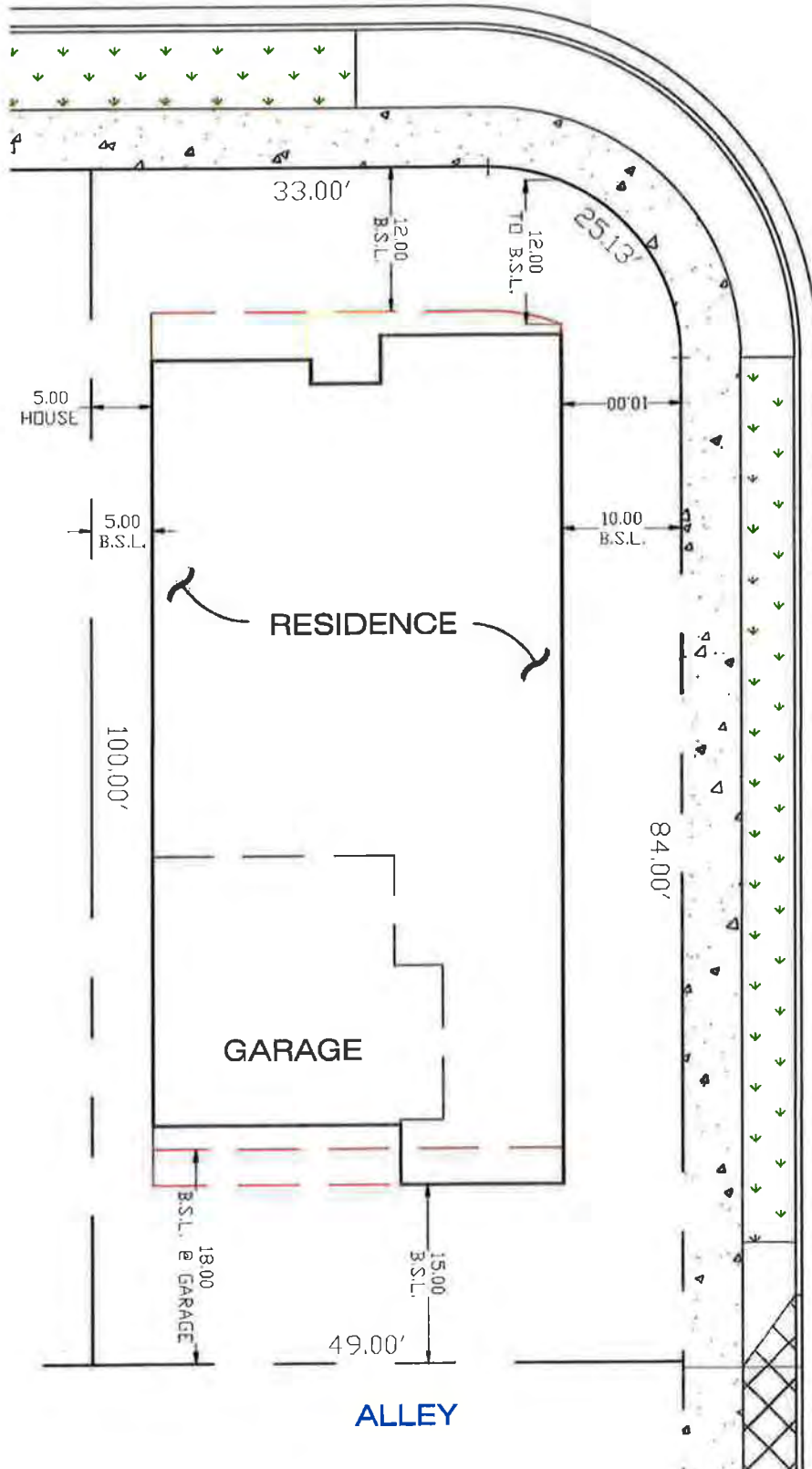
I (intend / refuse) to provide the additional material identified as incompleteness items in correspondence from the Division of Planning and Development, dated March 13, 2018.

Ben Altman Pioneer Design Group
Signed and Acknowledged (Applicant's Representative)

3-14-18

Date

STREET



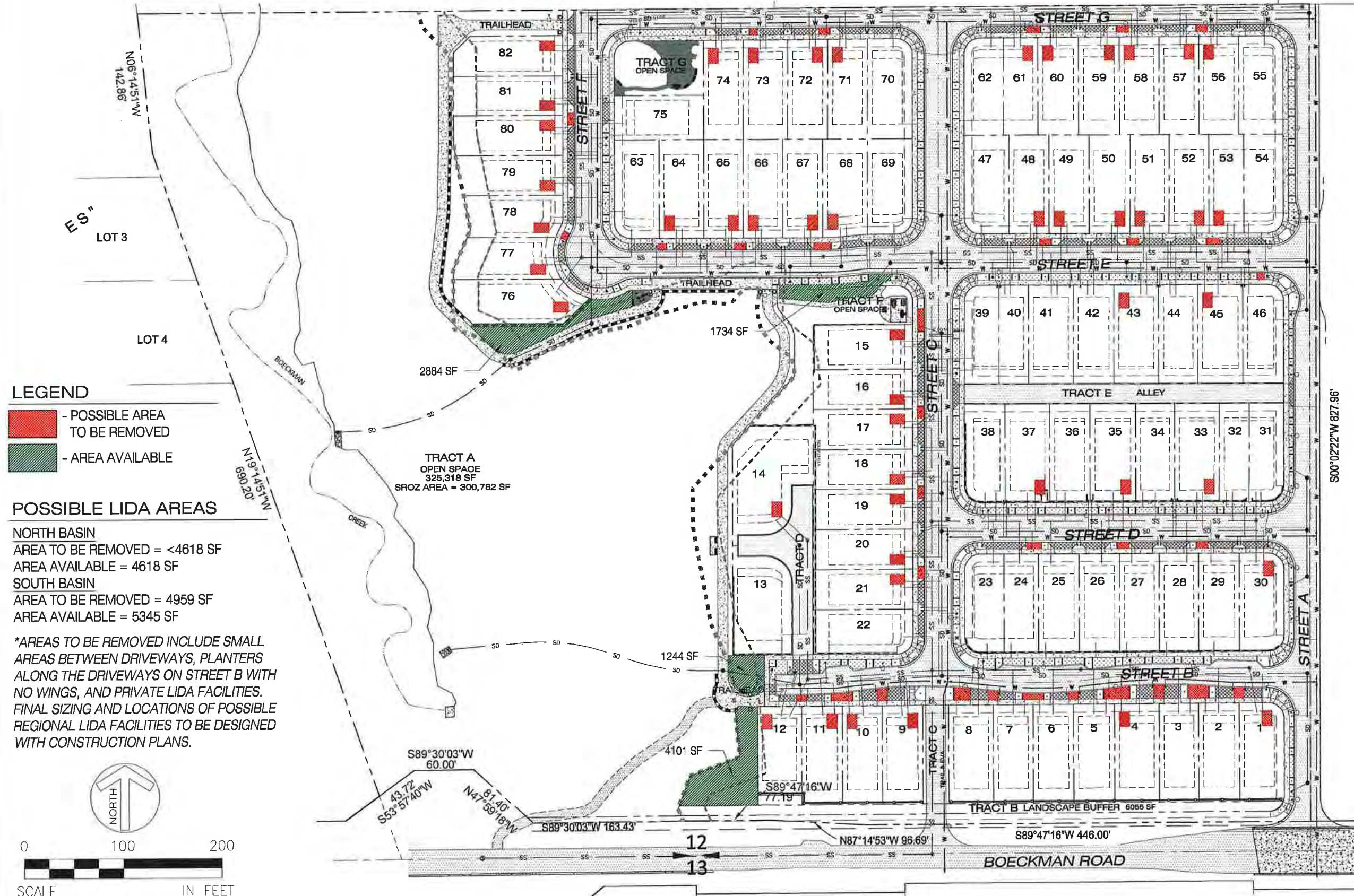
STREET

ALLEY

OFF-STREET LIDA FACILITY EXHIBIT

MORGAN FARM

N89°46'02"E



9020 SW WASHINGTON SQUARE RD.
 SUITE 170
 PORTLAND, OREGON 97223
 p 503 643.8286
 f 844.715.4743
 www.pd-grp.com



Designed by	Date	04/18
Drawn by	TCC	04/18
Reviewed by	BEF	04/18
Project No.	321-002	REF.
Horiz. Scale:	1"=100'	
Vert. Scale:		

Project
MORGAN FARM

No.
321-002

Type
ENGINEERING

Sheet

B:\Land Projects 2004\338-001\dwg\planning\Exhibits\Regional LIDA exhibit.dwg 4/25/2018 12:05:15 PM

Application



29799 SW Town Center Loop E, Wilsonville, OR 97070
 Phone: 503.682.4960 Fax: 503.682.7025
 Web: www.ci.wilsonville.or.us

**Planning Division
 Development Permit Application**

Final action on development application or zone change is required within 120 days in accordance with provisions of ORS 227.175

A pre application conference is normally required prior to submittal of an application. Please visit the City's website for submittal requirements

Pre-Application Meeting Date: _____

Incomplete applications will not be scheduled for public hearing until all of the required materials are submitted.

Applicant:

Name: Jim Wolfston
 Company: CollegeNet, Inc.
 Mailing Address: 805 SW Broadway, Suite 1600
 City, State, Zip: Portland, OR 97205
 Phone: 503-806-0526 Fax: _____
 E-mail: jim@collegenet.com

Authorized Representative:

Name: Ben Altman
 Company: Pioneer Design Group
 Mailing Address: 9020 SW Washington Sq Rd. STE170
 City, State, Zip: Portland, OR 97223
 Phone: 971-708-6258 Fax: _____
 E-mail: baltman@pd-grp.com

Property Owner:

Name: Jim Wolfston
 Company: CollegeNet, Inc.
 Mailing Address: 805 SW Broadway, Suite 1600
 City, State, Zip: Portland, OR 97205
 Phone: 503-806-0526 Fax: _____
 E-mail: jim@collegenet.com

Property Owner's Signature:


 Printed Name: James, H. Wolfston Date: 1 FEB '18

Applicant's Signature: (If different from Property Owner)

Printed Name: _____ Date: _____

Site Location and Description:

Project Address if Available: 7331 and 7447 SW Boeckman Road, Wilsonville Suite/Unit _____
 Project Location: _____
 Tax Map #(s): T3S R1W 12D Tax Lot #(s): 2400, 2600 & 2700 County: Washington Clackamas

Request:

Annexation, Zone Change, Stage I Master Plan, Stage II/Preliminary Plat, Type C Tree Plan, SRIR Review, Site Design Review
82 Lot Subdivision

Project Type: Class I Class II Class III

Residential Commercial Industrial Other: _____

Application Type(s):

- | | | | |
|--|---|---|---|
| <input checked="" type="checkbox"/> Annexation | <input type="checkbox"/> Appeal | <input type="checkbox"/> Comp Plan Map Amend | <input type="checkbox"/> Parks Plan Review |
| <input type="checkbox"/> Final Plat | <input type="checkbox"/> Major Partition | <input type="checkbox"/> Minor Partition | <input type="checkbox"/> Request to Modify Conditions |
| <input type="checkbox"/> Plan Amendment | <input checked="" type="checkbox"/> Planned Development | <input checked="" type="checkbox"/> Preliminary Plat | <input checked="" type="checkbox"/> Site Design Review |
| <input type="checkbox"/> Request for Special Meeting | <input type="checkbox"/> Request for Time Extension | <input type="checkbox"/> Signs | <input checked="" type="checkbox"/> Stage II Final Plan |
| <input checked="" type="checkbox"/> SROZ/SRIR Review | <input type="checkbox"/> Staff Interpretation | <input checked="" type="checkbox"/> Stage I Master Plan | <input type="checkbox"/> Variance |
| <input checked="" type="checkbox"/> Type C Tree Removal Plan | <input type="checkbox"/> Tree Permit (B or C) | <input type="checkbox"/> Temporary Use | <input type="checkbox"/> Other (describe) _____ |
| <input type="checkbox"/> Villebois SAP | <input type="checkbox"/> Villebois PDP | <input type="checkbox"/> Villebois FDP | |
| <input checked="" type="checkbox"/> Zone Map Amendment | <input type="checkbox"/> Waiver(s) | <input type="checkbox"/> Conditional Use | |

Compliance Narrative

**Land Use Application
City of Wilsonville**

**Frog Pond West, Sub-District 1
Morgan Farm - 82 Lot Subdivision
Tax Lots 2400 2600 & 2700 T3S R1W 12D**

**February 14, 2018
Revised March 30, 2018 for Completeness
Revised April 25, 2018 for Completeness**

OWNER:

Jim Wolfston
c/o CollegenET, Inc.
805 SW Broadway, Suite 1600
Portland, OR 97205
Contact: Jim Wolfston
Phone: 503-806-0526
Email: jim@collegenet.com

APPLICANT/DEVELOPER:

Pahlisch Homes, Inc.
15333 SW Sequoia Pkwy Suite 190
Portland, OR 97224
Contact: Mike Morse
Phone: Direct: 503-317-6500
Email: mikem@pahlischhomes.com

APPLICANT'S REPRESENTATIVES - DESIGN TEAM:

Pioneer Design Group, Inc.: Planning, Surveying, Civil Engineering
9020 SW Washington Square Road, Suite 170
Portland, OR 97223
Contact: Ben Altman, Senior Planner/Project Manager
Phone: 503-641-8311, Dir 971-708-6258
Email: baltman@pd-grp.com

Morgan Holen & Associates LLC, Arborist
3 Monroe Parkway, Suite P220
Lake Oswego, OR 97035
Contact: Morgan Holen
Phone: 971-409-9354
Email: morgan.holen@comcast.net

GeoPacific Engineering, Inc.
14835 SW 72nd Avenue
Portland, OR 97224
Contact: Ben Anderson
Phone: 503-598-8445
Email: banderson@geopacificeng.com

SWCA Environmental Consultants
1220 SW Morrison Street, Suite 700
Portland, OR 97205
Contact: Mirth Walker
Phone: 503-224-0333, ext. 6250
Email: cmwalker@swca.com

Percival Landscape Architecture
PO Box 14676
Portland, OR 97293
Contact: Joe Percival
Phones: 503-939-3547
Email: perlandscape@gmail.com

FACT SHEET

Project Name: Morgan Farm

Proposed Action: Annexation, Zone Change (County FD-10 to City SROZ & NR; Stage I Revised Master Plan; Preliminary Subdivision Plat (82 lots) (Stage II, Final Development Plans); Site Design Review; and Type C Tree Removal Plan.

Tax Map/Lots: T3S R1W 12D, Lots 2400, 2600 & 2700

Site Size: Approximately 20.13 acres

Location: 7331 and 7447 SW Boeckman Road

Zoning: RN Residential Neighborhood, Frog Pond (Sub-district 1, R-5 Small Lot Single Family) and SROZ

OWNER:

Jim Wolfston
c/o CollegeNET, Inc.
805 SW Broadway, Suite 1600
Portland, OR 97205
Phone: 503-806-0526
Email: jim@collegenet.com

APPLICANT/DEVELOPER:

Pahlisch Homes, Inc.
15333 SW Sequoia Pkwy Suite 190
Portland, OR 97224
Contact: Mike Morse
Phone: Direct: 503-317-6500
Email: mikem@pahlischhomes.com

APPLICANT'S REPRESENTATIVE:

Pioneer Design Group
9020 SW Washington Square Road, Suite 170
Portland, OR 97223
Ben Altman, Senior Planner/Project Manager
503-641-8311, Dir 971-708-6258
Email: baltman@pd-grp.com

Table of Contents

I. <u>Introduction</u>	4
II. Annexation	21
III. Comprehensive Plan	28
IV. Zone Change	55
V. Code Compliance	
NR, R-5 (Frog Pond, Sub-District 1	60
Standards applicable to all PDR	86
SROZ	87
Planned Development Regulations	90
Land Division	117
Tree Preservation	126
Site Design Review	133
VI. Final Conclusion	145
VII. Appendices	
I. Metro & Clackamas County Annexation Criteria	146
II. Statewide Planning Goals	149

I. INTRODUCTION

This application for Annexation, Zoning and Development Plan approval is submitted on behalf of Jim Wolfston the owner of Tax Lots 2400, 2600 & 2700, T3S R1W 12D; AND Pahlisch Homes, Inc., the Developer. Based on the boundary survey, these three Tax Lots combined contain approximately 20.13 gross acres or 876,700 square feet.

Mr. Wolfston has executed a purchase and sale agreement with Pahlisch Homes, Inc. Pahlisch Homes is based in Bend, Oregon, but has a local office in Tigard, managed by Mike Morse. Pahlisch Homes will be the developer for this project.

The subject site is situated in the southwest corner of the Frog Pond Master Plan, West Neighborhood, specifically in Subarea 1 (Ord 806). The property fronts on Boeckman Road with the western boundary extending into and across Boeckman Creek. Boeckman Creek and its riparian canyon are designated as Significant Resource, to be zoned SROZ.

The general land use designation for Frog Pond West is Neighborhood Residential (NR). The subject site is within Sub-district 1, which is further designated for small lot single family (R-5) in the Frog Pond West Master Plan. The designated density range is 66 to 82 units, with a requirement for 10% of the units to be attached single-family or duplexes (2-attached units). Density transfer from the SROZ has been factored into the maximum density allowed at 82 units. The Plat will be known as Morgan Farms.

Existing Conditions

The site is currently developed with two existing houses (one on TL 2400 & one on TL 2600). Tax Lots 2400 and 2700 are further developed as an equestrian center with barns, stables and pastures for horses. The remainder of the site is undeveloped. The two homes and equestrian facilities will all be removed to accommodate the proposed new development.

Primary access to the property will be via a new local street intersecting with Boeckman Road. The primary access road will also provide access to the school property, which is adjacent to the east (Tax Lot 2300, Map 31 W 12D). This property is identified for a future elementary school.

The subject property contains approximately 20.13 gross acres or 876,700 square feet. The western portion of the property includes Boeckman Creek and its riparian canyon, all of which is designated as Significant Resource, to be zoned SROZ. The SROZ covers 6.905 acres or 300,782 square feet, which equals 34.1% of the gross site. The net buildable site area, minus the SROZ and street rights-of-way is 8.84 acres or 385,125 square feet.

Table 1
Net Developable Land

Gross Site Area	Streets & Alley	SROZ	Net Site Area
876,700 sf	196,593 sf	300,782 sf	385,125 sf

Surrounding Uses

The property is situated in the southwest corner of the Frog Pond West neighborhood, which is generally developed as rural residential. The Master Plan area is bounded by Boeckman Road on the south and Stafford Road on the east. As noted, the western boundary of the site is framed by Boeckman Creek. To the south, across Boeckman Road is the Arbor Crossing development.

School Property

The eastern boundary of the subject site abuts property owned by the West Linn-Wilsonville School District. The District owns 25 acres consisting of 3 tax lots. The District has identified the 10 acres adjacent to and east of the subject site for a future elementary school (tax lot 2300). In the interim, the district currently operates an agricultural environmental education center at this location.

The Design Team has coordinated with the District and the City relative to street alignments and site access. The District does not anticipate construction of the new primary school for maybe 5 years. However, in coordination with the City, they do have a relatively good idea of how they will provide access when the school is constructed.

Most likely the school will be constructed in the southern third to half of the site with play fields in the remaining north portion. The District intends to provide bus only access to the school directly from Boeckman Road, aligned with the Laurel Glen Lane intersection, which is the access to Arbor Crossing. However, regular non-bus access will need to be provided from the main north/south street (Street A) to be constructed by the proposed development of the Wolfston property.

The District also anticipates providing for pedestrian/bike access from the surrounding neighborhood streets. More importantly the district has agreed to dedicate their half of the right-of-way for Street A. The District's dedication allows the centerline to be placed on the common property line. This alignment minimizes SROZ impacts on the west side of the development.

Further, for site and student security the District anticipates installing a 6 foot chain-link security fence around the perimeter of the site. The fence is expected to be set 6" inside of the property line, and will likely have a planted vegetative buffer. The District will not allow access from any individual private lots, but do anticipate having pedestrian/bike gates at public access points around the perimeter.

Neighborhood Park

The Frog Pond West Master Plan anticipates a neighborhood park. The City has initiated discussions with the School District to acquire the 5 acre parcel (tax lot 2200) the District owns. This planned neighborhood park site is adjacent to the east of the future 10 acre primary school. So the park, once constructed, will be within ¼ mile and very walkable from the proposed new homes in Morgan Farm.

Professional Design Team

The Planned Development Regulations require the applicant to be represented by a professional design team. The Design Team for this project, led by Pioneer Design Group, includes the following:

Planning, Engineering, and Surveying:	Pioneer Design Group, Inc.
Arborist:	Morgan Holen & Associates
Resource Specialist:	SWCA, Mirth Walker
Geo-Tech Engineering:	GeoPacific Engineering, Inc.
Landscape Architecture:	Percival Landscape Architecture
Lighting Engineer:	R & W Engineering, Inc.
Developer:	Pahlisch Homes, Inc.

Pre-Application Review and Development Plan Refinement

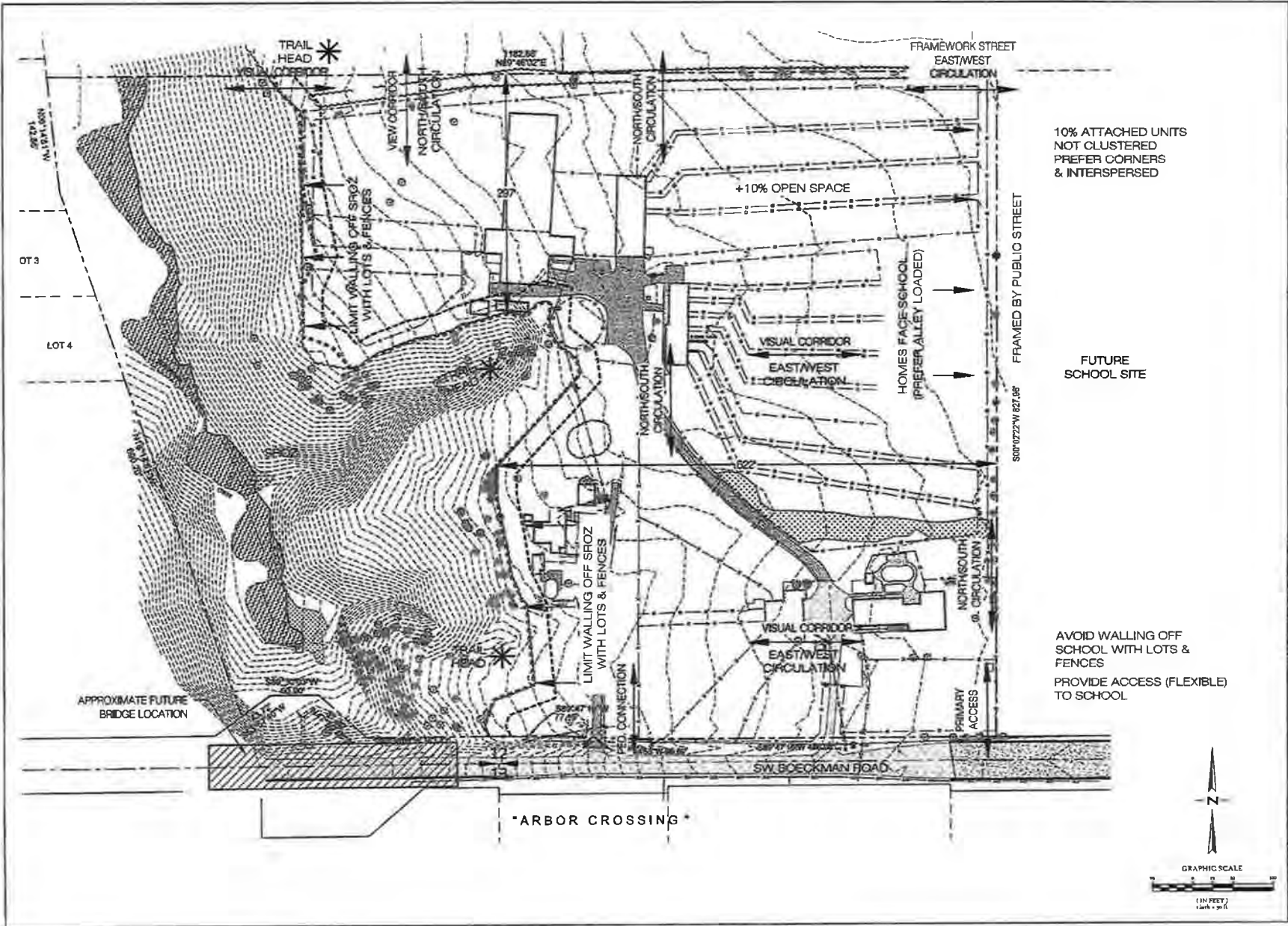
Mr. Wolfston has conducted two pre-application conferences on conceptual plans, one in July 2017 and another in December 2017. These preliminary reviews provided valuable feedback from the City staff, as this is one of the first developments proposed in the Frog Pond West Neighborhood. Based on review comments, and the developer's desired lot mix, a refined Preliminary Plat has been prepared.

The initial plan created 88 lots, accounting for a density transfer from the SROZ, maximizing the development potential of the property. However, it was found that this lot layout failed to meet several of the Frog Pond Master Plan design objectives.

A revised plan for 85 lots was then prepared and reviewed in the second pre-application conference. The revised preliminary plan better met the majority of the design objectives, but not all of them. It also included a density transfer of 3 additional units for a total of 85 lots. Through the pre-application review, it was confirmed that a density transfer was not permitted within Area 1.

The Frog Pond West Master Plan Objectives Exhibit on the following page reflects the key design criteria set forth in the Master Plan, and as summarized below. These design criteria frame the desired neighborhood design outcomes.

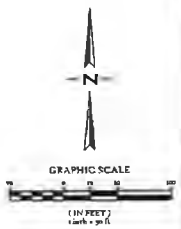
At the same time, they combine to create challenging constraints when applied to this specific property. This is a challenging site when applying all of the Master Plan Design Objectives given its irregular shape. In particular this site is constrained by irregular shape, protected resource and street rights-of-way. The need to provide access to the school site constrains development options on the east side. There is also the primary east/west "framework street" from Stafford Road aligned along the northern boundary. There are streets framing three side of the property, each requiring right-of-way in specific locations, further altering the already odd geometry of the useable land area. The SROZ frames the west boundary in a very irregular shape. Given all of that, the proposed preliminary plat has been designed to comply with the Master Plan Objectives, reflected in the following graphic and summarized below.



10% ATTACHED UNITS
NOT CLUSTERED
PREFER CORNERS
& INTERSPERSED

FUTURE
SCHOOL SITE

AVOID WALLING OFF
SCHOOL WITH LOTS &
FENCES
PROVIDE ACCESS (FLEXIBLE)
TO SCHOOL



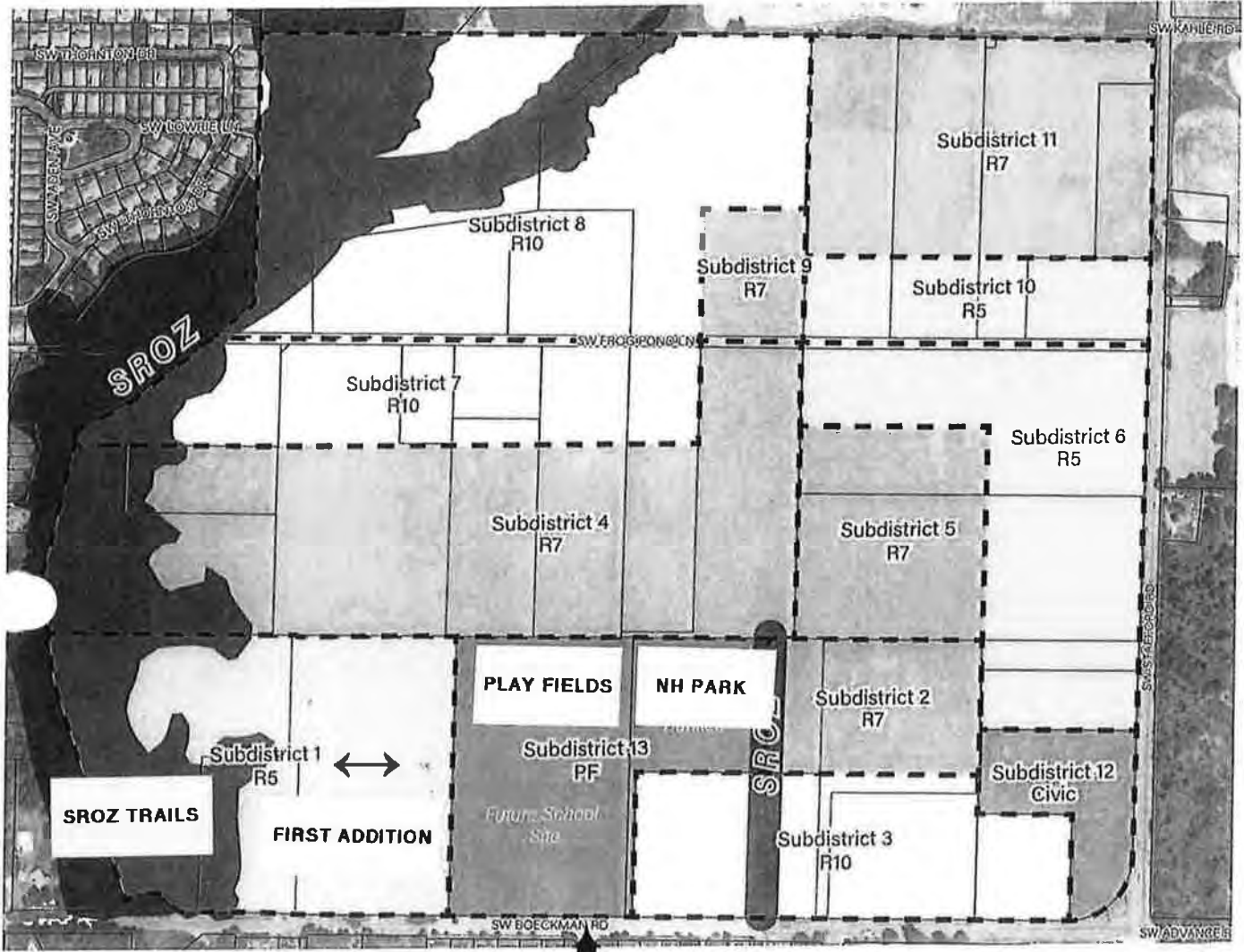
**STAGE I MASTER PLAN -
CONCEPTUAL**

MORGAN FARMS
CITY OF WILSONVILLE, OREGON

Prepared by: WLS Date: 02/20/08
 Drawn by: TCC Date: 02/20/08
 Checked by: MJS Date: 02/20/08
 Project No.: 200801
 North Scale: 1" = 50'
 Map Scale: 1/8"

Public:
 MORGAN FARMS
 No.: MSP-001
 Type: PLANNING
 Date:

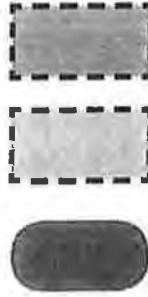
Figure 6. Frog Pond West Land Use and Subdistricts



SCHOOL ACCESS ALIGNED WITH



- R5 - Small Lot Single Family **LAUREL GLEN LN.**
- R7 - Medium Lot Single Family
- R10 - Large Lot Single Family



- Public Facilities
- Civic
- Significant Resources Overlay Zone (SROZ)

* Land banked for school facilities, a neighborhood park, and/or residential use.



Project Description

Scope of Application

This application includes the following requested land use actions:

- Annexation, including School District right-of-way dedication;
- Zone Change – from County FD-10 to City NR and SROZ;
- PDR Stage I Master Plan (Concept Plan);
- PDR Stage II, Final Development Plan for 82 Lots (same as Preliminary Plat);
- Preliminary Plat, for 82 Lots;
- SRIR and SROZ Map boundary refinement;
- Site Design Review Landscaping of Open Spaces and Common Areas; and
- Type C Tree Removal and Preservation Plan.

This application and proposed development plans are based on the adopted Frog Pond West Master Plan and Development Code, and Pre-application plan review comments on alternative development plans.

The applicant is proposing to remove all of the existing improvements and then subdivide the property. Based on pre-application review, the proposed development plan is designed to create 82 lots, 72 lots for detached homes and 10 lots for attached single family homes. The lots sizes and unit mix have been set by Pahlisch Homes. The proposed plans provided compliance with the full range of key design criteria as described below:

Table 2
Preliminary Plan Comparison to Design Objectives
Frog Pond West Neighborhood
Wolfston - Frog Pond West First Edition

Woonerf & Alley Design (Option 14) – 82 Lots	
Design Objective	Compliance Response
1. <i>Sub-District 1 has a base designated density of 66-82 units, with a 10% requirement for Attached Units (66 = 6 units; 82 = 8 units).</i>	The proposed Plan creates 82 lots, 72 detached + 10 attached = 12.2% of total units.
2. <i>R-5 Single family lots are 4,000-6,000 sf, with Attached units at 3,000 sf per unit, and maximum attached is two units.</i>	Good lot depths @ 98 to 100 + feet; Good variability of lot widths/sizes – Largest detached lot 7,778 sf, smallest 4,000 sf. The lots for attached units are at least 3,000 to 3,449 square feet per unit. The lots for attached units are spread throughout the development, not clustered and are located at opposite diagonally separated corners.

<p>3. <i>Protect SROZ and develop trails and trail heads, linked to local street network by visual corridors and pathways.</i></p>	<p>The SROZ covers approximately 6.91 acres or 300,782 square feet of area within the Boeckman Creek riparian corridor, which equals 34.1% of the gross site.</p> <p>Within the SROZ boundary 59,207 square feet is defined as Area of Limited Conflicting Use (ALCU). The ALCU allows a maximum of 5% encroachment by development. The area of allowed encroachment is 2,960 square feet</p> <p>The SROZ area is set aside in Tract ‘A’. The applicant intends to dedicate Tract ‘A’ to the City, including access pathways.</p>
<p>4. <i>The Code requires 10% of the net developable area within the R5 Zone to be provided in open space, including 50% of that amount being “usable,” per code definition.</i></p> <p><i>The 10 foot landscaped buffer, along the Boeckman Frontage, and pedestrian pathways, are allowed to be counted to meet the 10% requirement.</i></p>	<p>The net site area, minus the SROZ and street rights-of-way is approximately 8.84 acres or 385,125 square feet. Therefore a minimum of 38,512 square feet of open space must be provided. Of that amount, at least 19,256 square feet of “usable or active” play space must be provided.</p> <p>The proposed preliminary plat provides a total of 39,654 square feet of general open space, outside of the SROZ. This equals 10.3% of the net developable area.</p> <p>The proposed “active use” area (Tract s ‘C,’ ‘F,’ ‘G’ & portions of Tract ‘A’ including the trail) contains 41,952 square feet or 105.8% of the total general open space.</p> <p>The additional open space and pathway connections provide good flexibility for coordinating trail head and active space improvements.</p>
<p>5. <i>Streets are to follow the Street Demonstration Plan to the degree practicable. However, in final adoption, the City Council emphasized their intent for public streets to frame the boundaries of the school and park sites.</i></p>	<p>The proposed preliminary plat creates a street grid substantially consistent with the Street Demonstration Plan, as refined by final adoption. The layout provides good east/west Street/View Corridors, Street B, E & G east/west and Streets C & F north/south.</p>

<p><i>In addition, the Street Plan calls for the following:</i></p> <ul style="list-style-type: none"> <i>a. Based on the City Council's stated intent, the City Engineer has accepted our alignment of Street A, along the full length of the school property.</i> <i>b. The east/west street at north property line is a "Framework Street."</i> <i>c. The standard local street is 52 foot right-of-way, 28 foot paved LID (7' swale for storm) design.</i> <i>d. Alleys are 20 foot paved, with 18 foot setback to garage.</i> <i>e. A hammer-head alternative has 29 foot width.</i> <i>f. Pedestrian Pathways are to be 26 feet in width, with a 10 foot paved path.</i> <i>g. Alternative street designs may be approved subject to waiver provisions.</i> 	<p>Streets A (P1) & G (P5) are aligned to frame School property, per City Council intent. Street B & E provide good east/west view corridors and pedestrian connections to the SROZ. Street G is aligned as a "Framework Street" in the Street Demonstration Plan, and frames the north boundary of the school, and will ultimately provide access from Stafford Rd.</p> <p>Local streets meet this standard. One Woonerf design (Street B) is proposed.</p> <p>One alley is proposed (Tract 'E') One private drive, with hammer-head (Tract 'D')) is proposed, which meets this standard.</p> <p>Pathways meet this standard, Tracts 'A' and 'C'. Tract 'A' includes Trail Heads.</p> <p>One Woonerf design (Street B) is proposed to off-set double fronted lots (22-29) and create functional street frontage for lots adjacent to Boeckman Road (Lots 1-12).</p>
<p><i>6. Streets are to provide walkable grids for north/south and east/west circulation, and/or provide mid-block pedestrian access.</i></p> <ul style="list-style-type: none"> <i>a. The Street Demonstration Plan reflects a base grid of 200-300 foot blocks.</i> <i>b. Pedestrian circulation is to be provided with a maximum spacing of 330 feet if blocks are longer.</i> <i>c. Streets are to extend to the north maintaining grid pattern and connectivity consistent with the Street Demonstration Plan.</i> <i>d. Traffic calming elements encouraged to enhance the non-vehicular environment. This is particularly important at the access to the school site.</i> 	<p>The proposed street grid creates a safe and conveniently walkable grid.</p> <p>Block lengths of 322 feet (east/west) and 110 to 220 feet (north/south) thereby meeting the 330 foot spacing for pedestrian connections, without mid-block pathways, except for Tract 'C', providing access from Boeckman Road.</p> <p>The Street Plan meets this criterion, with Streets A, C and F extending to the north property line.</p> <p>The Street Plan can meet this standard at Street B, D or E or all 3, depending upon ultimate school access location,</p>

<p>e. <i>Streets are to terminate at, or run adjacent to, the SROZ and trail heads.</i></p> <p>f. <i>East/West streets are expected to create visual corridors to the SROZ.</i></p>	<p>and desired degree of traffic calming. Where practicable the streets create visual corridors to the SROZ, including Streets B, C, E, F & G, which all terminate at or run adjacent to the SROZ.</p> <p>Streets B, E & G provide good east/west view corridor and pedestrian connections to the SROZ. Streets C & F provide north/south connections to the SROZ and “Active” Open Space.</p> <p>Street B is a Woonerf design which provides enhanced pedestrian environment, with narrowed travel lane.</p>
<p>7. <i>School Property Access:</i></p> <p>a. <i>It is anticipated the building will be set towards Boeckman Road with Direct bus access (only) from Boeckman Road.</i></p> <p>b. <i>All other vehicular access will be expected to enter the school site from the new (north/south), which is to be generally aligned along the west property line, per Street Demonstration Plan.</i></p>	<p>Subject to School Site Development Plan.</p> <p>Street A, is aligned along the west school boundary, centered on the property line. The Street design meets these criteria, with optional access from Streets B, D or E meet this standard, or all 3, depending upon ultimate school access location.</p>
<p>8. <i>Lots Front the School:</i></p> <p><i>Lots along the west side of Street A are expected to have front or side facades facing the school site to the greatest degree practicable, and alley loading is preferred, but not required.</i></p> <p>a. <i>There are menu options for meeting this criteria including:</i></p> <p>i. <i>Alley loading</i></p> <p>ii. <i>Corner lots with garages accessing from side street</i></p> <p>iii. <i>Recess garages minimum 4 feet from front of unit</i></p> <p>b. <i>Development is to be oriented so fronts or side yards face the school. Rear yards and fences may generally not face the school.</i></p>	<p>Lots along the west side of Street A have side yards facing the school property.</p> <p>One Alley (Tract ‘E’) is proposed, and lots are designed to face east/west street, which eliminates garages on Street A.</p> <p>Lot design allows for meeting this standard.</p> <p>The Lot design meets this criterion with corner/side yards facing the school site. No lots have yards that are directly adjacent to the school property.</p>

<p>9. <i>There is an expectation that the SROZ will not be “walled off” by private yards and fences. The City Council, however, did not make the same emphasis on streets framing the SROZ as they did for the school and park properties.</i></p> <p><i>The Master Plan suggests where possible lots shall be oriented to minimize rear-yard orientation to the SROZ. Where side or rear yards are adjacent to the SROZ open views into the yards are to be provided, framed by wrought iron fencing.</i></p>	<p>It is not practicable to fully avoid lots adjacent to the SROZ given its irregular shape. Consequently, the proposed Plan has 15 lots with rear or side yards abutting the SROZ. Generally these lots all have good depth of over 100 feet and do not entirely wall off the SROZ. Additional open space areas, outside of the SROZ adjoin parts of the SROZ boundary, providing trail heads and “active use” areas.</p> <p>Open fencing and landscaping criteria will be applicable for Lots 12, 13, 14 and 76-82.</p>
<p>10. <i>There are two designated SROZ Trailheads shown on the Frog Pond Master Plan. The Plan envisions view corridors extending east/west from these trailheads along streets and/or pedestrian corridors.</i></p>	<p>Streets B & E provide good east/west view corridors and pedestrian connections to the SROZ and Open Space Tract ‘F’. Streets C & F provide north/south connection to the SROZ and Open Space Tract ‘F’. Trail and Trail Head improvements will be coordinated with City Parks & Recreation Director.</p>

CONCLUSION – Compliance with Design Objectives

While the Code includes Waiver provisions, based on City Council comments and concerns at the adoption hearings, the proposed preliminary plat is designed so that no waivers are necessary.

Streets

The preliminary plat aligns the main entry street along the common property line with the school property. This primary local access (Street A) is designated P1, Primary Street, Figure 42, in the Frog Pong West Master Plan. This alignment frames the school with the street and provides for homes across the street to face the school site.

The local streets are laid out providing an efficient circulation pattern with 3 north/south and 4 east/west streets. All of the local streets will be designed consistent with the “Low Impact green street” design per Figure 21, Low Impact Development Local Street.

Generally, the local streets have a 52 foot right-of-way, with 29 foot paved travel lanes, 7 foot planter and stormwater feature, 5 foot sidewalk and 6 foot PUE. To the degree practicable the streets are aligned to provide pedestrian oriented visual corridors between the SROZ and the school site.

The proposed street design introduces a “Woonerf” section, as the first east/west aligned street. The proposed “Woonerf” section is designed to address a double fronted lot configuration for the lots between Streets B and D. This design also provides a functional local street front access for lots abutting Boeckman Road.

Street B is designed with 20 feet of pavement, consistent with Fire District standards. The curvilinear design with wide landscaping provides an enhanced pedestrian environment and visual corridor, while also buffering the rear yards of Lots 22-29, which are otherwise double-fronted.

The three north/south aligned streets (Streets A, C & H) are designed to extend to abutting properties to the north. These alignments allow for continuation of the local streets to the north consistent with the Street Demonstration Plan grid.

Street A is aligned along the west boundary of the school property, and extends to the north, intersecting with Street G (P5). Street G is also east/west “Primary Street” and is aligned along the north boundary of the school property. Design details for Street G, including street trees, have been coordinated with the Stafford Meadows development on the east side of the school property proposed by West Hills Development. This street, when fully constructed by other developments, will complete the framing of the school property with public streets.

With the cooperation of the School District for dedication of right-of-way, this project is able to align Street A with the centerline on the common property line with the school site. This street is designed with a 32 foot wide paved section from Boeckman Road north to Street E. Curb extensions will be provided at the intersection with Street A, which will be the primary entrance to the future school.

This wider section is designed to accommodate the future access to the school site. From Street E north the pavement will be narrowed to 28 feet. The District’s dedication of 28 feet avoids offsetting the street 11 feet to the west, to accommodate the minimum required ½ street improvement (technically a ¾ section to provide two full travel lanes, within an interim 37 foot section). The applicant will construct the required 37 foot half-street section. The School District will be obligated to construct the final section of the street when the school facilities are developed.

Having the street centered on the property line, instead of off-set, helps to minimize SROZ impacts where there are proposed abutting lots. More specifically it helps to minimize any building encroachments into the 25 foot Impact Area.

The alignment for Street G has the centerline offset to the south of the north property line to accommodate the minimum required ½ street improvement (technically a ¾ section to provide two travel lanes).

For Street G, the proposed “Interim” section is 33 feet instead of 37 feet. This minor adjustment was suggested by City staff, to ensure proper alignment to the east along the north boundary of the School Property. The slightly narrower interim 20 foot paved section is considered reasonable, given that there will only be 15 lots using this interim street section.

Streets A & C extend full length through the site. However, only Street A connects out to Boeckman Road. Street C is connected out to Boeckman Road by a pedestrian pathway (Tract ‘C’).

Street F only serves lots in the northwest corner of the site, but does provide for a northerly extension. However, Street H extends to the SROZ and then intersects with Street E, which extends east to Street A. These two streets provide direct access adjacent to the SROZ, in the area of the primary trail head, and Tract ‘F.’ Tract ‘F’ will provide “active use” open space improvements.

The street grid has been refined to provide compliance with the pedestrian access spacing of 330 feet. The north/south blocks range from 115 to 230 feet in length, with the east/west blocks spaced at 330 feet or less. This configuration eliminates the need for any mid-block pedestrian links.

However, with this block spacing and curvilinear nature of the SROZ, it was not possible to align Street C fully along the edge of the SROZ. Never the less, Streets B, E and G provide visual corridors from the school property to the SROZ. Streets B, C, E, F, and G all provide direct links to the SROZ or to trail heads.

Tract ‘B’ accommodates the 10 foot landscaped buffer along the Boeckman Road frontage, between the planned brick wall and the sidewalk. Tract ‘C’ provides a pedestrian link into the development and the trail system from Boeckman Road.

Trail Heads

The Frog Pond Master Plan identifies 3 planned trail heads associated with the subject property. These trail heads will provide local access to the planned regional trail system to be developed along Boeckman Creek. Preliminary improvements have been coordinated with the City Parks and Recreation Board relative to design details for the trail heads.

Tract ‘C’ provides a pedestrian connection out to Boeckman Road from the terminus of the Street C. Street C runs adjacent to the SROZ to the degree practicable and intersects with Street E, which also runs adjacent to the SROZ. The preliminary plan also provides for three pedestrian connections from the local streets and one connection from

Boeckman Road into the SROZ and planned trail heads. It is anticipated that the Trail Head will be included in the dedication of Tract 'A' to the City (SROZ).

The applicant has coordinated with the City Park & Recreation Department to develop improvement plans for the trails and trail heads. Initial ideas are to provide outdoor fitness stations, together with environmental educational signage, related to storm water management and the natural habitat of Boeckman Creek.

Open Space

The SROZ area is to be set aside in Tract 'A' and dedicated to the City. This application includes an SRIR and SROZ Map refinement, based on the site specific survey (tree & topo) details. The refined SROZ boundary includes 300,782 square feet (6.91 acres), which equals 34.1% of the gross site area. Within the SROZ boundary there are three areas containing a total of 59,207 square feet is defined as Area of Limited Conflicting Use (ALCU).

In addition to the SROZ, the Code requires 10% of the net buildable area within the R5 districts to be provided in active and passive open space. At least 50% of this open space must meet the "active use" criteria, see Table 3 below.

The proposed development meets the 10% open space requirement with landscaped open spaces including: Tracts, 'B,' 'C,' 'F,' and 'G.' In addition the Proposed Plan provides supplemental open space associated with the SROZ and trial heads, including specific "active use" (Tract 'F' & 'G') improvements.

The net site area, (minus the SROZ and street rights-of-way) is approximately 8.84 acres or 385,125 square feet. Therefore a minimum of 38,512 square feet of open space must be provided, which must include at least 19,256 square feet of "usable or active" play space.

As reflected in Table 3, the proposed preliminary plat provides a total of 39,654 square feet of general open space, outside of the SROZ. This equals 10.3% of the net developable area, thereby meeting code requirements.

The proposed "active use" area totals 41,952 square feet, which is actually 105.8% of the total general open space, which exceeds the 50% minimum requirement. The "active space" exceeds the general open space because it includes portions of the SROZ within Tract A, with trail and trail heads, while the general open space is all outside of the SROZ.

Tract 'G' include preservation of a very large 56 inch White Oak. Tract 'G' contains 4,941 square feet. Tract 'F', which contains 7,998 square feet. Both Tract 'F' and 'G' are proposed as "active open space" to be owned and maintained by the Home Owners Association (HOA).

The pathway connections and trail heads extending from Streets B, E and G are included in Tract 'A', for dedication to the City. Specific recreational improvements will be specified in the formal application, and coordinated with the trail head improvements.

Table 3
Open Space Percent of Gross & Net Site Area

Tract	Square Footage	Active Space SF	% Gross Site	% Net Site
'A' (SROZ)	300,782	8,353 Includes trail	34.1	
Tract 'A' Outside SROZ	19,281 *	19,281 ** Includes trail		
'B'	6,055			
'C'	2,600	2,600		
Tract 'F'	6,777	6,777 **		
'G' (White Oak)	4,941	4,941		
Total Open Space Total Active Space	39,654	41,952		10.3 105.8 *** of General Open Space
Total SROZ & Open Space	347,745		39.67	
Gross Site			876,700 sf	
Net Site				385,125 sf

NOTES: * Tract A includes 25,369 square feet which is outside of the SROZ, including portions of the pathway.

** A portion of Tract A, outside of the SROZ, and a portion of Tract F are being used for storm LIDA, reducing the available general and "active open space" areas. This change results in active open space remaining at 105% of the total general open space.

***The Active Open Space exceeds the General Open Space, because it includes 8,353 square feet of SROZ, which is used for the regional trail.

Because of the exceptionally irregular topographic lines, the boundary of the SROZ has also been smoothed along the edges, to simplify mapping and legal descriptions.

Lots

The base 82 lots designated for Sub-Area 1 requires at least 8 lots (10%) for attached units. The Code limits attached units to 2 units.

The proposed preliminary plat creates 82 lots, 72 for detached units and 10 lots for attached units, which equals 12.2% of the total units.

The single family, detached lots range from 4,000 to 7,778 square foot range, which is consistent with the RN, R-5 zoning. The lots for the attached units are 3,000 to 3,449 square feet per unit, which is also consistent with the R-5 sub-district zoning for the attached units.

The attached unit lots are dispersed throughout the development, so they are not clustered. These lots are also situated at diagonally opposite corners, so they are visually and physically separated within the development.

Morgan Farm

The plat name, Morgan Farm, was selected based on the history of the property. This property, including barns and stables, was originally developed for breeding horses. Bill and Helen Crawford of Boston Morgan Farm have been breeding and raising Morgan show horses for over 30 years. In 1973, they left their New England home and relocated to Wilsonville, OR.

Then late in 2003, they made a big move to their present location in La Cresta in Murrieta, CA where they built a new farm. Besides operating their horse farm, the Crawfords were also active in Wilsonville schools and youth sports, until they moved to California.

The farm's celebrity in residence, of course, is *Tug Hill Whamunition*, A World Champion (WC) Stallion in hand, six-time WC in the Park Saddle section and packing a total of 11 WC titles overall. This charismatic stallion is right at home and is enjoying welcoming visitors and charming the ladies of his court.



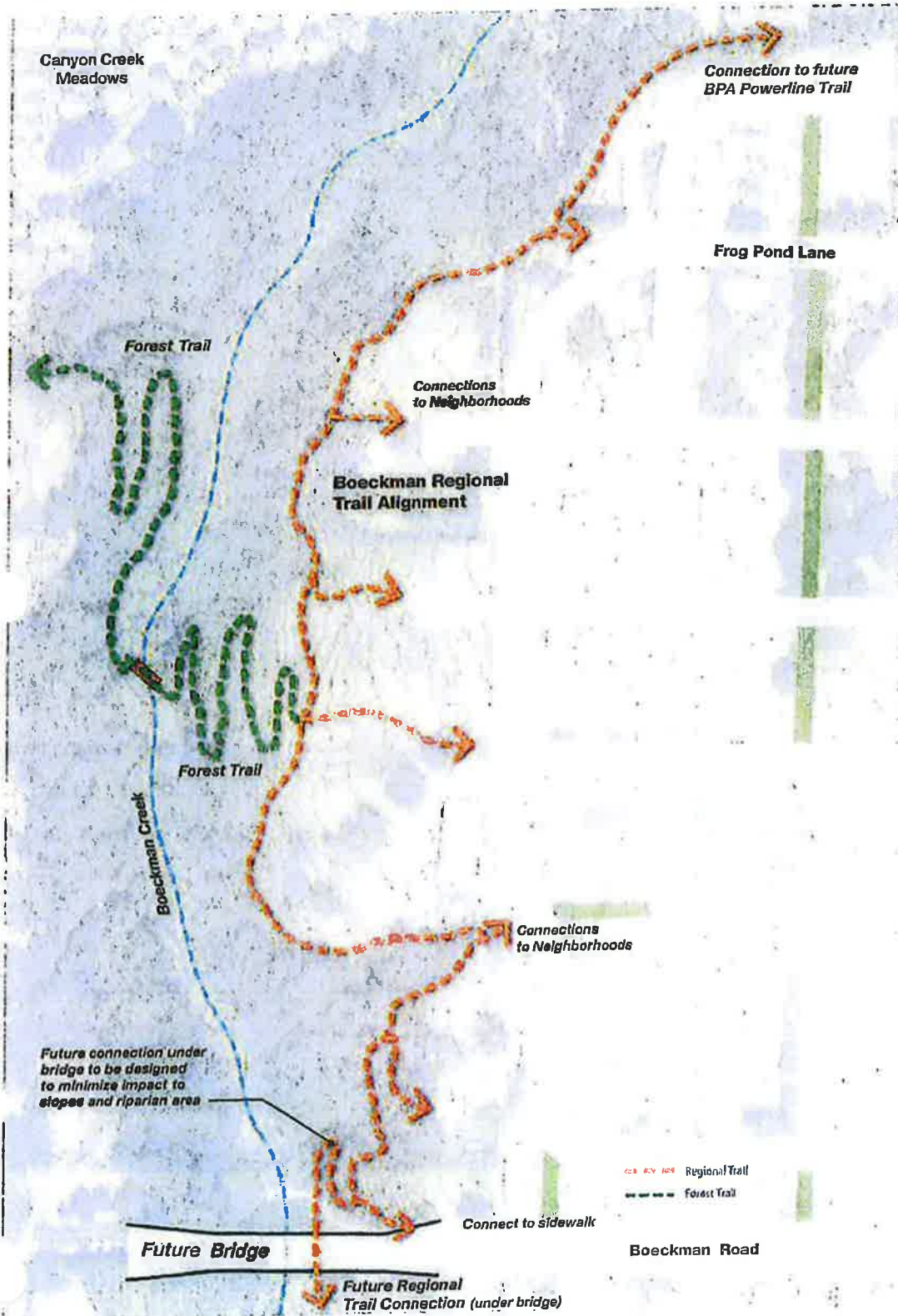
CONCLUSION – Compliance with Design Objectives

While the Code includes Waiver provisions, as summarized above and within this report, the proposed development complies with all of the Design Criteria, including density, percent of attached units, supplemental open space, and “active open space.”

Frog Pond WEST

Master Plan

Figure 30. Boeckman Trail in Frog Pond West



REPORT FORMAT

The following report addresses the City Comprehensive Plan, Frog Pond West Master Plan and Community Development Code provisions related to each of the proposed land use actions. It is formatted with the applicable policy, criterion or standard set out in (*10 pt italic*) followed by a narrative response presenting findings and conclusions relative to how this proposed development complies with that policy, criterion, or standard.

II. ANNEXATION

Requested Land Use Actions

The applicant is requesting Annexation of approximately 20 acres to the City of Wilsonville. This application includes the following Concurrent Land Use actions:

1. Zone Map Amendment County FD-10 to City NR and SROZ;
2. PDR, Stage I Master Plan;
3. SROZ Map Confirmation, with SRIR;
4. Preliminary Plat and Stage II Final Development Plan; and
5. Site Design Review

Property to be Annexed

Tax Lots 2400, 2600 and 2700, T3S R1W 12D are currently not within the City Limits, but were added to the Metro Urban Growth Boundary (UGB) in 2002. A legal boundary description of the annexation area has been provided, including the portion of Tax Lot 2300, owned by the School District, which is being dedicated for street right-of-way. These properties are currently regulated by Clackamas County, with FD-10, Future Development zoning.

These properties are within the area Master Planned by the City of Wilsonville as Frog Pond West (Ord 806). The master planning was completed in order to qualify the area for annexation, under Metro's Urban Growth Management requirements.

Ordinance 806 amended the City's Comprehensive Plan to establish the Frog Pond West Residential Neighborhood Plan, providing for three levels of Sub-District densities. The subject properties are within Sub-District 1, which is designated for R-5 small lot single family development. The City's applicable zoning, upon annexation, is NR.

Jim Wolfston is submitting a Petition to annex Tax Lots 2400, 2600 and 2700, Map T3S R1W 12D. The Petition represents 100% of the land owners therefore no elector approval is required.

Rezoning of Property

The property is currently under Clackamas County jurisdiction, with FD 10 Zoning. With the requested annexation, City of Wilsonville zoning will be applied. The

developable portion of the site will be zoned NR, while Boeckman Creek and its riparian canyon will be zoned SROZ. Legal descriptions have been provided.

Existing Conditions - Infrastructure

The Frog Pond West Neighborhood is bounded on the west by Boeckman Creek, on the south by Boeckman Road and on the east by Stafford Road. The Boeckman Creek corridor is designated as a Significant Natural Resource.

Both Boeckman and Stafford Roads are designated as Arterial streets. In conjunction with the West Linn/Wilsonville School District the City has recently completed intersection improvements at the four-way intersection of Wilsonville Road, Boeckman Road, Advance Road and Stafford Road. Otherwise, these two arterials are currently two-lane streets, and are not, yet, fully improved to urban standards.

There are city services including: existing sanitary sewer and storm drainage lines to the southwest and southeast of the subject properties. The sanitary sewer must be extended from the southwest to serve the area to be annexed. Water is currently available within Boeckman Road.

Public Utilities

- Water – There is an existing 12” water main within Boeckman Road (south side.
- Sanitary Sewer – The Boeckman Creek Trunk Line is located with the Boeckman Creek canyon, which abuts the west boundary of the subject site. The Sewer Master Plan calls for extension of an 18” line, within the Boeckman Road right-of-way to the east to the Wilsonville Road intersection.
- Storm Drainage – Boeckman Creek is the major drainage channel for the Frog Pond Area. Storm drainage for the proposed development will be designed with “green streets” and individual on-lot LIDAs. The outfalls to the creek will be designed to minimize bank erosion, utilizing energy dissipation facilities.

However, annexation must occur before these services will be available to serve development of the subject properties and Frog Pond West generally. The accompanying Annexation Petition initiates that process. It is understood that the annexation must be completed, for the City to officially hold the land use jurisdiction for development review. The City will be processing the annexation sequentially with the other land use requests listed above.

The City has adopted updated Utilities Master Plans, which identify needed system improvements to support development of the Frog Pond West Neighborhood. Based on the System Master Plans, the City will be providing the arterial street improvements, together with the sanitary sewer line extension within Boeckman Road. The subject property will be dedicating additional right-of-way along the Boeckman Road frontage to meet the arterial street standards.

Streets and Transportation

Boeckman Road

Boeckman and Stafford Roads are designated as Arterial streets (2013 TSP), both providing primary access to the Frog Pond West Neighborhood. Boeckman Road fronts the Site. See Comprehensive Plan, Public Facilities section for more details.

Infrastructure Funding

As an implementing element for the Frog Pond Master Plan, the City has adopted Resolution 2649. This resolution lays out the Supplemental Fees for Off-site infrastructure improvements. There is also a draft Development Agreement, which will be formalized with each development application, as part of the Annexation/Zoning.

CODE COMPLIANCE - Annexation

ANNEXATIONS AND URBAN GROWTH BOUNDARY AMENDMENTS

Section 4.700. Procedures Relating To The Processing Of Requests For Annexation And Urban Growth Boundary Amendments.

- (.01) *The City of Wilsonville is located within the Portland Metropolitan Area, and is therefore subject to regional government requirements affecting changes to the city limits and changes to the Urban Growth Boundary (UGB) around Wilsonville. The City has the authority to annex properties as prescribed in State law, but the City's role in determining the UGB is primarily advisory to Metro, as provided in Oregon Revised Statutes. The following procedures will be used to aid the City Council in formulating recommendations to those regional entities. [Amended by Ordinance No. 538, 2/21/02.]*
- A. Proponents of such changes shall provide the Planning Director with all necessary maps and written information to allow for review by city decision-makers. The Planning Director, after consultation with the City Attorney, will determine whether each given request is quasi-judicial or legislative in nature and will make the necessary arrangements for review based upon that determination.*
 - B. Written information submitted with each request shall include an analysis of the relationship between the proposal and the City's Comprehensive Plan, applicable statutes, as well as the Statewide Planning Goals and any officially adopted regional plan that may be applicable.*
 - C. The Planning Director shall review the information submitted by the proponents and will prepare a written report for the review of the City Council and the Planning Commission or Development Review Board. If the Director determines that the information submitted by the proponents does not adequately support the request, this shall be stated in the Director's staff report.*
 - D. If the Development Review Board, Planning Commission, or City Council determine that the information submitted by the proponents does not adequately support the request, the City Council may oppose the request to the regional entity having the final decision making authority.*

- (.02) *Each quasi-judicial request shall be reviewed by the Development Review Board, which shall make a recommendation to the City Council after concluding a public hearing on the proposal.*
- (.03) *Each legislative request shall be reviewed by the Planning Commission, which shall make a recommendation to the City Council after concluding a public hearing on the proposal.*

RESPONSE: The Frog Pond area was added to the regional UGB in 2002 by Metro. The City has subsequently completed and adopted (legislative action) the Frog Pond West Neighborhood Master Plan (Ord. 806). The Master Plan establishes the intended residential neighborhood development pattern, and provides the basis for annexation of properties within the Master Planned Area. Infrastructure funding, needed to support development of the Frog Pond West Neighborhood is outlined in Resolution 2649. Resolution 2649 established supplemental fees, to cover the costs of Off-Site Infrastructure improvements to be provided by the City.

This request for annexation represents a quasi-judicial review per sub-section (.02) and will be reviewed by the Development Review Board and City Council.

(.04) The City Council shall consider the information in the record of the Development Review Board or Planning Commission and shall, after concluding a public hearing on the request, determine the appropriate course of action. That course of action may be:

- A. In the case of a proposed amendment to the Regional Urban Growth Boundary: forward its recommendation in the form of a Resolution to the Metro Council.*
- B. In the case of a proposed annexation to the City, select from the following as allowed by State law (ORS 222):*
 - 1. Take no action;*
 - 2. Declare the subject property, or some portion thereof, to be annexed;*
 - 3. Set the matter for election of the voters residing within the affected territory; or*
 - 4. Set the matter for election of City voters.*

(.05) The City Council may adopt a development agreement with the owners of property that is proposed for annexation to the City, and such agreement may include an agreement to annex at a future date. A development agreement with an agreement to annex shall be subject to the same procedural requirement as other annexations in terms of staff report preparation, public review, and public hearings.

RESPONSE: The requested annexation is not an amendment to the Regional UGB. Therefore Sub-section (B.) is applicable. The following findings address the City's Comprehensive Plan provisions applicable to this annexation request. Under the provisions of Resolution 2649 the City will require execution of a Development Agreement to ensure implementation of the necessary Infrastructure Improvements set forth in the Frog Pond West Master Plan.

The following section addresses compliance with the Comprehensive Plan and Frog Pond Master Plan.

WILSONVILLE URBAN GROWTH AND BOUNDARY AMENDMENTS

Section 4.700. Procedures Relating To The Processing Of Requests For Annexation And Urban Growth Boundary Amendments.

(.01) The City of Wilsonville is located within the Portland Metropolitan Area, and is therefore subject to regional government requirements affecting changes to the city limits and changes to the Urban Growth Boundary (UGB) around Wilsonville. The City has the authority to annex properties as prescribed in State law, but the City's role in determining the UGB is primarily advisory to Metro, as provided in Oregon Revised Statutes. The following procedures will be used to aid the City Council in formulating recommendations to those regional entities. [Amended by Ordinance No. 538, 2/21/02.]

A. Proponents of such changes shall provide the Planning Director with all necessary maps and written information to allow for review by city decision-makers. The Planning Director, after consultation with the City Attorney, will determine whether each given request is quasi-judicial or legislative in nature and will make the necessary arrangements for review based upon that determination.

RESPONSE: The Petitioners, Jim Wolfston, owner of Tax Lots 2400, 2600 & 2700, Map T3S R1W 12D; and West Linn-Wilsonville School District, owner of Tax Lot 2300 are requesting annexation of all of Tax Lots 2400, 2600 & 2700; and a portion of Tax Lot 2300, into the City of Wilsonville.

The applicant has included an executed petition including one hundred percent of property owners within the affected territory. Because this is a 100% Owner Petition electors within the area to be annexed are not relevant to the process.

The City will determine if this request will be reviewed as quasi-judicial or legislative, and process the Petition accordingly. Given the adopted Frog Pond West Master Plan, it is anticipated that it will be a quasi-judicial review.

B. Written information submitted with each request shall include an analysis of the relationship between the proposal and the City's Comprehensive Plan, applicable statutes, as well as the Statewide Planning Goals and any officially adopted regional plan that may be applicable.

RESPONSE: This narrative provides confirmation that the proposed annexation is consistent with the City's Comprehensive Plan, the adopted Frog Pond West Master Plan and other applicable state and regional plans.

C. The Planning Director shall review the information submitted by the proponents and will prepare a written report for the review of the City Council and the Planning Commission or Development Review Board. If the Director determines that the information submitted by the proponents does not adequately support the request, this shall be stated in the Director's staff report.

RESPONSE: This action is the responsibility of the City in response to the Annexation Petition being submitted.

D. If the Development Review Board, Planning Commission, or City Council determine that the information submitted by the proponents does not adequately support the request, the City Council may oppose the request to the regional entity having the final decision making authority.

RESPONSE: The Petitioners understand this option for action by the City. However, based on the documentation and evidence provided in support of the petition, and the City's commitment to implement the Frog Pond West Master Plan, the applicant believes the City will support the annexation.

(.02) Each quasi-judicial request shall be reviewed by the Development Review Board, which shall make a recommendation to the City Council after concluding a public hearing on the proposal.

RESPONSE: The City is responsible to schedule the required hearings before the Development Review Board and City Council.

(.03) Each legislative request shall be reviewed by the Planning Commission, which shall make a recommendation to the City Council after concluding a public hearing on the proposal.

RESPONSE: The Petitioners do not believe this is a legislative action, but that decision will be made by the City, and processed accordingly.

(.04) The City Council shall consider the information in the record of the Development Review Board or Planning Commission and shall, after concluding a public hearing on the request, determine the appropriate course of action. That course of action may be:

A. In the case of a proposed amendment to the Regional Urban Growth Boundary: forward its recommendation in the form of a Resolution to the Metro Council. Section 4.700. Procedures Relating To The Processing Of Requests For Annexation And Urban Growth Boundary Amendments.

RESPONSE: This Petition is for annexation into the City of Wilsonville. The subject property is already within the Metro UGB and is already served by Tualatin Valley Fire & Rescue. There are no other special districts to which this area must be annexed in order to provide urban service. All other urban services are provided by the City.

B. In the case of a proposed annexation to the City, select from the following as allowed by State law (ORS 222):

- 1. Take no action;*
 - 2. Declare the subject property, or some portion thereof, to be annexed;*
 - 3. Set the matter for election of the voters residing within the affected territory;*
- or*
- 4. Set the matter for election of City voters.*

RESPONSE: The City will determine its appropriate decision, but the Petitioners believe they have demonstrated the request is consistent with the City's Comprehensive Plan and Frog Pond West Master Plan. The annexation and associated development agreement support the City's intent to provide necessary urban infrastructure needed to serve development of the area consistent with the adopted plans. Therefore the Petition should be approved.

(.05) The City Council may adopt a development agreement with the owners of property that is proposed for annexation to the City, and such agreement may include an agreement to annex at a future date. A development agreement with an agreement to annex shall be subject to the same procedural requirement as other annexations in terms of staff report preparation, public review, and public hearings.

RESPONSE: The applicant anticipates executing a Development Agreement with the City of Wilsonville, consistent with Resolution 2649. This agreement will assign financial obligations and anticipated timeframes for urban infrastructure to the applicant and to the City respectively, as the property is developed.

The applicant has further provided findings demonstrating compliance with Metro and Clackamas County annexation criteria, and compliance with Oregon Statewide Planning Goals. These findings are found in the Appendix, attached hereto.

CONCLUSION – Growth Boundary:

Based on the findings presented here, the applicant has demonstrated that this Petition to annex approximately 20 acres into the City of Wilsonville is consistent with the following:

1. City of Wilsonville Comprehensive Plan;
2. City’s adopted Frog Pond West Master Plan;
3. Urban Planning Area Agreement between Clackamas County and the City of Wilsonville;
4. Metro Boundary Change Criteria (Appendix I) and
5. Statewide Planning Goals (Appendix II).

The City’s Master Plan, TSP and Public Facilities Master Plans demonstrate that necessary urban services can be provided without extensions being required outside of the UGB, as annexation is required prior to development, consistent with the adopted UPAA.

Therefore all approval criteria have been met.

III. COMPREHENSIVE PLAN COMPLIANCE - FROG POND WEST

MASTER PLAN

Plan Compliance

The Wilsonville Comprehensive Plan policies and implementing objectives are generally applicable, and are addressed herein. However, the Adopted Frog Pond West Master Plan provisions are more specifically applicable to this proposed development. Therefore these Master Plan provisions are also specifically addressed.

The Frog Pond West Master Plan identifies the subject property as Sub-Area 1. Sub-District 1 establishes the intended use as Small Lot Residential with a density of 8.7 units per acre (4,000 to 6,000 sf lots). The current zoning is Clackamas County FD-10. Consistent with the Frog Pond West Master Plan and concurrent with annexation the zoning is proposed to be changed to RN, Residential Neighborhood, which is within the small lot single family, R-5 Sub-District) and SROZ.

PLANNING AND ZONING DESIGNATION– RESIDENTIAL NEIGHBORHOOD

A new “Residential Neighborhood” Comprehensive Plan Map and Zoning Map designation will be applied to Frog Pond West. The purpose of the new designation is to explicitly implement the vision for Frog Pond West as a great neighborhood, as described in the following Comprehensive Plan policy:

Policy 4.1.7a *New neighborhoods in residential urban growth expansion areas may be designated “Residential Neighborhood” on the Comprehensive Plan Map.*

The Residential Neighborhood designation has been crafted so that it may be applied to the other neighborhoods within the Frog Pond Area Plan, as well as any other areas the City deems appropriate. Figure 5 shows the Residential Neighborhood designation in the context of surrounding Comprehensive Plan designations.

The Residential Neighborhood Zone district (RN) implements the Comprehensive Plan. It is a hybrid of the zoning approaches used within the City’s Planned Development Residential Zones and the Villebois Village Zone. It includes the elements summarized below and is described in more detail in the Master Plan and in the Code.

Purpose. *The purpose statement mirrors the Comprehensive Plan policy cited above.*

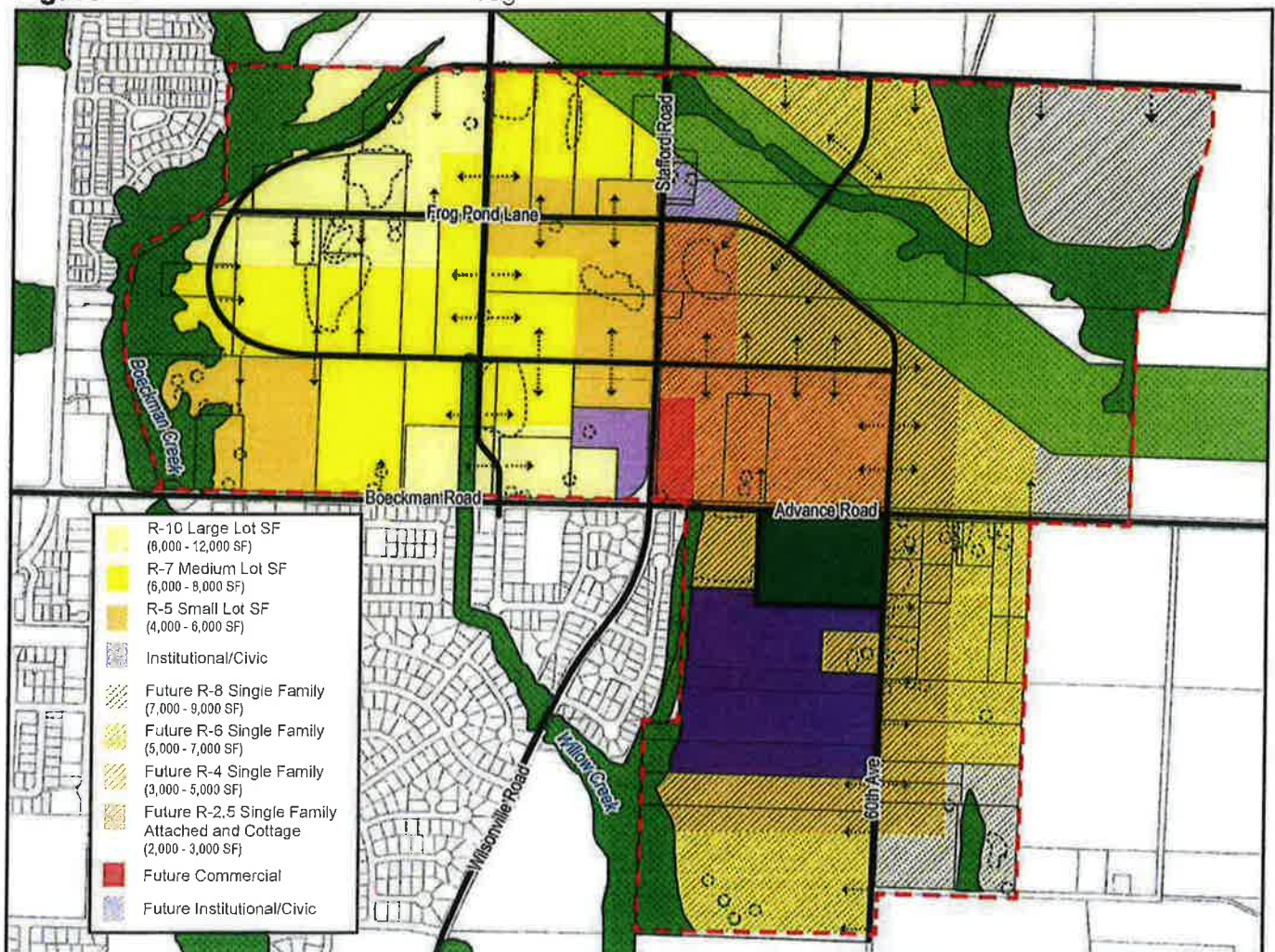
Planned Development Residential procedures. *The RN Zone will be administered through the same process as PDR Zones are in other areas of the City.*

The subdistrict approach provides a straightforward and clear method of establishing lot types, densities, and standards that implement the Area Plan. It eliminates the uncertainty that the City, property owners, and developers often face when using the old formulas for density calculation in the Code. The draft Frog Pond West subdistrict method is simpler and more predictable for all parties, while still providing flexibility. Table 1 lists the minimum and maximum dwelling units in each subdistrict.

FROG POND AREA PLAN CONTEXT

The 181-acre Frog Pond West Neighborhood is part of the larger 500-acre Frog Pond Area, which has been planned by the City in the adopted Frog Pond Area Plan¹. The entire Frog Pond Area is a logical and intuitive extension of the City of Wilsonville. Historically, it was part of the City's early settlement pattern, with important gathering places for the rural farming community, such as the Grange Hall (originally the Frog Pond School) and the Frog Pond Church. Physically, it is adjacent to key connector streets (e.g. Wilsonville and Boeckman Roads), existing neighborhoods, and natural areas such as Boeckman Creek. Even the shape of the study area wraps around the edge of the community.

Figure 4. Land Use Framework from Frog Pond Area Plan



¹ The Frog Pond Area Plan, A Concept Plan for Three New Neighborhoods in East Wilsonville, was adopted by the Wilsonville City Council on November 16, 2015.



Figure 5. Comprehensive Plan Designations

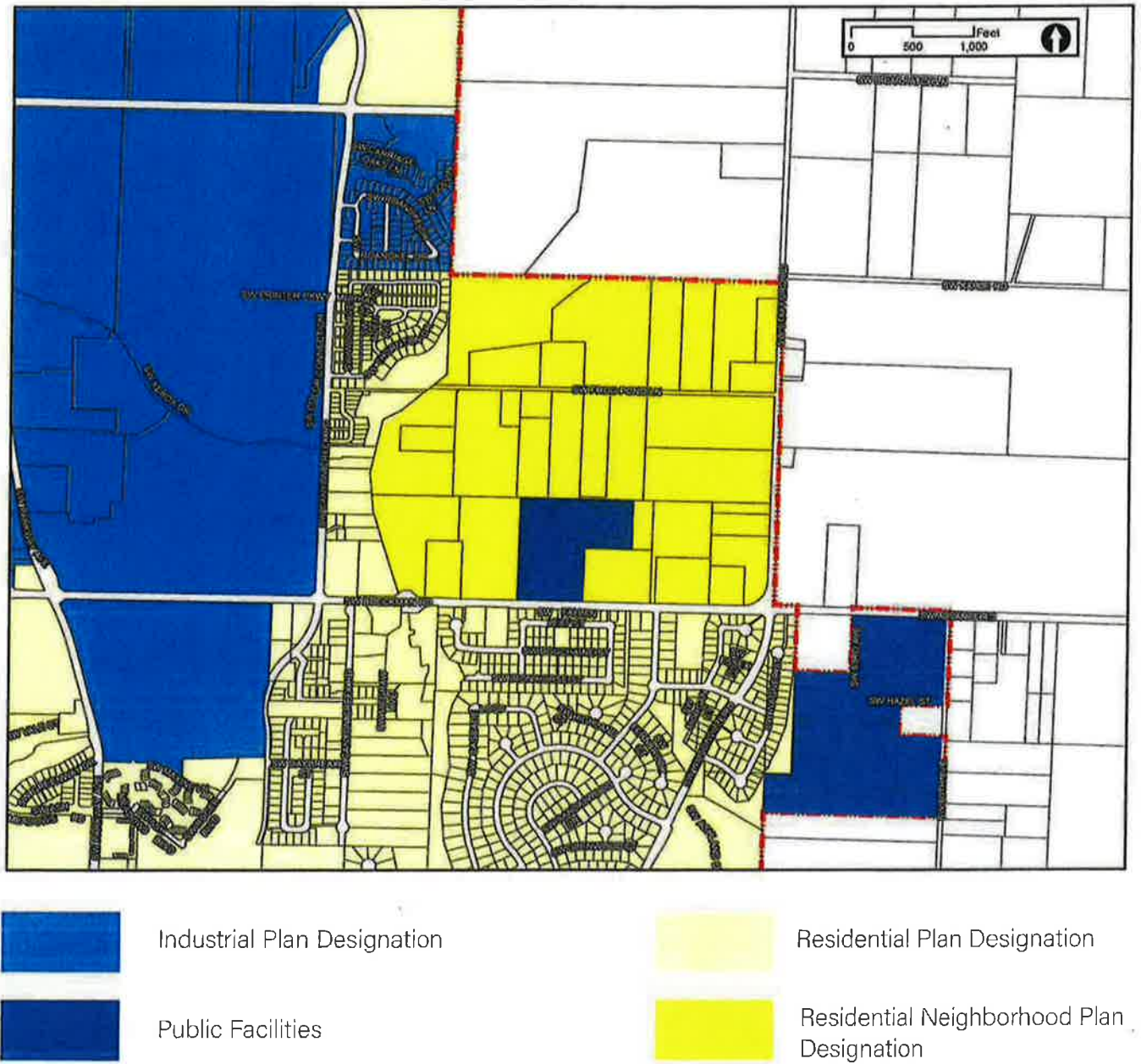
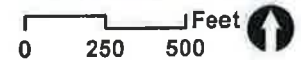
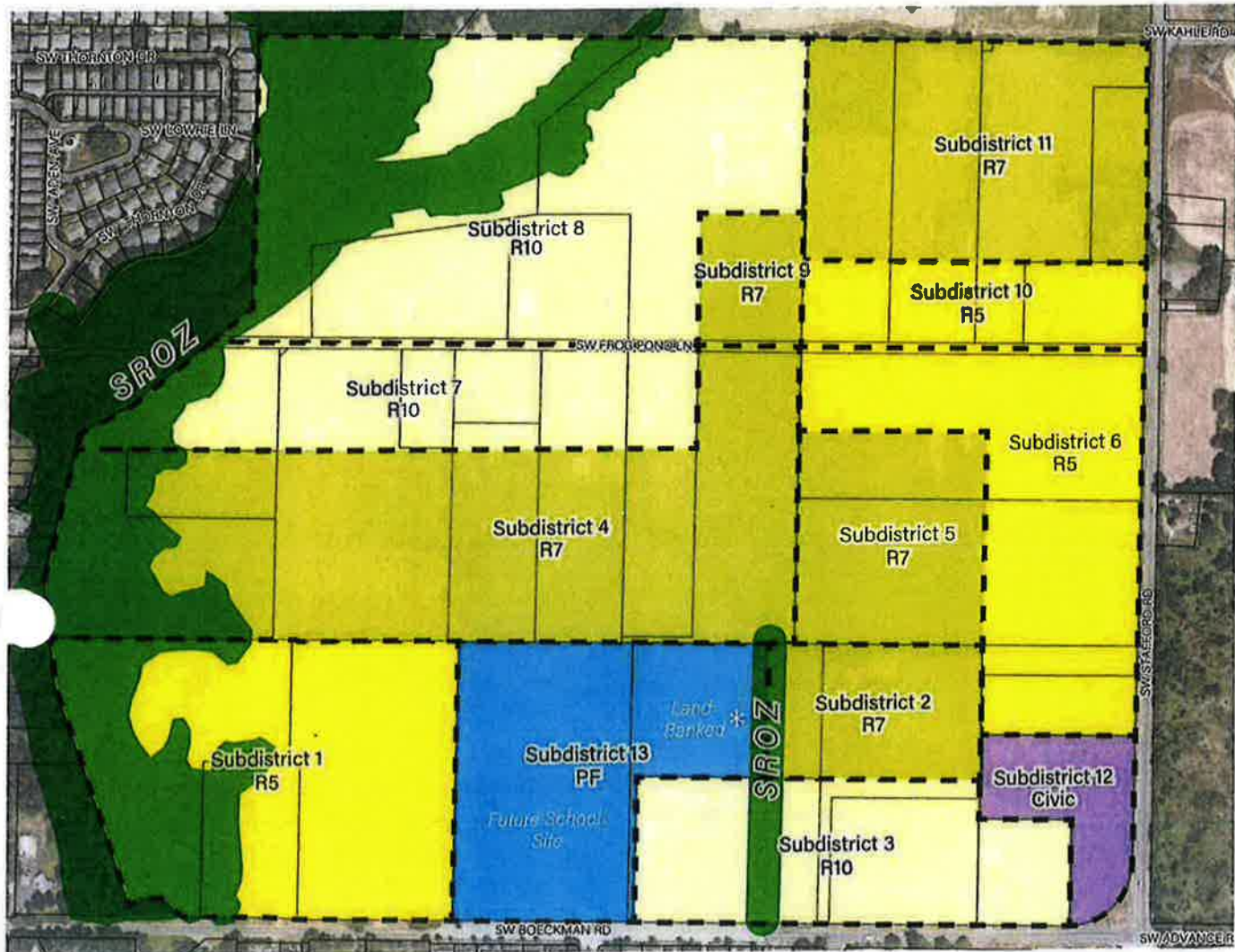




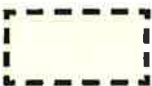



Figure 6. Frog Pond West Land Use and Subdistricts



- | | | | |
|---|-------------------------------|--|---|
|  | R5 - Small Lot Single Family |  | Public Facilities |
|  | R7 - Medium Lot Single Family |  | Civic |
|  | R10 - Large Lot Single Family |  | Significant Resources Overlay Zone (SROZ) |

* Land banked for school facilities, a neighborhood park, and/or residential use.



basis, using gross acreage. See Appendix C for further information on the subdistrict metrics and method for calculating proportional density.

- **Flexibility.** The City may allow a reduction in the minimum density for a subdistrict when it is demonstrated that the reduction is necessary due to topography; protection of trees, wetlands, and other natural resources; constraints posed by existing development; infrastructure needs; provision of non-residential uses; or similar physical conditions.

The subdistrict approach provides a straightforward and clear method of establishing lot types, densities, and standards that implement the Area Plan. It eliminates the uncertainty that the City, property owners, and developers often face when using the old formulas for density calculation in the Code. The draft Frog Pond West subdistrict method is simpler and more predictable for all parties, while still providing flexibility. Table 1 lists the minimum and maximum dwelling units in each subdistrict.

Table 1. Minimum and Maximum Dwelling Units Permitted in Each Subdistrict

Area Plan Designation	Frog Pond West Subdistrict	Minimum Dwelling Units in Subdistrict	Maximum Dwelling Units in Subdistrict
R-10 Large Lot Single Family (8,000 – 12,000 SF)	9	26	32
	7	24	30
	8	43	53
R-7 Medium Lot Single Family (6,000 – 8,000 SF)	2	20	25
	4	86	107
	5	27	33
	9	10	13
R-5 Small Lot Single Family (4,000 – 6,000 SF)	11	46	58
	1	66	82
	6	74	93
Civic	10	30	38
	12	0	7*
Public facilities (PF)	13	0	0
TOTAL		452	571

* These metrics apply to all housing within the Community of Hope Church property; should the property owner choose to develop housing on the site. Housing in the Civic subdistrict is subject to the R-7 Medium Lot Single Family regulations.



Table 1. Minimum and Maximum Dwelling Units Permitted in Each Subdistrict

Area Plan Designation	Frog Pond West Subdistrict	Minimum Dwelling Units in Subdistrict	Maximum Dwelling Units in Subdistrict
R-5 Small Lot Single Family (4,000 – 6,000 SF)	1	66	82

RESPONSE: The subject property is within Sub Area 1 of the West Neighborhood. The Frog Pond Master Plan establishes the allowed density range per Table 1 above. Sub-District 1 is designated for a density range of 66 to 82 units. The maximum 82 units already accounts for density transfer from the SROZ, so no further density bonus is available.

The proposed preliminary plat creates 82 lots, 72 lots for detached units and 10 lots for attached units. The lot sizes for detached units range from 4,000 to 7,778 square feet. The lots for attached units are 3,000 to 3,449 square feet per unit. Therefore the density and lot size criteria are met.

The lots for attached unit are spread throughout the development, so they are not clustered in one area. These attached unit lots are also situated at corners, so the attached units are located at opposite and diagonally opposing corners.

Therefore the proposed development density will be consistent with the Comprehensive Plan Map and Frog Pond Master Plan. The Master Plan further includes specific design objectives for streets, lots, and architecture, which are addressed in more detail under the Design Review section of this compliance narrative.

LOT AND SITE DESIGN IN SMALL LOT SUBDISTRICTS

Principles

Each home is part of the larger neighborhood and community.

Variety is the spice of good design.

Design guidelines should be tailored to each zone.

Master Plan Intent

Small Lot Subdistricts have unique lot and site design requirements in order to:

- 1. Ensure that development in the Small Lot Subdistricts is compatible with other developments in the Frog Pond West Neighborhood;*
- 2. Ensure varied design that avoids homogenous street frontages;*
- 3. Orient site design to support active pedestrian street frontages; and*
- 4. Integrate open space into the development pattern.*

Small lots present unique opportunities and challenges. On the positive side, they provide affordable housing choices, options for residents who do not want to maintain large homes and lots, and a solution for maintaining density while providing open space. They are an important part of Frog Pond's variety of housing. On the challenging side, they require careful site design to ensure an attractive street edge and compatibility with nearby larger lots. To address these issues, the Master Plan and the implementing code utilize a flexible system where one or more of the following site design elements are employed on each block:

- Alleys, so that streetscapes are "people places" and not dominated by closely-spaced driveways.*
- Residential main entries grouped around a common green or entry courtyard (e.g. cluster housing) provide open space integrated with the small homes.*
- Four or more residential main entries facing a pedestrian connection allowed by an applicable master plan to activate pedestrian connections with front doors and activity.*
- Garages recessed at least 4 feet from the front façade or 6 feet from the front of a front porch.*

RESPONSE: The proposed preliminary plat has been designed with a combination of local streets, an alley and a “Woonerf Street” to create a pedestrian-friendly environment. It is also anticipated the garages will be recessed from the front facades to minimize their visual dominance.

OPEN SPACE IN SMALLLOT SUBDISTRICTS

Principles

Variety is the spice of good design.

Green is great.

Create community gathering spaces.

Master Plan Intent

The Master Plan, and the implementing Code, requires that open space is included in developments within Small Lot Single Family Subdistricts. The amount of open space is “10 percent of net developable area,” meaning 10% of the net area after “take-outs” for non-residential uses, SROZ-regulated lands, streets, alleys, and pedestrian connections. The required open space must be in the form of active greens, courtyards, community gardens, tot lots, public pedestrian ways, tracts with preserved trees and wetlands, and similar spaces. The City’s rationale and purpose for this open space requirement is to:

- 1. Add variety and livability to the built form in Small Lot Subdistricts, where density is highest in the neighborhood.*
- 2. Provide a useful tool to preserve trees and wetlands in areas of smaller lots.*
- 3. Provide active play spaces close to homes that have smaller yards.*

Natural resource areas such as tree groves and/or wetlands and unfenced low impact development storm water management facilities may be counted toward the 10% requirement at the discretion of the City. Fenced storm water detention facilities do not count toward the open space requirement. The minimum area for a single facility or tract is 4,000 square feet so that spaces are a meaningful size for active uses or resource protection; the City may approve smaller spaces on a case-by-case basis.

RESPONSE: The subject property is sandwiched between the SROZ of Boeckman Creek on the west and the School property on the east. The school site is 10 acres, and the SROZ covers approximately 6.91 acres of the site.

The horizontal distance between the SROZ and the School property is about 600 feet. This is a very walkable distance for residents living in Sub-Area 1 move between the open natural areas and the future school.

While the school is not scheduled for maybe up to 5 years, the District currently operates an environmental and agricultural education center on the property. This operation creates opportunities to be considered in the realm of environmental education. And, the facility is within 600 feet of a majority of the proposed lots.

Further, as noted above, there is a good possibility that the City will acquire the 5 acres east of the school site for the planned Neighborhood Park. This planned park property will be less than ¼ mile from the farthest west homes in the proposed development.

These two properties combined with the SROZ provide significant open space, recreational, and educational resources immediately available to Sub-District 1.

The street layout provides direct pedestrian-friendly view corridors between the school property and Boeckman Creek, and the associated trails and trail heads. The preliminary plan identifies three trail head links directly at the west end of these streets and view corridors.

This application includes an SRIR prepared by SWCA. The SRIR provides the basis for SROZ Map refinement and addresses anticipated development impacts, including minor wetland fill. The proposed site plan reflects the proposed refined SROZ boundary, based on the topographic survey and field evaluation by SWCA. A detailed Arborist's Report is also provided. Based on the Arborist's Report a Tree Preservation, Removal and Mitigation Plan has been prepared.

Based on the analysis by SWCA, the refined SROZ boundary includes approximately 6.77 acres of the subject property. This is equal to 33.6% of the gross site area.

These detailed resource related reports serve to define the western edge of the developed lots, as well as providing the basis for detailed design for the two trail heads and "active open space."

The net site area, minus the SROZ and street rights-of-way, is approximately 8.84 acres or 385,125 square feet. Therefore a minimum of 10% open space or 38,512 square feet must be provided, including 19,255 square feet of "usable or active" play space.

In addition to the SROZ, the proposed preliminary plat provides 39,654 square feet of general open space, which equals 10.3% of the net developable area. The proposed "active use" area equals 41,952 square feet. This Active space exceeds the general open space (105.8%) because it includes portion of the SROZ and Tract A, which are being used for the regional trail, thereby exceeding the 50% criteria.

BOECKMAN AND STAFFORD ROAD FRONTAGES

Principles

Details are important.

Create a complete streets and trails network.

Provide compatible transitions to surrounding areas.

Master Plan Intent

Boeckman Road and Stafford Road are very important streets for Frog Pond West. Visually and functionally, Boeckman Road is a "front door" to Frog Pond West. It is also a "seam" between Frog Pond West and existing neighborhoods to the south. It serves an important connecting function between East Wilsonville and Central and West Wilsonville. Stafford Road will be the new gateway into Wilsonville from the north and a seam between Frog Pond West and the future Frog Pond East.

The Master Plan seeks to: (1) Ensure that development does not "wall off" Boeckman Road and Stafford Road from their adjacent neighborhoods; (2) Create walkable and bikeable streets, even though they are arterial classifications and will carry relative large volumes of traffic; (3) Coordinate frontage standards to create an attractive edge to the neighborhood and a strong connection with the larger community; and (4) Find the right balance between a streetscape that works for people, and development that seeks residential privacy.

There are two strategies employed by the Master Plan to achieve the above objectives. The first strategy involves tailored cross-sections that have a planted median, a buffered bike lane, a generous planter strip and wide sidewalks. The second strategy involves coordinated frontage requirements that will create a cohesive and attractive design along the frontages of both roads. Figure 10 shows the required frontage improvements. The elements include:

1. **Brick wall with wrought iron fence on top.** The property line fencing along Boeckman Road and Stafford Road will include a 4' high brick wall with a 2' high wrought iron fence located at the lot line. 6' high brick columns will be placed at regular intervals.
2. **Foundation landscaping.** Landscaping comprised of low shrubs and ornamental plants will be provided at the foot of the wall to offer variety and visual interest.
3. **Pedestrian connections.** Connections will be provided from Boeckman Road into the neighborhood, at a spacing consistent with the Street Demonstration Plan. The pedestrian connections will be consistent with the Pedestrian Connection cross-section in the Frog Pond West Master Plan.
4. **Landscape buffer tract landscaping.** A Landscape Buffer Tract will be provided between the right-of-way and the rear of the abutting lots. The buffer will be a common tract and will be planted with climate-adaptive shrubs to create a landscaped edge to the streetscape and reduce the visibility of the walls.
5. **Enhanced elevations.** The street-facing facades of the homes along Boeckman will meet the standards (windows, articulation, residential design standards, house plan variety) for front elevations elsewhere. These elevations do not need to mirror the fronts, but they do need to meet the Code's standards. These "enhanced elevations" requirements also apply to facades facing pedestrian connections, parks, open space tracts and the Boeckman Trail.

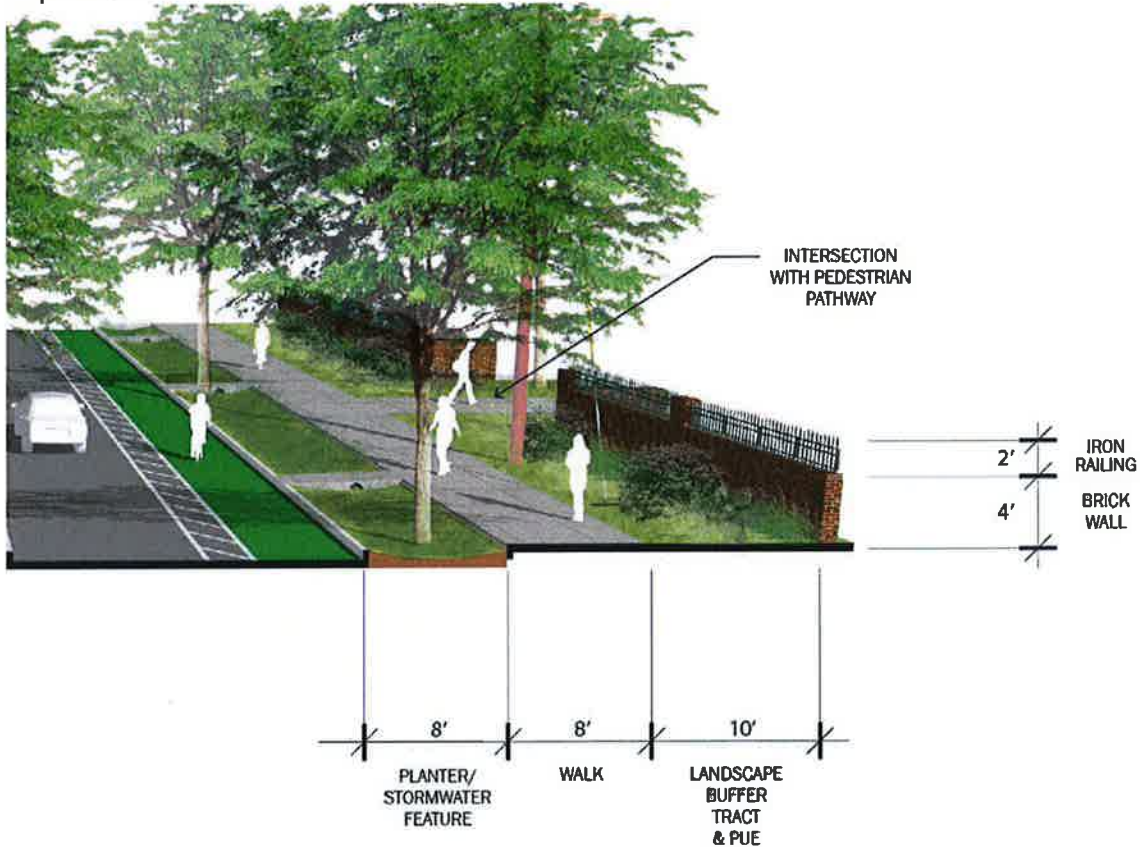
RESPONSE: The preliminary plan provides for dedication along the site frontage to meet the 41 foot centerline cross-section for Boeckman Road. The proposed development plan provides the 10 foot wide landscaped buffer (Tract 'B'), with brick wall, framing the outside edge of the development along the site frontage, see the graphic image on the following page.

The proposed plans anticipate minor interim safety improvements along the Boeckman Road frontage, including left-turn pocket and taper lanes to match existing pavement, as recommended by DKS. A temporary pathway may also be provided along the site frontage, to ensure pedestrian safety.

Under the provisions of Resolution 2649, and the pending Development Agreement, the City will provide the infrastructure improvements (sanitary sewer and street widening, as reflected in the following figure. The City will also ultimately construct the Boeckman Bridge, consistent with the Frog Pond West Master Plan.

The Development will pay the standard and supplemental SDCs to cover the proportional cost of the off-site infrastructure improvements.

Boeckman Road and Stafford Road Frontage Improvements



STREET DEMONSTRATION PLAN

The Street Demonstration Plan is a detailed guide to the desired level of connectivity and overall street pattern for the Frog Pond West Neighborhood. It implements the “Framework Streets” developed in the Frog Pond Area Plan and shows a conceptual layout of local streets, alleyways, pedestrian and bicycle connections, and trails. The ultimate layout of the local street network will be implemented based on the needs of individual developments, consistent with the Street Demonstration Plan.

The street layout and block pattern in this diagram is illustrative; it shows one way of achieving the transportation and connectivity goals of the plan. It is intended to be guiding rather than binding, and used as a “consistency” standard during development review. This will be implemented through new zoning code text for the Neighborhood (N) Zone.

Wilsonville Code (WC) Section 4.127(.09) Block, access and connectivity shall comply with adopted Legislative Master Plans.

Within the Frog Pond West Neighborhood, streets shall be consistent with Figure 17, Street Demonstration Plan, in the Frog Pond West Master Plan. The Street Demonstration Plan is intended to be guiding, not binding. Variations from the Street Demonstration Plan may be approved by the Development Review Board, upon finding that one or more of the following justify the variation: barriers such as existing buildings and topography; designated Significant Resource Overlay Zone areas; tree groves, wetlands, or other natural resources; existing or planned existing or planned parks and other active open space that will serve as pedestrian connections for the public; alignment with property lines and ownerships that result in efficient use of land while

providing substantially equivalent connectivity for the public; and/or, site design that provides substantially equivalent connectivity for the public.

If a legislative master plan does not provide sufficient guidance for a specific development or situation, the Development Review Board shall use the block and access standards in Section 4.124 (.06) as the applicable standards.

RESPONSE: The Street Demonstration Plan lays out a basic street grid for the West Neighborhood. The proposed preliminary plat provides block lengths configured at 100 to 220 feet north/south and 330 feet east/west. This pattern meets the 330 foot maximum spacing standard for pedestrian circulation, without need for any mid-block pathways. The perimeter block lengths are less than 1,200 feet.

There are two existing driveways to the site, one for each of the two existing homes. These driveways are located towards the southwestern boundary of the property. The preliminary plan anticipates removing these two driveways and creating a new local street intersection from Boeckman Road into the site, Street A.

Consistent with the objectives of the Frog Pond West Master Plan, this primary access (Street A) frames the west boundary of the school site. This configuration provides great flexibility for the location of the vehicular access to the future school. It also provides for the desired orientation of homes facing the school site from across the street, thereby avoiding walling off the school with private lots.

Street A sets the location for the primary north/south local access from Boeckman Road. This street is designated as P1, Primary Street (Street Tree Plan, Figure 43) in the Frog Pond West Master Plan. This alignment is generally consistent with, but slightly different from the Street Demonstration Plan in the Frog Pond Master Plan. The primary difference is the full alignment along the school site, rather than the S-curved concept in the Demonstration Plan, where the road moves away from the school property as it extends north. The City Council made it clear they want the school property framed with public streets.

The Street Demonstration Plan shows this primary access aligned along the boundary with the school district property, then curving to the west and extending to the north boundary of the site. However, the curvilinear “Demonstration” alignment creates awkward and inefficient spacing for lots and breaks up a logical grid pattern.

Consequently the preliminary plat extends Street A along the full length of the school property to the north boundary of the site. At the north end Street A intersects with the east/west “Primary Street” (Street G), which is designated P5 per the Street Tree Plan, Figure 43 of the Master Plan. Street G will ultimately extend east providing access and circulation to and from Stafford Road. This proposed minor revised alignment is consistent with the City Council’s desire to fully frame the school property with public streets.

Boeckman Road is designated a Minor Arterial in the Transportation System Plan. The arterial standard calls for an 81 foot right-of-way (40.5 foot centerline section), plus a 10 wide landscape buffer and public utilities easement.

The City's minor arterial access spacing standard is 600 feet, which is applicable for Boeckman Road. There is a specific design section for Boeckman Road that includes bike lanes, sidewalks and a 10 foot wide landscaped buffer and utilities easement, and is framed by a brick wall, topped with wrought iron railing.

The intersection for Street A is situated approximately 350 feet west of the SW Laurel Glen Street intersection, which serves Arbor Crossing on the south side of Boeckman Road. The Laurel Glen alignment is also expected to provide "Bus Only" access to the future school site. The proposed Street A alignment is generally consistent with the "Street Demonstration Plan," even though it does not meet the arterial spacing standard. It is noted that the Bus Only access is not reflected on the Demonstration Plan, but has been discussed between the School District and the City.

The Frog Pond West Master Plan identifies a collector street aligned with SW Willow Creek Drive, which is approximately 740 feet east of the SW Laurel Glen Street intersection. Willow Creek Drive is intended to intersect with the east/west street that is aligned along the northern boundary (Street G) of the subject site.

The proposed preliminary plan provides four east/west aligned streets (Streets B, D, E & G). Streets B & E are aligned to terminate at or run parallel to designated Trail Heads. Street D is aligned to provide access to the school property, with street G, aligned along the northern boundary of the school. Street G will ultimately provide east/west circulation to and from Stafford Road.

Streets A, C & F provide north/south circulation, completing an efficient circulation and lot pattern. The north/south streets are designed to extend to abutting properties allowing for continuation of the local streets consistent with the Street Demonstration Plan.

The local streets will be designed consistent with the "green street" design per Figure 21, Low impact Development Local Street. These street all have a 52 foot right-of-way.

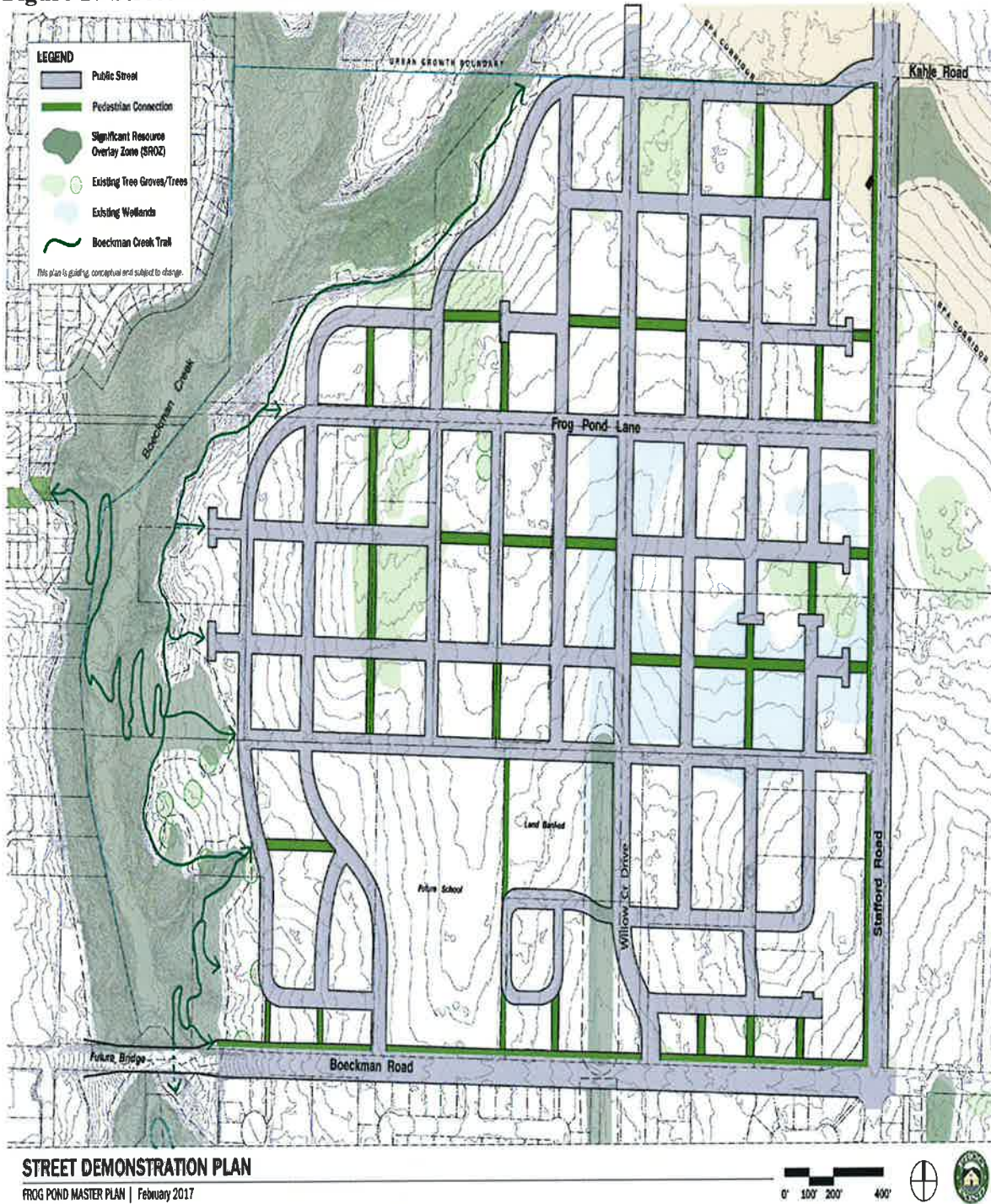
Intersection spacing on Boeckman Road for Street A will be proximately 1,080 feet west of SW Willow Creek Drive, but only 350 feet west of SW Laurel Glen Street. Both of these existing streets are south of Boeckman Road. However, Willow Creek is intended to be extended north into the West Neighborhood. And the Laurel Glen alignment is anticipated for Bus Only access for the school.

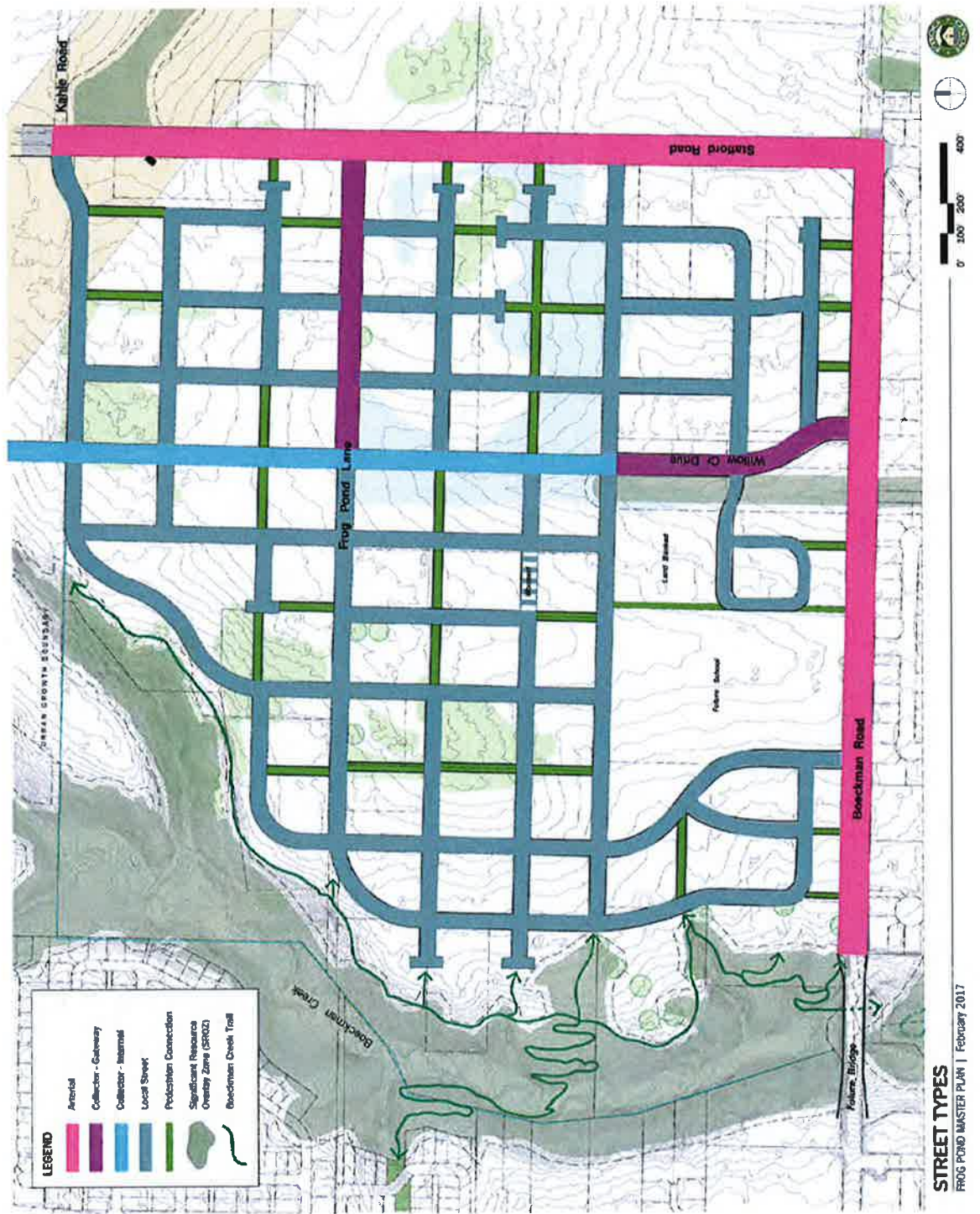
This proposed new intersection is located to provide access to and frame the school property, while also providing the maximum possible sight distance along Boeckman Road. There is good visibility to the east, but the visibility to the west is currently limited to some degree due to the vertical curve in Boeckman Road. Ultimately this limited sight distance will be enhanced when the bridge is constructed. Based on current plans, the City anticipates the bridge will be complete by 2023-24.

Consistent with Wilsonville's practice, DKS has prepared a detail traffic impact report as part of this formal application. Generally, DKS evaluated the overall traffic impacts anticipated from West Neighborhood as part of the Master Plan adoption process.

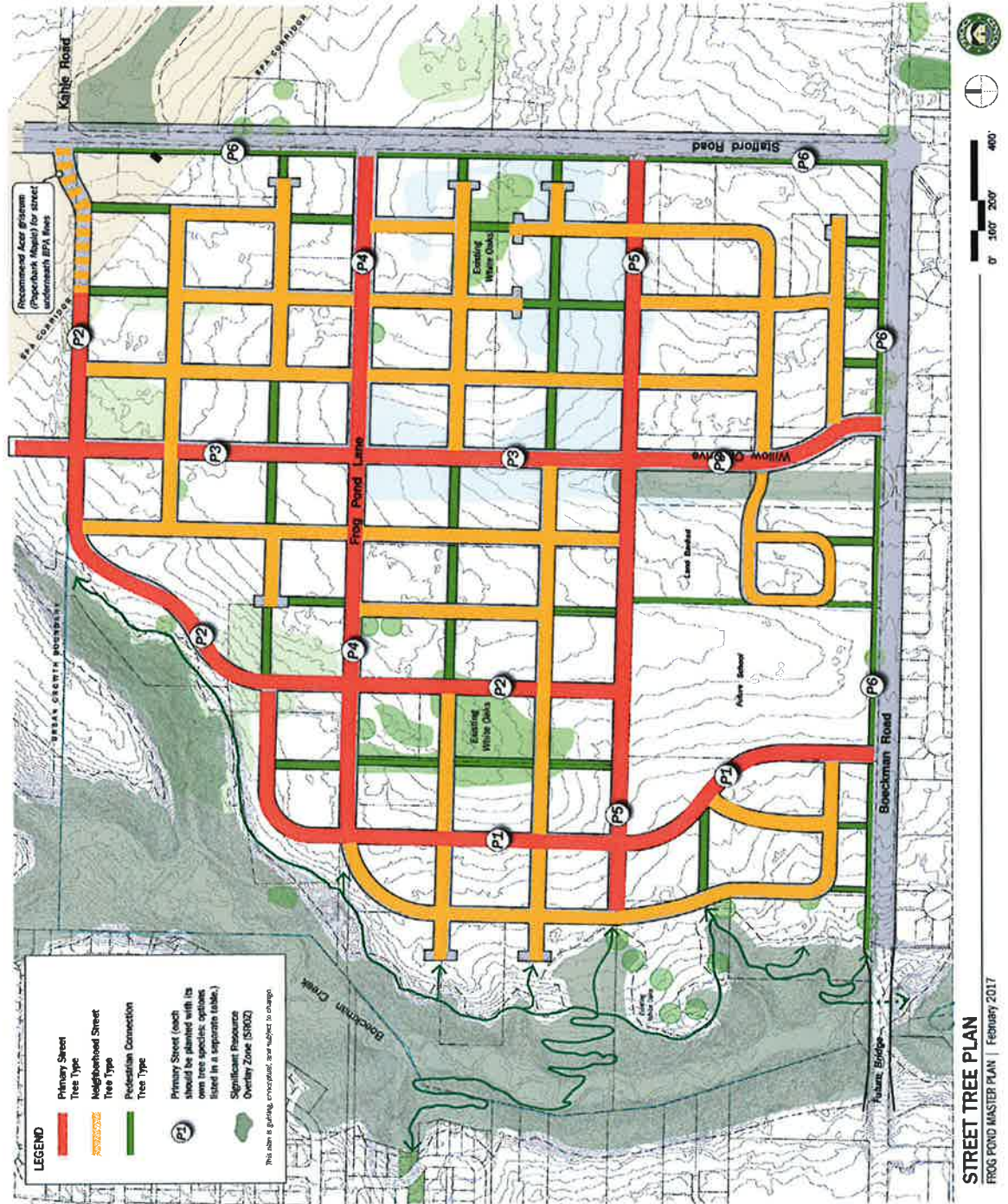
The DKS's development specific study addresses, among other elements, necessary interim safety improvements, required for the proposed development, until the City complete the widening of Boeckman Road, anticipated for 2019-20.

Figure 17 Street Demonstration Plan





Street Tree Plan



BOECKMAN CREEK FRONTAGES

Principles

- Green is great.
- Design guidelines should be tailored to each zone.
- Provide access to nature.
- Provide compatible transitions to surrounding areas.

Master Plan Intent

The Boeckman Creek Significant Resource Overlay Zone (SROZ) is a unique asset to the West Neighborhood. It provides a scenic backdrop, a large open space, the location of the Boeckman Trail, and a planned future trail crossing that will connect the Frog Pond neighborhoods to the Canyon Creek Road area on the west side of the Boeckman Creek corridor. The character and form of adjacent development—the orientation of lots, the design and location of open space tracts, the type of fencing, and the landscape plantings—will all influence:

- (1) how compatible (or incompatible) new development is with the resource area; and*
- (2) how much physical and visual access the neighborhood and larger community has to Boeckman Creek.*

RESPONSE: It was not possible to avoid having some lots back onto the SROZ given the need to comply with the street design criteria, and also in consideration of the irregular shape of the SROZ boundary. However, for the lots, that do have side or rear yards towards the SROZ, the Master Plan’s open view fencing and landscaping criteria will be applied. See responses to Section 4.139 and the SRIR for impacts & mitigation related to lots abutting the SROZ. The location and heights of retaining walls has also been carefully considered relative to views from the trail system to lots and vice-versa.

SITE PLANNING TO PRESERVE TREES AND WETLANDS

Principles

*Green is great.
Provide access to nature.
Retain trees.
Integrate sustainability.*

Master Plan Intent

The tree groves within the planning area provide a key visual asset and are a link to the historic character of the area. To the extent that existing mature trees can be retained and protected as annexation and development occurs, it will contribute to the character and desirability of new neighborhoods. The city has existing annexation policies that incentivize tree retention.

Maps prepared for the City show an area of farmed wetlands in the southeast area of the neighborhood. They are relatively low-quality wetlands that do not meet the City’s criteria for “significant” designation and application of the SROZ. However, they do have potential to be restored, used as storm water areas, and incorporated as amenities into the neighborhood.

The Master Plan intends for tree groves to be preserved and incorporated into the design of developments as much as possible. This will be achieved through the Planned Development Review and application of Section 4.600, Tree Preservation and Protection, of the Development Code. Tree protection is also incentivized by counting toward open space requirements in the Small Lot subdistricts.

Figure 14 shows a site with a grove of trees, and how those trees might be incorporated into a development plan that would be acceptable to the City. The City encourages exploration of tree and wetland issues during the pre-application process before significant funds have been invested in designs that may not be approved.

RESPONSE: The applicant has provided an SRIR, with proposed SROZ Boundary Refinement, including Metro Title 3 buffer. A detailed Tree inventory, with Tree Removal and Preservation Plan has also been provided.

The Site Survey and Resource Analysis identified a small wetland area along the eastern portion of the site, just north of the existing home. A Wetland Delineation application has been submitted to DSL, and DSL has confirmed the delineation.

This small wetland area is more the result of agricultural field tiling, and lack of proper drainage, compounded by some driveway crossing, than it is a naturally occurring wetland. This small wetland area is not identified as significant by the City. Consequently it is proposed to be filled, with mitigation provided through the regional wetland mitigation bank. The Joint (DSL/Corps) Fill Permit will be filed prior to submittal of construction plans.

Based on the Site Survey, three logical locations for anticipated trail heads within this development have been identified. To the degree practicable, the streets are aligned to terminate at or run adjacent to these trail head locations.

We have further coordinated with the City Parks & Recreation Director, Planning Director and Parks and Recreation Advisory Board for design guidance for trail locations, and preliminary trail head improvements.

Preliminary design concepts are proposed for trails and trail heads, together with “active use” enhancements Tract F and portions of Tract ‘A’ outside of the SROZ. The proposed primary design guidelines relate to creating low impact recreational exercise stations and environmental educational experiences entering and within the Boeckman Creek canyon.

The applicant will be coordinating the final design in cooperation with the City Parks Department. These various improvements, together with the 10 foot landscaped buffer along Boeckman Road and other open space tracts serve to exceed the 10% open space criteria. See Section 4.139 and SRIR for side and rear yard impacts and mitigation.

Other applicable Comprehensive Plan provisions:

3. PUBLIC FACILITIES AND SERVICES

Policy 3.1.2 The City of Wilsonville shall provide, or coordinate the provision of, facilities and services concurrent with need (created by new development, redevelopment, or upgrades of aging infrastructure).

Implementation Measure 3.1.2.a Urban development will be allowed only in areas where necessary facilities and services can be provided.

Implementation Measure 3.1.2.e When development is proposed in areas of the City where full urban services/facilities are not yet available, development approval shall be conditioned on the provision of adequate facilities and services to serve the subject property. Where the development can reasonably proceed in phases prior to the availability of full urban services/facilities, such development may be permitted. However, the use of on-site sewage disposal and private water systems shall only be approved where permitted by City ordinance.

RESPONSE: Urban level development, within the City, extends to the west and south boundaries of the property. Existing public facilities are generally available to the subject site, or can be extended to serve the proposed development. Preliminary evaluation and

documentation provided in support of the Frog Pond Master Plan indicates that all urban services are generally available and adequate to support urban level development as proposed.

However, the sanitary sewer line in Boeckman Creek will need to be extended. This extension is part of the Infrastructure Funding Plan (Resolution 2649), linked with the improvements to Boeckman Road.

Transportation facilities are also adequate, or will be made adequate through implementation under Resolution 2649. The infrastructure funding package provided by Resolution 2649 ensures that the necessary off-site facilities improvements will be timely delivered to serve the proposed development. The development will provide all the necessary on-site improvements, consistent with City Standards.

DKS, the City's Traffic Engineers have prepared a Traffic Impact report. The DKS Traffic Report identifies necessary interim safety improvements to be provided by the developer. Therefore it can be concluded the proposed development will be consistent with these public facilities policies and these implementing measures.

Policy 3.1.3 The City of Wilsonville shall take steps to assure that the parties causing a need for expanded facilities and services, or those benefiting from such facilities and services, pay for them.

Implementation Measure 3.1.3.a Developers will continue to be required to pay for demands placed on public facilities/services that are directly related to their developments. The City may establish and collect systems development charges (SDC's) for any or all public facilities/services, as allowed by law. An individual exception to this standard may be justified, or SDC credits given, when a proposed development is found to result in public benefits that warrant public investment to support the development.

RESPONSE: The Frog Pond West Master Plan includes provisions for covering the financial costs of providing urban services, including updates to the utilities master plans for sanitary sewer, storm drainage, water and transportation.

For this proposed development we do not anticipate a need for any major system improvements to support the proposed subdivision, except for the sewer line extension along Boeckman Road, to be constructed by the City. The timing for the sewer extension has been coordinated with the City, and will be addressed in the proposed Annexation Agreement. All other utility improvements will be designed and constructed in accordance with the adopted master plans and City Public Works Standards.

The City has established financing mechanism for each of the utility systems, which all include system development charges (SDC's). In addition for specific infrastructure needed to support the Frog Pond Master Plan, the City has adopted Resolution 2649, which establishes supplemental fees to be paid in addition to the standard SDCs. These supplemental fees equitably distribute the costs for arterial streets, sanitary sewer, the neighborhood park, and the Boeckman Bridge.

This development will provide on-site improvements for each of the facilities systems, as needed for the proposed 82 new lots, including water, sanitary sewer, storm drainage and streets. Consistent with the Frog Pond Master Plan, the developer will be paying the applicable SDC's (including Supplemental SDCs per Res 2649) as a proportionate share contribution for the overall off-site systems. Therefore the development will be consistent with this Policy and implementing measure.

Sanitary Sewer Plan

Policy 3.1.4: The City of Wilsonville shall continue to operate and maintain the wastewater treatment plant and system in conformance with federal, state, and regional water quality standards.

Implementation Measure 3.1.4.b The City shall continue to manage growth consistent with the capacity of sanitary sewer facilities.

Implementation Measure 3.1.4.f The cost of all line extensions and individual services shall be the responsibility of the developer and/or property owners(s) seeking service. When a major line is to be extended, the City may authorize and administer formation of a Local Improvement District (LID). All line extensions shall conform to the City Sanitary Sewer Collection System Master Plan, urbanization policies, and Public Works Standards.

RESPONSE: There is an existing sanitary sewer trunk line, which runs parallel to Boeckman Creek. There is an 18 inch line in Boeckman Road, and the Master Plan calls for extending a 12” sewer line along Boeckman Road, with a 12” sanitary sewer line being extended to and through the subject site.

The main line and associated pump station (Memorial Park) are adequate to accommodate the initial 82 units proposed. This portion of the system generally has adequate current capacity, but pump station upgrades are identified for future capacity.

Through the funding provided under Resolution 2649 the City will construct the sewer line and complete the widening of Boeckman Road.

Water Service Plan

Policy 3.1.5 The City shall continue to develop, operate and maintain a water system, including wells, pumps, reservoirs, transmission mains and a surface water treatment plant capable of serving all urban development within the incorporated City limits, in conformance with federal, state, and regional water quality standards. The City shall also continue to maintain the lines of the distribution system once they have been installed and accepted by the City.

Implementation Measure 3.1.5.c Extensions shall be made at the cost of the developer or landowner of the property being served.

Implementation Measure 3.1.5.d All water lines shall be installed in accordance with the City's urban growth policies and Public Works Standards.

RESPONSE: There is an existing 12 inch water line in SW Boeckman Road. This portion of the system generally has adequate current and future capacity. The Frog Pond Facilities Master Plan calls for a 12 inch line extension through the subject site, with

system looping. The existing water system is adequate to serve the proposed development, without any major system improvements.

Roads and Transportation Plan

RESPONSE: Primary arterial access to the property will be via Wilsonville Road, Parkway Avenue and Boeckman Road. The subject site has frontage on Boeckman Road.

In 2013 the city adopted an updated Transportation System Plan (TSP). Minor amendments were adopted in 2016. In addition, other specific local transportation system improvements are identified in the Frog Pond Master Plan, including the “Street Demonstration Plan,” which layouts the general street grid pattern anticipated to serve the larger West Neighborhood.

Traffic impacts related to this proposed development have been fully analyzed in more detail by the City’s Traffic Engineer (DKS) relative to this specific development. The DKS report identifies necessary interim safety improvements.

Implementation Measure 3.1.6.s Pedestrian, bicycle, and equestrian travel are often considered a recreational activity. However, people commonly bike and walk throughout the City, and with increasing gasoline prices and traffic congestion, these forms of travel are likely to increase in popularity. For this reason, provisions for pedestrian and bicycle travel will be considered as a basic transportation element as well as a recreational element.

Implementation Measure 3.1.6.z City street standards require concrete sidewalks on both sides of all streets. This standard can be waived only in cases where alternative provisions are found to adequately address pedestrian needs.

Implementation Measure 3.1.6.aa All bikeways are to be developed in conformity with the City’s adopted Bicycle and Pedestrian Master Plan.

RESPONSE: The Frog Pond West Master Plan identifies a general street network in the Street Demonstration Plan.

Streets within the proposed development have been designed and will be constructed consistent with the standards in the Master Plan, and will include curbs and sidewalks, Storm LIDA facilities and street trees.

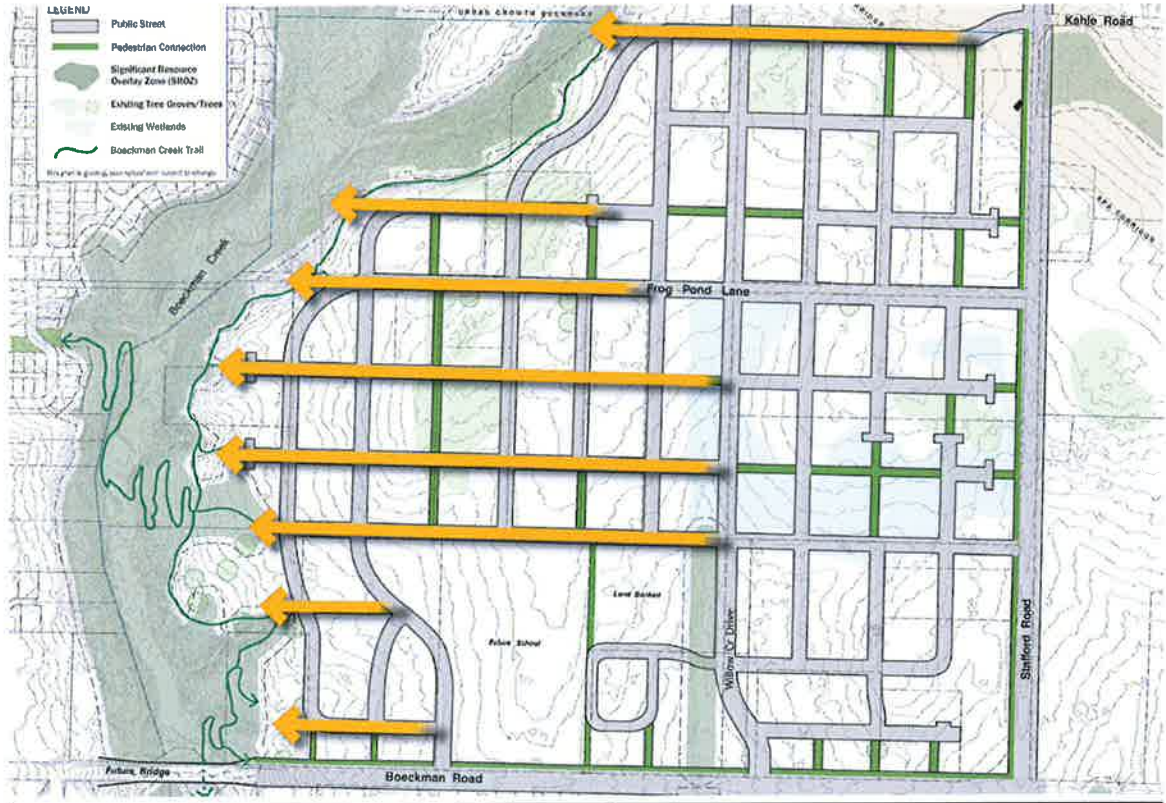
The Master Plan designates a regional trail system within the Boeckman Creek canyon. In addition the Master Plan calls for both east/west and north/south pedestrian connections for enhanced non-vehicular circulation.

The proposed preliminary plan accommodates provisions for the Boeckman Creek trail and trail heads. The street plan (east/west streets) creates direct pedestrian access and visual corridors between the school site and the Boeckman Creek SROZ. The roads are aligned to terminate at or adjacent to the planned trail heads. The plan also identifies a north/south pedestrian corridor providing a non-vehicular link from Boeckman Road into the neighborhood.

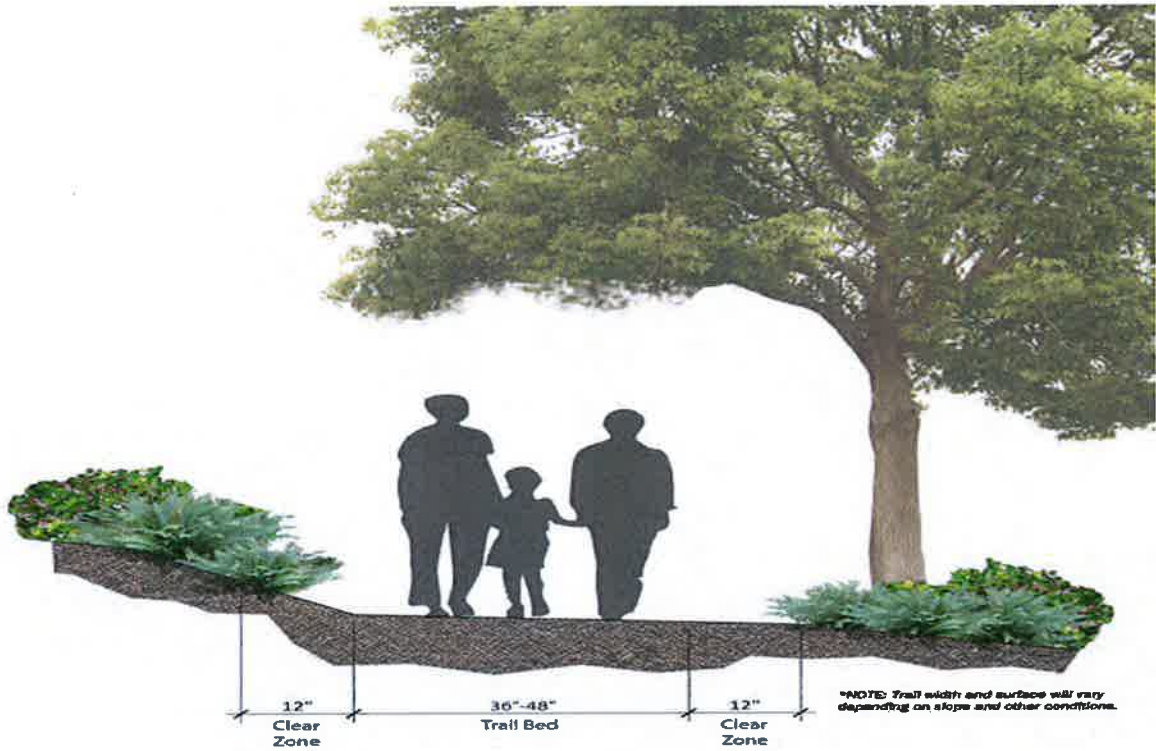
Therefore we conclude that the proposed development will comply with all applicable public facilities and transportation master plans and policies. This initial phase, due to its limited scale, is also anticipated to be able to comply with the 'D' LOS standard, without any major off-site improvements.

Specific initial trail head and trail improvements have been coordinated with the City. These trail head and pathway improvements provided will be subject to Parks SDC credits.

Sight Lines to Boeckman Creek Corridor



Boeckman Creek Forest Trail Cross-Section



Boeckman Creek Regional Trail Cross-Section



Storm Drainage Plan

Policy 3.1.7 The City of Wilsonville shall develop and maintain an adequate storm drainage system. However, where the need for new facilities is the result of new development, the financial burden for drainage system improvements shall remain primarily the responsibility of developers. The City will use systems development charges, user fees, and/or other funding sources to construct facilities to improve storm water quality and control the volume of runoff.

RESPONSE: The subject site lies within the Boeckman Creek Drainage Basin. The City's new Storm Drainage standards prioritize infiltration over detention. However, our preliminary geo-technical report indicates this property has zero infiltration capacity. Therefore, the project anticipates the need for water quality and detention facilities that do not rely heavily upon infiltration.

The development plan will implement the LIDA Green Streets identified in the Master Plan (Figure 22). The storm system has been designed to avoid the reliance on large detention facilities. Rather, the system utilizes LIDA facilities designed into the streets, which collectively provide the necessary detention and water quality filtration. LIDA planters will be used on the individual lots that cannot be treated in the street swales.

Based on guidance provided by Steve Adams, the Preliminary Utilities Plan has been revised to show the two outfalls, with energy dissipation below the ordinary high water elevation. Based on recommendations from the Project Biologist, the outfalls are further designed to re-direct the outfall flows parallel to and downstream to the creek channel, with energy dissipation riprap. We located the outfalls at the flattest areas above the ordinary high water line.

We are proposing that the at-grade HDPE pipe goes below grade near the creek to outfall to a 5 foot deep ditch inlet (per C of W detail 2120). The stormwater will then rise and bubble out of the grate and be dispersed over a Class 50 rip rap pad and slowly flow into the existing creek.

This development will also be paying SDC's, which contribute towards overall system improvements, proportional to its impact.

Therefore we conclude that the proposed development will comply with all applicable storm drainage design standards and policies.

Fire Protection Plan

Policy 3.1.8 The City of Wilsonville shall continue to coordinate planning for fire safety with the Tualatin Valley Fire and Rescue District.

Police Protection And Public Safety

Policy 3.1.9 The City of Wilsonville shall continue to provide adequate police protection.

RESPONSE: High quality fire protection is provided by Tualatin Valley Fire & Rescue. High quality police services are provided by contract with Clackamas County Sheriff's Office.

There is nothing unusual about this development that would cause undue service demands on either of these emergency service agencies. The site is located within 2 miles of both the Kinsman Road and Elligsen Road Fire stations. It is also within 1.2 miles of the police headquarters located in the Town Center. Also, Tract 'C' is designed to function as an Emergency Vehicle access, with bollards to limit other vehicle access. The city police provide regular patrols throughout the city.

Water lines and hydrants will be installed consistent with City standards.

School and Educational Services

Policy 3.1.10 The City of Wilsonville shall continue to coordinate planning for educational facilities with all three local school districts and Clackamas Community College.

Implementation Measure 3.1.10.e It is the basic reasoning of these policies that development within the City should not be regulated based on the availability of school facilities and services. Rather, these services should be planned for and provided to meet the demands created by development. If, however, school facilities and/or services were determined to be severely inadequate and the school districts unable to provide satisfactory improvement, then growth limitations would be appropriate.

RESPONSE: The availability of school facilities is not a primary permit criterion. However, schools are important so we have addressed them in general terms.

Wilsonville is well served by educational facilities. There are 2 primary schools, 2 middle schools, and a high school all within 2.5 mile of this development site. Most of these facilities are on Wilsonville Road, with the newest Lowrie School being within Villebois.

The District has identified the 10 acres abutting the eastern boundary of the Subject Site for a future Elementary School. Timing for development of the school has not, yet, been defined, but is likely within the next 5-7 years.

The School District has been successful in passing Special Options Levies, which fund additional school facilities improvements, including expansion of the Wilsonville High School and Wood Middle School, and construction of the new Meridian Creek Middle School on 60th Avenue.

The District has also determined that a primary school will be needed in the near future, as the Frog Pond Area develops. The District owns property within the Frog Pond Area, and intends to develop the primary school on 10 of their 25 acres, which fronts on Boeckman Road. This property is adjacent to the Subject Site, and will likely share in the alignment of the street access from Boeckman Road.

There is also a Clackamas Community College facility located in the Town Center, which is about a mile south of the site in the Town Center. The OIT Metro Campus is less than a mile north of the site, with Pioneer Pacific College across the street from OIT.

Parks/Recreation/Open Space

Policy 3.1.11: The City of Wilsonville shall conserve and create open space throughout the City for specified objectives including park land.

Implementation Measure 3.1.11.d Continue the acquisition, improvement, and maintenance of open space.

Implementation Measure 3.1.11.e Require small neighborhood parks (public or private) in residential areas and encourage maintenance of these parks by homeowner associations.

Implementation Measure 3.1.11.g Where appropriate, require developments to contribute to open space.

RESPONSE: The Frog Pond Master Plan anticipates a good sized (2.5 acre) central neighborhood park, which all developing properties will participate in funding (Resolution 2649). In addition the Master Plan envisions a series of landscaped pedestrian pathways, linking the various neighborhoods to the central park, school and the Boeckman Creek Canyon and associated trail system.

Further, smaller localized “active open spaces” are intended to be provided, particularly in the R5 small lot neighborhoods. The Draft Code calls for 10% of the small lot neighborhoods to be in usable open spaces and/or pedestrian corridors.

The subject site is sandwiched between the protected SROZ of Boeckman Creek and the School District 10 acre future school property. Approximately 34% of the site (6.91 acres) is within the SROZ, based on the Existing Conditions Survey. The Frog Pond West Master Plan identifies development of a trail system within the SROZ, with trail heads at the edge of the development, linked to the local streets.

The preliminary plans identify three locations for trail heads. There is flatter land within the Area of Limited Conflicting Use (ALCU) immediately surrounding the trail heads to accommodate trailhead improvements. However, trails, as a public facility are exempt from the SROZ regulations applicable to the ALCU. Therefore there are no development related impacts within the ALCU.

The Code allows encroachment up to 5% of the ALCU. Within the SROZ boundary 59,207 square feet is defined as Area of Limited Conflicting Use (ALCU). Therefore 2,960 square feet (5%) could be utilized for open space related improvements.

However, the only proposed improvements within the ALCU will be the regional trail, which will be within the area to be dedicated to the City. The trail is an allowed use, so the limitations related to the ALCU are not applicable to this development.

The School District is also planning for a future elementary school on the adjacent 10 acres to the east. In the interim the District is currently operating the property as a Farm to School, Agricultural Education and Resource Center, as part of their Crest environmental education program.

These two public resources provide substantial usable open space for recreational and educational opportunities in close proximity to the proposed development. The proposed neighborhood park will add additional recreational opportunities within ¼ mile of the development.

The net site area, minus the SROZ and street rights-of-way is approximately 8.84 acres or 385,125 square feet. Therefore a minimum of 38,512 square feet of open space must be provided, which must include at least 19,256 square feet of “usable or active” play space.

The proposed preliminary plat provides a total of 39,654 square feet of general open space, outside of the SROZ. This equals 10.3% of the net developable area, thereby meeting code requirements.

The proposed “active use” area totals 41,952 square feet, which is actually 105.8% of the total general open space, which exceeds the 50% minimum requirement.

Specific recreational improvements are proposed for Tracts ‘F’ & ‘G,’ which will be owned and maintained by the HOA.

In addition to the private open space and trail head improvements, the initial 1,120 linear feet of the regional trail, extending through the development, will be constructed. The trail is aligned along the top edge of the SROZ, with three trail head connections extending from the streets within the development.

In coordination with the City, the initial trail head improvements will include directional signage, together with some outdoor fitness/exercise stations. These exercise stations will be constructed of strong durable material, likely metal, not wood.

Semi-Public Utilities

Policy 3.1.13 The City of Wilsonville shall coordinate planning activities with the utility companies, to insure orderly and efficient installation of needed service lines and equipment.

RESPONSE: PGE, Verizon, Comcast, and Northwest Natural provide electric power, telephone, natural gas, and cable TV service throughout the City. These services are all available to serve the proposed development.

CONCLUSION – Public Facilities

All urban services are generally available and either are or can be made adequate to serve the proposed development. Therefore this development will be consistent with the Public Facilities elements of the Comprehensive Plan.

5. ENVIRONMENTAL RESOURCES AND COMMUNITY DESIGN

Policy 4.1.5: Protect valuable resource lands from incompatible development and protect people and property from natural hazards.

RESPONSE: Boeckman Creek and its riparian canyon are identified “Environmentally Sensitive Areas” which are protected by the SROZ. There is a substantial area of the site designated as SROZ, which is primarily associated with Boeckman Creek and its riparian canyon. The outer edge of the Resource is defined by the tree canopy line at the top of slope. The two intermittent streams draining to the Creek are not primary resources, but are protected by the riparian corridor.

The Design Team includes a Resource Specialist and an Arborist.

The Arborist has prepared a tree inventory and assessment report in compliance with the Tree Preservation requirements of the Code.

The project Resource Specialist has prepared a standard SRIR, which provides the basis for SROZ Map confirmation and refinement.

The subject site is not part of any designated Area of Special Concern. Therefore that section of the Comprehensive Plan is not applicable.

CONCLUSION – Annexation - Comprehensive Plan and Frog Pond Master Plan

The proposed Development Plan is consistent with the applicable provisions of the Comprehensive Plan and Frog Pond Master Plan.

Based on the response findings above, it has been demonstrated that the proposed annexation and anticipated development will be in full compliance with the applicable policies, objectives, and implementing measures of the Comprehensive Plan, Frog Pond West Master Plan, Applicable Public Facilities Master Plans and Transportation System Plan.

IV. ZONE CHANGE

The applicant is requesting a Zone Change from County FD-10 to City Frog Pond NR R-5.

Section 4.197. Zone Changes and Amendments To This Code – Procedures.

- (.01) *The following procedure shall be followed in applying for an amendment to the text of this Chapter:*
- A. *The Planning Commission shall conduct a public hearing on the proposed amendment at its earliest practicable meeting after it is proposed and shall, within forty (40) days after concluding the hearing, provide a report and recommendation to the City Council regarding the proposed amendment. The findings and recommendations of the Commission shall be adopted by resolution and shall be signed by the Chair-of the Commission.*
 - B. *In recommending approval of a proposed text amendment, the Planning Commission shall, at a minimum, adopt findings relative to the following:*
 - 1. *That the application was submitted in compliance with the procedures set forth in Section 4.008; and*
 - 2. *The amendment substantially complies with all applicable goals, policies and objectives set forth in the Comprehensive Plan; and*
 - 3. *The amendment does not materially conflict with, nor endanger, other provisions of the - text of the Code; and*
 - 4. *If applicable, the amendment is in compliance with Statewide Land Use Planning Goals and related administrative rules; and*
 - 5. *If applicable, the amendment is necessary to ensure that the City's Land Use and Development Ordinance complies with mandated requirements of State or Federal laws and/or statutes.*

RESPONSE: This application is not requesting any text amendment. Therefore these criteria are not applicable.

- (.02) *In recommending approval or denial of a proposed zone map amendment, the Planning Commission or Development Review Board shall at a minimum, adopt findings addressing the following criteria:*
- A. *That the application before the Commission or Board was submitted in accordance with the procedures set forth in Section 4.008, Section 4.125 (.18)(B)(2) or, in the case of a Planned Development, Section 4.140; and [Amended by Ord 557, adopted 9/5/03]*
 - B. *That the proposed amendment is consistent with the Comprehensive Plan map designation and substantially complies with the applicable goals, policies and objectives, set forth in the Comprehensive Plan text; and*
 - C. *In the event that the subject property, or any portion thereof, is designated as "Residential" on the City's Comprehensive Plan Map; specific findings shall be made addressing substantial compliance with Implementation Measures 4.1.4.b, d, e, q, and x of Wilsonville's Comprehensive Plan text; and [Amended by Ordinance No. 538, 2/21/02.]*

- D. *That the existing primary public facilities, i.e., roads and sidewalks, water, sewer and storm sewer are available and are of adequate size to serve the proposed development; or, that adequate facilities can be provided in conjunction with project development. The Planning Commission and Development Review Board shall utilize any and all means to insure that all primary facilities are available and are adequately sized; and*
- E. *That the proposed development does not have a significant adverse effect upon Significant Resource Overlay Zone areas, an identified natural hazard, or an identified geologic hazard. When Significant Resource Overlay Zone areas or natural hazard, and/or geologic hazard are located on or abut the proposed development, the Planning Commission or Development Review Board shall use appropriate measures to mitigate and significantly reduce conflicts between the development and identified hazard or Significant Resource Overlay Zone and*
- F. *That the applicant is committed to a development schedule demonstrating that development of the property is reasonably expected to commence within two (2) years of the initial approval of the zone change; and*
- G. *That the proposed development and use(s) can be developed in compliance with the applicable development standards or appropriate conditions are attached that insure that the project development substantially conforms to the applicable development standards.*
- H. *Adequate public facilities, services, and transportation networks are in place, or are planned to be provided concurrently with the development of the property. The applicant shall demonstrate compliance with the Transportation Planning Rule, specifically by addressing whether the proposed amendment has a significant effect on the transportation system pursuant to OAR 660-012-0060. A Traffic Impact Analysis (TIA) shall be prepared pursuant to the requirements in Section 4.133.05.(01).*

RESPONSE: This application has been submitted in compliance with the procedures set forth in Section 4.008, Section 4.125 (.18)(B)(2) and, in this case as a Planned Development, Section 4.140. As demonstrated herein, the requested zoning amendment:

1. Substantially complies with all applicable goals, policies and objectives set forth in the Comprehensive Plan, and specifically implements the designated land use for Sub-District 1, identified in the Frog Pond West Master Plan.
2. The subject property is designated as "Residential" on the City's Comprehensive Plan Map and more specifically the Frog Pond West Master Plan. Therefore specific findings must be made addressing substantial compliance with Implementation Measures 4.1.4.b, d, e, q, and x of Wilsonville's Comprehensive Plan text. See Findings below.
3. The existing primary public facilities, i.e., roads and sidewalks, water, sewer and storm sewer are available and are of adequate size to serve the proposed development. Adequate and equitable funding of necessary infrastructure is to be implemented through the provisions of Resolution 2649. This Resolution was specifically adopted as an implementing element of the Frog Pond West Master Plan.
4. This proposed development will not have any significant adverse effect upon Significant Resource Overlay Zone areas, identified natural hazard, or identified geologic hazard. The applicant has clearly delineated the Significant Resource Overlay Zone area, and has provided geo-technical analysis of natural hazard and geologic hazards associated with the slopes of the Boeckman Creek canyon. The

entire SROZ is set aside in a Conservation Tract, which will be dedicated to the City. The development plan provides for appropriate setbacks and buffering of the SROZ, and provides for identified trails and trail heads, per the Frog Pond West Master Plan.

5. The applicant is committed to a development schedule demonstrating that development of the property is reasonably expected to commence within two (2) years of the initial approval of the zone change.
6. The proposed development and residential use can be developed in compliance with the applicable development standards as set forth in the Frog Pond West Master Plan.
7. Adequate public facilities, services, and transportation networks are in place, or are planned to be provided concurrently with the development of the property, per Resolution 2649. The applicant has demonstrated compliance with the Transportation Planning Rule, specifically by addressing whether the proposed amendment has a significant effect on the transportation system pursuant to OAR 660-012-0060. A Traffic Impact Analysis (TIA) has been prepared by DKS pursuant to the requirements in Section 4.133.05(01).

Specific Findings of substantial compliance with Implementation Measures 4.1.4.b, d, e, q, and x of Wilsonville's Comprehensive Plan text:

Policy 4.1.4 The City of Wilsonville shall provide opportunities for a wide range of housing types, sizes, and densities at prices and rent levels to accommodate people who are employed in Wilsonville.

Implementation Measure 4.1.4.b Plan for and permit a variety of housing types consistent with the objectives and policies set forth under this section of the Comprehensive Plan, while maintaining a reasonable balance between the economics of building and the cost of supplying public services. It is the City's desire to provide a variety of housing types needed to meet a wide range of personal preferences and income levels. The City also recognizes the fact that adequate public facilities and services must be available in order to build and maintain a decent, safe, and healthful living environment.

RESPONSE: The Comprehensive Plan provides for a wide range of densities throughout the City. More specifically, for this development, the City has adopted the Frog Pond West Master Plan, which establishes a general land use designation of Neighborhood Residential (NR), which includes three Sub-Districts including: small lots (R-5), medium lots (R-7) and large lots (R-10). The Frog Pond West Master Plan was adopted with findings of compliance with the Comprehensive Plan, including this Policy and set of Implementing Measures.

The subject development is within Sub-District 1, which is designated for small lot single family (R-5) development. The protected resources associated with Boeckman Creek, which are within the subject site, are to be zoned SROZ. The proposed development has been designed to comply with the standards of the NR, including the R-5 sub-district and SROZ zoning.

The Frog Pond West Master Plan states as follows:

Frog Pond West Master Plan

“Subdistricts. *The Master Plan and the RN Zone establish “subdistricts” to geographically specify the minimum and maximum number of residential dwellings in each subdistrict area of the neighborhood.*

The Master Plan establishes “subdistricts” to specify the minimum and maximum number of residential dwellings within twelve subareas of the neighborhood. The number of dwellings and density distribution are consistent with those adopted in the Frog Pond Area Plan. They are grouped into three “zones”: R-10 Large Lot, R-7 Medium Lot, and R-5 Small Lot single family districts.

Maximum densities. *The maximum number of dwellings in a subdistrict is the net buildable acres divided by the average lot sizes assumed in the Area Plan: 10,000 net sq. ft. for R-10 Large Lot Single Family; 7,000 net sq. ft. for R-7 Medium Lot Single Family; and 5,000 net sq. ft. for Small Lot Single Family.”*

While the general zoning will be NR, Figure 6 (page 28 herein) and Table I of the Master Plan (page 29 herein) both reflect the Sub-districts, specifically showing Sub-District 1 as R-5, small lot single family.

Implementation Measure 4.1.4.d Encourage the construction and development of diverse housing types, but maintain a general balance according to housing type and geographic distribution, both presently and in the future. Such housing types may include, but shall not be limited to: Apartments, single-family detached, single-family common wall, manufactured homes, mobile homes, modular homes, and condominiums in various structural forms.

RESPONSE: The Frog Pond West Master Plan designates the subject site as Sub-District 1, which is to be developed for small lot R-5 residential, including detached and attached units. The proposed development has been designed to comply with the standard of the NR (R-5) zoning, and includes the required 10% attached units.

Implementation Measure 4.1.4.e Targets are to be set in order to meet the City's Goals for housing and assure compliance with State and regional standards.

RESPONSE: The Frog Pond West Master Plan sets the targets for various sized lots. The proposed development has been designed to comply with the standard of the NR (R-5) zoning, and includes the required 10% attached units, on lots sized from 4,000 to 7,778 square feet for detached units, and 3,000 to 3,449 square feet per unit for the attached.

Implementation Measure 4.1.4.q The City will continue to allow for mobile homes and manufactured dwellings, subject to development review processes that are similar to those used for other forms of housing. Individual units will continue to be allowed on individual lots, subject to design standards. Mobile home parks and subdivisions shall be subject to the same procedures as other forms of planned developments.

RESPONSE: The Comprehensive Plan provides for a wide range of densities throughout the City, including provisions for accommodating manufactured homes. However, the applicant is not proposing any manufactured homes.

Implementation Measure 4.1.4.x Apartments and mobile homes are to be located to produce an optimum living environment for the occupants and surrounding residential areas.

Development criteria includes:

- 1. Buffering by means of landscaping, fencing, and distance from conflicting uses.*
- 2. Compatibility of design, recognizing the architectural differences between apartment buildings and houses.*
- 3. On-site recreation space as well as pedestrian and bicycle access to parks, schools, mass transit stops and convenience shopping.*
- 4. The siting of buildings to minimize the visual effects of parking areas and to increase the availability of privacy and natural surveillance for security.*

RESPONSE: The Comprehensive Plan provides for a wide range of densities throughout the City, including provisions for accommodating manufactured homes. However, the Frog Pond West Master Plan does not include any such provisions for manufactured homes.

CONCLUSION – Zone Change: Based on the findings presented herein, the applicant has demonstrated compliance with the applicable approval criteria for the requested zone change.

V. COMPLIANCE WITH DEVELOPMENT CODE

This section presents information related to the proposed preliminary plat and addresses compliance with the code provisions for subdivision and residential development, under the PDR regulations, and more specifically the Frog Pond West Master Plan, and Sub-Area 1.

Section 4.127

Residential Neighborhood (RN) Zone

(.01) Purpose.

The Residential Neighborhood (RN) zone applies to lands within Residential Neighborhood Comprehensive Plan Map designation. The RN zone is a Planned Development zone, subject to applicable Planned Development regulations, except as superseded by this section or in legislative master plans. The purposes of the RN Zone are to:

- A. Implement the Residential Neighborhood policies and implementation measures of the Comprehensive Plan.*
- B. Implement legislative master plans for areas within the Residential Neighborhood Comprehensive Plan Map designation.*
- C. Create attractive and connected neighborhoods in Wilsonville.*
- D. Regulate and coordinate development to result in cohesive neighborhoods that include: walkable and active streets; a variety of housing appropriate to each neighborhood; connected paths and open spaces; parks and other non-residential uses that are focal points for the community; and, connections to and integration with the larger Wilsonville community.*
- E. Encourage and require quality architectural and community design as defined by the Comprehensive Plan and applicable legislative master plans.*
- F. Provide transportation choices, including active transportation options.*
- G. Preserve and enhance natural resources so that they are an asset to the neighborhoods, and there is visual and physical access to nature.*

RESPONSE: The subject property is within the Frog Pond West Neighborhood. Therefore these purposes and this Code section are applicable to the proposed development.

The applicant is proposing a residential subdivision consistent with the neighborhood characteristics envisioned by these purposes. The proposed development provides for protection and enhancement of the natural resources provided by Boeckman Creek, and promotes walkable and active streets, with connectivity between the school property and Boeckman Creek.

(.02) Permitted uses:

- A. Open Space.*
- B. Single-Family Dwelling Unit.*
- C. Attached Single-Family Dwelling Unit. In the Frog Pond West Neighborhood, a maximum of 2 dwelling units, not including ADU's, may be attached.*

- D. Duplex.
- E. Multiple-Family Dwelling Units, except when not permitted in a legislative master plan, subject to the density standards of the zone. Multi-family dwelling units are not permitted within the Frog Pond West Master Plan area.
- F. Cohousing.
- G. Cluster Housing.
- H. Public or private parks, playgrounds, recreational and community buildings and grounds, tennis courts, and similar recreational uses, all of a non-commercial nature, provided that any principal building or public swimming pool shall be located not less than forty-five (45) feet from any other lot.
- I. Manufactured homes.

RESPONSE: The proposed preliminary plat is designed primarily for detached single-family homes, while also providing attached units consistent with the 10% code requirement.

(.03) Permitted accessory uses to single family dwellings:

- A. Accessory uses, buildings and structures customarily incidental to any of the principal permitted uses listed above, and located on the same lot.
- B. Living quarters without kitchen facilities for persons employed on the premises or for guests. Such facilities shall not be rented or otherwise used as a separate dwelling unless approved as an accessory dwelling unit or duplex.
- C. Accessory Dwelling Units, subject to the standards of Section 4.113 (.11).
- D. Home occupations.
- E. A private garage or parking area.
- F. Keeping of not more than two (2) roomers or boarders by a resident family.
- G. Temporary buildings for uses incidental to construction work, which buildings shall be removed upon completion or abandonment of the construction work.
- H. Accessory buildings and uses shall conform to front and side yard setback requirements. If the accessory buildings and uses do not exceed 120 square feet or ten (10) feet in height, and they are detached and located behind the rear-most line of the main buildings, the side and rear yard setbacks may be reduced to three (3) feet.
- I. Livestock and farm animals, subject to the provisions of Section 4.162.

RESPONSE: The applicant is not proposing any specific accessory uses or dwellings. Individual home owners may elect to provide accessory uses, which will require consistency with this Section, at the time the accessory use is proposed.

(.04) Uses permitted subject to Conditional Use Permit requirements:

- A. Public and semi-public buildings and/or structures essential to the physical and economic welfare of an area, such as fire stations, sub-stations and pump stations.

- B. *Commercial Recreation, including public or private clubs, lodges or meeting halls, golf courses, driving ranges, tennis clubs, community centers and similar commercial recreational uses. Commercial Recreation will be permitted upon a finding that it is compatible with the surrounding residential uses and promotes the creation of an attractive, healthful, efficient and stable environment for living, shopping or working. All such uses except golf courses and tennis courts shall conform to the requirements of Section 4.124(.04)(D) (Neighborhood Commercial Centers).*
- C. *Churches; public, private and parochial schools; public libraries and public museums.*
- D. *Neighborhood Commercial Centers limited to the provisions of goods and services primarily for the convenience of and supported by local residents. Neighborhood Commercial Centers are only permitted where designated on an approved legislative master plan.*

RESPONSE: The applicant is not proposing any Conditional Uses.

(.05) Residential Neighborhood Zone Sub-districts:

- 1. *RN Zone sub-districts may be established to provide area-specific regulations that implement legislative master plans.*
 - 1. *For the Frog Pond West Neighborhood, the sub-districts are listed in Table 1 of this code and mapped on Figure 6 of the Frog Pond West Master Plan. The Frog Pond West Master Plan Sub-District Map serves as the official sub-district map for the Frog Pond West Neighborhood.*

RESPONSE: The proposed development is within Sub-District 1, which is designated for small lot residential use (R-5), within the general NR zoning.

(.06) Minimum and Maximum Residential Units:

- A. *The minimum and maximum number of residential units approved shall be consistent with this code and applicable provisions of an approved legislative master plan.*
 - 1. *For the Frog Pond West Neighborhood, Table 1 in this code and Frog Pond West Master Plan Table 1 establish the minimum and maximum number of residential units for the sub-districts.*
 - 2. *For parcels or areas that are a portion of a sub-district, the minimum and maximum number of residential units are established by determining the proportional gross acreage and applying that proportion to the minimums and maximums listed in Table 1. The maximum density on a parcel may be increased, up to a maximum of 10% of what would otherwise be permitted, based on an adjustment to an SROZ boundary that is consistent with 4.139.06.*
- B. *The City may allow a reduction in the minimum density for a sub-district when it is demonstrated that the reduction is necessary due to topography, protection of trees, wetlands and other natural resources, constraints posed by existing development, infrastructure needs, provision of non-residential uses and similar physical conditions.*

Table 1. Minimum and Maximum Dwelling Units by Sub-District in the Frog Pond West Neighborhood

Area Plan Designation	Frog Pond West Sub-district	Minimum Dwelling Units in Sub-district	Maximum Dwelling Units in Sub-district
<i>R-10 Large Lot Single Family</i>	3	26	32
	7	24	30
	8	43	53
<i>R-7 Medium Lot Single Family</i>	2	20	25
	4	86	107
	5	27	33
	9	10	13
	11	46	58
<i>R-5 Small Lot Single Family</i>	1	66	82
	6	74	93
	10	30	38
<i>Civic</i>	12	0	7 ^a
<i>Public Facilities (PF)</i>	13	0	0

a These metrics apply to infill housing within the Community of Hope Church property, should they choose to develop housing on the site. Housing in the Civic sub-district is subject to the R-7 Medium Lot Single Family regulations.

RESPONSE: The proposed development is within Sub-Area 1, which is designated for small lot residential (R-5) within the general NR zoning. The allowed density for this development is 66 to 82 units. The proposed preliminary plat creates 82 lots, which is consistent with the allowed density.

(.07) *Development Standards Generally*

A. *Unless otherwise specified by this the regulations in this Residential Development Zone chapter, all development must comply with Section 4.113, Standards Applying to Residential Development in Any Zone.*

RESPONSE: Compliance with Section 4.113 is addressed later in this report.

(.08) *Lot Development Standards:*

A. *Lot development shall be consistent with this code and applicable provisions of an approved legislative master plan.*

B. *Lot Standards Generally. For the Frog Pond West Neighborhood, Table 2 establishes the lot development standards unless superseded or supplemented by other provisions of the Development Code.*

C. *Lot Standards for Small Lot Sub-districts. The purpose of these standards is to ensure that development in the Small Lot Sub-districts includes varied design that avoids homogenous street frontages, creates active pedestrian street frontages and has open space that is integrated into the development pattern.*

Standards. Planned developments in the Small Lot Sub-districts shall include one or more of the following elements on each block:

1. Alleys.
2. Residential main entries grouped around a common green or entry courtyard (e.g. cluster housing).
3. Four or more residential main entries facing a pedestrian connection allowed by an applicable legislative master plan.
4. Garages recessed at least 4 feet from the front façade or 6 feet from the front of a front porch.

RESPONSE: The proposed lots are designed so that some are alley-loaded (Lots 31-46). For the other lots where the garage will face the street, the garage will be recessed a minimum of 4 feet.

Table 2: Neighborhood Zone Lot Development Standards

Neighborhood Zone Sub-District	Min. Lot Size (sq.ft.)	Min. Lot Depth (ft.)	Max. Lot Coverage (%)	Min. Lot Width ^{G, H, J} (ft.)	Max. Bldg. Height ^F (ft.)	Setbacks ^H				
						Front Min. (ft.)	Rear Min. (ft.)	Side Min. (note)	Garage Min. Setback from Alley (ft.)	Garage Min. Setback from Street ^K (ft.)
R-10 Large Lot Single Family	8,000 ^A	60'	40% ^B	40	35	20 ^C	20	I	18 ^D	20
R-7 Medium Lot Single Family	6,000 ^A	60'	45% ^B	35	35	15 ^C	15	I	18 ^D	20
R-5 Small Lot Single Family	4,000^A	60'	60%^B	35	35	12^C	15	I	18^D	20

- Notes:
- A May be reduced to 80% of minimum lot size where necessary to preserve natural resources (e.g. trees, wetlands) and/or provide active open space. Cluster housing may be reduced to 80% of minimum lot size. Duplexes in the R-5 Sub-District have a 6,000 SF minimum lot size.
 - B On lots where detached accessory buildings are built, maximum lot coverage may be increased by 10%.
 - C Front porches may extend 5 feet into the front setback.
 - D The garage setback from alley shall be minimum of 18 feet to a garage door facing the alley in order to provide a parking apron. Otherwise, the rear or side setback requirements apply.
 - F Vertical encroachments are allowed up to ten additional feet, for up to 10% of the building footprint; vertical encroachments shall not be habitable space.
 - G May be reduced to 24' when the lot fronts a cul-de-sac. No street frontage is required when the lot fronts on an approved, platted private drive or a public pedestrian access in a cluster housing development.
 - H Front Setback is measured as the offset of the front lot line or a vehicular or pedestrian access easement line. On lots with alleys, Rear Setback shall be measured from the rear lot line abutting the alley.
 - I On lots greater than 10,000 SF with frontage 70 ft. or wider, the minimum combined side yard setbacks shall total 20 ft. with a minimum of 10 ft. On other lots, minimum side setback shall be 5 ft. On a corner lot, minimum side setbacks are 10 feet.
 - J For cluster housing with lots arranged on a courtyard, frontage shall be measured at the front door face of the building adjacent to a public right of way or a public pedestrian access easement linking the courtyard with the Public Way.
 - K Duplexes with front-loaded garages are limited to one shared standard-sized driveway/apron.

RESPONSE: The proposed development is within Sub-District 1, which is designated for small lot residential (R-5). The proposed preliminary plat has been designed to comply with the R-5 standards, set forth in Table 2.

Lots for detached single-family units each have at least 4,000 square feet. The detached lots, except Lots 13 & 14, have 35 feet of frontage on a public street.

The lots for attached units maintain a minimum of 3,000 square feet per unit. Table 2 does not provide separate standards for the Attached lots.

The attached lots are proposed with 30 foot widths. This lot width is consistent with the equivalent PRD-5 zone (2,500-3,000 sf), which has a 30 foot width standard.

D. Lot Standards Specific to the Frog Pond West Neighborhood.

1. *Lots adjacent to Boeckman Road and Stafford Road shall meet the following standards:*
 - a. *Rear or side yards adjacent to Boeckman Road and Stafford Road shall provide a wall and landscaping consistent with the standards in Figure 10 of the Frog Pond West Master Plan.*
2. *Lots adjacent to the collector-designated portions of Willow Creek Drive and Frog Pond Lane shall not have driveways accessing lots from these streets, unless no practical alternative exists for access. Lots in Large Lot Sub-districts are exempt from this standard.*

RESPONSE: The proposed preliminary plat has lots backing onto Boeckman Road. No lots are adjacent to a collector street. The Landscape Plan provides for the 10 foot wide buffer along the Boeckman Road frontage, including the brick wall reflected in Figure 10.

(.09) Open Space:

- A. *Purpose. The purposes of these standards for the Residential Neighborhood Zone are to:*
 1. *Provide light, air, open space, and useable recreation facilities to occupants of each residential development.*
 2. *Retain and incorporate natural resources and trees as part of developments.*
 3. *Provide access and connections to trails and adjacent open space areas.*

For Neighborhood Zones which are subject to adopted legislative master plans, the standards work in combination with, and as a supplement to, the park and open space recommendations of those legislative master plans. These standards supersede the Outdoor Recreational Area requirements in WC Section 4.113 (.01) and (.02).

RESPONSE: The proposed development specifically identifies the natural resources of Boeckman Creek, and delineates the SROZ boundary. The SROZ, including trail heads, is proposed to be set aside in Tract 'A', for conservation purposes, and dedicated to the City. The development plan further provides pedestrian-friendly streets, with visual corridors and pathway connections between the school property and Boeckman Creek. Additional open space is addressed in the following sections.

B. Within the Frog Pond West Neighborhood, the following standards apply:

1. *Properties within the R-10 Large Lot Single Family sub-districts and R-7 Medium Lot Single Family sub-districts are exempt from the requirements of this section. If the Development Review Board finds, based upon substantial evidence in the record, that there is a need for open space, they may waive this exemption and require open space proportional to the need.*
2. *For properties within the R-5 Small Lot Single Family sub-districts, Open Space Area shall be provided in the following manner:*

Ten percent (10%) of the net developable area shall be in open space. Net developable area does not include land for non-residential uses, SROZ-regulated lands, streets and private drives, alleys and pedestrian connections. Open space must include at least 50% usable open space as defined by this Code and other like space that the Development Review Board finds will meet the purpose of this section.

- a. Natural resource areas such as tree groves and/or wetlands, and unfenced low impact development storm water management facilities, may be counted toward the 10% requirement at the discretion of the Development Review Board. Fenced storm water detention facilities do not count toward the open space requirement. Pedestrian connections may also be counted toward the 10% requirement.*
- b. The minimum land area for an individual open space is 2,000 square feet, unless the Development Review Board finds, based on substantial evidence in the record, that a smaller minimum area adequately fulfills the purpose of this Open Space standard.*
- c. The Development Review Board may reduce or waive the usable open space requirement in accordance with Section 4.118(.03). The Board shall consider substantial evidence regarding the following factors: the walking distance to usable open space adjacent to the subject property or within 500 feet of it; the amount and type of open space available adjacent or within 500 feet of the subject property, including facilities which support creative play.*
- d. The Development Review Board may specify the method of assuring the long-term protection and maintenance of open space and/or recreational areas. Where such protection or maintenance are the responsibility of a private party or homeowners' association, the City Attorney shall review any pertinent bylaws, covenants or agreements prior to recordation.*

RESPONSE: The proposed development is within the NR, (R-5) Sub-District 1 and therefore subject to the supplemental open space provisions set forth in Sub-B.2.

The net site area, minus the SROZ and street rights-of-way is approximately 8.84 acres or 384,125 square feet. Therefore a minimum of 38,512 square feet of open space must be provided, including 19,256 square feet of “usable or active” play space.

The proposed preliminary plat provides a total of 39,654 square feet of general open space, outside of the SROZ. This equals 10.3% of the net developable area, thereby meeting code requirements. The proposed “active use” area totals 41,952 square feet, which is actually 105.8% of the total general open space, which exceeds the 50% minimum requirement.

(.10) *Block, access and connectivity standards:*

Purpose. These standards are intended to regulate and guide development to create: a cohesive and connected pattern of streets, pedestrian connections and bicycle routes; safe, direct and convenient routes to schools and other community destinations; and, neighborhoods that support active transportation and Safe Routes to Schools.

- A. *Blocks, access and connectivity shall comply with adopted legislative master plans.*
1. *Within the Frog Pond West Neighborhood, streets shall be consistent with Figure 18, Street Demonstration Plan, in the Frog Pond West Master Plan. The Street Demonstration Plan is intended to be guiding, not binding. Variations from the Street Demonstration Plan may be approved by the Development Review Board, upon finding that one or more of the following justify the variation: barriers such as existing buildings and topography; designated Significant Resource Overlay Zone areas; tree groves, wetlands or other natural resources; existing or planned parks and other active open space that will serve as pedestrian connections for the public; alignment with property lines and ownerships that result in efficient use of land while providing substantially equivalent connectivity for the public; and/or site design that provides substantially equivalent connectivity for the public.*
 2. *If a legislative master plan does not provide sufficient guidance for a specific development or situation, the Development Review Board shall use the block and access standards in Section 4.124 (.06) as the applicable standards.*

RESPONSE: The local streets are laid out to provide an efficient circulation and lot pattern, with block lengths ranging from 110 to 322 feet. The total block perimeters are less than 1,200 feet. The north/south streets are designed to extend to abutting properties allowing for continuation of the local streets consistent with the Street Demonstration Plan.

(.011) *Signs. Per the requirements of Sections 4.156.01 through 4.156.11 and applicable provisions from adopted legislative master plans.*

RESPONSE: The applicant is not proposing any Development signs at this time.

(.012) *Parking. Per the requirements of Section 4.155 and applicable provisions from adopted legislative master plans.*

RESPONSE: Parking requirements are addressed later in this report under Section 4.155.

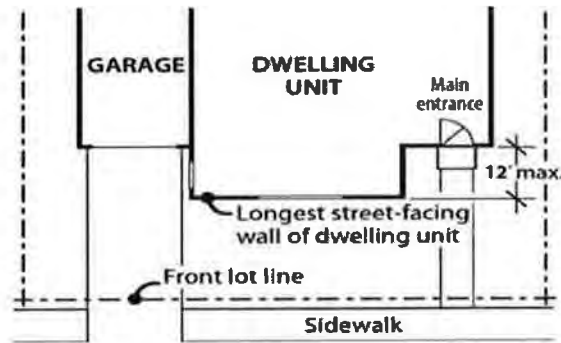
(.013) *Corner Vision Clearance. Per the requirements of Section 4.177.*

RESPONSE: The Street Plan and Landscaping Plan provide for compliance with the corner vision requirements.

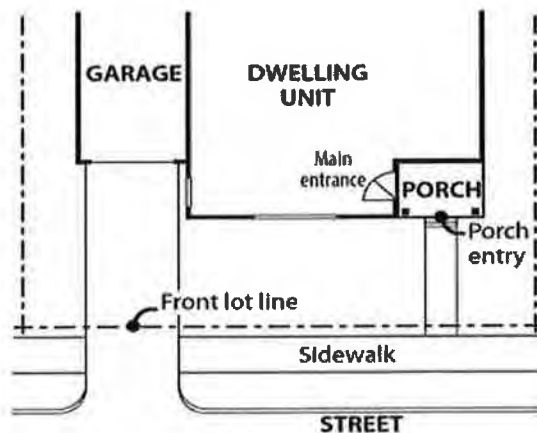
(.014) *Main Entrance Standards*

- A. *Purpose. These standards:*

1. Support a physical and visual connection between the living area of the residence and the street;
 2. Enhance public safety for residents and visitors and provide opportunities for community interaction;
 3. Ensure that the pedestrian entrance is visible or clearly identifiable from the street by its orientation or articulation; and
 4. Ensure a connection to the public realm for development on lots fronting both private and public streets by making the pedestrian entrance visible or clearly identifiable from the public street.
- B. Location. At least one main entrance for each structure must:
1. Be within 12 feet of the longest street-facing front wall of the dwelling unit; and
 2. Either:
 - a. Face the street
 - b. Be at an angle of up to 45 degrees from the street; or
 - c. Open onto a porch. The porch must:
 - i. Be at least 6 feet deep
 - ii. Have at least one entrance facing the street; and
 - iii. Be covered with a roof or trellis



Main Entrance Opening onto a Porch



RESPONSE: Architectural review is not required for Preliminary Approval. However, the proposed lots have been designed and oriented to allow compliance with these Main Entrance criteria. Specific unit designs are not proposed at this time, but will be subject to administrative review for compliance with these criteria at the time building permit review.

(.015) *Garage Standards*

A. *Purpose. These standards:*

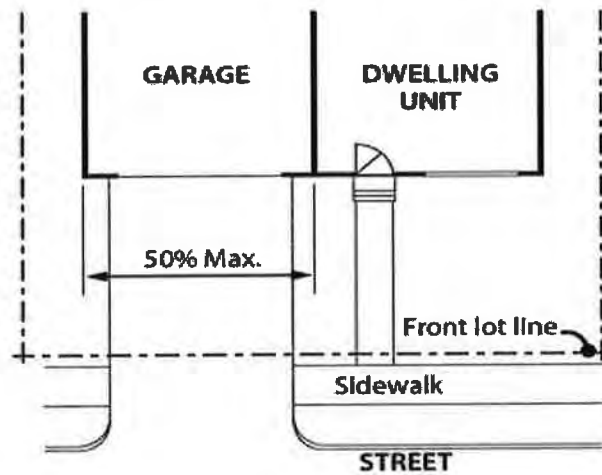
1. *Ensure that there is a physical and visual connection between the living area of the residence and the street;*
2. *Ensure that the location and amount of the living area of the residence, as seen from the street, is more prominent than the garage;*
3. *Prevent garages from obscuring the main entrance from the street and ensure that the main entrance for pedestrians, rather than automobiles, is the prominent entrance;*
4. *Provide for a pleasant pedestrian environment by preventing garages and vehicle areas from dominating the views of the neighborhood from the sidewalk; and*
Enhance public safety by preventing garages from blocking views of the street from inside the residence.

B. *Street-Facing Garage Walls*

1. *Where these regulations apply. Unless exempted, the regulations of this subsection apply to garages accessory to residential units.*
2. *Exemptions:*
 - a. *Garages on flag lots.*
 - b. *Development on lots which slope up or down from the street with an average slope of 20 percent or more.*
3. *Standards.*
 - a. *The length of the garage wall facing the street may be up to 50 percent of the length of the street-facing building façade. For duplexes, this standard applies to the total length of the street-facing façades. For all other lots and structures, the standards apply to the street-facing façade of each unit. For corner lots, this standard applies to only one street side of the lot. For lots less than 50 feet wide at the front lot line, the standard in (b) below applies.*
 - b. *For lots less than 50 wide at the front lot line, the following standards apply:*
 - i. *The width of the garage door may be up to 50 percent of the length of the street-facing façade.*
 - ii. *The garage door must be recessed at least 4 feet from the front façade or 6 feet from the front of a front porch.*
 - iii. *The maximum driveway width is 18 feet.*
4. *Where a dwelling abuts a rear or side alley or a shared driveway, the garage shall orient to the alley or shared drive.*

5. *Where three or more contiguous garage parking bays are proposed facing the same street, the garage opening closest to a side property line shall be recessed at least two feet behind the adjacent opening(s) to break up the street facing elevation and diminish the appearance of the garage from the street. Side-loaded garages, i.e., where the garage openings are turned away from the street, are exempt from this requirement.*
6. *A garage entry that faces a street may be no closer to the street than the longest street facing wall of the dwelling unit. There must be at least 20 feet between the garage door and the sidewalk. This standard does not apply to garage entries that do not face the street.*

Length of Street-Facing Garage Wall



RESPONSE: Architectural review is not required for Preliminary Approval. The detached lots are all less than 50 feet in width, therefore garage design criteria (.15)B.3.b. is applicable, which measures the garage door, not the full garage façade width. However, the City has clarified that for attached units, (.15)B.3.a. is applicable, whereas “The length of the garage wall facing the street may be up to 50 percent of the length of the street-facing building façade.”

Specific unit designs are not proposed at this time. However, Pahlisch Homes has provided examples of typical building elevations for the various lot widths to show that the garage percent of front elevation standard can be met. But, this standard only applied to the units on Lots 23/24, Lots 39/40, and Lots 61/62, as Lots 31/32 and Lots 39/40 are proposed as rear-loaded units.

(0.16) Residential Design Standards

A. Purpose. These standards:

- 1. Support consistent quality standards so that each home contributes to the quality and cohesion of the larger neighborhood and community.*
- 2. Support the creation of architecturally varied homes, blocks and neighborhoods, whether a neighborhood develops all at once or one lot at a time, avoiding homogeneous street frontages that detract from the community’s appearance.*

- B. Applicability. These standards apply to all façades facing streets, pedestrian connections, or elsewhere as required by this Code or the Development Review Board. Exemptions from these standards include: (1) Additions or alterations adding less than 50% to the existing floor area of the structure; and, (2) Additions or alterations not facing a street.*
- C. Windows. The standards for minimum percentage of façade surface area in windows are below. These standard apply only to facades facing streets and pedestrian connections.*
- 1. For two-story homes:*
 - a. 15% - front facades*
 - b. 12.5% – front facades if a minimum of six (6) design elements are provided per Section 4.127 (0.15) E, Design Menu.*
 - c. 10% - front facades facing streets if a minimum of seven (7) design elements are provided per Section 4.127 (0.15) E, Design Menu.*
 - 2. For one-story homes:*
 - a. 12.5% - front facades*
 - b. 10 % – front facades if a minimum of six (6) design elements are provided per Section 4.127 (0.15) E, Design Menu.*
 - 3. For all homes: 5% for street-side facades.*
 - 4. Windows used to meet this standard must provide views from the building to the street. Glass block does not meet this standard. Windows in garage doors and other doors count toward this standard.*
- D. Articulation. Plans for residential buildings shall incorporate design features such as varying rooflines, offsets, balconies, projections (e.g., overhangs, porches, or similar features), recessed or covered entrances, window reveals, or similar elements that break up otherwise long, uninterrupted elevations. Such elements shall occur at a minimum interval of 30 feet on façades facing streets, pedestrian connections, or elsewhere as required by this Code or the Development Review Board. Where a façade governed by this standard is less than 30 feet in length, at least one of the above-cited features shall be provided.*
- E. Residential Design Menu. Residential structures shall provide a minimum of five (5) of the design elements listed below for front facades, unless otherwise specified by the code. For side facades facing streets or pedestrian connections, a minimum of three (3) of the design elements must be provided. Where a design features includes more than one element, it is counted as only one of the five required elements.*
- 1. Dormers at least three (3) feet wide.*
 - 2. Covered porch entry – minimum 48 square foot covered front porch, minimum six (6) feet deep and minimum of a six (6) foot deep cover. A covered front stoop with minimum 24 square foot area, 4 foot depth and hand rails meets this standard.*
 - 3. Front porch railing around at least two (2) sides of the porch.*
 - 4. Front facing second story balcony – projecting from the wall of the building a minimum of four (4) feet and enclosed by a railing or parapet wall.*
 - 5. Roof overhang of 16 inches or greater.*
 - 6. Columns, pillars or posts at least four (4) inches wide and containing larger base materials.*
 - 7. Decorative gables – cross or diagonal bracing, shingles, trim, corbels, exposed rafter ends or brackets (does not include a garage gable if garage projects beyond dwelling unit portion of street façade).*

8. *Decorative molding above windows and doors.*
 9. *Decorative pilaster or chimneys.*
 10. *Shakes, shingles, brick, stone or other similar decorative materials occupying at least 60 square feet of the street façade.*
 11. *Bay or bow windows – extending a minimum of 12 inches outward from the main wall of a building and forming a bay or alcove in a room within the building.*
 12. *Sidelight and/or transom windows associated with the front door or windows in the front door.*
 13. *Window grids on all façade windows (excluding any windows in the garage door or front door).*
 14. *Maximum nine (9) foot wide garage doors or a garage door designed to resemble two (2) smaller garage doors and/or windows in the garage door (only applicable to street facing garages).*
 15. *Decorative base materials such as natural stone, cultured stone or brick extending at least 36 inches above adjacent finished grade occupying a minimum of 10 % of the overall primary street facing façade.*
 16. *Entry courtyards which are visible from, and connected directly to, the street. Courtyards shall have a minimum depth of 10 feet and minimum width of 80% of the non-garage/driveway building width to be counted as a design element.*
- F. *House Plan Variety. No two directly adjacent or opposite dwelling units may possess the same front or street-facing elevation. This standard is met when front or street-facing elevations differ from one another due to different materials, articulation, roof type, inclusion of a porch, fenestration, and/or number of stories. Where façades repeat on the same block face, they must have at least three intervening lots between them that meet the above standard. Small Lot developments over 10 acres shall include duplexes and/or attached 2-unit single family homes comprising 10% of the homes – corner locations are preferred.*
- G. *Prohibited Building Materials. The following construction materials may not be used as an exterior finish:*
1. *Vinyl siding.*
 2. *Wood fiber hardboard siding.*
 3. *Oriented strand board siding.*
 4. *Corrugated or ribbed metal.*
 5. *Fiberglass panels.*

RESPONSE: Architectural review is not required for Preliminary Approval. However, the proposed lots have been designed and oriented to allow compliance with these Residential Design criteria. The developer, Pahlisch Homes is fully aware of these design criteria and indicates they have unit designs that meet these criteria for building permit review.

Benjamin
2590 Sq. Ft.



'E' Elevation

Makenna
2771 Sq. Ft.



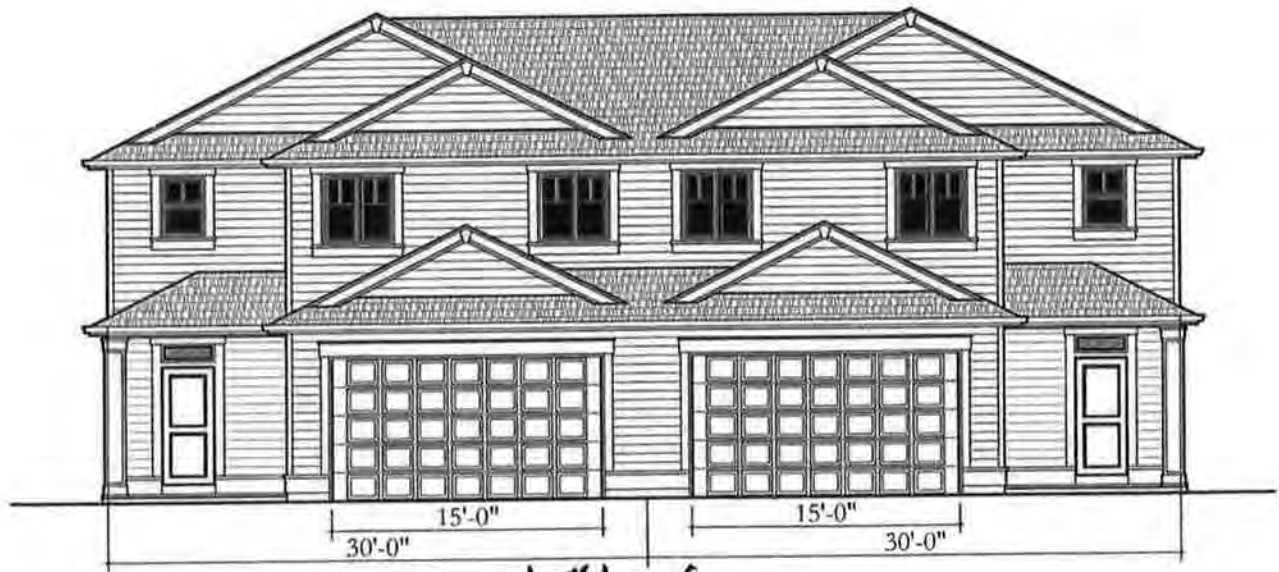
Northwest 'A' Elevation

Caldwell
2042 Sq. Ft.



'F' Elevation

Atwood
Townhomes
1657 Sq. Ft.



'A' Elevation

(0.17) Fences

A. *Within Frog Pond West, fences shall comply with standards in 4.113 (.08) except as follows:*

1. *Columns for the brick wall along Boeckman Road and Stafford Road shall be placed at lot corners where possible.*
2. *A solid fence taller than 4 feet in height is not permitted within 8 feet of the brick wall along Boeckman Road and Stafford Road, except for fences placed on the side lot line that are perpendicular to the brick wall and end at a column of the brick wall.*
3. *Height transitions for fences shall occur at fence posts.*

RESPONSE: The proposed Landscaping Plan provides for fencing consistent with these criteria. The design for the Buffer Wall along the Boeckman Road frontage has been coordinated with West Hills Development (Stafford Meadows), to ensure a degree of consistency in the type of brick, column spacing, and general format for the foundation landscaping in front of the wall, as follows:

- The brick is to be Mutual Material, Inca, smooth, with gray mortar;
- Column Spacing, generally 25 feet, with some adjustments at intersections;
- Foundation Planting – evergreen base plants planted at regular intervals, with deciduous plantings interspersed to add color and texture variety, per coordination with Stafford Meadows (OTAK); and
- No individual lot fencing is proposed at this time. Any subsequent fencing proposed by property owners or builders will be subject to these criteria, plus criteria provided within the CC&Rs.

(0.18) *Homes Adjacent to Schools, Parks and Public Open Spaces*

A. *Purpose. The purpose of these standards is to ensure that development adjacent to schools and parks is designed to enhance those public spaces with quality design that emphasizes active and safe use by people and is not dominated by driveways, fences, garages, and parking.*

B. *Applicability. These standards apply to development that is adjacent to or faces schools and parks. As used here, the term adjacent includes development that is across a street or pedestrian connection from a school or park.*

C. *Development must utilize one or more of the following design elements:*

1. *Alley loaded garage access.*
2. *On corner lots, placement of the garage and driveway on the side street that does not face the school, park, or public open space.*
3. *Recess of the garage a minimum of four feet from the front façade of the home.*

A second story above the garage, with windows, is encouraged for this option.

D. *Development must be oriented so that the fronts or sides of homes face adjacent schools or parks. Rear yards and rear fences may generally not face the schools or parks, unless approved through the waiver process of 4.118 upon a finding that there is no practicable alternative due to the size, shape or other physical constraint of the subject property.*

RESPONSE: The preliminary plat aligns Street A (P1) and Street G (P5) so they frame the west and north boundaries of the school property. With this street configuration there will be no lots with side or rear yards directly abutting the school property.

The lots along the west side of Street A are configured so that the sides of the units will face the school property. All the garages will be accessed from the side streets or the alley (Tract 'E') rather than from Streets A, D, or E. For the lots with garages facing the street, the garages will be recessed back from the front façade of the home, at least 4 feet, to diminish the visual dominance of garages from the street.

Street B is a “Woonerf” design. This special street section has been employed in order to alleviate the double frontage situation for Lots 23-30, and also add an additional design feature to the project. In this case the “Woonerf” design provides four desirable design elements:

1. The wide landscape strip on the north side provides additional buffering for the rear lots abutting Street B;
2. Per Fire District, 20 foot paved surface not counting curb;
3. The street provides a logical and aesthetic public street frontage for Lots 1-12, which abut Boeckman Road. Without a public street, these lots would have no functional street frontage.
4. Parking bays provide for visitor parking; and
5. The heavily landscaped, meandering design creates an enhanced pedestrian corridor between the school and the SROZ and trail head.

CONCLUSION – Frog Pond Standards

As demonstrated herein and on supporting plans and documents, the applicant has demonstrated compliance with the applicable design criteria set forth in the Frog Pond Residential Neighborhood Zone.

Stage I Master Plan

The PDR zoning requires master planning, particularly when development is to be phased. The proposed development is not anticipated to be phased. For this application, the Preliminary Plat also represents the Stage I Master Plan.

Stage I Master Plan, with Annexation

The applicant is proposing a small lot single family subdivision for the subject site, consisting of Sub-Area 1. The Stage I master plan envisions 82 lots, including 10 lots for attached units.

The Landscape Plan provides for preservation of 2 existing large White Oaks (56" & 38"), and 5 other trees outside of the SROZ, but within the 25 foot Impact Area. In addition, the Plan provides for planting of 124 street trees, plus 64 general landscape trees within the open space tracts. Street trees along the Boeckman Road frontage will be installed by the City with the road improvements.

Section 4.113. Standards Applying To Residential Developments In Any Zone.

(.01) Outdoor Recreational Area in Residential Developments.

A. Purpose. The purposes of the following standards for outdoor recreational area are to provide adequate light, air, open space and usable recreational facilities to occupants of each residential development. Unless otherwise provided for by this code or a legislative master plan, outdoor recreational area shall be:

- 1. Designed with a reasonable amount of privacy balanced between indoor and outdoor living areas. Such outdoor recreational area shall be provided consistent with the requirements of this Section.*
- 2. Recreational areas shall be provided in keeping with the needs of the prospective tenants and shall not be located in required yards, parking, or maneuvering areas, or areas that are inaccessible. Standards for outdoor recreational areas may be waived by the Development Review Board upon finding that the recreational needs of the residents will be adequately met through the use of other recreational facilities that are available in the area.*
- 3. In mixed-use developments containing residential uses, the Development Review Board shall establish appropriate requirements for outdoor recreational area, consistent with this Section.*
- 4. The Development Review Board may establish conditions of approval to alter the amount of required outdoor recreation area, based on findings of projected need for the development. Multi-family developments shall provide at least the following minimum recreational area:*
 - a. For ten (10) or fewer dwelling units, 1000 square feet of usable recreation area;*
 - b. For eleven (11) through nineteen (19) units, 200 square feet per unit;*
 - c. For twenty (20) or more units, 300 square feet per unit.*
- 5. Outdoor recreational area shall be considered to be part of the open space required in the following subsection.*

RESPONSE: The proposed development is for single family detached and attached units. However, the 4.113 standards are superseded by the Frog Pond NR, Neighborhood Residential, and the R-5 sub-district code provisions, which were addressed above.

(.02) Open Space Area shall be provided in the following manner:

RESPONSE: These standards are superseded by the Frog Pond Neighborhood (RN & R-5 sub-district) code provisions, which were addressed above.

C. The Development Review Board may specify the method of assuring the long term protection and maintenance of open space and/or recreational areas. Where such protection or maintenance are the responsibility of a private party or homeowners' association, the City Attorney shall review any pertinent bylaws, covenants, or agreements prior to recordation.

RESPONSE: The entire significant resource area of Boeckman Creek is set aside in Tract 'A', and will be zoned SROZ. Tract 'A' is proposed to be dedicated to the City, including trail head access areas located outside of the SROZ. Supplemental open space and pathway and landscaping tracts (Tract 'B', 'C,' 'F,' and 'G') within the development will be owned and maintained by the Home Owners Association (HOA).

(.03) Building Setbacks (for Fence Setbacks, see subsection .08). The following provisions apply unless otherwise provided for by the Cod or a legislative master plan.

B. For lots not exceeding 10,000 square feet:...

RESPONSE: These standards are superseded by the Frog Pond Neighborhood (RN R-5) code provisions, which were addressed above.

(.04) Height Guidelines: The Development Review Board may regulate heights as follows: Section 4.113. Standards Applying To Residential Developments In Any Zone.

A. Restrict or regulate the height or building design consistent with adequate provision of fire protection and fire-fighting apparatus height limitations.

B. To provide buffering of low density developments by requiring the placement of buildings more than two (2) stories in height away from the property lines abutting a low density zone.

C. To regulate building height or design to protect scenic vistas of Mt. Hood or the Willamette River from greater encroachments than would occur if developed conventionally.

RESPONSE: These standards are generally superseded by the Frog Pond Neighborhood (RN & the R-5 Sub-District 1) code provisions, which were addressed above.

Consistent with the Frog Pond West Master Plan the street system establishes logical transition points (Streets A & G) for separating uses and densities. Therefore there is no need for any special buffering.

Section 4.118. Standards applying to all Planned Development Zones:

(.01) Height Guidelines: In "S" overlay zones, the solar access provisions of Section 4.137 shall be used to determine maximum building heights. In cases that are subject to review by the Development Review Board, the Board may further regulate heights as follows:

A. Restrict or regulate the height or building design consistent with adequate provision of fire protection and fire-fighting apparatus height limitations.

B. To provide buffering of low-density developments by requiring the placement of three or more story buildings away from the property lines abutting a low-density zone.

C. To regulate building height or design to protect scenic vistas of Mt. Hood or the Willamette River.

RESPONSE: There has not been any “S” (Solar Access) zone imposed on the subject properties. Therefore the solar access provisions set forth in Section 4.137 do not specifically apply to this development, relative to any height limitations.

The proposed units will be designed consistent with the height limitations of the NR zoning, which is 35 feet. No specific home designs are proposed at this time, but the homes will most likely be all two stories in height, and all less than 35 feet.

Tualatin Valley Fire & Rescue has reviewed the preliminary plans and provided comments at the pre-application conference. Fire hydrant spacing is consistent with City standards. No sprinkler systems are proposed, and a secondary emergency access is provided via Tract ‘C.’

There is no need for lower density buffering, as this development is consistent with the surrounding densities in the neighborhood, as set forth in the Frog Pond West Master Plan. There are also no scenically identified views of the Mt. Hood or the Willamette River to be protected from this site.

Therefore, the development complies with these criteria.

(.02) Underground Utilities shall be governed by Sections 4.300 to 4.320. All utilities above ground shall be located so as to minimize adverse impacts on the site and neighboring properties.

RESPONSE: Consistent with City standards, all of the utilities serving this development will be placed underground. However, storm drainage lines extending into the SROZ, will be run along the surface to minimize construction impacts and avoid tree removal. The discharge points will be near the low water elevation.

(.03) Notwithstanding the provisions of Section 4.140 to the contrary, the Development Review Board, in order to implement the purposes and objectives of Section 4.140, and based on findings of fact supported by the record may:

A. Waive the following typical development standards:

- 1. minimum lot area;*
- 2. lot width and frontage;*
- 3. height and yard requirements;*
- 4. lot coverage;*
- 5. lot depth;*
- 6. street widths;*
- 7. sidewalk requirements;*
- 8. height of buildings other than signs;*
- 9. parking space configuration;*
- 10. minimum number of parking or loading spaces;*
- 11. shade tree islands in parking lots, provided that alternative shading is provided;*
- 12. fence height;*
- 13. architectural design standards;*
- 14. transit facilities;*
- 15. On-site pedestrian access and circulation standards*
- 16. solar access standards, as provided in Section 4.137; and*
- 17. Open space in the Residential Neighborhood zone.*

RESPONSE: The code requires that all waivers be specified at the time of Stage I Master Plan and Preliminary Plat approval.

For this development the applicant is not requesting any waivers.

- B. The following shall not be waived by the Board, unless there is substantial evidence in the whole record to support a finding that the intent and purpose of the standards will be met in alternative ways:*
- 1. open space requirements in residential areas, except that the Board may waive or reduce open space requirements in the Residential Neighborhood zone. Waivers in compliance with 4.127(.08)(B)(2)(d);;*
 - 2. minimum density standards of residential zones. The required minimum density may be reduced by the Board in the Residential Neighborhood one in accordance with 4.127(.06)B;*
 - 3. minimum landscape, buffering, and screening standards;*

RESPONSE: The applicant is not requesting any reduction in required open space or density. The open space provided exceeds the minimum standards. No reduction in landscaping or buffering requirements is being requested.

- C. The following shall not be waived by the Board, unless there is substantial evidence in the whole record to support a finding that the intent and purpose of the standards will be met in alternative ways, and the action taken will not violate any applicable federal, state, or regional standards:*
- 1. maximum number of parking spaces;*
 - 2. standards for mitigation of trees that are removed;*
 - 3. standards for mitigation of wetlands that are filled or damaged; and*
 - 4. Trails or pathways shown in the Parks and Recreation Master Plan.*

RESPONSE: For this development the applicant is not requesting any waivers.

- E. Locate individual building, accessory buildings, off-street parking and loading facilities, open space and landscaping and screening without reference to lot lines;*

RESPONSE: The proposed design provides for full compliance with code standards, under the NR, R-5 Sub-District 1 setback standards. Therefore this criterion is not applicable.

- E. Adopt other requirements or restrictions, inclusive of, but not limited to, the following:*
- 1. Percent coverage of land by buildings and structures in relationship to property boundaries to provide stepped increases in densities away from low-density development.*
 - 2. Parking ratios and areas expressed in relation to use of various portions of the property and/or building floor area.*
 - 3. The locations, width and improvement of vehicular and pedestrian access to various portions of the property, including portions within abutting street.*
 - 4. Arrangement and spacing of buildings and structures to provide appropriate open spaces around buildings.*
 - 5. Location and size of off-street loading areas and docks.*

6. *Uses of buildings and structures by general classification, and by specific designation when there are unusual requirements for parking, or when the use involves noise, dust, odor, fumes, smoke, vibration, glare or radiation incompatible with present or potential development of surrounding property. Such incompatible uses may be excluded in the amendment approving the zone change or the approval of requested permits.*
7. *Measures designed to minimize or eliminate noise, dust, odor, fumes, smoke, vibration, glare, or radiation, which would have an adverse effect on the present or potential development on surrounding properties.*
8. *Schedule of time for construction of the proposed buildings and structures and any stage of development thereof to insure consistency with the City's adopted Capital Improvements Plan and other applicable regulations.*
9. *A waiver of the right of remonstrance by the applicant to the formation of a Local Improvement District (LID) for streets, utilities and/or other public purposes.*
10. *Modify the proposed development in order to prevent congestion of streets and/or to facilitate transportation.*
11. *Condition the issuance of an occupancy permit upon the installation of landscaping or upon a reasonable scheduling for completion of the installation of landscaping. In the latter event, a posting of a bond or other security in an amount equal to one hundred ten percent (110%) of the cost of the landscaping and installation may be required.*
12. *A dedication of property for streets, pathways, and bicycle paths in accordance with adopted Facilities Master Plans or such other streets necessary to provide proper development of adjacent properties.*

(.04) The Planning Director and Development Review Board shall, in making their determination of compliance in attaching conditions, consider the effects of this action on availability and cost. The provisions of this section shall not be used in such a manner that additional conditions, either singularly or cumulatively, have the effect of unnecessarily increasing the cost of development. However, consideration of these factors shall not prevent the Board from imposing conditions of approval necessary to meet the minimum requirements of the Comprehensive Plan and Code.

RESPONSE: The proposed preliminary plat design provides for full compliance with code standards, under the NR, including the R-5 Sub-District 1 provisions.

Appropriate conditions will be recommended by the City planning staff for consideration by the DRB and ultimately the City Council. The applicant will have an opportunity prior to or during the public hearing to review and comment on any such conditions.

So, the applicant reserves the right to comment at that time, as we do not know what they might be at this time (prior to submittal).

(.05) The Planning Director, Development Review Board, or on appeal, the City Council, may as a condition of approval for any development for which an application is submitted, require that portions of the tract or tracts under consideration be set aside, improved, conveyed or dedicated for the following uses:

- A. *Recreational Facilities: The Director, Board, or Council, as the case may be, may require that suitable area for parks or playgrounds be set aside, improved or permanently reserved for the owners, residents, employees or patrons of the development consistent with adopted Park standards and Parks and Recreation Master Plan.*

- B. *Open Space Area: Whenever private and/or common open space area is provided, the City shall require that an association of owners or tenants be established which shall adopt such Articles of Incorporation, By-Laws or other appropriate agreement, and shall adopt and impose such Declaration of Covenants and Restrictions on such open space areas and/or common areas that are acceptable to the Development Review Board. Said association shall be formed and continued for the purpose of maintaining such open space area. Such an association, if required, may undertake other functions. It shall be created in such a manner that owners of property shall automatically be members and shall be subject to assessments levied to maintain said open space area for the purposes intended. The period of existence of such association shall be not less than twenty (20) years and it shall continue thereafter and until a majority vote of the members shall terminate it, and the City Council formally votes to accept such termination.*
- C. *Easements: Easements necessary to the orderly extension of public utilities, and the protection of open space, may be required as a condition of approval. When required, such easements must meet the requirements of the City Attorney prior to recordation.*

RESPONSE: This development provides open space, including:

- Tract 'A', encompasses the SROZ and pathway connections;
- Tract 'B', the 10 foot wide buffer along the Boeckman frontage;
- Tract 'C' provides a pedestrian connection from Boeckman Road into the development; and
- Tract 'F' & 'G', provide "active open space." Tract 'G,' also preserves the large 60 inch White Oak at the corner of Streets F & G.

These tracts combine to accommodate passive and active recreational needs of the home owners, as well as pedestrian connections to the pathway within the SROZ.

The applicant will establish a homeowners association and associated CC&R's to manage address long term ownership and maintenance of all the Common Tracts ('B,' 'C,' 'D,' 'E,' 'F,' & 'G') within the development. Tract 'A,' including the trail heads, will be dedicated to the City.

- (.07) *Density Transfers. In order to protect significant open space or resource areas, the Development Review Board may authorize the transfer of development densities from one portion of a proposed development to another. Such transfers may go to adjoining properties, provided that those properties are considered to be part of the total development under consideration as a unit.*

RESPONSE: These standards are generally superseded by the Frog Pond Neighborhood (RN and applicable R-5 Sub-District 1 standards) code provisions, which do not allow for a density transfer applicable to this development.

Provisions are made to protect significant open space and natural resource areas within this development, so shifting or transferring density is not necessary.

- (.08) *Wetland Mitigation and other mitigation for lost or damaged resources. The Development Review Board may, after considering the testimony of experts in the field, allow for the replacement of resource areas with newly created or enhanced resource areas. The Board may specify the ratio of lost to created and/or enhanced areas after making findings based on information in the record. As much as possible, mitigation areas shall replicate the beneficial values of the lost or damaged resource areas.*

RESPONSE: The SROZ and wetlands associated with this development have been identified, as shown on the Existing Conditions Plan. A small wetland area in the eastern portion of the property has been identified, and is proposed to be filled.

An Arborist's report has been prepared by Morgan Holen, see Arborist Index Tab; and an SRIR has been prepared by SWCA, see SROZ Index Tab.

The Arborist's report addresses all trees impacted by this development, and includes a tree mitigation plan, linked with the master landscaping plan. The Landscaping Plan, prepared by Joe Percival, provides for plantings within the open space tracts, as well as street trees, and the 10 foot wide buffer along Boeckman Road.

The SRIR addresses impacts within the SROZ, and the proposed filling of the small eastside wetland. DSL has confirmed the wetland delineation, and will process the proposed Joint Fill-Permit.

The SROZ is set aside in Tract 'A' and is proposed to be dedicated to the City. A level one environmental assessment of the property has been prepared by GeoPacific Engineering. Channel restoration within Tract A will be completed prior to dedication to the City.

- (.09) *Habitat-Friendly Development Practices. To the extent practicable, development and construction activities of any lot shall consider the use of habitat-friendly development practices, which include:*
- A. Minimizing grading, removal of native vegetation, disturbance and removal of native soils, and impervious area;*
 - B. Minimizing adverse hydrological impacts on water resources, such as using the practices described in Part (a) of Table NR-2 in Section 4.139.03, unless their use is prohibited by an applicable and required state or federal permit, such as a permit required under the federal Clean Water Act, 33 U.S.C. §§1251 et seq., or the federal Safe Drinking Water Act, 42 U.S.C. §§300f et seq., and including conditions or plans required by such permit;*
 - C. Minimizing impacts on wildlife corridors and fish passage, such as by using the practices described in Part (b) of Table NR-2 in Section 4.139.03; and*
 - D. Using the practices described in Part (c) of Table NR-2 in Section 4.139.03. [Section 4.118(.09) added by Ord. # 674 11/16/09]*

RESPONSE: The SRIR addresses impacts within the SROZ, and the proposed filling of the small eastside wetland. Proposed trail and trail head improvements within the SROZ are designed consistent with these criteria. The SROZ is set aside in Tract 'A' and is proposed to be dedicated to the City.

Section 4.124. Standards Applying To All Planned Development Residential Zones.

RESPONSE: These standards are generally superseded by the Frog Pond Neighborhood (RN & applicable R-5 Sub-District 1 standards) code provisions, which are addressed above.

(.06) Block and access standards:

- 1. Maximum block perimeter in new land divisions: 1,800 feet.*
- 2. Maximum spacing between streets for local access: 660 feet, unless waived by the Development Review Board upon finding that barriers such as railroads, freeways, existing buildings, topographic variations, or designated Significant Resource Overlay Zone areas will prevent street extensions meeting this standard.*
- 3. Maximum block length without pedestrian and bicycle crossing: 330 feet, unless waived by the Development Review Board upon finding that barriers such as railroads, freeways, existing buildings, topographic variations, or designated Significant Resource Overlay Zone areas will prevent pedestrian and bicycle facility extensions meeting this standard.*

RESPONSE: The local streets are laid out to provide an efficient circulation and lot pattern, with block lengths in the 110 to 322 foot range, and block perimeters under 1,200 feet. The north/south streets are designed to extend to abutting properties allowing for continuation of the local streets consistent with the Street Demonstration Plan.

(.08) Parking. Per the requirements of Section 4.155.

RESPONSE: The code requires a minimum of 1 space per unit. Each home will have at least a two-car garage, plus the driveway accounting for 2 cars. Therefore the off-street parking standard will be met.

(.09) Corner Vision Clearance. Per the requirements of Section 4.177.

RESPONSE: The Street Plan and Landscaping Plans combine to provide the for appropriate corner vision areas will be provided consistent with City standards.

Section 4.137. Solar Access For New Residential Development.

RESPONSE: Compliance with this standard is not required. However, a majority of the lots are oriented to east/west streets, with at least 90 foot north/south depths, thereby providing for good solar exposure.

Section 4.137.5. Screening and Buffering (SB) Overlay Zone.

RESPONSE: There is no (SB) Overlay zone applicable to this development.

Section 4.139.00 Significant Resource Overlay Zone (SROZ) Ordinance

Section 4.139.01 **SROZ - Purpose**

The Significant Resource Overlay Zone (SROZ) is intended to be used with any underlying base zone as shown on the City of Wilsonville Zoning Map. The purpose of the Significant Resource Overlay Zone is to implement the goals and policies of the Comprehensive Plan relating to natural resources, open space, environment, flood hazard, and the Willamette River Greenway. In addition, the purposes of these regulations are to achieve compliance with the requirements of the Metro Urban Growth Management Functional Plan (UGMFP) relating to Title 3 Water Quality Resource Areas, and Title 13 Habitat Conservation Areas, and that portion of Statewide Planning Goal 5 relating to significant natural resources. It is not the intent of this ordinance to prevent development where the impacts to significant resources can be minimized or mitigated. [Amended by Ord. # 674 11/16/09]

Section 4.139.02 **Where These Regulations Apply**

The regulations of this Section apply to the portion of any lot or development site, which is within a Significant Resource Overlay Zone and its associated "Impact Areas". The text provisions of the Significant Resource Overlay Zone ordinance take precedence over the Significant Resource Overlay Zone maps. The Significant Resource Overlay Zone is described by boundary lines shown on the City of Wilsonville Significant Resource Overlay Zone Map. For the purpose of implementing the provisions of this Section, the Wilsonville Significant Resource Overlay Zone Map is used to determine whether a Significant Resource Impact Report (SRIR) is required. Through the development of an SRIR, a more specific determination can be made of possible impacts on the significant resources.

Unless otherwise exempted by these regulations, any development proposed to be located within the Significant Resource Overlay Zone and/or Impact Area must comply with these regulations. Where the provisions of this Section conflict with other provisions of the City of Wilsonville Planning and Land Development Ordinance, the more restrictive shall apply.

The SROZ represents the area within the outer boundary of all inventoried significant natural resources. The Significant Resource Overlay Zone includes all land identified and protected under Metro's UGMFP Title 3 Water Quality Resource Areas and Title 13 Habitat Conservation Areas, as currently configured, significant wetlands, riparian corridors, and significant wildlife habitat that is inventoried and mapped on the Wilsonville Significant Resource Overlay Zone Map. [Amended by Ord. # 674 11/16/09]

RESPONSE: A substantial portion of this property lies within the SROZ. Therefore these provisions are applicable.

(.03) Significant Resource Impact Report (SRIR). For proposed non-exempt development within the SROZ, the applicant shall submit a Significant Resource Impact Report (SRIR) as part of any application for a development permit.

Section 4.139.05 **Significant Resource Overlay Zone Map Verification**

The map verification requirements described in this Section shall be met at the time an applicant requests a building permit, grading permit, tree removal permit, land division approval, or other land use decision. Map verification shall not be used to dispute whether the mapped Significant Resource Overlay Zone boundary is a significant natural resource. Map refinements are subject to the requirements of Section 4.139.10(.01)(D).

RESPONSE: This application includes an SRIR (see SROZ Index Tab) and SROZ Map refinement, based on the site specific survey (tree & topo) details. Boeckman Creek is the only Primary Protected Resource.

The Metro Title 3 buffer is adjusted per Table NR-1 of the Code, see SRIR for details. The refined SROZ boundary is defined by the tree canopy line at the top of bank, which includes 300,782 square feet (6.91 acres), which equals 34.1% of the gross site area.

Within the SROZ boundary there are three areas totaling 59,207 square feet, which is defined as Area of Limited Conflicting Use (ALCU). This is the area above the break in slope and outside of the Metro Title 3 buffer. The Code allows up to 5% development impact within the ALCU, which in this case calculated to 2,960 square feet, subject to SRIR evaluation and mitigation. However, no development is proposed within the ALCU, other than the trail, which is an allowed use. The SROZ area is set aside in Tract A and dedicated to the City.

The SRIR, prepared by SWCA, provides full evaluation of the resources and provides recommendations for mitigation of identified development impacts. The report also provides guidance for the design and construction of proposed pathways and trail heads to be located within the SROZ. Although it is noted that the regional trail and trail heads are exempt from the SROZ regulations, as a proposed public facility. The wetland delineation has also been concurred with by Oregon Division of State Lands (DSL), a Joint Fill Permit has also been initiated.

It is noted that portions of Lots 12 and 14 encroach into the 25 Foot Impact Area. However, for Lots 12 & 14, there is no encroachment into the ALCU. The encroachment is into the 25 Foot Impact Area, which is allowed, per Section 4.139.03 Administration.

The City's Natural Resource Manager noted that – *“The Impact Area definition, as related to development impacts, is based on the concept of avoidance, minimization and mitigation, subject to SRIR review. We typically don't allow building footprints or other impervious area in the Impact Area.”*

- (.02) Impact Area. *The “Impact Area” is the area adjacent to the outer boundary of a Significant Resource within which development or other alteration activities may be permitted through the review of an SRIR (Significant Resource Impact Report). Where it can be clearly determined by the Planning Director that development is only in the Impact Area and there is no impact to the Significant Resource, development may be permitted without SRIR review. The impact area is 25 feet wide unless otherwise specified in this ordinance or by the decision making body. Designation of an Impact Area is required by Statewide Planning Goal 5. The primary purpose of the Impact Area is to ensure that development does not encroach into the SROZ.*

Section 4.139.04 Uses and Activities Exempt from These Regulations

A request for exemption shall be consistent with the submittal requirements listed under Section 4.139.06(.01)(B – I), as applicable to the exempt use and activity. [Added by Ord. # 674 11/16/09]

- (.17) *New Single-Family Dwelling. The construction of a new single family dwelling is exempt unless the building encroaches into the Impact Area and/or the SROZ.*
- A. If the proposed building encroaches only into the Impact Area then an abbreviated SRIR may be required as specified in Section 4.139.05, unless it can be clearly determined by the Planning Director that the development proposal will have no impact on the Significant Resource. The primary purpose of the Impact Area is to insure that development does not encroach into the SROZ.*

The GeoTech Report indicates that development impacts within the 25 Foot Impact Area are acceptable, so long as they are setback at least 20 feet from the break in slope. The limited impacts related to Lots 12 & 14 conform with this design guideline. The scope of allowable encroachment is not specified in the Code, as to yard versus structure or impervious area.

The 25 Foot Impact Area and the pathway adjacent to these two lots ensures that there will be not direct encroachment or resulting development impact occurring within the SROZ, which is consistent with Section 4.139.04(.17).

The SRIR has been amended to address the potential impacts for Lots 12 & 14. In this case, complete avoidance of encroachment into the 25 foot Impact Area, would result in the loss, at least 1 lot and maybe 2 lots. Based on the supplemental SRIR analysis, the applicant submits that the potential minor encroachments do not result in any significant physical or environmental impacts to the protected resources within the SROZ.

The proposed potential encroachments (maximum building envelopes) are, in fact, minimized, with only a small portion of potential building structure encroachment for either lot:

- Lot 12 Maximum encroachment is a triangular portion of the building envelope measuring 5 x 50 feet, or 250 square feet; and setback 180 feet from the break in slope.

For Lot 12 there is an ornamental fence (Sheet L4 & L9) proposed along the west boundary, with native grass seeded within the remainder of the 25 Foot Impact Area and adjacent minor slopes of the SROZ.

- Lot 14 Maximum encroachment is a trapezoidal shaped portion of the building envelope measuring 10 x 50 feet, or 450 square feet; and setback 70 feet from the break in slope.

For Lot 14, the trail, which is adjacent to this lot, provides a 10 foot wide physical and horizontal buffer between the potential structure and the SROZ. There is an ornamental fencing proposed along the western boundary of the lot (Sheet L1).

Per the Geo-Tech Engineer's recommendation, these minor encroachments are setback significantly more than 20 feet from the break in slope (ALCU).

Consequently, there is no physical or environment impact into the SROZ resulting from the encroachment, which satisfies the impact avoidance criterion, set by Section 4.139.04(.17).

PLANNED DEVELOPMENT REGULATIONS

Section 4.140. Planned Development Regulations.

(.01) Purpose.

- A. The provisions of Section 4.140 shall be known as the Planned Development Regulations. The purposes of these regulations are to encourage the development of tracts of land sufficiently large to allow for comprehensive master planning, and to provide flexibility in the application of certain regulations in a manner consistent with the intent of the Comprehensive Plan and general provisions of the zoning regulations and to encourage a harmonious variety of uses through mixed use design within specific developments thereby promoting the economy of shared public services and facilities and a variety of complimentary activities consistent with the land use designation on the Comprehensive Plan and the creation of an attractive, healthful, efficient and stable environment for living, shopping or working.*
- B. It is the further purpose of the following Section:*
- 1. To take advantage of advances in technology, architectural design, and functional land use design;*
 - 2. To recognize the problems of population density, distribution and circulation and to allow a deviation from rigid established patterns of land uses, but controlled by defined policies and objectives detailed in the comprehensive plan;*
 - 3. To produce a comprehensive development equal to or better than that resulting from traditional lot land use development.*
 - 4. To permit flexibility of design in the placement and uses of buildings and open spaces, circulation facilities and off-street parking areas, and to more efficiently utilize potentials of sites characterized by special features of geography, topography, size or shape or characterized by problems of flood hazard, severe soil limitations, or other hazards;*
 - 5. To permit flexibility in the height of buildings while maintaining a ratio of site area to dwelling units that is consistent with the densities established by the Comprehensive Plan and the intent of the Plan to provide open space, outdoor living area and buffering of low-density development.*
 - 6. To allow development only where necessary and adequate services and facilities are available or provisions have been made to provide these services and facilities.*
 - 7. To permit mixed uses where it can clearly be demonstrated to be of benefit to the users and can be shown to be consistent with the intent of the Comprehensive Plan.*
 - 8. To allow flexibility and innovation in adapting to changes in the economic and technological climate.*

RESPONSE: This application seeks to apply the applicable planned development zoning to the properties being annexed to the City. The Frog Pond West Master Plan requires Planned Development Review. Therefore this Section is applicable.

(.02) Lot Qualification.

- A. Planned Development may be established on lots which are suitable for and of a size to be planned and developed in a manner consistent with the purposes and objectives of Section 4.140.*

- B. *Any site designated for development in the Comprehensive Plan may be developed as a Planned Development, provided that it is zoned "PD" or specifically defined as a PD zone by this Code. All sites which are greater than two (2) acres in size, and designated in the Comprehensive Plan for commercial, residential, or industrial use shall be developed as Planned Developments, unless approved for other uses permitted by the Development Code. Smaller sites may also be developed through the City's PD procedures, provided that the location, size, lot configuration, topography, open space and natural vegetation of the site warrant such development.*

(.03) Ownership.

- A. *The tract or tracts of land included in a proposed Planned Development must be in one (1) ownership or control or the subject of a joint application by the owners of all the property included. The holder of a written option to purchase, with written authorization by the owner to make applications, shall be deemed the owner of such land for the purposes of Section 4.140.*
- B. *Unless otherwise provided as a condition for approval of a Planned Development permit, the permittee may divide and transfer units or parcels of any development. The transferee shall use and maintain each such unit or parcel in strict conformance with the approval permit and development plan.*

RESPONSE: The Frog Pond West Master Plan requires Planned Development Review. Therefore this Section is applicable. The property contains more than 2 acres. The applicant is the owner of all three parcels involved in this application. Therefore these criteria are met.

(.04) Professional Design.

- A. *The applicant for all proposed Planned Developments shall certify that the professional services of the appropriate professionals have been utilized in the planning process for development.*
- B. *Appropriate professionals shall include, but not be limited to the following to provide the elements of the planning process set out in Section 4.139:*
1. *An architect licensed by the State of Oregon;*
 2. *A landscape architect registered by the State of Oregon;*
 3. *An urban planner holding full membership in the American Institute of Certified Planners, or a professional planner with prior experience representing clients before the Development Review Board, Planning Commission, or City Council; or*
 4. *A registered engineer or a land surveyor licensed by the State of Oregon.*
- C. *One of the professional consultants chosen by the applicant from either 1, 2, or 3, above, shall be designated to be responsible for conferring with the planning staff with respect to the concept and details of the plan.*
- D. *The selection of the professional coordinator of the design team will not limit the owner or the developer in consulting with the planning staff.*

RESPONSE: The applicant is represented by Pioneer Design Group, including professional land use planning, surveying and civil engineering. The Design Team is listed on the Cover page and page 5 herein. Therefore these criteria are met.

(.05) Planned Development Permit Process.

- A. All parcels of land exceeding two (2) acres in size that are to be used for residential, commercial or industrial development, shall, prior to the issuance of any building permit:
 1. Be zoned for planned development;
 2. Obtain a planned development permit; and
 3. Obtain Development Review Board, or, on appeal, City Council approval.
- B. Zone change and amendment to the zoning map are governed by the applicable provisions of the Zoning Sections, inclusive of Section 4.197
- C. Development Review Board approval is governed by Sections 4.400 to 4.450
- D. All planned developments require a planned development permit. The planned development permit review and approval process consists of the following multiple stages, the last two or three of which can be combined at the request of the applicant:
 1. Pre-application conference with Planning Department;
 2. Preliminary (Stage I) review by the Development Review Board. When a zone change is necessary, application for such change shall be made simultaneously with an application for preliminary approval to the Board; and
 3. Final (Stage II) review by the Development Review Board
 4. In the case of a zone change and zone boundary amendment, City Council approval is required to authorize a Stage I preliminary plan.

RESPONSE: This application addresses the planned development provisions. Because this proposed development is one of the first submittals for the Frog Pond West Master Plan, the applicant actually completed two pre-application conferences, to review various lot and street layouts.

The Design Team has coordinated closely with City staff throughout the preparation of this application. The application includes Stage I & II Plans, which in this case are both equal to the proposed Preliminary Plat.

(.07) *Preliminary Approval (Stage One);*

- A. *Applications for preliminary approval for planned developments shall:*
 1. *Be made by the owner of all affected property or the owner's authorized agent; and*
 2. *Be filed on a form prescribed by the City Planning Department and filed with said Department.*
 3. *Set forth the professional coordinator and professional design team as provided in subsection (.04), above.*
 4. *State whether the development will include mixed land uses, and if so, what uses and in what proportions and locations.*

RESPONSE: The developer (Pahlisch Homes) is the contract purchaser, but the owner of all affected properties has signed the application. The application has been submitted on a form provided by the City, and includes a list of the professional design team. This application is for a residential subdivision and does not include any proposed mixed-uses. These criteria are met.

B. *The application shall include conceptual and quantitatively accurate representations of the entire development sufficient to judge the scope, size, and impact of the development on the community; and, in addition to the requirements set forth in Section 4.035, shall be accompanied by the following information:*

1. *A boundary survey or a certified boundary description by a registered engineer or licensed surveyor.*
2. *Topographic information as set forth in Section 4.035.*
3. *A tabulation of the land area to be devoted to various uses, and a calculation of the average residential density per net acre. Developments within the RN zone shall show how the proposed number of units complies with the applicable maximum and minimum provisions of the RN zone.*
4. *A staged development schedule demonstrating that the developer intends to receive Stage II approval within two (2) years of receiving Stage I approval, and to commence construction within two (2) years after the approval of final development plan, and will proceed diligently to completion, unless a phased development schedule has been approved; in which case adherence to that schedule shall be considered to constitute diligent pursuit of project completion.*
5. *A commitment by the applicant to provide in the Final Approval (Stage II) a performance bond or other acceptable security for the capital improvements required by the project.*
6. *If it is proposed that the final development plan will be executed in stages, a schedule thereof shall be provided.*
7. *Statement of anticipated waivers from any of the applicable site development standards.*

RESPONSE: This development lies within the area included in the Frog Pond West Master Plan. The Stage I Master Plan provides the conceptual development pattern, including residential densities, street pattern and open spaces.

For this development, the proposed preliminary plat also represents the Stage I Master Plan, as they are virtually identical. And further, the Stage II Final Development Plans are also identical to the Preliminary Plat.

The minimum and maximum densities allowed for this development are set by the Frog Pond West Master Plan (Table 1, page 22).

There are no separate density calculations provided. The proposed Plan complies with the allowed density. Therefore these criteria are met.

C. *An application for a Stage I approval shall be considered by the Development Review Board as follows:*

1. *A public hearing as provided in Section 4.013.*
2. *After such hearing, the Board shall determine whether the proposal conforms to the permit criteria set forth in this Code, and may approve or disapprove the application and the accompanying preliminary development plan or require such changes therein or impose such conditions of approval as are in its judgment, necessary to ensure conformity to*

said criteria and regulations. In so doing the Board may, in its discretion, authorize submission of the final development plan in stages, corresponding to different units or elements of the development. It shall do so only upon evidence assuring completion of the entire development in accordance with the preliminary development plan and staged development schedule.

RESPONSE: Once the application is determined complete, by the Planning Department, a public hearing before the Development Review Board will be scheduled. The Board will consider the application, together with public testimony and make a decision. The Board's decision will include a recommendation to the City Council relative to the annexation and rezoning.

As demonstrated herein, the applicant believes that based on the findings presented herein, the Stage I Master Plan should be approved.

(.09) Final Approval (Stage Two):

- A. *Unless an extension has been granted by the Development Review Board, within two (2) years after the approval or modified approval of a preliminary development plan (Stage I), the applicant shall file with the City Planning Department a final plan for the entire development or when submission in stages has been authorized pursuant to Section 4.035 for the first unit of the development, a public hearing shall be held on each such application as provided in Section 4.013.*
- B. *After such hearing...*
- C. *The final plan shall conform in all major respects with the approved preliminary development plan, and shall include all information included in the preliminary plan plus the following:*
 - 1. *The location of water, sewerage and drainage facilities;*
 - 2. *Preliminary building and landscaping plans and elevations, sufficient to indicate the general character of the development;*
 - 3. *The general type and location of signs;*
 - 4. *Topographic information as set forth in Section 4.035;*
 - 5. *a map indicating the types and locations of all proposed uses; and*
 - 6. *a grading plan.*
- D. *The final plan shall be sufficiently detailed to indicate fully the ultimate operation and appearance of the development or phase of development. However, Site Design Review is a separate and more detailed review of proposed design features, subject to the standards of Section 4.400.*
- E. *Copies of legal documents required by the Development Review Board for dedication or reservation of public facilities, or for the creation of a non-profit homeowner's association, shall also be submitted.*
- F. *Within thirty (30) days...*
- G. *Upon receipt of the final development plan...*
- H. *If the Development Review Board...*
- I. *All Stage II Development Plan approvals shall expire two years after their approval date, if substantial development has not occurred on the property prior to that time,...*
- J. *A planned development permit may be granted by the Development Review Board on if it is found that the development conforms to all the following criteria, as well as to the Planned Development Regulations in Section 4.140:*
 - 1. *The location, design, size and uses, both separately and as a whole, are consistent with the Comprehensive Plan, and with any other applicable plan, development map or Ordinance adopted by the City Council.*

2. *That the location, design, size and uses are such that traffic generated by the development at the most probable used intersection(s) can be accommodated safely and without congestion in excess of Level of Service D, ...*
 - a. *In determining levels of Service D, the City shall hire a traffic engineer at the applicant's expense...*
 - b. *The following are exempt from meeting the Level of Service D criteria standard:*
 - i. *A planned development or expansion thereof which generates three (3) new p.m. peak hour traffic trips or less;...*
3. *That the location, design, size and uses are such that the residents or establishments to be accommodated will be adequately served by existing or immediately planned facilities and services.*

RESPONSE: In this case, the Stage II Final Development Plans is identical to the Preliminary Plat. Therefore there will be no separate application for Stage II approval. This application covers the Stage I, Stage II and Preliminary Plat as one combined design. Therefore this combined application satisfies the two-year time requirement for Stage II approvals.

As demonstrated herein and with the supporting plans and documentation, the location, design, size and uses, both separately and as a whole, are consistent with the Comprehensive Plan, the Frog Pond West Master Plan, the NR, including R-5 Sub-District 1 zoning provisions and other applicable provisions of the Development Code. This is a residential development and does not include any proposed mixed uses.

The application, and specifically the DKS Traffic Impact Report, demonstrates that the location, design, size and uses are such that traffic generated by this development will maintain safe traffic operations and Level of Service 'D' or better; at the most probable used intersection(s), as defined in the Highway Capacity Manual published by the National Highway Research Board.

The development will take primary local street access from Boeckman Road, which is classified as an arterial street. The City has identified specific improvements for widening and enhancing Boeckman Road, and has further adopted a funding program for completion of these improvements under the provisions of Resolution 2649. Immediately planned arterial and collector streets are those listed in the City's adopted TSP and Capital Improvements Plan. These scheduled capital improvements are planned to be completed within two years of occupancy of the development.

The applicant has further demonstrated that the location, design, size and uses are such that the residents to be accommodated will be adequately served by existing and immediately planned facilities and services, per Resolution 2649.

Consistent with the Frog Pond West Master Plan and Resolution 2649, the applicant will be executing a Development Agreement committing to the proportional financial obligations related to the impacts created by this development.

Section 4.154. On-site Pedestrian Access and Circulation.

(.01) On-site Pedestrian Access and Circulation

- A. *The purpose of this section is to implement the pedestrian access and connectivity policies of the Transportation System Plan. It is intended to provide for safe, reasonably direct, and convenient pedestrian access and circulation.*
- B. *Standards. Development shall conform to all of the following standards:*
 1. *Continuous Pathway System. A pedestrian pathway system shall extend throughout the development site and connect to adjacent sidewalks, and to all future phases of the development, as applicable.*
 2. *Safe, Direct, and Convenient. Pathways within developments shall provide safe, reasonably direct, and convenient connections between primary building entrances and all adjacent parking areas, recreational areas/playgrounds, and public rights-of-way and crosswalks based on all of the following criteria:*
 - a. *Pedestrian pathways are designed primarily for pedestrian safety and convenience, meaning they are free from hazards and provide a reasonably smooth and consistent surface.*
 - b. *The pathway is reasonably direct. A pathway is reasonably direct when it follows a route between destinations that does not involve a significant amount of unnecessary out-of-direction travel.*
 - c. *The pathway connects to all primary building entrances and is consistent with the Americans with Disabilities Act (ADA) requirements.*
 - d. *All parking lots larger than three acres in size shall provide an internal bicycle and pedestrian pathway pursuant to Section 4.155(.03)(B.)(3.)(d.).*
 3. *Vehicle/Pathway Separation. Except as required for crosswalks, per subsection 4, below, where a pathway abuts a driveway or street it shall be vertically or horizontally separated from the vehicular lane. For example, a pathway may be vertically raised six inches above the abutting travel lane, or horizontally separated by a row of bollards.*
 4. *Crosswalks. Where a pathway crosses a parking area or driveway, it shall be clearly marked with contrasting paint or paving materials (e.g., pavers, light-color concrete inlay between asphalt, or similar contrast).*
 5. *Pathway Width and Surface. Primary pathways shall be constructed of concrete, asphalt, brick/masonry pavers, or other durable surface, and not less than five (5) feet wide. Secondary pathways and pedestrian trails may have an alternative surface except as otherwise required by the ADA.*
 6. *All pathways shall be clearly marked with appropriate standard signs.*

RESPONSE: Consistent with the Frog Pond West Master Plan, the proposed street network provides for north/south and east/west pedestrian circulation, including connections to Boeckman Road. The Development Plans also provide for initial trails within the SROZ, including trail head improvements.

Where sidewalks and/or pathways cross a parking area or driveway, the crossing will be marked with contrasting paving and/or paint. These pedestrian facilities will provide the framework for non-auto circulation between the SROZ and the school property.

As other developments occur, vehicle and pedestrian access will also be provided to the planned community park, to be located east of the school property via Street G. The pathways will be clearly marked with appropriate signage.

Therefore these criteria are or will be met.

Section 4.155. General Regulations - Parking, Loading and Bicycle Parking.

(.01) Purpose:

- A. The design of parking areas is intended to enhance the use of the parking area as it relates to the site development as a whole, while providing efficient parking, vehicle circulation and attractive, safe pedestrian access.*
- B. As much as possible, site design of impervious surface parking and loading areas shall address the environmental impacts of air and water pollution, as well as climate change from heat islands.*
- C. The view from the public right of way and adjoining properties is critical to meet the aesthetic concerns of the community and to ensure that private property rights are met. Where developments are located in key locations such as near or adjacent to the I-5 interchanges, or involve large expanses of asphalt, they deserve community concern and attention.*

(.02) General Provisions:

- A. The provision and maintenance of off-street parking spaces is a continuing obligation of the property owner. The standards set forth herein shall be considered by the Development Review Board as minimum criteria.*
 - 1. The Board shall have the authority to grant variances or planned development waivers to these standards in keeping with the purposes and objectives set forth in the Comprehensive Plan and this Code.*
 - 2. Waivers to the parking, loading, or bicycle parking standards shall only be issued upon a findings that the resulting development will have no significant adverse impact on the surrounding neighborhood, and the community, and that the development considered as a whole meets the purposes of this section.*
- B. No area shall be considered a parking space unless it can be shown that the area is accessible and usable for that purpose, and has maneuvering area for the vehicles, as determined by the Planning Director.*
- C. In cases of enlargement of a building or a change of use from that existing on the effective date of this Code, the number of parking spaces required shall be based on the additional floor area of the enlarged or additional building, or changed use, as set forth in this Section. Current development standards, including parking area landscaping and screening, shall apply only to the additional approved parking area.*
- D. In the event several uses occupy a single structure or parcel of land, the total requirement for off-street parking shall be the sum of the requirements of the several uses computed separately, except as modified by subsection "E," below.*
- E. Owners of two (2) or more uses, structures, or parcels of land may utilize jointly the same parking area when the peak hours of operation do not overlap, provided satisfactory legal evidence is presented in the form of deeds, leases, or contracts securing full and permanent access to such parking areas for all the parties jointly using them. [Amended by Ord. # 674 11/16/09]*

- F. *Off-street parking spaces existing prior to the effective date of this Code may be included in the amount necessary to meet the requirements in case of subsequent enlargement of the building or use to which such spaces are necessary.*
- G. *Off-Site Parking. Except for single-family dwellings, the vehicle parking spaces required by this Chapter may be located on another parcel of land, provided the parcel is within 500 feet of the use it serves and the DRB has approved the off-site parking through the Land Use Review. The distance from the parking area to the use shall be measured from the nearest parking space to the main building entrance, following a sidewalk or other pedestrian route. The right to use the off-site parking must be evidenced in the form of recorded deeds, easements, leases, or contracts securing full and permanent access to such parking areas for all the parties jointly using them. [Amended by Ord. # 674 11/16/09]*
- H. *The conducting of any business activity shall not be permitted on the required parking spaces, unless a temporary use permit is approved pursuant to Section 4.163.*
- I. *Where the boundary of a parking lot adjoins or is within a residential district, such parking lot shall be screened by a sight-obscuring fence or planting. The screening shall be continuous along that boundary and shall be at least six (6) feet in height.*
- J. *Parking spaces along the boundaries of a parking lot shall be provided with a sturdy bumper guard or curb at least six (6) inches high and located far enough within the boundary to prevent any portion of a car within the lot from extending over the property line or interfering with required screening or sidewalks.*
- K. *All areas used for parking and maneuvering of cars shall be surfaced with asphalt, concrete, or other surface, such as pervious materials (i. e. pavers, concrete, asphalt) that is found by the City's authorized representative to be suitable for the purpose. In all cases, suitable drainage, meeting standards set by the City's authorized representative, shall be provided. [Amended by Ord. # 674 11/16/09]*
- L. *Artificial lighting which may be provided shall be so limited or deflected as not to shine into adjoining structures or into the eyes of passers-by.*
- M. *Off-street parking requirements for types of uses and structures not specifically listed in this Code shall be determined by the Development Review Board if an application is pending before the Board. Otherwise, the requirements shall be specified by the Planning Director, based upon consideration of comparable uses.*
- N. *Up to forty percent (40%) of the off-street spaces may be compact car spaces as identified in Section 4.001 - "Definitions," and shall be appropriately identified.*
- O. *Where off-street parking areas are designed for motor vehicles to overhang beyond curbs, planting areas adjacent to said curbs shall be increased to a minimum of seven (7) feet in depth. This standard shall apply to a double row of parking, the net effect of which shall be to create a planted area that is a minimum of seven (7) feet in depth.*

RESPONSE: Under Table 5, Section 4.155, residential development (detached and attached) requires a minimum of 1 off-street parking space per unit. There is no set maximum number.

For this residential development no parking lots are proposed. The street design provides for on-street parking, and each lot is designed to accommodate a single home. Each home is anticipated to have, at least, a two-car garage, with two spaces in the driveway.

It is further anticipated that the garages will accommodate the 2 spaces for required bike storage.

Therefore these criteria are met.

Section 4.156.01. Sign Regulations Purpose and Objectives.

(.01) Purpose. The general purpose of the sign regulations are to provide one of the principal means of implementing the Wilsonville Comprehensive Plan by fostering an aesthetically pleasing, functional, and economically vital community, as well as promoting public health, safety, and well-being. The sign regulations strive to accomplish the above general purpose by meeting the needs of sign owners while maintaining consistency with the development and design standards elsewhere in Chapter 4. This code regulates the design, variety, number, size, location, and type of signs, as well as the processes required to permit various types of signs. Sign regulations have one or more of the following specific objectives:

- A. Well-designed and aesthetically pleasing signs sufficiently visible and comprehensible from streets and rights-of-way that about a site as to aid in wayfinding, identification and provide other needed information.*
- B. Sign design and placement that is compatible with and complementary to the overall design and architecture of a site, along with adjoining properties, surrounding areas, and the zoning district.*
- C. A consistent and streamlined sign review process that maintains the quality of sign development and ensures due process.*
- D. Consistent and equitable application and enforcement of sign regulations.*
- E. All signs are designed, constructed, installed, and maintained so that public safety, particularly traffic safety, are not compromised.*
- F. Sign regulations are content neutral.*

RESPONSE: The developer/builder for this development may submit a signage program as a separate application once site development is underway.

Section 4.177. Street Improvement Standards.

This section contains the City's requirements and standards for pedestrian, bicycle, and transit facility improvements to public streets, or within public easements. The purpose of this section is to ensure that development, including redevelopment, provides transportation facilities that are safe, convenient, and adequate in rough proportion to their impacts.

(.01) Development and related public facility improvements shall comply with the standards in this section, the Wilsonville Public Works Standards, and the Transportation System Plan, in rough proportion to the potential impacts of the development. Such improvements shall be constructed at the time of development or as provided by Section 4.140, except as modified or waived by the City Engineer for reasons of safety or traffic operations..

(.02) Street Design Standards.

- A. All street improvements and intersections shall provide for the continuation of streets through specific developments to adjoining properties or subdivisions.
 - 1. Development shall be required to provide existing or future connections to adjacent sites through the use of access easements where applicable. Such easements shall be required in addition to required public street dedications as required in Section 4.236(.04).**

RESPONSE: Primary access to the subject property is from Boeckman Road, via proposed Street A. Ultimately, as other properties develop, Street G will provide additional access and circulation to and from Stafford Road.

Street A is aligned to also provide access to the school property when it is developed for the proposed elementary school.

Consistent with the Frog Pond Street Demonstration Plan, the local street network provides for good circulation and extensions to serve properties to the north. All proposed streets will be public, and designed consistent with the local street cross-sections set forth in the frog Pond West Master Plan.

B. The City Engineer shall make the final determination regarding right-of-way and street element widths using the ranges provided in Chapter 3 of the Transportation System Plan and the additional street design standards in the Public Works Standards.

C. Rights-of-way.

- 1. Prior to issuance of a Certificate of Occupancy Building permits or as a part of the recordation of a final plat, the City shall require dedication of rights-of-way in accordance with the Transportation System Plan. All dedications shall be recorded with the County Assessor's Office.*
- 2. The City shall also require a waiver of remonstrance against formation of a local improvement district, and all non-remonstrances shall be recorded in the County Recorder's Office as well as the City's Lien Docket, prior to issuance of a Certificate of Occupancy Building Permit or as a part of the recordation of a final plat.*
- 3. In order to allow for potential future widening, a special setback requirement shall be maintained adjacent to all arterial streets. The minimum setback shall be 55 feet from the centerline or 25 feet from the right-of-way designated on the Master Plan, whichever is greater.*

RESPONSE: The proposed street system has been designed in substantial compliance with the Frog Pond Street Demonstration Plan.

The rights-of-way are designed consistent with the local green street standards. All streets are proposed to be dedicated public rights-of-way, except Tract D, which is a private drive.

The preliminary plat provides for the dedication along the Boeckman Road frontage consistent with the arterial designation and the cross-section shown in Figure 19, in the Frog Pond West Master Plan.

The local streets and pathways are design consistent with the cross-sections shown in Frog Pond West Master Plan Figures 21, 24, 25 & 27.

E. Corner or clear vision area.

- 1. A clear vision area which meets the Public Works Standards shall be maintained on each corner of property at the intersection of any two streets, a street and a railroad or a street and a driveway. However, the following items shall be exempt from meeting this requirement:
 - a. Light and utility poles with a diameter less than 12 inches.*
 - b. Trees less than 6" d.b.h., approved as a part of the Stage II Site Design, or administrative review.*
 - c. Except as allowed by b., above, an existing tree, trimmed to the trunk, 10 feet above the curb.**

d. Official warning or street sign.

e. Natural contours where the natural elevations are such that there can be no cross-visibility at the intersection and necessary excavation would result in an unreasonable hardship on the property owner or deteriorate the quality of the site.

RESPONSE: The street and landscape designs provide for appropriate vision clearance and sight distance consistent with these criteria.

(.03) Sidewalks. Sidewalks shall be provided on the public street frontage of all development. Sidewalks shall generally be constructed within the dedicated public right-of-way, but may be located outside of the right-of-way within a public easement with the approval of the City Engineer.

A. Sidewalk widths shall include a minimum through zone of at least five feet. The through zone may be reduced pursuant to variance procedures in Section 4.196, a waiver pursuant to Section 4.118, or by authority of the City Engineer for reasons of traffic operations, efficiency, or safety.

RESPONSE: The proposed new streets will have sidewalks on both sides, except for the private drive, hammerhead serving Lots 13-14, where there will only be a sidewalk on one side.

In addition, a temporary pathway will be provided along the Boeckman Road frontage, to ensure pedestrian safety, until the City completes the street improvements. This temporary path will ultimately be replaced when the full street improvements, including sidewalk are completed by the City.

Figure 20. Boeckman Road - Looking West

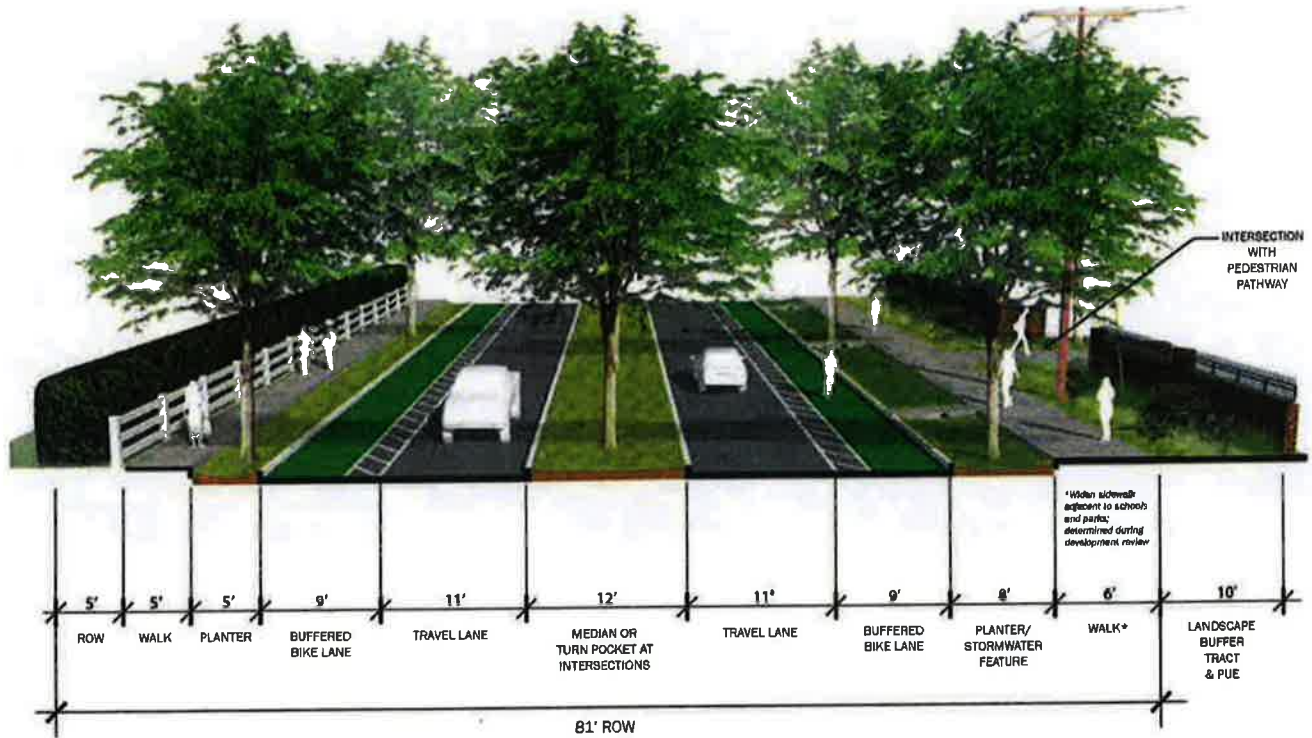


Figure 21. Stafford Road - Looking North

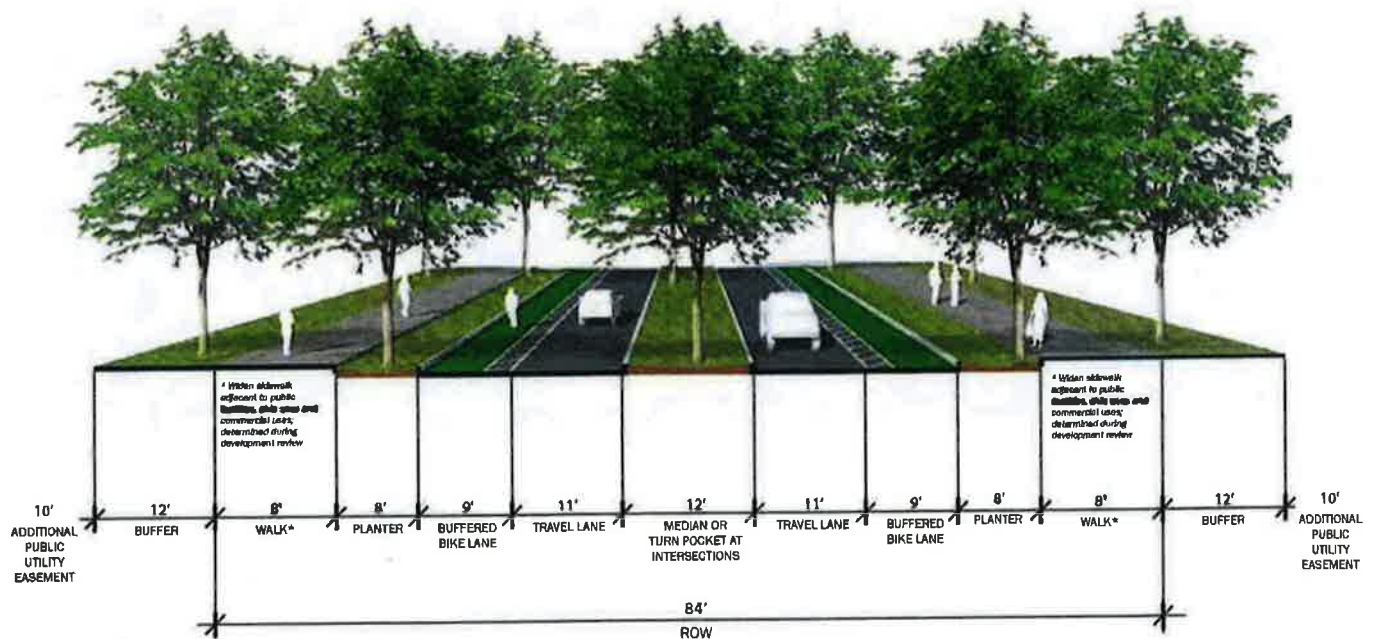


Figure 22. Low Impact Development Local Street

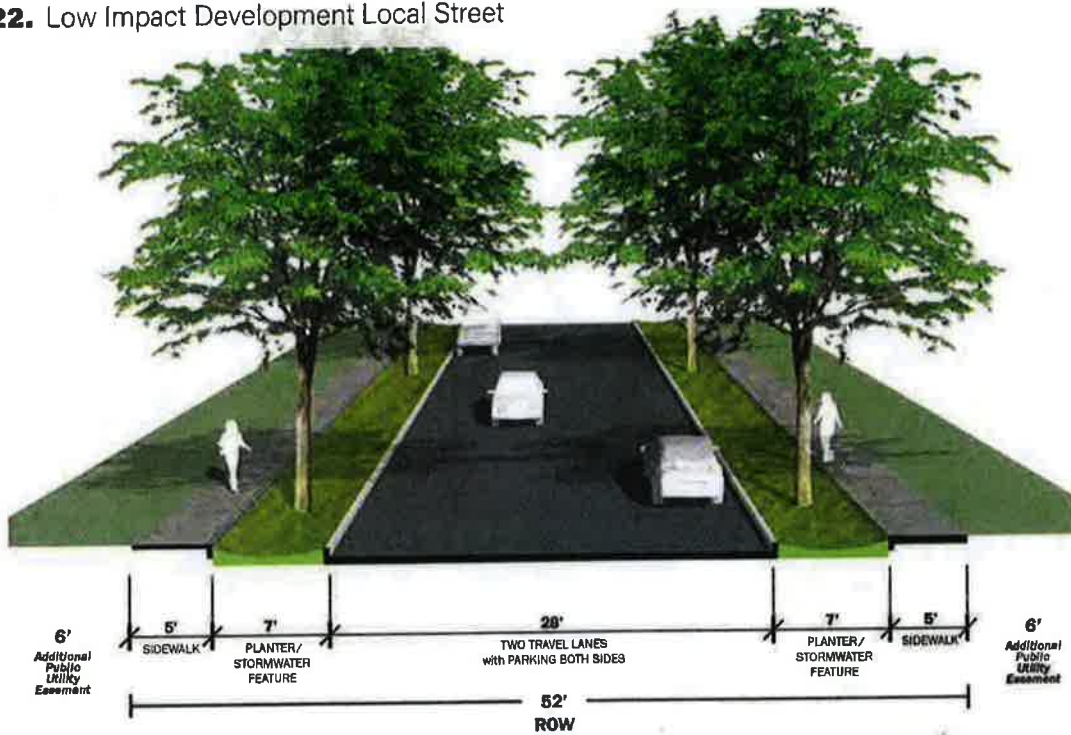


Figure 23. Collector - Gateway

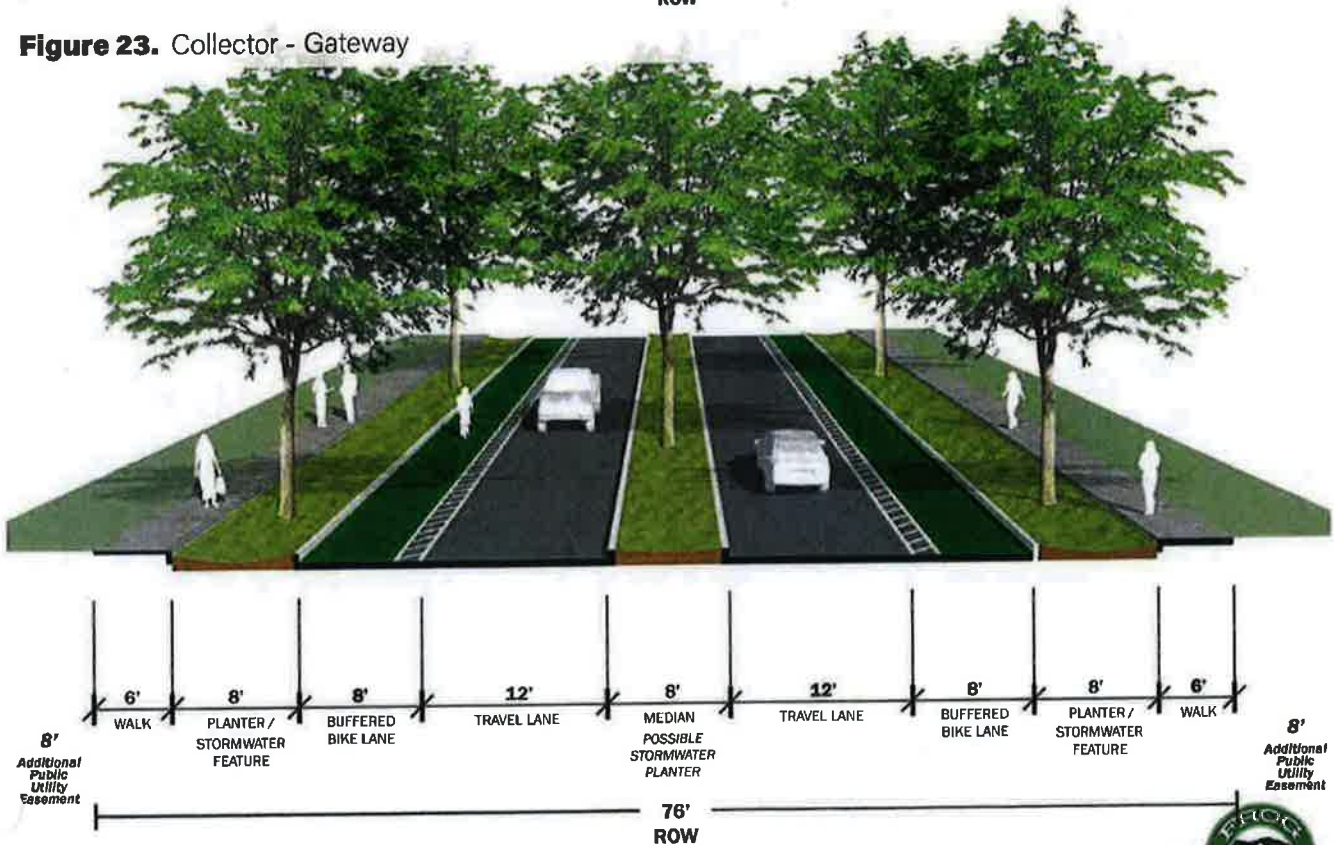


Figure 24. Collector - Internal

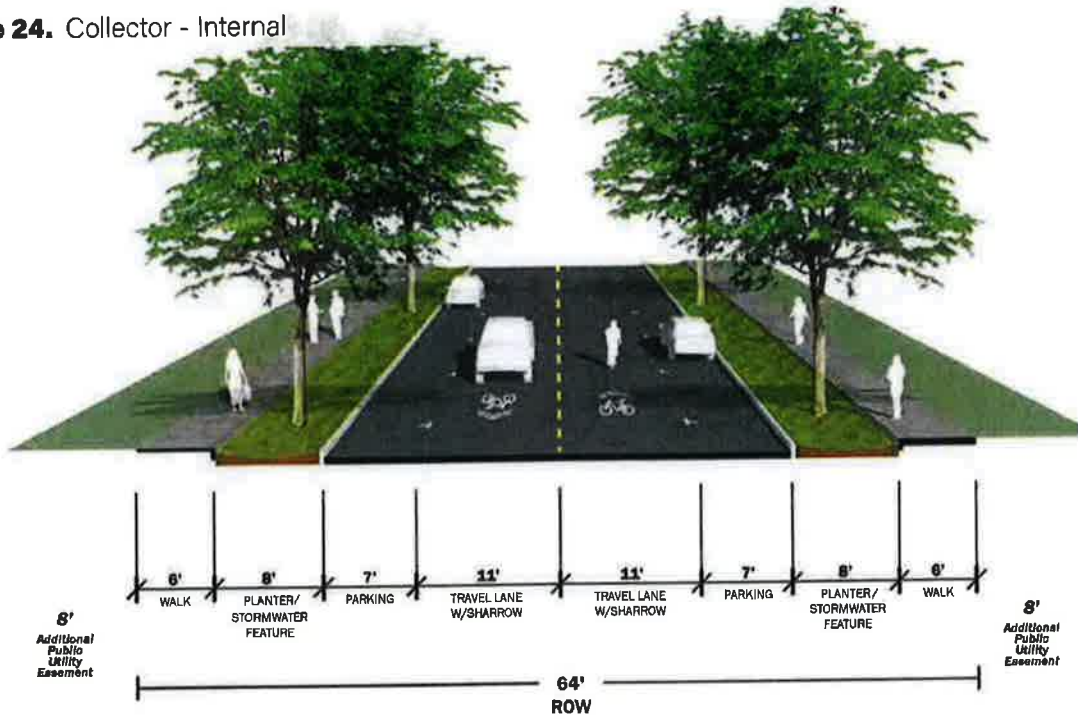


Figure 25. Typical Pedestrian Connection

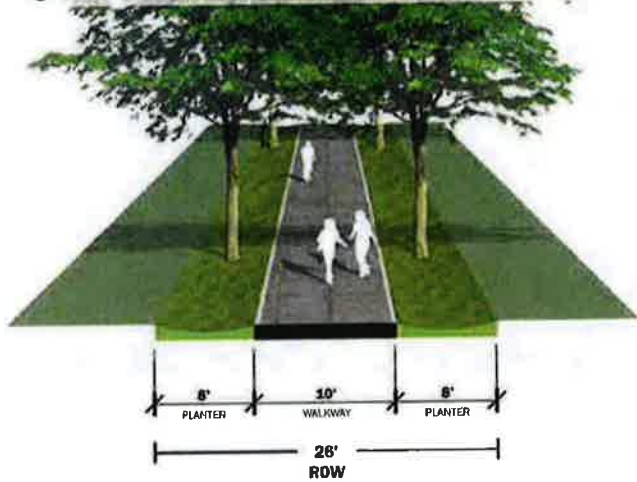


Figure 26. Typical Alley

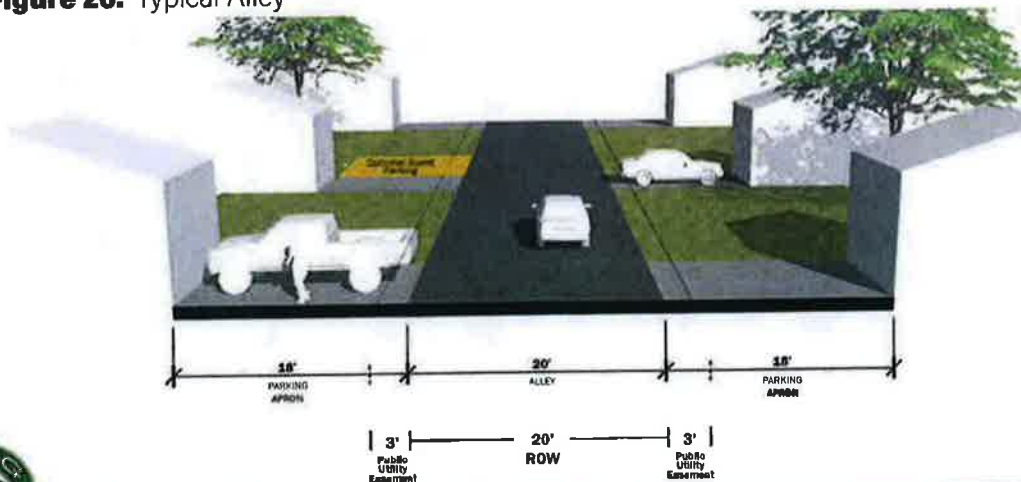


Figure 27. "Woonerf" street

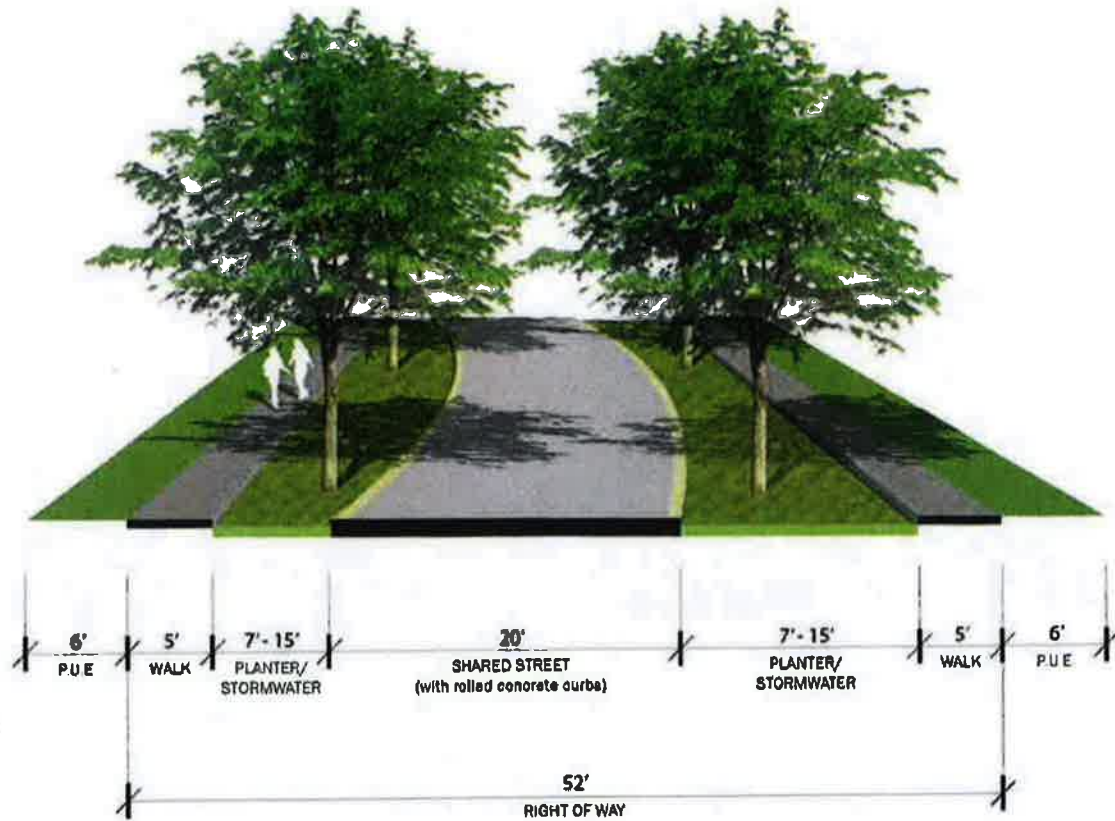
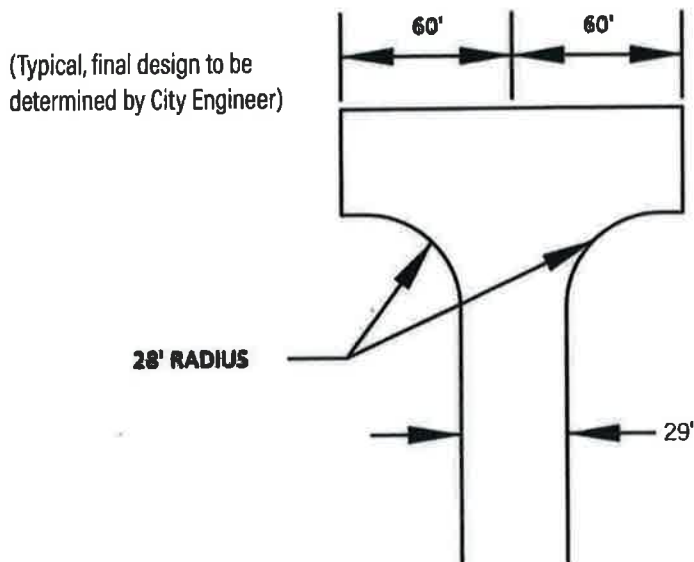


Figure 28. "Hammerhead" diagram



(.04) Bicycle Facilities. Bicycle facilities shall be provided to implement the Transportation System Plan, and may include on-street and off-street bike lanes, shared lanes, bike boulevards, and cycle tracks. The design of on-street bicycle facilities will vary according to the functional classification and the average daily traffic of the facility.

(.05) Multiuse Pathways. Pathways may be in addition to, or in lieu of, a public street. Paths that are in addition to a public street shall generally run parallel to that street, and shall be designed in accordance with the Public Works Standards or as specified by the City Engineer. Paths that are in lieu of a public street shall be considered in areas only where no other public street connection options are feasible, and are subject to the following standards.

A. Paths shall be located to provide a reasonably direct connection between likely pedestrian and bicyclist destinations. Additional standards relating to entry points, maximum length, visibility, and path lighting are provided in the Public Works Standards.

B. To ensure ongoing access to and maintenance of pedestrian/bicycle paths, the City Engineer will require dedication of the path to the public and acceptance of the path by the City as public right-of-way; or creation of a public access easement over the path.

RESPONSE: There will be bicycle lanes on Boeckman Road, once the City completes the widening. The local streets are designed to accommodate in-street bike travel. In addition multi-purpose pathway facilities are provided for connectivity to the SROZ and planned trails and trail heads. Bike-friendly connections are provided between Streets B & E and the trailheads.

(.06) Transit Improvements

Development on sites that are adjacent to or incorporate major transit streets shall provide improvements as described in this section to any bus stop located along the site's frontage, unless waived by the City Engineer for reasons of safety or traffic operations. Transit facilities include bus stops, shelters, and related facilities. Required transit facility improvements may include the dedication of land or the provision of a public easement.

A. Development shall at a minimum provide:

1. Reasonably direct pedestrian connections, as defined by Section 4.154, between building entrances and the transit facility and between buildings on the site and streets adjoining transit stops.

2. Improvements at major transit stops. Improvements may include intersection or mid-block traffic management improvements to allow for pedestrian crossings at major transit stops.

B. Developments generating an average of 49 or more pm peak hour trips shall provide bus stop improvements per the Public Works Standards. Required improvements may include provision of benches, shelters, pedestrian lighting; or provision of an easement or dedication of land for transit facilities.

RESPONSE: There currently is limited transit service along Boeckman Road. However, as the Frog Pond area develops, it is anticipated that additional service will be added. It is anticipated that the City will address transit stops with the design of the proposed widening of Boeckman Road.

(.07) Residential Private Access Drives. Residential Private Access Drives shall meet the following standards:

A. Residential Private Access Drives shall provide primary vehicular access to no more than four (4) dwelling units, excluding accessory dwelling units.

B. The design and construction of a Residential Private Access Drive shall ensure a useful lifespan and structural maintenance schedule comparable, as determined by the City Engineer or City's Authorized Representative, to a local street constructed in conformance to current public works standards.

1. The design of residential private access drives shall be stamped by a professional engineer registered in the state of Oregon and shall be approved by the City Engineer or City's Authorized Representative to ensure the above requirement is met.

2. Prior to issuing a certificate of occupancy for any residential dwelling unit whose primary vehicular access is from a Residential Private Access Drive the City Engineer or City's Authorized Representative shall certify construction of the Residential Private Access Drive substantially conforms the design approved by the City Engineer or City's Authorized Representative.

C. Residential Private Access Drives shall be named for addressing purposes. All Residential Private Access Drives shall use the suffix "Lane", i.e. SW Oakview Lane.

D. Residential Private Access Drives shall meet or exceed the standards for access drives and travel lanes established in Subsection (.08) of this Section.

[Amended by Ord. 682, 9/1/10]

RESPONSE: The applicant is proposing one private drive, Tract 'D'. Therefore these criteria are applicable. The design is consistent with City standard, and provides a vehicle turn-around in a hammer-head configuration. This private drive only serves two lots, and will be approximately 169 feet in length.

(.08). Access Drive and Driveway Approach Development Standards.

A. An access drive to any proposed development shall be designed to provide a clear travel lane free from any obstructions.

B. Access drive travel lanes shall be constructed with a hard surface capable of carrying a 23-ton load.

C. Where emergency vehicle access is required, approaches and driveways shall be designed and constructed to accommodate emergency vehicle apparatus and shall conform to applicable fire protection requirements. The City may restrict parking, require signage, or require other public safety improvements pursuant to the recommendations of an emergency service provider.

D. Secondary or emergency access lanes may be improved to a minimum 12 feet with an all-weather surface as approved by the Fire District. All fire lanes shall be dedicated easements.

E. Minimum access requirements shall be adjusted commensurate with the intended function of the site based on vehicle types and traffic generation.

F. The number of approaches on higher classification streets (e.g., collector and arterial streets) shall be minimized; where practicable, access shall be taken first from a lower classification street.

G. The City may limit the number or location of connections to a street, or impose access restrictions where the roadway authority requires mitigation to alleviate safety or traffic operations concerns.

H. The City may require a driveway to extend to one or more edges of a parcel and be designed to allow for future extension and inter-parcel circulation as adjacent properties develop. The City may also require the owner(s) of the subject site to record an access easement for future joint use of the approach and driveway as the adjacent property(ies) develop(s).

I. Driveways shall accommodate all projected vehicular traffic on-site without vehicles stacking or backing up onto a street.

J. Driveways shall be designed so that vehicle areas, including but not limited to drive-up and drive-through facilities and vehicle storage and service areas, do not obstruct any public right-of-way.

K. Approaches and driveways shall not be wider than necessary to safely accommodate projected peak hour trips and turning movements, and shall be designed to minimize crossing distances for pedestrians.

L. As it deems necessary for pedestrian safety, the City, in consultation with the roadway authority, may require traffic-calming features, such as speed tables, textured driveway surfaces, curb extensions, signage or traffic control devices, or other features, be installed on or in the vicinity of a site.

M. Approaches and driveways shall be located and designed to allow for safe maneuvering in and around loading areas, while avoiding conflicts with pedestrians, parking, landscaping, and buildings.

N. Where a proposed driveway crosses a culvert or drainage ditch, the City may require the developer to install a culvert extending under and beyond the edges of the driveway on both sides of it, pursuant applicable Public Works standards.

O. Except as otherwise required by the applicable roadway authority or waived by the City Engineer, temporary driveways providing access to a construction site or staging area shall be paved or graveled to prevent tracking of mud onto adjacent paved streets.

P. Unless constrained by topography, natural resources, rail lines, freeways, existing or planned or approved development, or easements or covenants, driveways proposed as part of a residential or mixed-use development shall meet local street spacing standards and shall be constructed to align with existing or planned streets, if the driveway.

1. Intersects with a public street that is controlled, or is to be controlled in the planning period, by a traffic signal;

2. Intersects with an existing or planned arterial or collector street; or

3. Would be an extension of an existing or planned local street, or of another major driveway.

RESPONSE: The proposed street improvements have been designed to meet the criteria of this Section to the degree they are applicable. Final design details will be coordinate with the City Engineer at the time of construction permits.

(.09) Minimum street intersection spacing standards.

A. New streets shall intersect at existing street intersections so that centerlines are not offset. Where existing streets adjacent to a proposed development do not align properly, conditions shall be imposed on the development to provide for proper alignment.

B. Minimum intersection spacing standards are provided in Transportation System Plan Table 3-2.

(.10) Exceptions and Adjustments. The City may approve adjustments to the spacing standards of subsections (.08) and (.09) above through a Class II process, or as a waiver per Section 4.118(.03)(A.), where an existing connection to a City street does not meet the standards of the roadway authority, the proposed development moves in the direction of code compliance, and mitigation measures alleviate all traffic operations and safety concerns. Mitigation measures may include consolidated access (removal of one access), joint use driveways (more than one property uses same access), directional limitations (e.g., one-way), turning restrictions (e.g., right in/out only), or other mitigation.

[Section 4.177 amended by Ord. 719, 6/17/13]

RESPONSE: The primary access to this development will be from Boeckman Road. Boeckman Road is designated a Minor Arterial in the Transportation System plan. The arterial standard calls for an 81 foot right-of-way (40.5 foot centerline section), plus a 10 wide landscape buffer and public utilities easement.

The City's minor arterial access spacing standard is 600 feet, which is applicable for Boeckman Road.

The proposed alignment of Street A, does not fully comply with the arterial spacing standard. However, this street is located consistent with the Frog Pond Street Demonstration Plan.

The intersection for Street A is situated approximately 350 feet west of the SW Laurel Glen Street intersection, which serves Arbor Crossing on the south side of Boeckman Road. The Laurel Glen alignment is also expected to provide "Bus Only" access to the school site. This alignment is generally consistent with the "Street Demonstration Plan," even though it does not meet the arterial spacing standard. It is noted that the Bus Only access is not reflected on the Demonstration Plan, but has been discussed with the City.

The Frog Pond Master Plan identifies a collector street aligned with SW Willow Creek Drive, which is approximately 740 feet east of the SW Laurel Glen Street intersection.

Section 4.176. Landscaping, Screening, and Buffering.

Note: the reader is encouraged to see Section 4.179, applying to screening and buffering of storage areas for solid waste and recyclables.

- (.01) *Purpose. This Section consists of landscaping and screening standards and regulations for use throughout the City. The regulations address materials, placement, layout, and timing of installation. The City recognizes the ecological and economic value of landscaping and requires the use of landscaping and other screening or buffering to:*
- A. Promote the re-establishment of vegetation for aesthetic, health, erosion control, flood control and wildlife habitat reasons;*
 - B. Restore native plant communities and conserve irrigation water through establishment, or re-establishment, of native, drought-tolerant plants;*
 - C. Mitigate for loss of native vegetation;*
 - D. Establish and enhance a pleasant visual character which recognizes aesthetics and safety issues;*
 - E. Promote compatibility between land uses by reducing the visual, noise, and lighting impacts of specific development on users of the site and abutting sites or uses;*
 - F. Unify development and enhance and define public and private spaces;*
 - G. Promote the retention and use of existing topsoil and vegetation. Amended soils benefit stormwater retention and promote infiltration;*
 - H. Aid in energy conservation by providing shade from the sun and shelter from the wind; and*
 - I. Screen from public view the storage of materials that would otherwise be considered unsightly.*

- J. *Support crime prevention, create proper sight distance clearance, and establish other safety factors by effective landscaping and screening.*
- K. *Provide landscaping materials that minimize the need for excessive use of fertilizers, herbicides and pesticides, irrigation, pruning, and mowing to conserve and protect natural resources, wildlife habitats, and watersheds.*

(.02) *Landscaping and Screening Standards.*

- A. *Subsections “C” through “I,” below, state the different landscaping and screening standards to be applied throughout the City. The locations where the landscaping and screening are required and the depth of the landscaping and screening is stated in various places in the Code.*
- B. *All landscaping and screening required by this Code must comply with all of the provisions of this Section, unless specifically waived or granted a Variance as otherwise provided in the Code. The landscaping standards are minimum requirements; higher standards can be substituted as long as fence and vegetation-height limitations are met. Where the standards set a minimum based on square footage or linear footage, they shall be interpreted as applying to each complete or partial increment of area or length (e.g., a landscaped area of between 800 and 1600 square feet shall have two trees if the standard calls for one tree per 800 square feet.*

RESPONSE: The Frog Pond West Master Plan provides design guidance for general common area landscaping. The proposed plans provide for the 10 foot wide landscaped buffer (Tract “B”) along the Boeckman Road frontage, including the brick wall, consistent with Figure 19 of the Master Plan. Design details for the brick wall and buffer landscaping in front of the wall has been coordinated with West Hills Development (Stafford Meadows). Street trees and pathway planting are designed consistent with Figures 13, 18, 19, 21, 24 and 42.

- (.03) *Landscape Area. Not less than fifteen percent (15%) of the total lot area, shall be landscaped with vegetative plant materials. The ten percent (10%) parking area landscaping required by section 4.155.03(B)(1) is included in the fifteen percent (15%) total lot landscaping requirement. Landscaping shall be located in at least three separate and distinct areas of the lot, one of which must be in the contiguous frontage area. Planting areas shall be encouraged adjacent to structures. Landscaping shall be used to define, soften or screen the appearance of buildings and off-street parking areas. Materials to be installed shall achieve a balance between various plant forms, textures, and heights. The installation of native plant materials shall be used whenever practicable. (For recommendations refer to the Native Plant List maintained by the City of Wilsonville). [Amended by Ord. # 674 11/16/09]*

RESPONSE: The SROZ covers 34.1% of the gross site area. This area will remain in native vegetation, with proposed enhancements, including trails and trail heads. In addition the development plan provides 10.3% general open space in “active” and “pedestrian-friendly” open spaces.

Section 4.179. Mixed Solid Waste and Recyclables Storage in New Multi-Unit Residential and Non-Residential Buildings.

- (.01) *All site plans for multi-unit residential and non-residential buildings submitted to the Wilsonville Development Review Board for approval shall include adequate storage space for mixed solid waste and source separated recyclables. [Amended by Ordinance No. 538, 2/21/02.]*

RESPONSE: This is a residential development for single-family homes. The applicant has coordinated with Republic Services for residential roll-cart services for the homes, and to ensure safe and convenient truck access and circulation.

Typically the carts are placed at the curb for pick-up. The streets are laid out to facilitate safe and convenient truck access for weekly pick-up. Other provisions of the Section are not applicable as they relate to multi-family and non-residential developments.

Section 4.199.10. Outdoor Lighting In General.

- (.01) Purpose: *The purpose of this Code is to provide regulations for outdoor lighting that will:*
- A. *Permit reasonable uses of outdoor lighting for nighttime safety, utility, security, productivity, enjoyment and commerce.*
 - B. *Conserve energy and resources to the greatest extent possible.*
 - C. *Minimize glare, particularly in and around public rights-of-way; and reduce visual discomfort and improve visual acuity over large areas by avoiding "light islands" and "spotlighting" that result in reduced visual perception in areas adjacent to either the source of the glare or the area illuminated by the glare.*
 - D. *Minimize light trespass, so that each owner of property does not cause unreasonable light spillover to other property.*
 - E. *Curtail the degradation of the nighttime environment and the night sky.*
 - F. *Preserve the dark night sky for astronomy and enjoyment.*
 - G. *Protect the natural environment, including wildlife, from the damaging effects of night lighting from human sources.*
- (.02) Purpose Statement as Guidelines: *Declaration of purpose statements are guidelines and not approval criteria in the application of WC Section 4.199.*

Section 4.199.20. Applicability.

- (.01) *This Ordinance is applicable to:*
- A. *Installation of new exterior lighting systems in public facility, commercial, industrial and multi-family housing projects with common areas.*
 - B. *Major additions or modifications (as defined in this Section) to existing exterior lighting systems in public facility, commercial, industrial and multi-family housing projects with common areas.*

RESPONSE: This is a residential development for single-family homes. Other provisions of the Section are not applicable as they relate to multi-family and non-residential developments.

The proposed development plans provide for street and pathway lighting consistent with the provisions set forth in the Frog Pond West Master Plan. The lighting plan has been coordinated with the design and spacing for street trees, utilities, water meters, etc. to make sure there are no major conflicts, consistent with the City's Street Tree Spacing Standards and Design Guidelines for Planting Strips.

UNDERGROUND UTILITIES

Section 4.300. General.

- (.01) *The City Council deems it reasonable and necessary in order to accomplish the orderly and desirable development of land within the corporate limits of the City, to require the underground installation of utilities in all new developments.*
- (.02) *After the effective date of this Code, the approval of any development of land within the City will be upon the express condition that all new utility lines, including but not limited to those required for power, communication, street lighting, gas, cable television services and related facilities, shall be placed underground.*
- (.03) *The construction of underground utilities shall be subject to the City's Public Works Standards and shall meet applicable requirements for erosion control and other environmental protection.*

Section 4.310 Exceptions.

Section 4.300 of this Code shall not apply to surface-mounted transformers, surface-mounted connection boxes, wireless communication facilities, and meter cabinets and other appurtenances which are reasonably necessary to be placed above ground, or to temporary utility service facilities during construction, or to high capacity electric and communication feeder lines, or to utility transmission lines operating at 50,000 volts or more.

Section 4.320. Requirements.

- (.01) *The developer or subdivider shall be responsible for and make all necessary arrangements with the serving utility to provide the underground services (including cost of rearranging any existing overhead facilities). All such underground facilities as described shall be constructed in compliance with the rules and regulations of the Public Utility Commission of the State of Oregon relating to the installation and safety of underground lines, plant, system, equipment and apparatus.*
- (.02) *The location of the buried facilities shall conform to standards supplied to the subdivider by the City. The City also reserves the right to approve location of all surface-mounted transformers.*
- (.03) *Interior easements (back lot lines) will only be used for storm or sanitary sewers, and front easements will be used for other utilities unless different locations are approved by the City Engineer. Easements satisfactory to the serving utilities shall be provided by the developer and shall be set forth on the plat.*

RESPONSE: All utilities, except the high-voltage lines along Boeckman Road will be placed underground. Also, storm lines extending into the SROZ may be laid on the surface, to allow maximum flexibility in avoiding trees. This surface design also minimizes erosion. These criteria will be met, as part of the Construction Plan review process. Anticipated utilities and access easements are shown on the Preliminary Plat.

Section 4.171. General Regulations - Protection of Natural Features and Other Resources.

(.01) **Purpose.** *It is the purpose of this Section to prescribe standards and procedures for the use and development of land to assure the protection of valued natural features and cultural resources. The requirements of this Section are intended to be used in conjunction with those of the Comprehensive Plan and other zoning standards. It is further the purpose of this Section:*

- A. *To protect the natural environmental and scenic features of the City of Wilsonville.*
- B. *To encourage site planning and development practices which protect and enhance natural features such as riparian corridors, streams, wetlands, swales, ridges, rock outcroppings, views, large trees and wooded areas.*
- C. *To provide ample open space and to create a constructed environment capable and harmonious with the natural environment.*

(.02) **General Terrain Preparation:**

- A. *All developments shall be planned, designed, constructed and maintained with maximum regard to natural terrain features and topography, especially hillside areas, floodplains, and other significant landforms.*
- B. *All grading, filling and excavating done in connection with any development shall be in accordance with the Uniform Building Code*
- C. *In addition to any permits required under the Uniform Building Code, all developments shall be planned, designed, constructed and maintained so as to:*
 1. *Limit the extent of disturbance of soils and site by grading, excavation and other land alterations.*
 2. *Avoid substantial probabilities of: (1) accelerated erosion; (2) pollution, contamination, or siltation of lakes, rivers, streams and wetlands; (3) damage to vegetation; (4) injury to wildlife and fish habitats.*
 3. *Minimize the removal of trees and other native vegetation that stabilize hillsides, retain moisture, reduce erosion, siltation and nutrient runoff, and preserve the natural scenic character.*

RESPONSE: The major natural feature associated with this development is Boeckman Creek and its associated riparian canyon. This area is designated for protection and to be zoned SROZ. The SROZ will be set aside in Tract ‘A’ and is proposed to be dedicated to the City.

The SROZ has been delineated and an SRIR has been provided to guide map refinement and limited low impact improvements for pathways and trail heads. Provisions will be made to ensure channel restoration is completed within Tract A, prior to dedication to the City.

Trees outside of the SROZ have been inventoried and evaluated by the project Arborist.

Consistent with the Frog Pond West Master Plan, the streets (east/west) provide both visual and pedestrian-friendly corridors between the canyon and the school property.

- (.03) Hillsides: All developments proposed on slopes greater than 25% shall be limited to the extent that:
- A. An engineering geologic study approved by the City, establishes that the site is stable for the proposed development, and any conditions and recommendations based on the study are incorporated into the plans and construction of the development. The study shall include items specified under subsection 4.171(.07)(A.) (2.) (a-j):
 - B. Slope stabilization and re-vegetation plans shall be included as part of the applicant's landscape plans.
 - C. Buildings shall be clustered to reduce alteration of terrain and provide for preservation of natural features.
 - D. Creation of building sites through mass pad grading and successive padding or terracing of building sites shall be avoided where feasible.
 - E. Roads shall be of minimum width, with grades consistent with the City's Public Works Standards.
 - F. Maintenance, including re-vegetation, of all grading areas is the responsibility of the developer, and shall occur through October 1 of the second growing season following receipt of Certificates of Occupancy unless a longer period is approved by the Development Review Board.
 - G. The applicant shall obtain an erosion and sediment control permit from the City's Building and Environmental Services Division's.

RESPONSE: The steeper slopes within this property are all related to the Creek and canyon, within the SROZ. The applicant has provided a Geo-technical report addressing slope stability and providing setback recommendations from the top of bank. All buildable areas of lots will be setback a minimum of 20 feet from top of bank. All lots adjacent to the SROZ have sufficient depth to avoid any structural impacts within 20 feet of the top of bank.

GeoPacific has provided specific design guidance for the retaining walls for the pathway within Tract A. However, this is a construction detail, which will be addressed at the time of Construction Plan design and review for permits.

- (.04) Trees and Wooded Areas.
- A. All developments shall be planned, designed, constructed and maintained so that:
 - 1. Existing vegetation is not disturbed, injured, or removed prior to site development and prior to an approved plan for circulation, parking and structure location.
 - 2. Existing wooded areas, significant clumps/groves of trees and vegetation, and all trees with a diameter at breast height of six inches or greater shall be incorporated into the development plan and protected wherever feasible.
 - 3. Existing trees are preserved within any right-of-way when such trees are suitably located, healthy, and when approved grading allows.
 - B. Trees and woodland areas to be retained shall be protected during site preparation and construction according to City Public Works design specifications, by:
 - 1. Avoiding disturbance of the roots by grading and/or compacting activity.
 - 2. Providing for drainage and water and air filtration to the roots of trees which will be covered with impermeable surfaces.

3. *Requiring, if necessary, the advisory expertise of a registered arborist/horticulturist both during and after site preparation.*
4. *Requiring, if necessary, a special maintenance, management program to insure survival of specific woodland areas of specimen trees or individual heritage status trees.*

RESPONSE: The major natural feature associated with this development is Boeckman Creek and its associated riparian canyon. This area is designated for protection and zoned SROZ. The SROZ will be set aside in Tract ‘A’ and is proposed to be dedicated to the City.

Trees outside of the SROZ have been inventoried and evaluated by the project Arborist. Generally all trees within the SROZ will be preserved, except for specific hazard trees, and trees conflicting with the trail system.

Any identified hazard trees will be cut, but left on the ground as woody debris or left standing as snags. Specific trees, determined to be preserved by the project Arborist and the City’s Resource Manager have been identified. All other trees outside of the SROZ will be removed.

(.05) *High Voltage Powerline Easements and Rights of Way and Petroleum Pipeline Easements:*

- A. *Due to the restrictions placed on these lands, no residential structures shall be allowed within high voltage powerline easements and rights of way and petroleum pipeline easements, and any development, particularly residential, adjacent to high voltage powerline easements and rights of way and petroleum pipeline easements shall be carefully reviewed.*
- B. *Any proposed non-residential development within high voltage powerline easements and rights of way and petroleum pipeline easements shall be coordinated with and approved by the Bonneville Power Administration, Portland General Electric Company or other appropriate utility, depending on the easement or right of way ownership.*

RESPONSE: There are high-voltage PGE lines running along the Boeckman Road frontage of the property. These lines have too high of voltage to underground. Therefore the poles will remain, within the 10 foot landscaped buffer along the frontage of the development. The landscaping will be consistent the Frog Pond West Master Plan and PGE criteria relative to the height of trees.

Specific poles may be relocated to accommodate the Boeckman Road improvements, but that will be managed by the City as part of their construction project.

(.06) *Hazards to Safety: Purpose:*

- A. *To protect lives and property from natural or human-induced geologic or hydrologic hazards and disasters.*
- B. *To protect lives and property from damage due to soil hazards.*
- C. *To protect lives and property from forest and brush fires.*
- D. *To avoid financial loss resulting from development in hazard areas.*

(.07) Standards for Earth Movement Hazard Areas:

- A. *No development or grading shall be allowed in areas of land movement, slump or earth flow, and mud or debris flow, except under one of the following conditions:*
 1. *Stabilization of the identified hazardous condition based on established and proven engineering techniques which ensure protection of public and private property. Appropriate conditions of approval may be attached by the City.*
 2. *An engineering geologic study approved by the City establishing that the site is stable for the proposed use and development. The study shall include the following:*
 - a. *Index map.*
 - b. *Project description, to include: location; topography, drainage, vegetation; discussion of previous work; and discussion of field exploration methods.*
 - c. *Site geology, to include: site geologic map; description of bedrock and superficial materials including artificial fill; location of any faults, folds, etc.; and structural data including bedding, jointing, and shear zones.*
 - d. *Discussion and analysis of any slope stability problems.*
 - e. *Discussion of any off-site geologic conditions that may pose a potential hazard to the site or that may be affected by on-site development.*
 - f. *Suitability of site for proposed development from geologic standpoint.*
 - g. *Specific recommendations for cut slope stability, seepage and drainage control, or other design criteria to mitigate geologic hazards.*
 - h. *Supportive data, to include: cross sections showing subsurface structure; graphic logs of subsurface explorations; results of laboratory tests; and references.*
 - i. *Signature and certification number of engineering geologist registered in the State of Oregon.*
 - j. *Additional information or analyses as necessary to evaluate the site.*
- B. *Vegetative cover shall be maintained or established for stability and erosion control purposes.*
- C. *Diversion of storm water into these areas shall be prohibited.*
- D. *The principal source of information for determining earth movement hazards is the State Department of Geology and Mineral Industries (DOGAMI) Bulletin 99 and any subsequent bulletins and accompanying maps. Approved site specific engineering geologic studies shall be used to identify the extent and severity of the hazardous conditions on the site, and to update the earth movement hazards database.*

RESPONSE: The steeper slopes within this property are all related to the creek and canyon, within the SROZ. The applicant has provided a Geo-technical report addressing slope stability and providing setback recommendations from the top of bank. All buildable areas of lots will be setback a minimum of 20 feet from top of bank. All lots adjacent to the SROZ have sufficient depth to avoid any structural impacts within 20 feet of the top of bank. Some side or rear yards will include the 25 foot Impact Area.

GeoPacific has provided specific design guidance for the retaining walls for the pathway within Tract A.

(.08) Standards for Soil Hazard Areas:

- A. *Appropriate siting and design safeguards shall insure structural stability and proper drainage of foundation and crawl space areas for development on land with any of the following soil conditions: wet or high water table; high shrink-swell capability; compressible or organic; and shallow depth-to-bedrock.*
- B. *The principal source of information for determining soil hazards is the State DOGAMI Bulletin 99 and any subsequent bulletins and accompanying maps. Approved site-specific soil studies shall be used to identify the extent and severity of the hazardous conditions on the site, and to update the soil hazards database accordingly.*

(.09) Historic Protection: Purpose:

- A. *To preserve structures, sites, objects, and areas within the City of Wilsonville having historic, cultural, or archaeological significance.*

RESPONSE: The slope hazards, which are minimal, are addressed by the Geo-Tech report findings and recommendations for setbacks from top of bank.

There is no historic preservation related to this property.

Section 4.175. Public Safety and Crime Prevention.

- (.01) *All developments shall be designed to deter crime and insure public safety.*
- (.02) *Addressing and directional signing shall be designed to assure identification of all buildings and structures by emergency response personnel, as well as the general public.*
- (.03) *Areas vulnerable to crime shall be designed to allow surveillance. Parking and loading areas shall be designed for access by police in the course of routine patrol duties.*
- (.04) *Exterior lighting shall be designed and oriented to discourage crime.*

RESPONSE: The proposed street and pathway system are laid out to provide good surveillance of the neighborhood. Homes will be designed to allow eyes on the streets and pathways. Street and pathway lighting will be designed consistent with the criteria set forth in the Frog Pond West Master Plan.

LAND DIVISION

Section 4.210. Application Procedure.

- (.01) *Pre-application conference. Prior to submission of a tentative condominium, partition, or subdivision plat, a person proposing to divide land in the City shall contact the Planning Department to arrange a pre-application conference as set forth in Section 4.010.*
- B. *Tentative Plat Submission. The purpose of the Tentative Plat is to present a study of the proposed subdivision to the Planning Department and Development Review Board and to receive approval or recommendations for revisions before preparation of a final Plat. The design and layout of this plan plat shall meet the guidelines and requirements set forth in this Code. The Tentative Plat shall be submitted to the Planning Department with the following information:*
 1. *Site development application form completed and signed by the owner of the land or a letter of authorization signed by the owner. A preliminary title report or other proof of ownership is to be included with the application form.*

2. *Application fees as established by resolution of the City Council.*
3. *Ten (10) copies and one (1) sepia or suitable reproducible tracing of the Tentative Plat shall be submitted with the application. Paper size shall be eighteen inch (18") by twenty-four inch (24"), or such other size as may be specified by the City Engineer.*
4. *Name of the subdivision. No subdivision name shall duplicate or resemble the name of any other subdivision in Clackamas or Washington County. Names may be checked through the county offices.*
5. *Names, addresses, and telephone numbers of the owners and applicants, and engineer or surveyor.*
6. *Date, north point and scale of drawing.*
7. *Location of the subject property by Section, Township, and Range.*
8. *Legal road access to subject property shall be indicated as City, County, or other public roads.*
9. *Vicinity map showing the relationship to the nearest major highway or street.*
10. *Lots: Dimensions of all lots, minimum lot size, average lot size, and proposed lot and block numbers.*
11. *Gross acreage in proposed plat.*
12. *Proposed uses of the property, including sites, if any, for multi-family dwellings, shopping centers, churches, industries, parks, and playgrounds or other public or semi-public uses.*
13. *Improvements: Statement of the improvements to be made or installed including streets, private drives, sidewalks, lighting, tree planting, and times such improvements are to be made or completed. [Amended by Ord. 682, 9/9/10]*
14. *Trees. Locations, types, sizes, and general conditions of all existing trees, as required in Section 4.600.*
15. *Utilities such as electrical, gas, telephone, on and abutting the tract.*
16. *Easements: Approximate width, location, and purpose of all existing and proposed easements on, and known easements abutting the tract.*
17. *Deed Restrictions: Outline of proposed deed restrictions, if any.*
18. *Written Statement: Information which is not practical to be shown on the maps may be shown in separate statements accompanying the Tentative Plat.*
19. *If the subdivision is to be a "Planned Development," a copy of the proposed Home Owners Association By-Laws must be submitted at the time of submission of the application. The Tentative Plat shall be considered as the Stage I Preliminary Plan. The proposed By-Laws must address the maintenance of any parks, common areas, or facilities.*
20. *Any plat bordering a stream or river shall indicate areas subject to flooding and shall comply with the provisions of Section 4.172.*
21. *Proposed use or treatment of any property designated as open space by the City of Wilsonville.*
22. *A list of the names and addresses of the owners of all properties within 250 feet of the subject property, printed on self-adhesive mailing labels. The list shall be taken from the latest available property ownership records of the Assessor's office of the affected county.*
23. *A completed "liens and assessments" form, provided by the City Finance Department.*
24. *Locations of all areas designated as a Significant Resource Overlay Zone by the City, as well as any wetlands shall be shown on the tentative plat.*
25. *Locations of all existing and proposed utilities, including but not limited to domestic water, sanitary sewer, storm drainage, and any private utilities crossing or intended to serve the site. Any plans to phase the construction or use of utilities shall be indicated. [Amended by Ord. 682, 9/9/10]*
26. *A traffic study, prepared under contract with the City, shall be submitted as part of the tentative plat application process, unless specifically waived by the Community Development Director.*

RESPONSE: The applicant participated in two pre-application conferences to review different development plan scenarios. The proposed preliminary plat and development plans have been designed based on pre-application feedback and developer preferences for unit and lot mix.

The applicant has provided all applicable and relevant submittal material, listed in B.1-26, w. Compliance is confirmed by the planning staff's determination of "complete application."

This application involves master planning and preliminary subdivision plat. The Final Plat will be submitted subsequent to obtaining approvals for this application, and preparation of construction documents.

Section 4.220. Final Plat Review.

(.04) Action on Final Plat: Within thirty (30) days of receipt of a complete final plat submittal, the Planning Director shall approve, deny, or, when further information is required, postpone a decision on the application. Written notice of such action shall be mailed to the applicant by the Planning Director. If the Planning Director determines that full conformity with all applicable ordinances has not been made, the Director shall advise the applicant of the changes or additions that must be made and shall afford the applicant an opportunity to make the necessary changes or additions...

RESPONSE: The final plat is an administrative review function, which occurs after Comprehensive Plan, Zoning, and Preliminary Plat approvals, as well as after the preparation of construction drawings have occurred. The final plat review is compared to the conditions of approval established for the preliminary plat. The applicant intends to proceed with construction and final platting as soon as all approvals and permits are obtained.

The following section presents information related to the proposed preliminary plat and addresses compliance with the code provisions for land division for residential development.

Section 4.236. General Requirements - Streets.

(.01) Conformity to the Transportation System Plan. Land divisions shall conform to and be in harmony with the Transportation Systems Plan, the Bicycle and Pedestrian Master Plan, and the Parks and Recreation Master Plan. [Amended by Ord. #719, 6/17/13]

(.02) Relation to Adjoining Street System.

A. A land division shall provide for the continuation of the principal streets existing in the adjoining area, or of their proper projection when adjoining property is not developed, and shall be of a width not less than the minimum requirements for streets set forth in these regulations. Where, in the opinion of the Planning Director or Development Review Board, topographic conditions make such continuation or conformity impractical, an exception may be made. In cases where the Board or Planning Commission has adopted a plan or plat of a neighborhood or area of which the proposed land division is a part, the subdivision shall conform to such adopted neighborhood or area plan.

B. Where the plat submitted covers only a part of the applicant's tract, a sketch of the prospective future street system of the unsubmitted part shall be furnished and the street system of the part submitted shall be considered in the light of adjustments and connections with the street system of the part not submitted.

C. At any time when an applicant proposes a land division and the Comprehensive Plan would allow for the proposed lots to be further divided, the city may require an arrangement of lots and streets such as to permit a later resubdivision in conformity to the street plans and other requirements specified in these regulations.

RESPONSE: The proposed street system has been designed in substantial compliance with the Frog Pond Street Demonstration Plan. The rights-of-way are designed consistent with the local green street and Woonerf standards. All streets are proposed to be dedicated public rights-of-way, except Tract D, which is a private drive. The north/south streets stub to the adjacent property to the north for future extension.

The preliminary plat provides for the dedication along the Boeckman Road frontage consistent with the arterial designation and the cross-section shown in Figure 19, in the Frog Pond West Master Plan.

The local streets and pathways are design consistent with the cross-sections shown in Figures 21, 24, 25 & 27 of the Master Plan. These streets will also be dedicated by the plat.

(.03) All streets shall conform to the standards set forth in Section 4.177 and the block size requirements of the zone.

(.04) Creation of Easements: The Planning Director or Development Review Board may approve an easement to be established without full compliance with these regulations, provided such an easement is the only reasonable method by which a portion of a lot large enough to allow partitioning into two (2) parcels may be provided with vehicular access and adequate utilities. If the proposed lot is large enough to divide into more than two (2) parcels, a street dedication may be required. [Amended by Ord. 682, 9/9/10]

(.05) Topography: The layout of streets shall give suitable recognition to surrounding topographical conditions in accordance with the purpose of these regulations.

RESPONSE: The proposed new streets conform to the Code and block standards, substantially consistent with the Frog Pond Street Demonstration Plan. The street system is designed in proper relationship to surrounding topography, including providing pedestrian-friendly view and walking corridors between the school property and the SROZ. All easement required will be provided as part of the Final Plat.

(.06) Reserve Strips: The Planning Director or Development Review Board may require the applicant to create a reserve strip controlling the access to a street. Said strip is to be placed under the jurisdiction of the City Council, when the Director or Board determine that a strip is necessary:

A. To prevent access to abutting land at the end of a street in order to assure the proper extension of the street pattern and the orderly development of land lying beyond the street; or

B. To prevent access to the side of a street on the side where additional width is required to meet the right-of-way standards established by the City; or

- C. To prevent access to land abutting a street of the land division but not within the tract or parcel of land being divided; or*
- D. To prevent access to land unsuitable for building development.*

RESPONSE: Wilsonville typically has not required reserve strips. However, any such strip that may be required, such as the east end of the proposed new public street, will be provided as part of the Final Plat.

- (.07) Future Expansion of Street: When necessary to give access to, or permit a satisfactory future division of, adjoining land, streets shall be extended to the boundary of the land division and the resulting dead-end street may be approved without a turn-around. Reserve strips and street plugs shall be required to preserve the objective of street extension. Notification that the street is planned for future extension shall be posted on the stub street. [Amended by Ord. #719, 6/17/13]*
- (.08) Existing Streets: Whenever existing streets adjacent to or within a tract are of inadequate width, additional right-of-way shall conform to the designated width in this Code or in the Transportation Systems Plan.*

RESPONSE: The proposed street system is consistent with the TSP and the Frog Pond Street Demonstration Plan. All streets are proposed to be dedicated public rights-of-way, except Tract D, which is a private drive. The north/south streets stub to the adjacent property to the north for future extension.

- (.09) Street Names: No street names will be used which will duplicate or be confused with the names of existing streets, except for extensions of existing streets. Street names and numbers shall conform to the established name system in the City, and shall be subject to the approval of the City Engineer.*

RESPONSE: At the time of Final Plat, street names will be provided consistent with the City's policies and confirmed by Clackamas County, as not duplicating any existing streets.

Section 4.237. General Requirements – Other.

(.01) Blocks:

- A. The length, width, and shape of blocks shall be designed with due regard to providing adequate building sites for the use contemplated, consideration of needs for convenient access, circulation, control, and safety of pedestrian, bicycle, and motor vehicle traffic, and recognition of limitations and opportunities of topography.*
- B. Sizes: Blocks shall not exceed the sizes and lengths specified for the zone in which they are located unless topographical conditions or other physical constraints necessitate larger blocks. Larger blocks shall only be approved where specific findings are made justifying the size, shape, and configuration.*

RESPONSE: The proposed street system has been designed in substantial compliance with the Frog Pond Street Demonstration Plan. The street network provides a very walkable, pedestrian-friendly grid, with block lengths consistent with Code standards. No block exceeds 330 feet, and perimeter block lengths are less than 1,200 feet.

(.02) Easements:

- A. Utility lines. Easements for sanitary or storm sewers, drainage, water mains, electrical lines or other public utilities shall be dedicated wherever necessary. Easements shall be provided consistent with the City's Public Works Standards, as*

specified by the City Engineer or Planning Director. All of the public utility lines within and adjacent to the site shall be installed within the public right-of-way or easement; with underground services extending to the private parcel constructed in conformance to the City's Public Works Standards. All franchise utilities shall be installed within a public utility easement. All utilities shall have appropriate easements for construction and maintenance purposes.]

B. Water courses. Where a land division is traversed by a water course, drainage way, channel or stream, there shall be provided a storm water easement or drainage right-of-way conforming substantially with the lines of the water course, and such further width as will be adequate for the purposes of conveying storm water and allowing for maintenance of the facility or channel. Streets or parkways parallel to water courses may be required.

RESPONSE: All necessary easements will be provided at the time of Final Plat. Boeckman Creek lies within the SROZ, which will be dedicated to the City, with appropriate public pathway easements consistent with the proposed trail system.

(.03) Pedestrian and bicycle pathways. An improved public pathway shall be required to transverse the block near its middle if that block exceeds the length standards of the zone in which it is located.

A. Pathways shall be required to connect to cul-de-sacs or to pass through unusually shaped blocks.

B. Pathways required by this subsection shall have a minimum width of ten (10) feet unless they are found to be unnecessary for bicycle traffic, in which case they are to have a minimum width of six (6) feet.

RESPONSE: The proposed street system has been design in substantial compliance with the Frog Pond Street Demonstration Plan and Figure 21. The street network provides a very walkable, pedestrian-friendly grid, with block lengths consistent with Code standards. No block exceeds 330 feet, and perimeter block lengths are less than 1,200 feet. Pedestrian connections are also provided out to Boeckman Road. The pathway connections are designed with 26 foot width and 10 foot paved surfaces, consistent with the Frog Pond West Master Plan criteria, Figure 24.

(.04) Tree planting. Tree planting plans for a land division must be submitted to the Planning Director and receive the approval of the Director or Development Review Board before the planting is begun. Easements or other documents shall be provided, guaranteeing the City the right to enter the site and plant, remove, or maintain approved street trees that are located on private property.

RESPONSE: The proposed landscaping plan provides for required street trees as well as trees and other landscaping within all common areas and along the Boeckman Road frontage, consistent with Figure 42, of the Frog Pond West Master Plan.

Preliminary designs for improvements to the trails, trail heads, within Tract 'A' and "active space" (Tract 'F' & 'G') have been provided. Final design details for the trails and trail heads will be coordinated with the City Parks & Recreation Director and Resource Manager.

(.05) Lot Size and shape. The lot size, width, shape and orientation shall be appropriate for the location of the land division and for the type of development and use contemplated. Lots shall meet the requirements of the zone where they are located.

- A. In areas that are not served by public sewer, an on-site sewage disposal permit is required from the City. If the soil structure is adverse to on-site sewage disposal, no development shall be permitted until sewer service can be provided.*
- B. Where property is zoned or deeded for business or industrial use, other lot widths and areas may be permitted at the discretion of the Development Review Board. Depth and width of properties reserved or laid out for commercial and industrial purposes shall be adequate to provide for the off-street service and parking facilities required by the type of use and development contemplated.*
- C. In approving an application for a Planned Development, the Development Review Board may waive the requirements of this section and lot size, shape, and density shall conform to the Planned Development conditions of approval.*

RESPONSE: The lots are designed consistent with these provisions, and the provision of the Frog Pond West Master Plan and Section 4.127 NR, including R-5 sub-district of the Development Code. All lots will be served by public sanitary sewer. There is no land intended for non-residential use.

(.06) Access. The division of land shall be such that each lot shall have a minimum frontage on a street or private drive, as specified in the standards of the relative zoning districts. This minimum frontage requirement shall apply with the following exceptions:

- A. A lot on the outer radius of a curved street or tract with a private drive, or facing the circular end of a cul-de-sac shall have frontage of not less than twenty-five (25) feet upon a street or tract with a private drive, measured on the arc.*
- B. The Development Review Board may waive lot frontage requirements where in its judgment the waiver of frontage requirements will not have the effect of nullifying the intent and purpose of this regulation or if the Board determines that another standard is appropriate because of the characteristics of the overall development. [Section 4.237(.06) amended by Ord. 682, 9/9/10]*

RESPONSE: All the proposed lots except Lots 13 & 14 will have frontage on a public street, consistent with code standards. However, Tract ‘D’ is proposed as a private drive. This private drive is designed to provide access to Lots 13 & 14, and includes a hammer-head turn-around for safely accommodating garbage trucks and emergency vehicles.

(.07) Through lots. Through lots shall be avoided except where essential to provide separation of residential development from major traffic arteries or adjacent nonresidential activity or to overcome specific disadvantages of topography and orientation. A planting screen easement of at least ten (10) feet, across which there shall be no access, may be required along the line of lots abutting such a traffic artery or other disadvantageous use. Through lots with planting screens shall have a minimum average depth of one hundred (100) feet. The Development Review Board may require assurance that such screened areas be maintained as specified in Section 4.176.

RESPONSE: Lots 23-30 are technically “*through-lots*.” The Woonerf design for Street B is proposed to offset the double frontage of these lots, plus to provide public street access for Lots 1-12, which front on Boeckman Road. The Woonerf design is intended to meet the design criteria in sub-section (.07). All of these lots (1-12 & 22-19) all have 100 foot depths. The Woonerf design provides additional landscape buffering along the rear yards of Lots 23-30.

(.08) Lot side lines. The side lines of lots, as far as practicable for the purpose of the proposed development, shall run at right angles to the street or tract with a private drive upon which the lots face. [Amended by Ord. 682, 9/9/10]

RESPONSE: The proposed lot lines are all designed at right angles to the streets.

(.09) Large lot land divisions. In dividing tracts which at some future time are likely to be re-divided, the location of lot lines and other details of the layout shall be such that re-division may readily take place without violating the requirements of these regulations and without interfering with the orderly development of streets. Restriction of buildings within future street locations shall be made a matter of record if the Development Review Board considers it necessary.

RESPONSE: The proposed preliminary plat develops all available property. No remnant parcels or over-sized lots are created, and no lot is sufficiently sized such that it could be further divided under the NR and R-5 sub-district zoning.

(.10) Building line. The Planning Director or Development Review Board may establish special building setbacks to allow for the future redivision or other development of the property or for other reasons specified in the findings supporting the decision. If special building setback lines are established for the land division, they shall be shown on the final plat.

(.11) Build-to line. The Planning Director or Development Review Board may establish special build-to lines for the development, as specified in the findings and conditions of approval for the decision. If special build-to lines are established for the land division, they shall be shown on the final plat.

RESPONSE: No special building lines or build-to lines are proposed or necessary.

(.12) Land for public purposes. The Planning Director or Development Review Board may require property to be reserved for public acquisition, or irrevocably offered for dedication, for a specified period of time.

RESPONSE: All streets, except Tract D, which is a private drive, will be dedicated to the City. Tract 'A' (SROZ) will also be dedicated to the City. Public access easements will be provided for the proposed pathway tracts.

(.13) Corner lots. Lots on street intersections shall have a corner radius of not less than ten (10) feet.

RESPONSE: All corner lots are designed with appropriate corner radii.

Section 4.250. Lots of Record.

All lots of record that have been legally created prior to the adoption of this ordinance shall be considered to be legal lots. Tax lots created by the County Assessor are not necessarily legal lots of record.

RESPONSE: The three subject properties are legal lots of record. However, because the applicant is proposing a subdivision, the Lot of Record status is not relevant.

Section 4.262. Improvements - Requirements.

(.01) Streets. Streets within or partially within the development shall be graded for the entire right-of-way width, constructed and surfaced in accordance with the Transportation Systems Plan and City Public Works Standards. Existing streets which about the development shall be graded, constructed, reconstructed, surfaced or repaired as determined by the City Engineer.

(.02) Curbs. Curbs shall be constructed in accordance with standards adopted by the City.

(.03) Sidewalks. Sidewalks shall be constructed in accordance with standards adopted by the City.

(.04) Sanitary sewers. When the development is within two hundred (200) feet of an existing public sewer main, sanitary sewers shall be installed to serve each lot or parcel in accordance with standards adopted by the City. When the development is more than two hundred (200) feet from an existing public sewer main, the City Engineer may approve an alternate sewage disposal system.

(.05) Drainage. Storm drainage, including detention or retention systems, shall be provided as determined by the City Engineer.

(.06) Underground utility and service facilities. All new utilities shall be subject to the standards of Section 4.300 (Underground Utilities). The developer shall make all necessary arrangements with the serving utility to provide the underground services in conformance with the City's Public Works Standards.

(.07) Streetlight standards. Streetlight standards shall be installed in accordance with regulations adopted by the City.

(.08) Street signs. Street name signs shall be installed at all street intersections and deadend signs at the entrance to all dead-end streets and cul-de-sacs in accordance with standards adopted by the City. Other signs may be required by the City Engineer.

(.09) Monuments. Monuments shall be placed at all lot and block corners, angle points, points of curves in streets, at intermediate points and shall be of such material, size and length as required by State Law. Any monuments that are disturbed before all improvements are completed by the developer and accepted by the City shall be replaced to conform to the requirements of State Law.

(.10) Water. Water mains and fire hydrants shall be installed to serve each lot in accordance with City standards.

RESPONSE: All streets and utilities are designed and will be constructed consistent with City standards. Sanitary sewer for Lots 1-7 will be served by a line located within Street B. All utilities, except the high-voltage PGE lines along Boeckman Road will be undergrounded, consistent with City Codes.

Street lighting will be provided consistent the criteria set forth on the Frog Pond West Master Plan. And, monuments will be placed consistent with State law.

CONCLUSION – Land Division

The proposed development and Preliminary Plat complies with all applicable provisions of the Frog Pond West Master Plan, and Development, as demonstrated herein. The applicant is not requesting any waivers. Adequate traffic capacity exists to accommodate the proposed development, while maintaining “D” or better LOS on the adjacent street system. All necessary public services are available and adequate to serve the development.

All common area tracts and open space equipment will be owned and maintained by the HOA, per CC&Rs, which will be recorded with the Plat.

TREE PRESERVATION PLAN

TREE PRESERVATION AND PROTECTION

Section 4.600. Purpose and Declaration

- (.01) *Rapid growth, the spread of development, need for water and increasing demands upon natural resources have the effect of encroaching upon, despoiling, or eliminating many of the trees, other forms of vegetation, and natural resources and processes associated therewith which, if preserved and maintained in an undisturbed and natural condition, constitute important physical, aesthetic, recreational and economic assets to existing and future residents of the City of Wilsonville.*

Section 4.610.10. Standards For Tree Removal, Relocation Or Replacement

- (.01) *Except where an application is exempt, or where otherwise noted, the following standards shall govern the review of an application for a Type A, B, C or D Tree Removal Permit:*

- A. Standard for the Significant Resource Overlay Zone. The standard for tree removal in the Significant Resource Overlay Zone shall be that removal or transplanting of any tree is not inconsistent with the purposes of this Chapter.*
- B. Preservation and Conservation. No development application shall be denied solely because trees grow on the site. Nevertheless, tree preservation and conservation as a design principle shall be equal in concern and importance to other design principles.*
- C. Developmental Alternatives. Preservation and conservation of wooded areas and trees shall be given careful consideration when there are feasible and reasonable location alternatives and design options on-site for proposed buildings, structures or other site improvements.*
- D. Land Clearing. Where the proposed activity requires land clearing, the clearing shall be limited to designated street rights-of-way and areas necessary for the construction of buildings, structures or other site improvements.*
- E. Residential Development. Where the proposed activity involves residential development, residential units shall, to the extent reasonably feasible, be designed and constructed to blend into the natural setting of the landscape.*
- F. Compliance With Statutes and Ordinances. The proposed activity shall comply with all applicable statutes and ordinances.*
- G. Relocation or Replacement. The proposed activity shall include necessary provisions for tree relocation or replacement, in accordance with WC 4.620.00, and the protection of those trees that are not to be removed, in accordance with WC 4.620.10.*
- H. Limitation. Tree removal or transplanting shall be limited to instances where the applicant has provided completed information as required by this Chapter and the reviewing authority determines that removal or transplanting is necessary based on the criteria of this subsection.*
 - 1. Necessary For Construction. Where the applicant has shown to the satisfaction of the reviewing authority that removal or transplanting is necessary for the construction of a building, structure or other site improvement, and that there is no feasible and reasonable location alternative or design option on-site for a proposed building, structure or other site improvement; or a tree is located too close to existing or proposed buildings or structures, or creates unsafe vision clearance.*

2. *Diseased, Damage, or Nuisance, or Hazard. Where the tree is diseased, damaged, or in danger of falling, or presents a hazard as defined in WC 6.208, or is a nuisance as defined in WC 6.200 et seq., or creates unsafe vision clearance as defined in this Code.*
 - (a) *As a condition of approval of Stage II development, filbert trees must be removed if they are no longer commercially grown or maintained.*
3. *Interference. Where the tree interferes with the healthy growth of other trees, existing utility service or drainage, or utility work in a previously dedicated right-of-way, and it is not feasible to preserve the tree on site.*
4. *Other. Where the applicant shows that tree removal or transplanting is reasonable under the circumstances.*

RESPONSE: The existing trees on-site have been inventoried and evaluated by the Project Arborist. A majority of these trees are located within the SROZ, and will thereby be preserved. Tract 'A', which includes the entire SROZ, will be dedicated to the City.

Eight-six trees outside of the SROZ have been evaluated by the Project Arborist and City Natural Resources Manager. Of these trees, 69 are on-site, 8 are within future rights-of-way and 9 immediately off-site. Seven trees, determined to be worthy of preservation have been identified.

The two trees proposed to be left as wildlife snags (#5129 & 5994) are technically counted as being removed, and do not count for mitigation credits. A total of 79 trees, outside the SROZ will be removed to accommodate the streets and lots. All other trees outside of the SROZ will be removed to accommodate the proposed development. Therefore per Section 4.620.00 a total of 81 mitigation trees will need to be planted.

Tract 'G' has been added to preserve a large 56 inch White Oak, at the corner of Streets F & G. Another 38 inch White Oak is also being preserved adjacent to Lot 12. Trees along the rear yards of Lot 76-82, which are within the 25 foot SROZ Impact Area will also be preserved. It is anticipated that only hazard trees within the SROZ will be downed, but left as woody debris or left standing as snags, except where the trail requires removal.

The Project Arborist has flagged a potential conflict between the 38 inch Oak adjacent to Lot 12 and the Boeckman Road buffer wall. The footings for the wall in this section near the tree will need to be designed to avoid significant root impacts, or the tree will need to be removed. This is a decision that is being deferred to construction design.

The Landscaping Plan provides for planting of street trees (116) and trees within open space tracts (64). Street trees along the Boeckman Road frontage will be installed by the City, with the road improvements.

I. Additional Standards for Type C Permits.

1. *Tree survey. For all site development applications reviewed under the provisions of Chapter 4 Planning and Zoning, the developer shall provide a Tree Survey before site development as required by WC 4.610.40, and*

2. *provide a Tree Maintenance and Protection plan, unless specifically exempted by the Planning Director or DRB, prior to initiating site development.*
2. *Platted Subdivisions. The recording of a final subdivision plat whose preliminary plat has been reviewed and approved after the effective date of Ordinance 464 by the City and that conforms with this subchapter shall include a Tree Survey and Maintenance and Protection Plan, as required by this subchapter, along with all other conditions of approval.*
3. *Utilities. The City Engineer shall cause utilities to be located and placed wherever reasonably possible to avoid adverse environmental consequences given the circumstances of existing locations, costs of placement and extensions, the public welfare, terrain, and preservation of natural resources. Mitigation and/or replacement of any removed trees shall be in accordance with the standards of this subchapter.*

RESPONSE: The required tree inventory and Arborist Report have been provided. Trees outside of the SROZ have been evaluated by the Project Arborist and City Natural Resources Manager. However, trees which conflict with the proposed trail system will be removed within the SROZ. Specific trees, determined to be worthy of preservation have been identified. All other trees outside of the SROZ will be removed to accommodate the proposed development.

Section 4.610.40. Type C Permit

- (.01) *Approval to remove any trees on property as part of a site development application may be granted in a Type C permit. A Type C permit application shall be reviewed by the standards of this subchapter and all applicable review criteria of Chapter 4. Application of the standards of this section shall not result in a reduction of square footage or loss of density, but may require an applicant to modify plans to allow for buildings of greater height. If an applicant proposes to remove trees and submits a landscaping plan as part of a site development application, an application for a Tree Removal Permit shall be included. The Tree Removal Permit application will be reviewed in the Stage II development review process, and any plan changes made that affect trees after Stage II review of a development application shall be subject to review by DRB. Where mitigation is required for tree removal, such mitigation may be considered as part of the landscaping requirements as set forth in this Chapter. Tree removal shall not commence until approval of the required Stage II application and the expiration of the appeal period following that decision. If a decision approving a Type C permit is appealed, no trees shall be removed until the appeal has been settled.*
- (.02) *The applicant must provide ten copies of a Tree Maintenance and Protection Plan completed by an arborist that contains the following information:*
 - A. *A plan, including a topographical survey bearing the stamp and signature of a qualified, registered professional containing all the following information:*
 1. *Property Dimensions. The shape and dimensions of the property, and the location of any existing and proposed structure or improvement.*
 2. *Tree survey. The survey must include:*
 - a. *An accurate drawing of the site based on accurate survey techniques at a minimum scale of one inch (1") equals one hundred feet (100') and which provides a) the location of all trees having six inches (6") or greater d.b.h. likely to be impacted, b)*

- the spread of canopy of those trees, (c) the common and botanical name of those trees, and d) the approximate location and name of any other trees on the property.*
- b. A description of the health and condition of all trees likely to be impacted on the site property. In addition, for trees in a present or proposed public street or road right-of-way that are described as unhealthy, the description shall include recommended actions to restore such trees to full health. Trees proposed to remain, to be transplanted or to be removed shall be so designated. All trees to remain on the site are to be designated with metal tags that are to remain in place throughout the development. Those tags shall be numbered, with the numbers keyed to the tree survey map that is provided with the application.*
 - c. Where a stand of twenty (20) or more contiguous trees exist on a site and the applicant does not propose to remove any of those trees, the required tree survey may be simplified to accurately show only the perimeter area of that stand of trees, including its drip line. Only those trees on the perimeter of the stand shall be tagged, as provided in "b," above.*
 - d. All Oregon white oaks, native yews, and any species listed by either the state or federal government as rare or endangered shall be shown in the tree survey.*
- 3. Tree Protection. A statement describing how trees intended to remain will be protected during development, and where protective barriers are necessary, that they will be erected before work starts. Barriers shall be sufficiently substantial to withstand nearby construction activities. Plastic tape or similar forms of markers do not constitute "barriers."*
 - 4. Easements and Setbacks. Location and dimension of existing and proposed easements, as well as all setbacks required by existing zoning requirements.*
 - 5. Grade Changes. Designation of grade changes proposed for the property that may impact trees.*
 - 6. Cost of Replacement. A cost estimate for the proposed tree replacement program with a detailed explanation including the number, size and species.*
 - 7. Tree Identification. A statement that all trees being retained will be identified by numbered metal tags, as specified in subsection "A," above in addition to clear identification on construction documents.*

Section 4.620.00. Tree Relocation, Mitigation, Or Replacement

- (.01) Requirement Established. A Type B or C Tree Removal Permit grantee shall replace or relocate each removed tree having six (6) inches or greater d.b.h. within one year of removal.*

RESPONSE: Appropriate permits shall be obtained for the removal of any and all trees, not to be preserved. The Project Arborist has prepared a detailed inventory and assessment of all trees within the development area. During construction trees specified to be protected will be delineated and protected by the placement of protective fencing at the edge of the tree root zone with plastic orange mesh fencing.

Frog Pond Master Plan

The Street Tree Plan (Figure 43) attributes a code to each Primary Street, from P1 to P6. To provide strong continuity, a Primary street should be planted with the same species for its entire length. No specific tree is proposed for a given Primary Street but each of these streets should be planted on both sides with a species unique to that street, selected from the list of eight possibilities.

Neighborhood Streets should strive for variety, as required in the Wilsonville Development Code (page C54-55 section D). All streets in a single subdivision or development's streets should not be planted with only trees of a single species. For example, east-west streets would have one tree from the recommended list and north-south streets would need to have another. An even finer grain of species distribution is recommended, if possible, at the City's discretion. However, both sides of a street should be planted with the same tree species.

The Neighborhood Street Tree List is as follows:

Paperbark Maple (Acer griseum)
Red Sunset Maple (Acer rubrum 'Red Sunset')
Katsura Tree (Cercidiphyllum japonicum)
Yellow Wood (Cladrastis kentukea)
Halka Honeylocust (Gleditsia triacanthos 'Halka')
Skycole Honeylocust (Gleditsia triacanthos 'Skycole')
Chinese Pistache (Pistacia chinensis)
Glenleven Little Leaf Linden (Tilia cordata 'Glenleven')
Accolade Elm (Ulmus 'Morton' Accolade)

Pedestrian Connections would feature a columnar species, reflecting the narrow space in these connections and ensuring that there are views through the length of them, helping with safety and wayfinding. The tree list for Pedestrian Connections includes:

Common Hornbeam (Carpinus betulus 'Fastigiata')
Bowhall Red Maple (Acer rubrum 'Bowhall')
English Oak (Quercus robur 'Fastigiata')
Musashino Zelkova (columnar) (Zelkova serrata 'Musashino')

RESPONSE: The landscaping plan provides a tree planting plan, consistent with these criteria and tree lists. Street trees along the Boeckman Road frontage will be installed by the City, with the road improvements.

The applicant has coordinated with West Hills Development (Stafford Meadows) to establish street trees for Primary Street (P5), which will be planted with American Linden. Primary Street (P1) will have Zelkova serrata as the assigned street tree.

The storm drainage system has been designed utilizing a combination of street-side LIDAs within the planter strips; and off-street LIDAs, within Tract A and F, plus a few LIDAs to be provided on individual lots.

The LIDAs within the planter strips have include tree boxes to accommodate the required street trees and LIDA facilities. The boxes allow for the proper species to be placed within the LIDA, while protecting the drainage and filtration capacity and avoiding conflicts with utility lines.

Street trees for the local (non-primary) streets and the pathway connections have been selected from the lists above from the Master Plan. Table 4 provides a list of the street trees by specific streets.

Street lighting has been adjusted to meet spacing standards from trees and utilities.

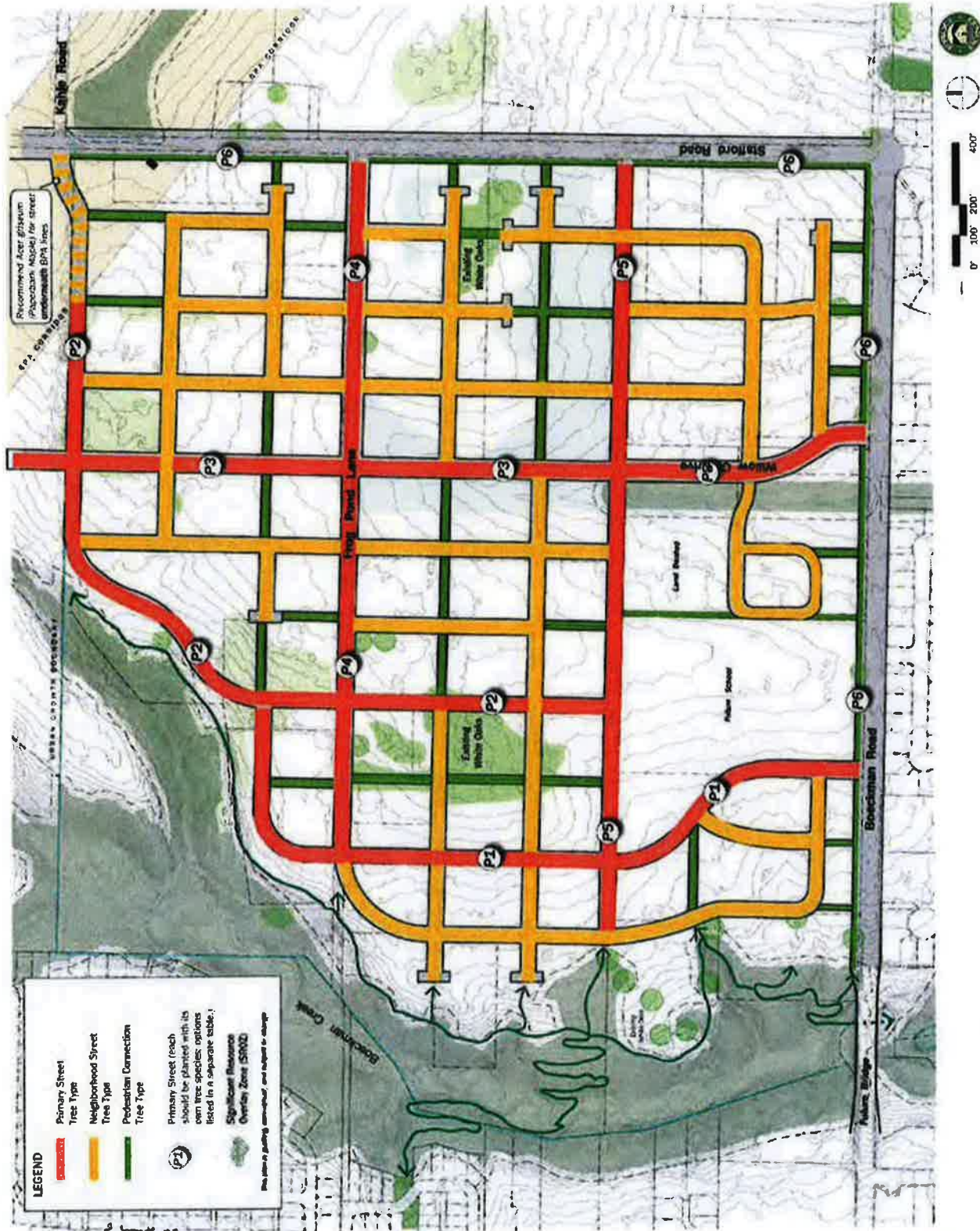
Table 4
Street Trees by Street

Street	Street Tree
A (P1)	Zelkova Serrata
B	Chinese Pistache
C	Katsura
D	Red Sunset Maple
E	Paper Bark Maple
F	Yellow Wood
G	American Linden
South Trail Head	Oregon White Ash
Middle Trail Head	Oregon White Oak
North Trail Head	Oregon White Oak

Frog Pond WEST

Master Plan

Figure 43. Street Tree Plan



SITE DESIGN REVIEW

SITE DESIGN REVIEW.

Section 4.400. Purpose.

(.01) Excessive uniformity, inappropriateness or poor design of the exterior appearance of structures and signs and the lack of proper attention to site development and landscaping in the business, commercial, industrial and certain residential areas of the City hinders the harmonious development of the City, impairs the desirability of residence, investment or occupation in the City, limits the opportunity to attain the optimum use in value and improvements, adversely affects the stability and value of property, produces degeneration of property in such areas and with attendant deterioration of conditions affecting the peace, health and welfare, and destroys a proper relationship between the taxable value of property and the cost of municipal services therefor.

(.02) The City Council declares that the purposes and objectives of site development requirements and the site design review procedure are to:

- A. Assure that Site Development Plans are designed in a manner that insures proper functioning of the site and maintains a high quality visual environment.*
- B. Encourage originality, flexibility and innovation in site planning and development, including the architecture, landscaping and graphic design of said development;*
- C. Discourage monotonous, drab, unsightly, dreary and inharmonious developments;*
- D. Conserve the City's natural beauty and visual character and charm by assuring that structures, signs and other improvements are properly related to their sites, and to surrounding sites and structures, with due regard to the aesthetic qualities of the natural terrain and landscaping, and that proper attention is given to exterior appearances of structures, signs and other improvements;*
- E. Protect and enhance the City's appeal and thus support and stimulate business and industry and promote the desirability of investment and occupancy in business, commercial and industrial purposes;*
- F. Stabilize and improve property values and prevent blighted areas and, thus, increase tax revenues;*
- G. Insure that adequate public facilities are available to serve development as it occurs and that proper attention is given to site planning and development so as to not adversely impact the orderly, efficient and economic provision of public facilities and services.*
- H. Achieve the beneficial influence of pleasant environments for living and working on behavioral patterns and, thus, decrease the cost of governmental services and reduce opportunities for crime through careful consideration of physical design and site layout under defensible space guidelines that clearly define all areas as either public, semi-private, or private, provide clear identity of structures and opportunities for easy surveillance of the site that maximize resident control of behavior -- particularly crime;*
- I. Foster civic pride and community spirit so as to improve the quality and quantity of citizen participation in local government and in community growth, change and improvements;*
- J. Sustain the comfort, health, tranquility and contentment of residents and attract new residents by reason of the City's favorable environment and, thus, to promote and protect the peace, health and welfare of the City.*

RESPONSE: The proposed development has been designed consistent with these design objectives, with the exception that architectural review is not required for preliminary approval. Review for architectural compliance will be part of the building permit process for each home.

No specific home designs are proposed at this time, but it is anticipated that Pahlisch Homes will provide individual dwelling units of high quality design. Unit architecture will be evaluated for compliance with the architectural design criteria set forth in the Master Plan, as part of the Building Permit review process.

The preliminary plat provides for ample open space, complimented with high quality landscaping consistent with the Frog Pond West Master Plan criteria.

Section 4.421. Criteria and Application of Design Standards.

(01) The following standards shall be utilized by the Board in reviewing the plans, drawings, sketches and other documents required for Site Design Review. These standards are intended to provide a frame of reference for the applicant in the development of site and building plans as well as a method of review for the Board. These standards shall not be regarded as inflexible requirements. They are not intended to discourage creativity, invention and innovation. The specifications of one or more particular architectural styles is not included in these standards. (Even in the Boones Ferry Overlay Zone, a range of architectural styles will be encouraged.)

RESPONSE: This development is not within the Boones Ferry Overlay Zone. However this development is within the area master planned as Frog Pond West. And, therefore the Frog Pond design criteria take precedence, as addressed below.

A. Preservation of Landscape. The landscape shall be preserved in its natural state, insofar as practicable, by minimizing tree and soils removal, and any grade changes shall be in keeping with the general appearance of neighboring developed areas.

RESPONSE: The site has previously been partially developed including two homes and an equestrian center. This application represents a proposal for full redevelopment of the property for an 82 lot subdivision. The site and landscaping design is consistent with the Frog Pond West Master Plan criteria.

B. Relation of Proposed Buildings to Environment. Proposed structures shall be located and designed to assure harmony with the natural environment, including protection of steep slopes, vegetation and other naturally sensitive areas for wildlife habitat and shall provide proper buffering from less intensive uses in accordance with Sections 4.171 and 4.139 and 4.139.5. The achievement of such relationship may include the enclosure of space in conjunction with other existing buildings or other proposed buildings and the creation of focal points with respect to avenues of approach, street access or relationships to natural features such as vegetation or topography.

RESPONSE: This site includes a large area of SROZ, equal to about 34% of the gross site area. The entire SROZ is set aside in Tract A, which will be dedicated to the City. The net developable portion of the site has much flatter topography than along the Boeckman Creek corridor, and is therefore very suitable for development.

The primary focal points for this development are the SROZ, and the three trail heads proposed for access to the nature trail system along the creek.

In addition to the SROZ, Tract 'F' and portions of Tract 'A,' which are outside of the SROZ, and including the trail segments within the SROZ are counted as "active use" open space, totaling 49,261 square feet. The trail heads provide direct links to the protected resource area and planned regional trail system.

This tract and other pathway links to the SROZ will be functionally and aesthetically landscaped, and connected with sidewalks. Enhanced trail head improvements are provided consistent with the intent of the Master Plan, and have been coordinated with the City.

C. Drives, Parking and Circulation. With respect to vehicular and pedestrian circulation, including walkways, interior drives and parking, special attention shall be given to location and number of access points, general interior circulation, separation of pedestrian and vehicular traffic, and arrangement of parking areas that are safe and convenient and, insofar as practicable, do not detract from the design of proposed buildings and structures and the neighboring properties.

RESPONSE: The proposed development provides for safe and convenient vehicle and pedestrian-friendly access and circulation to and throughout the site. Parking is provided generally on-street and also off-street for each home within private driveways and garages.

D. Surface Water Drainage. Special attention shall be given to proper site surface drainage so that removal of surface waters will not adversely affect neighboring properties of the public storm drainage system.
E. Utility Service. Any utility installations above ground shall be located so as to have a harmonious relation to neighboring properties and site. The proposed method of sanitary and storm sewage disposal from all buildings shall be indicated.

RESPONSE: To accommodate storm water the on-site system is designed with catch basins, utilizing Low Impact Green Street design, with street-side LIDA facilities. This design provides the majority of the storm water quality/detention within the rights-of-way. Individual LIDAs are also proposed within lots, to meet the full scope of required water quality treatment and detention.

F. Advertising Features. In addition to the requirements of the City's sign regulations, the following criteria should be included: the size, location, design, color, texture, lighting and materials of all exterior signs and outdoor advertising structures or features shall not detract from the design of proposed buildings and structures and the surrounding properties.

RESPONSE: No project identification signage at this time. If determined necessary, a Signage Plan will be provided under a separate application once site development has occurred.

The only signage proposed at this time are typical street signs and those related to the trails, trail heads and "active space" for directional information and environmental education, per the intent of the Frog Pond West Master Plan.

G. Special Features. Exposed storage areas, exposed machinery installations, surface areas, truck loading areas, utility buildings and structures and similar accessory areas and structures shall be subject to such setbacks, screen plantings or other screening methods as shall be required to prevent their being incongruous with the existing or contemplated environment and its surrounding properties. Standards for screening and buffering are contained in Section 4.176.

RESPONSE: No provisions for outdoor storage are proposed. All on-site storage is expected to be within the garages of each unit.

Each unit will have a 2-car garage, assumed to be adequate for typical residential storage needs, including the required bike storage. Any RVs, trailers, etc. will be stored off-site at appropriate storage facilities.

(.02) The standards of review outlined in Sections (a) through (g) above shall also apply to all accessory buildings, structures, exterior signs and other site features, however related to the major buildings or structures.

(.03) The Board shall also be guided by the purpose of Section 4.400, and such objectives shall serve as additional criteria and standards.

RESPONSE: The applicant is not proposing any accessory structures, as part of this application. However, individual home owners may elect to construct storage sheds, etc. in rear yards, subject to Code requirements.

Section 4.430. Location, Design and Access Standards for mixed Solid Waste and Recycling Areas.

(.01) The following locations, design and access standards for mixed solid waste and recycling storage areas shall be applicable to the requirements of Section 4.179 of the Wilsonville City Code.

RESPONSE: These dwellings will be single family detached and attached units, with garages. The applicant will coordinated with Republic Services for typical residential roller carts service. No common trash or recycling facilities are proposed.

Section 4.440. Procedure.

(.01) Submission of Documents. A prospective applicant for a building or other permit who is subject to site design review shall submit to the Planning Department, in addition to the requirements of Section 4.035, the following:

A. A site plan, drawn to scale, showing the proposed layout of all structures and other improvements including, where appropriate, driveways, pedestrian walks, landscaped areas, fences, walls, off-street parking and loading areas, and railroad tracks. The site plan shall indicate the location of entrances and exits and direction of traffic flow into and out of off-street parking and loading areas, the location of each parking space and each loading berth and areas of turning and maneuvering vehicles. The site plan shall indicate how utility service and drainage are to be provided.

RESPONSE: The development plans have been drawn to scale, and provide all the relevant information specified in this section.

B. A Landscape Plan, drawn to scale, showing the location and design of landscaped areas, the variety and sizes of trees and plant materials to be planted on the site, the location and design of landscaped areas, the varieties, by scientific and common name, and sizes of trees and plant materials to be retained or planted on the site, other pertinent landscape features, and irrigation systems required to maintain trees and plant materials. An inventory, drawn at the same scale as the Site Plan, of existing trees of 4" caliper or more is required. However, when large areas of trees are proposed to be retained undisturbed, only a survey identifying the location and size of all perimeter trees in the mass is necessary.

RESPONSE: The Plan Set includes a detailed landscaping plan, which covers all common areas, enhanced “active space,” pathways, trail heads, trails, and bio-swales along the new street, with street trees.

C. Architectural drawings or sketches, drawn to scale, including floor plans, in sufficient detail to permit computation of yard requirements and showing all elevations of the proposed structures and other improvements as they will appear on completion of construction. Floor plans shall also be provided in sufficient detail to permit computation of yard requirements based on the relationship of indoor versus outdoor living area, and to evaluate the floor plan's effect on the exterior design of the building through the placement and configuration of windows and doors.

RESPONSE: Architectural review is not required for Preliminary approval. The applicant is not proposing any specific home designs at this time. Individual home designs will be reviewed administratively as part of the Building Permit review process.

D. A Color Board displaying specifications as to type, color, and texture of exterior surfaces of proposed structures. Also, a phased development schedule if the development is constructed in stages.

RESPONSE: Architectural review is not required for Preliminary approval. The applicant is not providing any materials and color boards at this time, as they are not required under the Frog Pond Master Plan. The design details will be submitted for administrative review at the time of building permits.

E. A sign Plan, drawn to scale, showing the location, size, design, material, color and methods of illumination of all exterior signs.

RESPONSE: As previously addressed, the applicant is not proposing a signage program at this time, other than street and trail signage.

F. The required application fee.

RESPONSE: The applicant has paid the applicable application fees, as confirmed by the City’s “Completeness Review.”

Frog Pond West Design Criteria

MAIN ENTRANCES

Principles

*Each home is part of the larger neighborhood and community.
Front doors and walkways should face streets.
The front yard and porch or stoop are “semi-public” spaces...*

Master Plan Intent

The location of front doors, and their direct connections to the street, should:

- 1. Support a physical and visual connection between the living area of the residence and the street;*
- 2. Enhance public safety for residents and visitors and provide opportunities for community interaction;*
- 3. Ensure that the pedestrian entrance is visible or clearly identifiable from the street by its orientation or articulation; and*
- 4. Ensure a connection to the public realm for development on lots fronting both private and public streets by making the pedestrian entrance visible or clearly identifiable from the public street.*

The Code standards require a direct visual connection between the front door of the home and the front yard and street. Porches are an excellent way to emphasize this relationship and create a transition between the private realm of the home, the “semi-public” realm of the front yard, and the public realm of the sidewalk and street...

RESIDENTIAL DESIGN STANDARDS

Principles

*Each home is part of the larger neighborhood and community.
Details are important.
Variety is the spice of good design.
Create great neighborhoods...*

RESPONSE: Architectural review is not required for Preliminary approval. The applicant is not proposing any specific home designs at this time, but is fully aware of all the required design criteria. Individual home designs will be reviewed administratively as part of the Building Permit review process. However, typical building setbacks have been provided for the various lot widths, to demonstrate that the garage width criteria can be met.

LOT AND SITE DESIGN IN SMALL LOT SUBDISTRICTS

Principles

*Each home is part of the larger neighborhood and community.
Variety is the spice of good design.
Design guidelines should be tailored to each zone.*

Master Plan Intent

Small Lot Subdistricts have unique lot and site design requirements in order to:

- 5. Ensure that development in the Small Lot Subdistricts is compatible with other developments in the Frog Pond West Neighborhood;*

6. *Ensure varied design that avoids homogenous street frontages;*
7. *Orient site design to support active pedestrian street frontages; and*
8. *Integrate open space into the development pattern.*

Small lots present unique opportunities and challenges. On the positive side, they provide affordable housing choices, options for residents who do not want to maintain large homes and lots, and a solution for maintaining density while providing open space. They are an important part of Frog Pond's variety of housing. On the challenging side, they require careful site design to ensure an attractive street edge and compatibility with nearby larger lots. To address these issues, the Master Plan and the implementing code utilize a flexible system where one or more of the following site design elements are employed on each block:

- *Alleys, so that streetscapes are "people places" and not dominated by closely-spaced driveways.*
- *Residential main entries grouped around a common green or entry courtyard (e.g. cluster housing) provide open space integrated with the small homes.*
- *Four or more residential main entries facing a pedestrian connection allowed by an applicable master plan to activate pedestrian connections with front doors and activity.*
- *Garages recessed at least 4 feet from the front façade or 6 feet from the front of a front porch.*

RESPONSE: The proposed preliminary plat has been designed with a combination of local streets, an alley, and a Woonerf street. The Woonerf cross-section has been revised to provide the 20 foot paved surface, not counting the curbs, as requested by the Fire District. The proposed combination of street sections helps to create variety and interest, while also providing a high quality pedestrian-friendly environment. It is also anticipated the garages will be recessed from the front facades to minimize their visual dominance.

OPEN SPACE IN SMALLLOT SUBDISTRICTS

Principles

Variety is the spice of good design.

Green is great.

Create community gathering spaces.

Master Plan Intent

The Master Plan, and the implementing Code, requires that open space is included in developments within Small Lot Single Family Subdistricts. The amount of open space is "10 percent of net developable area," meaning 10% of the net area after "take-outs" for non-residential uses, SROZ-regulated lands, streets, alleys, and pedestrian connections. The required open space must be in the form of active greens, courtyards, community gardens, tot lots, public pedestrian ways, tracts with preserved trees and wetlands, and similar spaces. The City's rationale and purpose for this open space requirement is to:

1. *Add variety and livability to the built form in Small Lot Subdistricts, where density is highest in the neighborhood.*
2. *Provide a useful tool to preserve trees and wetlands in areas of smaller lots.*
3. *Provide active play spaces close to homes that have smaller yards.*

Natural resource areas such as tree groves and/or wetlands and unfenced low impact development storm water management facilities may be counted toward the 10% requirement at the discretion of the City. Fenced storm water detention facilities do not count toward the

open space requirement. The minimum area for a single facility or tract is 4,000 square feet so that spaces are a meaningful size for active uses or resource protection; the City may approve smaller spaces on a case-by-case basis.

RESPONSE: The subject property is sandwiched between the SROZ of Boeckman Creek on the west and the planned school property on the east. The school site is 10 acres, and the SROZ covers approximately 6.91 acres of the site, or about 34% of the gross site area.

The horizontal distance between the SROZ and the school property is approximately 600 feet. This is a very walkable distance for residents living in Sub-Area 1 to get to open natural areas and recreational space. The street system, including sidewalks and pathways is designed to provide a very walkable, pedestrian-friendly environment to move between the school and the SROZ and its pathways.

While the school is not scheduled for maybe up to 5 years, the District currently operates an environmental and agricultural education center on the property. This operation creates opportunities to be considered in the realm of environmental education. Further, as noted above, there is a good possibility that the City will acquire the 5 acres east of the school site for the planned Neighborhood Park. This planned park property will be within a ¼ mile from the farthest west homes in the proposed development.

In addition to the 6.91 acres of SROZ, the Code requires 10% of the net buildable area within the R5 districts to be provided in active and passive open space. At least 50% of this open space must meet the “active use” criteria.

The proposed development exceeds the required 10% open space in the form of several tracts (‘B’ ‘C’ ‘F’ & ‘G’), which combine to provide passive and active spaces, as well as landscaping creating an enhanced visual environment. The proposed Plans also provides supplemental open space associated with the SROZ and trail heads, including specific active use improvements.

The net site area, minus the SROZ and street rights-of-way is approximately 8.84 acres or 385,125 square feet. Therefore a minimum of 38,512 square feet of open space must be provided, including 19,256 square feet of “usable or active” play space.

The proposed preliminary plat provides a total of 39,654 square feet of general open space, outside of the SROZ. This equals 10.3% of the net developable area, thereby meeting code requirements. The proposed “active use” area totals 41,952 square feet, which is actually 105.8% of the total general open space, which exceeds the 50% minimum requirement.

BOECKMAN AND STAFFORD ROAD FRONTAGES

Principles

Details are important.

Create a complete streets and trails network.

Provide compatible transitions to surrounding areas.

Master Plan Intent

Boeckman Road and Stafford Road are very important streets for Frog Pond West. Visually and functionally, Boeckman Road is a “front door” to Frog Pond West. It is also a “seam” between Frog Pond West and existing neighborhoods to the south. It serves an important connecting function between East Wilsonville and Central and West Wilsonville. Stafford Road will be the new gateway into Wilsonville from the north and a seam between Frog Pond West and the future Frog Pond East.

The Master Plan seeks to: (1) Ensure that development does not “wall off” Boeckman Road and Stafford Road from their adjacent neighborhoods; (2) Create walkable and bikeable streets, even though they are arterial classifications and will carry relative large volumes of traffic; (3) Coordinate frontage standards to create an attractive edge to the neighborhood and a strong connection with the larger community; and (4) Find the right balance between a streetscape that works for people, and development that seeks residential privacy.

There are two strategies employed by the Master Plan to achieve the above objectives. The first strategy involves tailored cross-sections that have a planted median, a buffered bike lane, a generous planter strip and wide sidewalks. The second strategy involves coordinated frontage requirements that will create a cohesive and attractive design along the frontages of both roads. Figure 10 shows the required frontage improvements. The elements include:

1. **Brick wall with wrought iron fence on top.** *The property line fencing along Boeckman Road and Stafford Road will include a 4’ high brick wall with a 2’ high wrought iron fence located at the lot line. 6’ high brick columns will be placed at regular intervals.*
2. **Foundation landscaping.** *Landscaping comprised of low shrubs and ornamental plants will be provided at the foot of the wall to offer variety and visual interest.*
3. **Pedestrian connections.** *Connections will be provided from Boeckman Road into the neighborhood, at a spacing consistent with the Street Demonstration Plan. The pedestrian connections will be consistent with the Pedestrian Connection cross-section in the Frog Pond West Master Plan.*
4. **Landscape buffer tract landscaping.** *A Landscape Buffer Tract will be provided between the right-of-way and the rear of the abutting lots. The buffer will be a common tract and will be planted with climate-adaptive shrubs to create a landscaped edge to the streetscape and reduce the visibility of the walls.*
5. **Enhanced elevations.** *The street-facing facades of the homes along Boeckman will meet the standards (windows, articulation, residential design standards, house plan variety) for front elevations elsewhere. These elevations do not need to mirror the fronts, but they do need to meet the Code’s standards. These “enhanced elevations” requirements also apply to facades facing pedestrian connections, parks, open space tracts and the Boeckman Trail.*

RESPONSE: The Frog Pond West Master Plan provides a specific design for Boeckman Road, as reflected in the following Figure. The preliminary plans provide for dedication along the site frontage to meet the 40.5 foot centerline cross-section for Boeckman Road. Street improvements will be constructed by the City, with the developer executing a Development Agreement obligating them for payment of the standard and supplemental SDCs covering all of the planned off-site improvements.

The proposed plans provide the 10 foot landscaped buffer (Tract ‘B’) along the Boeckman Road frontage consistent with the Master Plan design. This tract is to be planted with low maintenance, climate-adaptive shrubs, with small trees, compatible with the overhead power lines.

The details for the brick wall and foundation landscaping has been coordinated with West Hills Development (Stafford Meadows) to ensure a sense of continuity and compatibility. The buffer landscaping will enhance the visual quality of the brick wall, per the Master Plan.

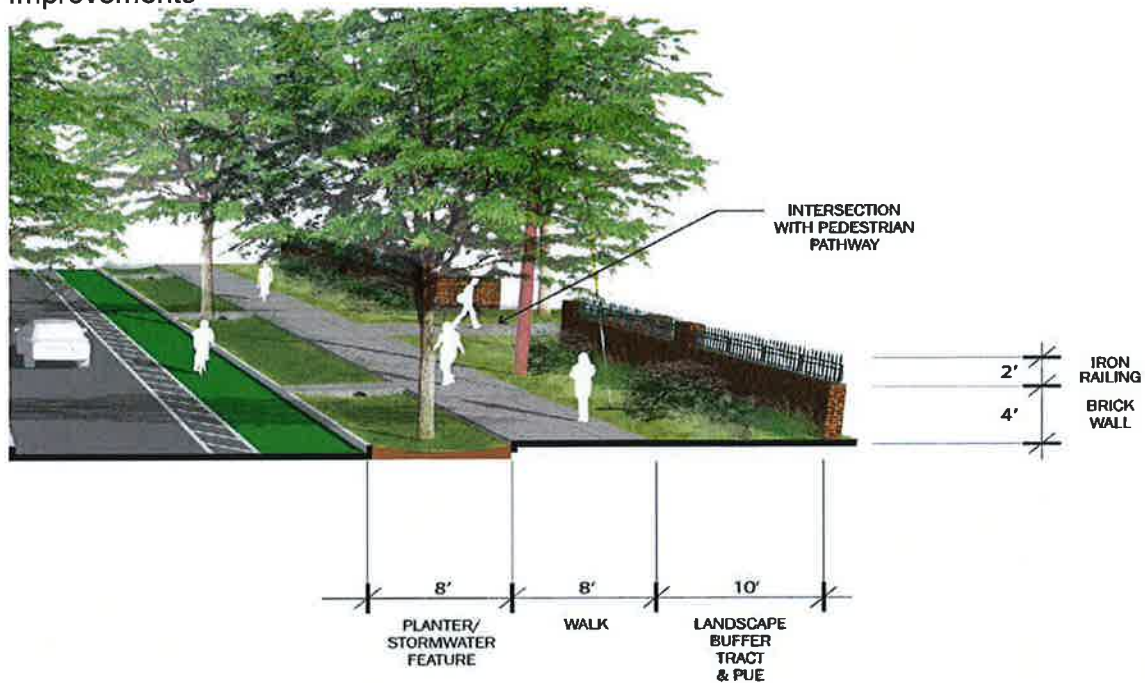
The wall will utilize Mutual Materials inca brick with columns spaced at 25 feet, and wall height of 4 feet at top of the concrete cap, with 20 feet of wrought iron fencing on top. The columns will be 7 feet 2 inches to the top of the concrete cap. Column spacing may vary slightly at intersections and pedestrian access points.

The coordinated buffer planting format is designed to establish a pattern of uniformity, while also allowing for some variation in specific plant types along the frontages of the three different developments. For example, Morgan Farm is adjacent to the Boeckman Creek corridor, which seems to suggest use of more native plants, than say Stafford Meadows, which does not have the same type of street frontage transition to the heavily wooded natural area. The provision for variability between the two developments recognizes that they are separated by the school property.

The uniform pattern will utilize *Viburnum davidii* a 'bridging' plant for all frontages on Boeckman frontages. Segments of *Viburnum* will be flanked by ornamental Dwarf Oregon Grape, Rugosa Rose and Lilac, fronted by Siberian Iris and Threadleaf Coreopsis and other ornamental plants, combining to add varied textures and colors.

The plans further provide for excellent pedestrian-friendly circulation consistent with the criteria in the Master Plan.

Boeckman Road and Stafford Road Frontage Improvements



The homes will be designed consistent with the “enhance elevations” specified in this Section. These designs will be reviewed for compliance at the time of building permits.

The propose plan is designed to ensure that neither the school site nor the SROZ are “walled-off” by private yards.

There are no yards abutting the school property. The school property will be fully-framed by Street A and Street G. Street trees (American Linden) for Street G (Primary Street 5) have also been coordinated with West Hills Development (Stafford Meadows).

While it was not possible to avoid some lots backing onto the SROZ, the number has been limited to the degree practicable. These lots will meet the open fencing, viewable rear yard criteria of the For Pond West Master Plan, per Figure 11.

The height of retaining walls adjacent to the SROZ has also been given careful consideration relative to views from the trail system. But, in coordination with City Staff, it was determined that given the steep slopes, retaining walls will be the best design to ensure stable slopes, and to limits impacts. The design of the retaining walls for the trail system will be guided by criteria provided by the Project Geotechnical Engineer.

BOECKMAN CREEK FRONTAGES

Principles

Green is great.

Design guidelines should be tailored to each zone.

Provide access to nature.

Provide compatible transitions to surrounding areas.

Master Plan Intent

The Boeckman Creek Significant Resource Overlay Zone (SROZ) is a unique asset to the West Neighborhood. It provides a scenic backdrop, a large open space, the location of the Boeckman Trail, and a planned future trail crossing that will connect the Frog Pond neighborhoods to the Canyon Creek Road area on the west side of the Boeckman Creek corridor. The character and form of adjacent development—the orientation of lots, the design and location of open space tracts, the type of fencing, and the landscape plantings—will all influence:

- (3) how compatible (or incompatible) new development is with the resource area; and*
- (4) how much physical and visual access the neighborhood and larger community has to Boeckman Creek.*

The Master Plan intends for the following to be implemented in order to ensure development is compatible with the adjacent SROZ and that physical and visual access to the Boeckman Creek Trail and SROZ area is provided:

- 1. The SROZ shall not be “walled off” or privatized by development. Rather, the objective is to ensure compatibility and to create physical and visual access for all neighborhood residents and visitors.*
- 2. Streets shall terminate in, or run adjacent to, the Boeckman Creek trail at trailhead locations shown on the Street Demonstration Plan. It is particularly important for the east-west streets to follow this requirement, so that there are clear visual corridors from the interior of the neighborhood to the Boeckman Creek SROZ area.*
- 3. Open space tracts and pedestrian connections that are provided with development shall be oriented to support the goals of compatibility and physical and visual access.*
- 4. Where possible, lots shall be oriented to minimize rear-yard orientation to the SROZ area.*

5. *All elevations adjacent to the Boeckman Creek trail shall be enhanced with articulation and architectural detailing consistent with the Residential Design Standards of the Neighborhood Residential Zone.*
6. *Fences facing onto the Boeckman Creek SROZ open space shall be comprised of wrought iron or other transparent materials acceptable to the City. Colors shall be black or a similar dark color.*
7. *The City's SROZ regulations for the use of native vegetation, preservation of existing trees, and other "Habitat Friendly Development Practices" will be applied.*

RESPONSE: The SROZ has been mapped and is set aside in Tract 'A', which will be dedicated to the City. The development plans provide for initial trail construction, together with initial improvements for the three planned trail heads, associated with this property.

The street system, together with pathway connections, provides pedestrian-friendly circulation between the school property and the SROZ, enhanced by view corridors along the east/west streets and alleys. Where possible the streets are designed to terminate at or run beside the SROZ. In particular, Street D and a portion of Street C frame the corner of the SROZ, where it encroaches furthest into the site. At this point additional "active use" open space is provided to enhance the trail head experience.

The proposed plan is designed to ensure that neither the school site nor the SROZ are "walled-off" by private yards. There are no yards abutting the school property. It is framed by Street A. While it was not possible to avoid any lots backing onto the SROZ, the number has been limited to the degree practicable. These lots will meet the open fencing, viewable rear yard criteria of the Frog Pond West Master Plan, per Figure 11.

SITE PLANNING TO PRESERVE TREES AND WETLANDS

Principles

Green is great.

Provide access to nature.

Retain trees.

Integrate sustainability.

Master Plan Intent

The tree groves within the planning area provide a key visual asset and are a link to the historic character of the area. To the extent that existing mature trees can be retained and protected as annexation and development occurs, it will contribute to the character and desirability of new neighborhoods. The city has existing annexation policies that incentivize tree retention. 1

Maps prepared for the City show an area of farmed wetlands in the southeast area of the neighborhood. They are relatively low-quality wetlands that do not meet the City's criteria for "significant" designation and application of the SROZ. However, they do have potential to be restored, used as storm water areas, and incorporated as amenities into the neighborhood.

The Master Plan intends for tree groves to be preserved and incorporated into the design of developments as much as possible. This will be achieved through the Planned Development Review and application of Section 4.600, Tree Preservation and Protection, of the Development Code. Tree protection is also incentivized by counting toward open space requirements in the Small Lot subdistricts.

Figure 14 shows a site with a grove of trees, and how those trees might be incorporated into a development plan that would be acceptable to the City. The City encourages exploration of tree and wetland issues during the pre-application process before significant funds have been invested in designs that may not be approved.

RESPONSE: This application includes a detailed site survey (Existing Conditions Plan), supported by an SRIR, prepared by a professional resource biologist. The SRIR provides guidance for SROZ Boundary Refinement. A detailed Tree Inventory has also been provided, prepared by the Project Arborist.

All trees within the SROZ will be preserved. Trees outside of the SROZ have been evaluated by the Project Arborist and City Natural Resources Manager. Specific trees, determined to be worthy of preservation have been identified. All other trees outside of the SROZ will be removed to accommodate the proposed development.

Based on our Site Survey, we have identified three logical locations for anticipated trail heads within this development. To the degree practicable, the streets are aligned so they either terminate at or run adjacent to these trail head locations. We invite any guidance the City may have as to the expectations for trail head improvements, including parking, and timing of any such improvements.

VI. FINAL CONCLUSION

This report demonstrates that the proposed development, Morgan Farm, complies with all applicable comprehensive plan provisions. It further satisfies all the applicable Zoning (NR, and the applicable R-5 sub-district standards) and all applicable Land Division standards and criteria. The applicant is not requesting any waivers from the Code standards.

The Stage I Master Plan for Morgan Farm reflects existing conditions and the proposed Sub-Area 1 development plans, creating 82 units, consistent with the R-5 small lot standards.

In this case the Stage I, Stage II, and Preliminary Plat are all essentially the same. The findings herein demonstrate compliance with the Stage II Planned Development Permit criteria.

Findings demonstrating compliance with Metro and Clackamas County boundary amendment criteria are provided in Appendix I. And, findings demonstrating compliance with applicable Statewide Planning Goals are provided in Appendix II.

Therefore the applicant respectfully requests approval.

VII. APPENDICES

I. METRO BOUNDARY CHANGE APPROVAL CRITERIA

CLACKAMAS COUNTY BOUNDARY CHANGE APPROVAL CRITERIA

The County Board shall consider the local comprehensive plan for the area and any service agreement (e.g., Urban Service Agreement) executed between a local government and the affected district [ORS 198.850(2)]. The board shall also consider the criteria set forth in Metro Code 3.09.050 (a) through (d).

APPLICANT'S RESPONSE: Frog Pond West Sub-Area 1, TAX LOTS 2400, 2600 & 2700, T3S R1W 12D. See Attached Petition

This application is requesting annexation of Tax Lots 2400 & 2600 and 2700, Map T3S R1W 12D into the City of Wilsonville.

The applicant includes an executed petition including one hundred percent (100%) of property owners within the affected territory; therefore the applicant respectfully **does not** request that the application be processed through an expedited process.

There 2-4 electors within the area to be annexed. However, the Petition is signed by 100% of the property ownerships. Therefore voters are not relevant.

Metro Code 3.09.050(a) through (d) are procedural requirements, the applicant anticipates that the Board will consider these requirements when reviewing the application.

Pursuant to Metro Code 3.09.050 (d) €, the Board's final decision on the boundary change proposal shall include findings and conclusions addressing the following criteria:

1. Find that the change is consistent with expressly applicable provisions in:
 - A. Any applicable urban service agreement adopted pursuant to ORS 195.205

RESPONSE: The property is within the Frog Pond West Master Plan area adopted by the City of Wilsonville (Ord 806). The Master Plan includes public facilities and transportation plans associated with the Frog Pond West Neighborhood Master Plan that includes the affected properties. The City of Wilsonville has adopted Resolution 2649, which establishes the funding mechanism and supplemental fees for construction of the necessary off-site infrastructure.

There is an Urban Planning Area Agreement (UPAA) between Clackamas County and City of Wilsonville, which guides future urbanization of this area, under the jurisdiction of Wilsonville. The proposed annexation is consistent with the UPAA and the Frog Pond West Master Plan. This annexation will help advance implementation of the Frog Pond West Master Plan.

B. Any applicable annexation plan adopted pursuant to ORS 195.205

RESPONSE: To our knowledge no annexation plan exists for the affected properties, other than the Urban Planning Area Agreement between Clackamas County and City of Wilsonville, and the City's Frog Pond West Master Plan.

C. Any applicable cooperative planning agreement adopted pursuant to ORS 195.020 (2) between the affected entity and a necessary party;

RESPONSE: There is an Urban Planning Area Agreement (UPAA) established between Clackamas County and the City of Wilsonville. The UPAA guides future urbanization of this area under the jurisdiction of Wilsonville. The proposed annexation is consistent with the UPAA and the Frog Pond West Master Plan, and will help advance implementation of these plans.

D. Any applicable public facility plan adopted pursuant to a statewide planning goal on public facilities and services; and

RESPONSE: The Clackamas County Pubic Facility Plan does not include the affected properties, as the City is the designated urban service provider.

This property is within the Frog Pond West Master Plan area adopted by the City of Wilsonville (ORD 806). The Master Plan identifies necessary public facilities and transportation improvements planned in association with the planned residential neighborhood development that includes the affected property. The applicant will be executing a Development Agreement with the City of Wilsonville, which will assign financial obligations (per Resolution 2649) and anticipated timeframes for urban infrastructure to the applicant and to the City, as the property is developed.

E. Any applicable comprehensive plan; and

RESPONSE: The City of Wilsonville has adopted the Frog Pond West Master Plan, which includes the subject property, and frames urban residential development for this area. There is an Urban Planning Area Agreement between Clackamas County and City of Wilsonville, which guides future urbanization of this area, under the jurisdiction of Wilsonville. The proposed urban services district annexation will help advance implementation of these plans.

F. Any applicable concept Plan; and

RESPONSE: The City of Wilsonville has adopted the Frog Pond West Master Plan, which includes the subject property, and frames urban residential development for this area. There is an Urban Planning Area Agreement between Clackamas County and City of Wilsonville, which guides future urbanization of this area, under the jurisdiction of Wilsonville. The Frog Pond West Plan assigns urban planning districts, provides preliminary plans for infrastructure, and provides a planning framework for how the properties will develop. The proposed annexations will help advance implementation of the City's Master Plan.

(2) Consider whether the boundary change would:

- A. Promote the timely, orderly and economic provision of public facilities and services;
- B. Affect the quality and quantity of urban services; and
- C. Eliminate or avoid unnecessary duplication of facilities and services.

RESPONSE: The requested annexation to the City of Wilsonville will promote the timely, orderly and economic provision of public facilities and services to the subject property. Annexation into the City of Wilsonville will allow sanitary sewer, public water, public storm sewerage networks, and urban roads to serve the planned development of the subject properties consistent with the Frog Pond West Master Plan adopted by the City of Wilsonville (Ord 806).

Representatives of the Clackamas County, the City and Metro have been heavily involved in City's Concept Planning process. That process considered the ability of the City as the designated urban service provider to provide necessary urban services to the Frog Pond area. Pertinent agencies have incorporated plans for development of the Frog Pond West Master Plan area, including the affected property, in their plans for the quality and quantity of their services. No significant concerns with providing those services to the area have been identified that are not being addressed by the agencies' individual capital development plans.

The subject property is contiguous with properties that are currently within the current City boundaries to which the Petitioner is requesting annexation. Existing and planned sanitary sewer, storm sewer and public water supply lines within the City of Wilsonville have been or will be sized to serve additional development within the Frog Pond West Master Plan area, including the affected property.

Therefore, the applicant concludes that the requested boundary change proposal will promote the timely, orderly and cost-effective provision of public facilities and services and will not affect the quality and quantity of those facilities and services. No other urban facilities or services exist in the area, therefore duplication or elimination of services on the subject property is not a possibility.

- 3. *A city may not annex territory that lies outside the UGB, except it may annex a lot or parcel that lies partially within and partially outside the UGB.*

RESPONSE: The subject parcel lies within the UGB, therefore this section is not applicable.

Metro Code 3.09.090 Extension of Services outside UGB states that neither a city nor a district may extend water or sewer service from inside a UGB to territory that lies outside the UGB.

RESPONSE: The applicant is seeking annexation into all applicable districts and the City of Wilsonville in order to provide necessary urban services.

II. COMPLIANCE WITH STATEWIDE GOALS

GOAL 1: CITIZEN INVOLVEMENT

OAR 660-015-0000(1)

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

RESPONSE: The City of Wilsonville has an Acknowledged Comprehensive Plan, which provides for appropriate citizen involvement through the land use review process. This application is being processed consistent with the City's review procedures, including public notice of the hearings before the Development Review Board and City Council.

GOAL 2: LAND USE PLANNING

OAR 660-015-0000(2)

PART I -- PLANNING

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

PART II -- EXCEPTIONS

A local government may adopt an exception to a goal when:

RESPONSE: The City of Wilsonville has an Acknowledged Comprehensive Plan, which complies with the Goal 2 Planning goals and objectives. The City has further recently adopted the Frog Pond West Master Plan (Ord 806), which was developed consistent with Goal 2 provisions. The subject property is not subject to a Goal Exception as it is already within the Metro Urban Growth Boundary.

GOAL 3: AGRICULTURAL LANDS

OAR 660-015-0000(3)

To preserve and maintain agricultural lands. Agricultural lands shall be preserved and maintained for farm use, consistent with existing and future needs for agricultural products, forest and open space and with the state's agricultural land use policy expressed in ORS 215.243 and 215.700.

RESPONSE: Goal 3 compliance has been addressed through the establishment of the current urban growth boundary by Metro. The subject property has been appropriately determined to be urban land and has been designated by Clackamas County as Future Developments, subject to annexation to the City of Wilsonville, consistent with the City/County UPAA.

GOAL 4: FOREST LANDS

OAR 660-015-0000(4)

To conserve forest lands by maintaining the forest land base and to protect the state's forest economy by making possible economically efficient forest practices that assure the continuous growing and harvesting of forest tree species as the leading use on forest land consistent with sound management of soil, air, water, and fish and wildlife resources and to provide for recreational opportunities and agriculture.

RESPONSE: Goal 4 compliance has been addressed through the establishment of the current urban growth boundary by Metro. The subject property has been appropriately

determined to be urban land and has been designated by Clackamas County as Future Developments, subject to annexation to the City of Wilsonville, consistent with the City/County UPAA.

GOAL 5: NATURAL RESOURCES, SCENIC AND

**GOAL 5: NATURAL RESOURCES, SCENIC AND
HISTORIC AREAS, AND OPEN SPACES**

OAR 660-015-0000(5)

(Please Note: Amendments Effective 08/30/96)

To protect natural resources and conserve scenic and historic areas and open spaces.

RESPONSE: The City of Wilsonville has an Acknowledged Comprehensive Plan, which complies with the Goal 5 Planning goals and objectives. The City has identified the subject property for residential development, and has further identified natural resources and significant open spaces associated with this property, primarily associated with Boeckman Creek.

**GOAL 6: AIR, WATER AND LAND
RESOURCES QUALITY**

OAR 660-015-0000(6)

To maintain and improve the quality of the air, water and land resources of the state.

RESPONSE: The City of Wilsonville has an Acknowledged Comprehensive Plan, which complies with the Goal 6 Planning goals and objectives. The land is designated for residential development, subject to the City's land development standards and the Frog Pond West Master Plan, which are designed to comply with Goal 6.

GOAL 7: AREAS SUBJECT TO NATURAL HAZARDS

To protect people and property from natural hazards.

RESPONSE: The City of Wilsonville has an Acknowledged Comprehensive Plan, which complies with the Goal 7 Planning goals and objectives. The City has not identified any natural hazards associated with the subject properties.

GOAL 8: RECREATIONAL NEEDS

OAR 660-015-0000(8)

To satisfy the recreational needs of the citizens of the state and visitors and, where appropriate, to provide for the siting of necessary recreational facilities including destination resorts.

RESPONSE: The City of Wilsonville has an Acknowledged Comprehensive Plan, which complies with the Goal 8 Planning goals and objectives. The City has not identified specific open space or recreational needs associated with the subject property and the Frog Pond West Neighborhood in general. Development of this property for small lot residential use will not in any way interfere with appropriate provision of recreational needs consistent with the Frog Pond West Master Plan.

GOAL 9: ECONOMIC DEVELOPMENT

OAR 660-015-0000(9)

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

RESPONSE: The Frog Pond West Master Plan identifies this general area for residential development, with limited neighborhood commercial, but no industrial use. The area to be annexed is specifically designated for residential use. Consistent with Metro’s Growth Management Plan and Industrial needs analysis, the City has designated other areas of the City, primarily in the northwest, to meet Regionally Significant Industrial development needs (Coffee Creek Industrial Area).

The applicant is proposing annexation to the City, together with Zone Map Amendment to conform to the Frog Pond West Neighborhood zoning of NR R5 and SROZ. The applicants proposed residential use of the property is consistent with the City’s adopted Frog Pond West Master Plan.

GOAL 10: HOUSING

OAR 660-015-0000(10)

To provide for the housing needs of citizens of the state.

RESPONSE: The subject property is designated for small lot residential development (NR R5), and is intended to help meet the City’s housing needs, consistent with the Frog Pond West Master Plan. Therefore Goal 10 is being implemented by this proposal for annexation and rezoning.

GOAL 11: PUBLIC FACILITIES AND SERVICES

OAR 660-015-0000(11)

To plan and develop a timely, orderly and efficient arrangement of public facilities and services to serve as a framework for urban and rural development.

RESPONSE: The City of Wilsonville has an Acknowledged Comprehensive Plan, which complies with the Goal 11 Planning goals and objectives. A major component of the City’s public facilities planning provisions is its “Concurrency Policies”, which require adequate facilities and services be available at the time of development. Within this Compliance Narrative, the applicant has demonstrated how the proposed annexation, zoning and pending development complies with these “Concurrency Policies”.

GOAL 12: TRANSPORTATION

OAR 660-015-0000(12)

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

RESPONSE: The City of Wilsonville has an Acknowledged Comprehensive Plan, which complies with the Goal 12 Planning goals and objectives. In 2013 the City adopted an update Transportation System Plan (TSP) consistent with Goal 12 and the Transportation Planning Rules.

This application for Annexation and Zoning is supported by a Traffic Impact Analysis prepared by DKS, the City’s Traffic Engineering consultants. The DKS report demonstrated compliance with the City’s TSP, and Planned Development Permit Criteria. It further confirms that no ODOT facilities will be significantly impacted by the proposed development of this property.

GOAL 13: ENERGY CONSERVATION

OAR 660-015-0000(13)

To conserve energy.

Land and uses developed on the land shall be managed and controlled so as to maximize the conservation of all forms of energy, based upon sound economic principles.

RESPONSE: The City of Wilsonville has an Acknowledged Comprehensive Plan, which complies with the Goal 13 Planning goals and objectives. The subject property is proposed for development under the Frog Pond West Neighborhood designation consistent with the City's development standards.

GOAL 14: URBANIZATION

OAR 660-015-0000(14)

(Effective April 28, 2006)

To provide for an orderly and efficient transition from rural to urban land use, to accommodate urban population and urban employment inside urban growth boundaries, to ensure efficient use of land, and to provide for livable communities.

RESPONSE: The City of Wilsonville has an Acknowledged Comprehensive Plan, which complies with the Goal 13 Planning goals and objectives. The subject property has already been included within the Metro UGB (2002), and is proposed to be annexed to the City of Wilsonville, consistent with the City and Clackamas County Plans and UPAA.

Goal 15 Willamette River Greenway

Goal 16 Estuarine Resources

Goal 17 Coastal Shorelands

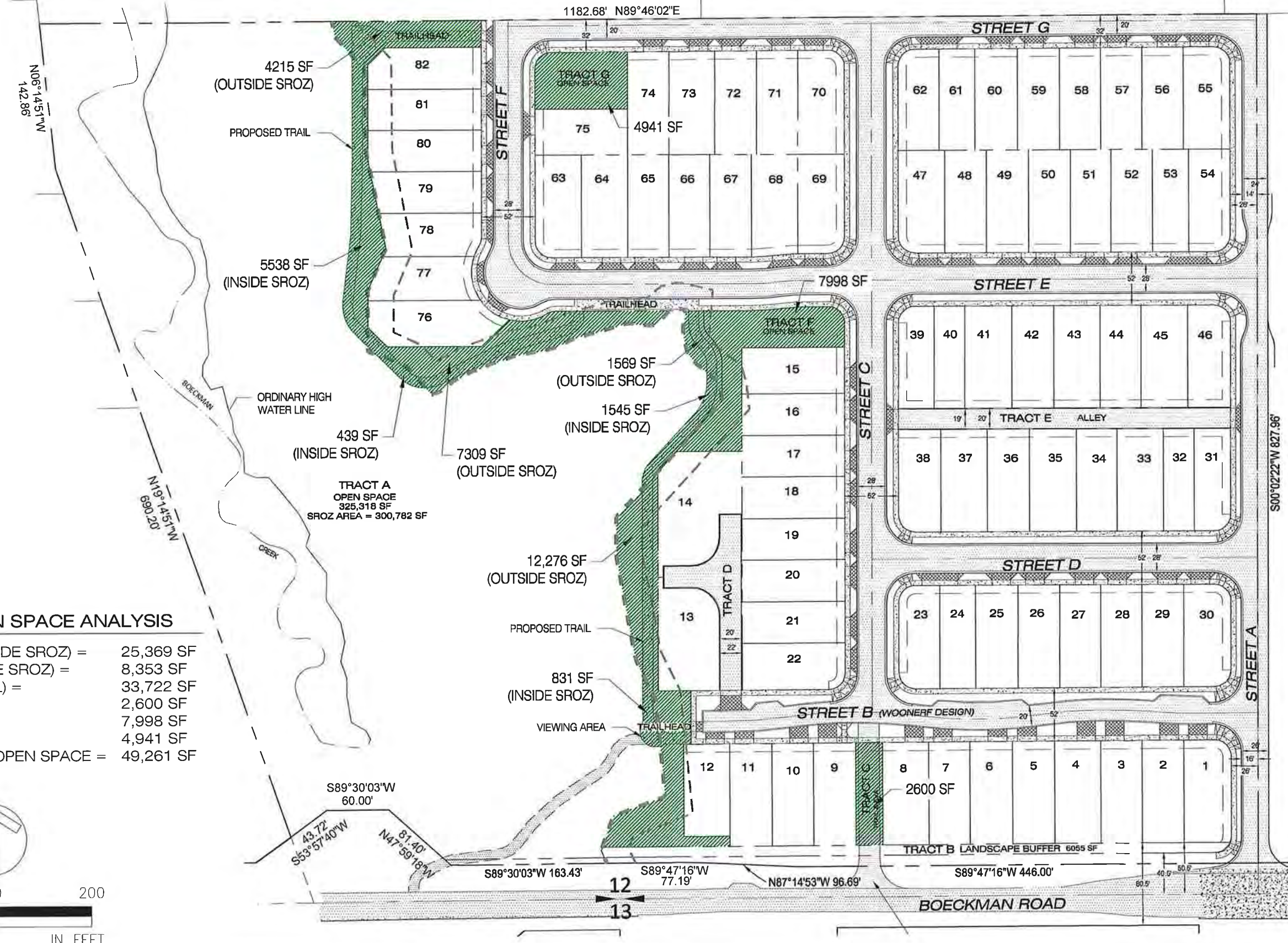
Goal 18 Beaches and Dunes

Goal 19 Ocean Resources

RESPONSE: These five Goals are not applicable to this annexation, zoning and development proposal.

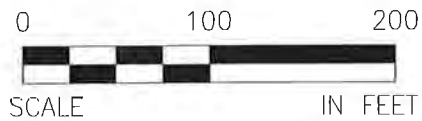
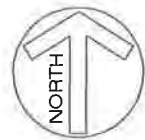
ACTIVE OPEN SPACE EXHIBIT

MORGAN FARM

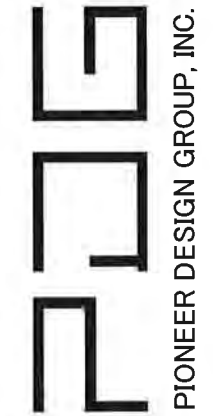


ACTIVE OPEN SPACE ANALYSIS

TRACT A (OUTSIDE SROZ) =	25,369 SF
TRACT A (INSIDE SROZ) =	8,353 SF
TRACT A (TOTAL) =	33,722 SF
TRACT C =	2,600 SF
TRACT F =	7,998 SF
TRACT G =	4,941 SF
TOTAL ACTIVE OPEN SPACE =	49,261 SF



9020 SW WASHINGTON SQUARE RD.
 SUITE 170
 PORTLAND, OREGON 97223
 p 503.643.8286
 f 844.715.4743
 www.pd-grp.com



Designed by	TCC	Date	04/18
Drawn by	MIS	Date	04/18
Reviewed by	REF.	Date	
Project No.	321-002	REF.	
Horiz. Scale:	1"=100'		
Vert. Scale:			

Project
 MORGAN FARM

No.
 321-002

Type
 PLANNING

Sheet

Annexation Petition & Legal Description

**ANNEXATION
PETITION SIGNERS**

NOTE: This petition may be signed by qualified persons even though they may not know their property description or precinct number.

SIGNATURE	PRINTED NAME	I AM A: *			PROPERTY ADDRESS	PROPERTY DESCRIPTION				PRECINCT #	DATE
		PO	RV	OV		LOT #	¼ SEC	T	R		
	James H. Wolfston Jr	X			7331 SW Boeckman Road	2400	12D	3S	1W	N/A	
	James H. Wolfston Jr	X			7331 SW Boeckman Road	2700	12D	3S	1W	N/A	
	James H. Wolfston Jr	X			7447 SW Boeckman Road	2400	12D	3S	1W	N/A	
		X			Boeckman Road Right-of-way	2400	12D	3S	1W	N/A	
Representing City of Wilsonville											

* PO =Property Owner
 RV =Registered Voter
 OV =Owner And Registered Voter

**ANNEXATION
PETITION SIGNERS**

NOTE: This petition may be signed by qualified persons even though they may not know their property description or precinct number.

SIGNATURE	PRINTED NAME	I AM A: *			PROPERTY ADDRESS	PROPERTY DESCRIPTION				PRECINCT #	DATE
		PO	RV	OV		LOT #	1/4 SEC	T	R		
	James H. Wolfson Jr.	X			7331 SW Boeckman Road	2400	12D	3S	1W	N/A	2/2/18
	James H. Wolfson Jr.	X			7331 SW Boeckman Road	2700	12D	3S	1W	N/A	2/2/18
	James H. Wolfson Jr.	X			7447 SW Boeckman Road	2400	12D	3S	1W	N/A	2/2/18

* PO =Property Owner
RV =Registered Voter
OV =Owner And Registered Voter

**ANNEXATION
PETITION SIGNERS**

NOTE: This petition may be signed by qualified persons even though they may not know their property description or precinct number.

SIGNATURE	PRINTED NAME	I AM A: *			PROPERTY ADDRESS	PROPERTY DESCRIPTION				PRECINCT #	DATE
		PO	RV	OV		LOT #	¼ SEC	T	R		
	James H. Wolfston Jr	X			7331 SW Boeckman Road	2400	12D	3S	1W	N/A	
	James H. Wolfston Jr	X			7331 SW Boeckman Road	2700	12D	3S	1W	N/A	
	James H. Wolfston Jr	X			7447 SW Boeckman Road	2400	12D	3S	1W	N/A	
<i>Kathleen E. Ludwig</i>	Kathleen E. Ludwig	X			7151 SW Boeckman Road	2300	12D	3S	1W	N/A	<i>3/29/2018</i>
Representing West Lin-Wilsonville Clackamas School District #3.											

* PO =Property Owner
 RV =Registered Voter
 OV =Owner And Registered Voter

SUBJECT PROPERTY BOUNDARY LEGAL DESCRIPTION

FROG POND

PDG PROJECT NO. 338-001

A PORTION OF THE SOUTHEAST AND SOUTHWEST QUARTERS OF SECTION 12, TOWNSHIP 3 SOUTH, RANGE 1 WEST OF THE WILLAMETTE MERIDIAN, CLACKAMAS COUNTY, OREGON BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT ON THE NORTH RIGHT-OF-WAY LINE OF BOECKMAN ROAD, 35.00 FEET FROM THE CENTERLINE THEREOF AND BEARING NORTH 00°21'20" WEST, 35.00 FEET FROM THE SOUTH ONE-QUARTER CORNER OF SAID SECTION 12; THENCE ALONG SAID RIGHT-OF-WAY LINE THE FOLLOWING (4) COURSES; NORTH 89°47'16" EAST, 77.19 FEET; THENCE SOUTH 87°14'53" EAST, 96.69 FEET; THENCE NORTH 89°47'16" EAST, 446.00 FEET TO THE SOUTHEAST CORNER OF "PARCEL I" OF DEED DOCUMENT NO. 2010-042556 (CLACKAMAS COUNTY DEED RECORDS) AND THE SOUTHWEST CORNER OF "PARCEL I" DESCRIBED IN DEED DOCUMENT NO. 99-052396, SAID RECORDS; THENCE CONTINUING ALONG SAID RIGHT-OF-WAY LINE AND THE SOUTH LINE OF SAID DOCUMENT NO. 99-052396, NORTH 89°47'16" EAST, 28.00 FEET; THENCE LEAVING SAID RIGHT-OF-WAY LINE, NORTH 00°02'22" EAST, 827.97 FEET TO THE NORTH LINE OF SAID DOCUMENT NO. 99-052396; THENCE SOUTH 89°46'02" WEST ALONG THE NORTH LINE THEREOF, 28.00 FEET TO THE NORTHWEST CORNER THEREOF, SAID CORNER ALSO BEING THE NORTHEAST CORNER OF SAID "PARCEL I" DESCRIBED IN SAID DEED DOCUMENT NO. 2010-042556; THENCE SOUTH 89°46'02" WEST ALONG THE NORTH LINE OF SAID "PARCEL I" AND THE NORTH LINE OF "PARCEL II", SAID DEED DOCUMENT, 1182.68 FEET TO THE NORTHWEST CORNER OF SAID "PARCEL II"; THENCE ALONG THE WEST BOUNDARY OF "PARCEL II" SOUTH 06°14'51" EAST, 142.86 FEET; THENCE CONTINUING ALONG SAID WEST BOUNDARY, SOUTH 19°14'51" EAST, 721.45 FEET TO A POINT 35.00 FEET, PERPENDICULAR MEASURE, FROM THE CENTERLINE OF BOECKMAN ROAD; THENCE PARALLEL WITH SAID CENTERLINE, NORTH 89°30'03" EAST, 308.97 FEET TO THE POINT OF BEGINNING.



NOT TO SCALE

DEED DOCUMENT
NO. 85-019621
"PARCEL 1"
142.86'
S06°14'51"E

"WEHLER ESTATES"
LOT 3
LOT 4

S19°14'51"E
721.45'

DEED DOCUMENT
NO. 2016-066517

DEED DOCUMENT
NO. 2010-042556
"PARCEL 1"

DEED DOCUMENT
NO. 2017-011403

1182.68'
S89°46'02"W

DEED DOCUMENT
NO. 2009-083133

S89°46'02"W
28.00'

DEED DOCUMENT
NO. 2010-042556
"PARCEL 1"

N00°02'22"E 827.97'

DEED DOCUMENT
NO. 99-052396
"PARCEL 1"

N89°30'03"E 308.97'

N00°21'20"W
35.00'

N89°47'16"E
77.19'

S87°14'53"E 96.69'

N89°47'16"E 446.00'

N89°47'16"E 28.00'

"ARBOR CROSSING"

12

13

56

39

30

39

30

PDG JOB NO.:
338-001

DATE:
04/24/18

SCALE:
NTS

EXHIBIT TO ACCOMPANY LEGAL DESCRIPTION



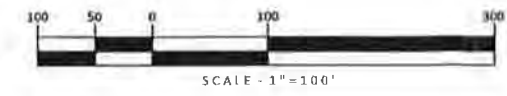
9020 SW WASHINGTON SQUARE RD
SUITE 170
PORTLAND, OREGON 97223
p 503.641.8311
f 844.715.4743
www.pd-grp.com

ANNEXATION EXHIBIT
LOCATED IN THE SOUTHEAST AND SOUTHWEST
QUARTERS OF SECTION 12, TOWNSHIP 3 SOUTH,
RANGE 1 WEST OF THE WILLAMETTE MERIDIAN,
CLACKAMAS COUNTY, OREGON

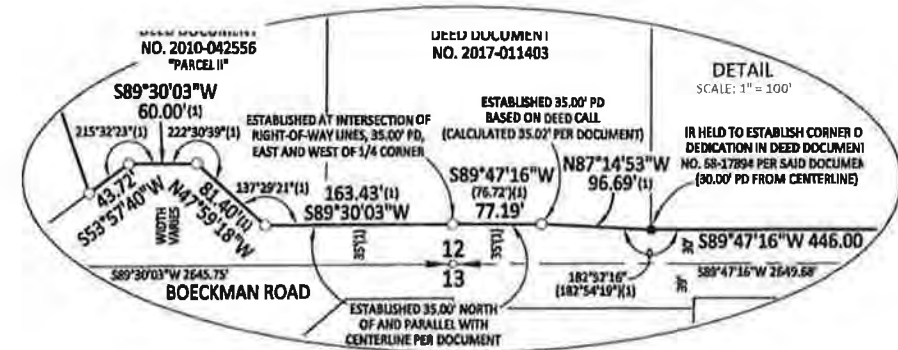


RECORD OF SURVEY

LOCATED IN THE SOUTHEAST AND SOUTHWEST QUARTERS OF SECTION 12,
 TOWNSHIP 3 SOUTH, RANGE 1 WEST OF THE WILLAMETTE MERIDIAN,
 CLACKAMAS COUNTY, OREGON
 PREPARED AT THE REQUEST OF JIM WOLFSTON
 DATE: NOVEMBER, 2017
 PIONEER DESIGN GROUP JOB NO. 338-001
 SHEET 1 OF 1



CLACKAMAS COUNTY SURVEYOR
 DATE RECEIVED: _____
 DATE ACCEPTED/FILED: _____
 SURVEY NUMBER: _____



NARRATIVE

THE PURPOSE OF THIS SURVEY IS LOCATE THE PERIMETER BOUNDARY OF THE LAND DESCRIBED IN DEED DOCUMENT NUMBERS 2010-042556 AND 2017-011403, CLACKAMAS COUNTY DEED RECORDS, TO ESTABLISH THE BOUNDARY OF A FUTURE SUBDIVISION PLAT, "MORGAN FARMS". THE BEARINGS NOTED ON THIS SURVEY ARE BASED ON THE LINE BETWEEN THE MONUMENTS MARKING THE SOUTHEAST AND SOUTH CORNERS OF SECTION 12, TOWNSHIP 3 SOUTH, RANGE 1 WEST THE BEARING ON THIS LINE WAS HELD AS SOUTH 89°47'16" WEST PER THE "ARBOR CROSSING" AND "ARBOR CROSSING NO. 2" SUBDIVISION PLATS.

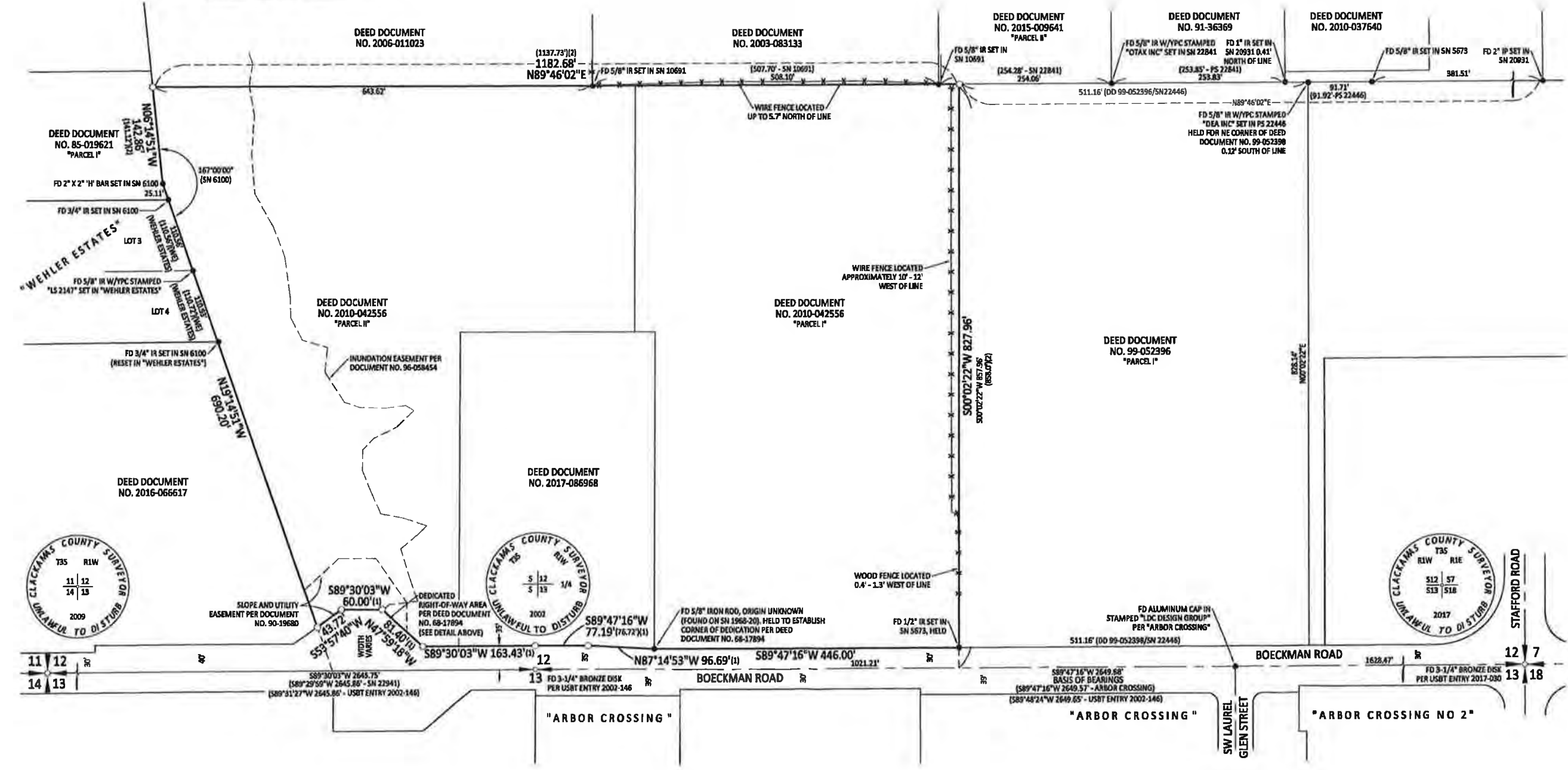
THE NORTH LINE OF THE SUBJECT PROPERTY WAS ESTABLISHED USING A BEST FIT LINE THROUGH THE FOUND MONUMENTS SHOWN ALONG THIS LINE. UNLESS NOTED OTHERWISE, THESE MONUMENT ARE LOCATED WITHIN 0.08' OF THIS LINE AS SHOWN. THIS LINE WAS THEN EXTENDED WEST TO INTERSECT THE EAST LINE OF DEED DOCUMENT NO. 85-019621. THIS LINE IS DESCRIBED IN NUMEROUS RECORDS AS BEING 858 FEET NORTH OF AND PARALLEL WITH THE SOUTH LINE OF SECTION 12.

THE EAST LINE OF DEED DOCUMENT NO. 2010-042556 WAS ESTABLISHED, PER THIS DEED, ALONG THE WEST LINE OF THE ADJOINING LAND TO THE EAST DESCRIBED IN DEED DOCUMENT NO. 99-052396. THE SOUTHWEST CORNER OF DEED DOCUMENT NO. 99-052396 WAS ESTABLISHED HOLDING THE 1/2" IRON ROD SET IN SN 5673 ON THE NORTH RIGHT-OF-WAY LINE OF BOECKMAN ROAD. THE NORTHWEST CORNER OF DOCUMENT NO. 99-052396 WAS ESTABLISHED 511.16 FEET, PER SAID DOCUMENT, WESTERLY OF THE DEED MONUMENT SET IN SN 22446 TO MARK THE NORTHEAST CORNER OF THIS PARCEL. THE 1/2" IRON ROD FOUND ON PREVIOUS SURVEYS MARKING THIS CORNER WAS SEARCHED FOR BUT NOT FOUND.

THE SOUTH LINE OF THE SUBJECT PROPERTY WAS ESTABLISHED ALONG THE NORTH RIGHT-OF-WAY LINE OF BOECKMAN ROAD. PER BOOK 691, PAGE 566, SAID RECORDS, THIS LINE WAS ESTABLISHED 30.00 FEET NORTHERLY OF THE SECTION LINE BETWEEN SECTIONS 12 AND 13 (T.3S/R.1W.). MONUMENTS MARKING THE SOUTHEAST, SOUTH AND SOUTHWEST CORNERS OF SAID SECTION 12 WERE SURVEYED TO ESTABLISH THIS SECTION LINE AND CENTERLINE. THE BOUNDARY OF THE LAND DEDICATED FOR RIGHT-OF-WAY PURPOSES IN DEED DOCUMENT NO. 68-17894 WAS ESTABLISHED RELATIVE TO THE CENTERLINE OF BOECKMAN ROAD HOLDING THE MONUMENT MARKING THE SOUTH QUARTER CORNER OF SECTION 12, THE DISTANCE OF 35.00 FEET FROM SAID CENTERLINE, AND RECORD DISTANCES FROM SAID DEED.

THE WEST LINE OF THE DEED DOCUMENT NO. 2010-042556 WAS ESTABLISHED HOLDING MONUMENTS SET IN SN 6100 AS SHOWN. THE PORTION OF THIS LINE NORTH OF THE ANGLE POINT, BEING MARKED BY THE 2" X 2" "H BEAM", WAS ESTABLISHED HOLDING THE RECORD ANGLE OF 149°06'59" PER SN 6100.

- ### LEGEND
- FOUND MONUMENT AS NOTED.
 - SET 5/8" X 30" IRON ROD W/YPC STAMPED "PIONEER DESIGN"
 - FD FOUND
 - IR IRON ROD
 - IP IRON PIPE
 - PD PERPENDICULAR DISTANCE FROM THE CENTERLINE OF BOECKMAN ROAD
 - W/YPC WITH YELLOW PLASTIC CAP
 - FENCE AS NOTED
 - WE WEHLER ESTATES
 - (###) RECORD DATA PER SOURCE NOTED
 - DD DEED DOCUMENT NUMBER, CLACKAMAS COUNTY RECORDS
 - (1) RECORD DATA OR CALCULATED DATA PER DEED DOCUMENT NO. 68-17894
 - (2) RECORD DATA PER DEED DOCUMENT NO. 2010-042556



EXISTING TREE TABLE											
POINT #	DESC.-DBHI	POINT #	DESC.-DBHI	POINT #	DESC.-DBHI	POINT #	DESC.-DBHI	POINT #	DESC.-DBHI	POINT #	DESC.-DBHI
5128	DE-48	6262	DE-48	8063	DE-18	8114	EV-30	8164	EV-8	8216	DE-10
5129	EV-24	6264	DE-12	8064	DE-36	8115	DE-8	8165	DE-14	8217	DE-8
5130	DE-24	6265	DE-12	8065	EV-10	8116	DE-8	8166	DE-12	8218	DE-20
5133	DE-28	6266	DE-12	8066	DE-16	8117	DE-8	8167	DE-16	8219	EV-22
5134	DE-24	6267	DE-18	8067	DE-10	8118	DE-6	8168	DE-12	8220	EV-46
5135	DE-9x12	7572	DE-6	8068	DE-8	8119	EV-26	8169	DE-14	8221	EV-48
5136	DE-36	7573	DE-6	8069	DE-20	8120	EV-26	8170	DE-14	8222	EV-22
5137	EV-18	7574	DE-8	8070	DE-10	8121	DE-12	8171	DE-26	8223	DE-8
5138	EV-18	7575	DE-2X8	8071	DE-12	8122	DE-6	8172	EV-12	8224	DE-14
5139	EV-18	7576	DE-6	8072	EV-18	8123	DE-8	8173	EV-12	8225	DE-10
5140	DE-60	7577	DE-8	8073	EV-18	8124	EV-22	8174	EV-10	8226	DE-8
5205	DE-8	7578	DE-6	8074	EV-22	8125	EV-34	8175	EV-8	8227	DE-22
5206	DE-18	7579	EV-24	8075	EV-18	8126	DE-14	8176	EV-8	8228	DE-14
5207	DE-16	7580	DE-6	8076	EV-18	8127	DE-10	8177	EV-6	8229	DE-30
5234	EV-14	7581	EV-24	8077	EV-28	8128	EV-32	8178	EV-14	8230	DE-18
5235	EV-14	7582	EV-10	8078	EV-12	8129	DE-8	8179	EV-10	8231	DE-10
5236	EV-10	7583	DE-6	8079	EV-12	8130	DE-8	8180	EV-14	8232	DE-16
5237	EV-12	7584	DE-6	8080	EV-26	8131	DE-6	8181	EV-12	8233	EV-45
5362	DE-6	7585	EV-30	8081	EV-36	8132	EV-30	8182	EV-14	8234	EV-6
5363	EV-10	7586	DE-6	8082	EV-28	8133	EV-22	8183	EV-14	8235	DE-8
5480	DE-6	7587	DE-6	8083	EV-20	8134	DE-8	8184	EV-12	8236	DE-8
5481	DE-8	7588	DE-12	8084	EV-26	8135	DE-8	8185	EV-10	8237	DE-8
5482	DE-8	7589	DE-10	8085	EV-26	8136	DE-12	8186	DE-26	8238	DE-10
5483	DE-10	7590	EV-36	8086	EV-28	8137	DE-6	8189	DE-20	8239	DE-10
5484	DE-14	7630	EV-28	8087	EV-18	8138	DE-6	8190	DE-48 STUMP	8240	DE-8
5485	DE-8	7631	EV-28	8088	EV-18	8139	DE-8	8191	DE-8	8241	DE-26
5486	DE-8	7632	EV-12-18	8089	EV-22	8140	DE-8	8192	DE-26	8242	DE-10
5695	EV-24	7633	EV-16-18-10	8090	EV-30	8141	EV-12	8193	DE-24	8243	DE-14
5696	EV-36	7634	EV-16-8-12-12	8091	EV-30	8142	DE-18	8194	DE-8	8244	DE-10
5697	EV-26	7635	EV-14	8092	EV-28	8143	DE-20	8195	DE-18	8245	DE-18
5698	EV-36	7636	EV-14	8093	DE-14	8144	DE-14	8196	DE-38	8246	DE-20
5699	EV-18	7637	EV-12	8094	DE-6	8145	EV-14	8197	DE-10	8247	DE-12
5700	EV-24	7638	EV-10	8095	DE-6	8146	EV-6	8198	DE-8	8248	DE-8
5701	EV-24	7639	EV-10	8096	DE-8	8147	EV-18	8199	DE-6	8249	DE-8
5702	EV-48	7640	EV-8	8097	EV-6	8148	EV-15	8200	DE-10	8250	DE-20
5703	EV-48	7641	EV-6	8098	EV-16	8149	EV-8	8201	DE-12	8251	DE-20
5861	EV-24	7642	EV-8	8099	EV-8	8150	NEZ-19	8202	DE-24	8252	DE-40
5876	DE-18	7643	EV-8	8100	EV-14	8151	EV-16	8203	DE-10	20020	DE-14
5877	DE-16	7653	DE-34	8101	EV-8	8152	EV-6	8204	DE-32		
5878	DE-24	8050	DE-24	8102	EV-34	8153	EV-8	8205	DE-16		
5994	EV-48	8051	EV-26	8103	EV-32	8154	EV-18	8206	DE-14		
6119	DE-36	8052	DE-8	8104	DE-8	8155	EV-6	8207	DE-8		
6157	DE-24	8053	DE-8	8105	EV-14	8156	EV-12	8208	DE-6		
6158	DE-18	8054	DE-8	8106	EV-18	8157	EV-12	8209	DE-10		
6159	DE-8	8055	DE-8	8107	EV-18	8158	EV-14	8210	DE-26		
6160	DE-20	8056	DE-20	8108	EV-12	8159	EV-14	8211	EV-32		
6161	DE-20	8057	DE-28	8110	DE-10	8160	EV-10	8212	EV-16		
6162	DE-36	8058	DE-18	8111	EV-22	8161	DE-14	8213	DE-16		
6165	DE-30	8059	DE-22	8112	DE-10	8162	DE-24	8214	DE-18		
6166	DE-30	8062	DE-10	8113	DE-8	8163	DE-12	8215	DE-18		

EXISTING CONDITIONS AND DEMOLITION PLAN

Designed By	BA	Date	07/2017
Drawn By	TCC	Date	07/2017
Reviewed By	BA	Date	07/2017
Project No.	338-001	REF.	
Horiz. Scale	N/A		
Vert. Scale	N/A		

No.	
Date	
Revision	
By	

Project
FROG POND
No.
338-001
Type
PLANNING
Sheet
2A of **XX**

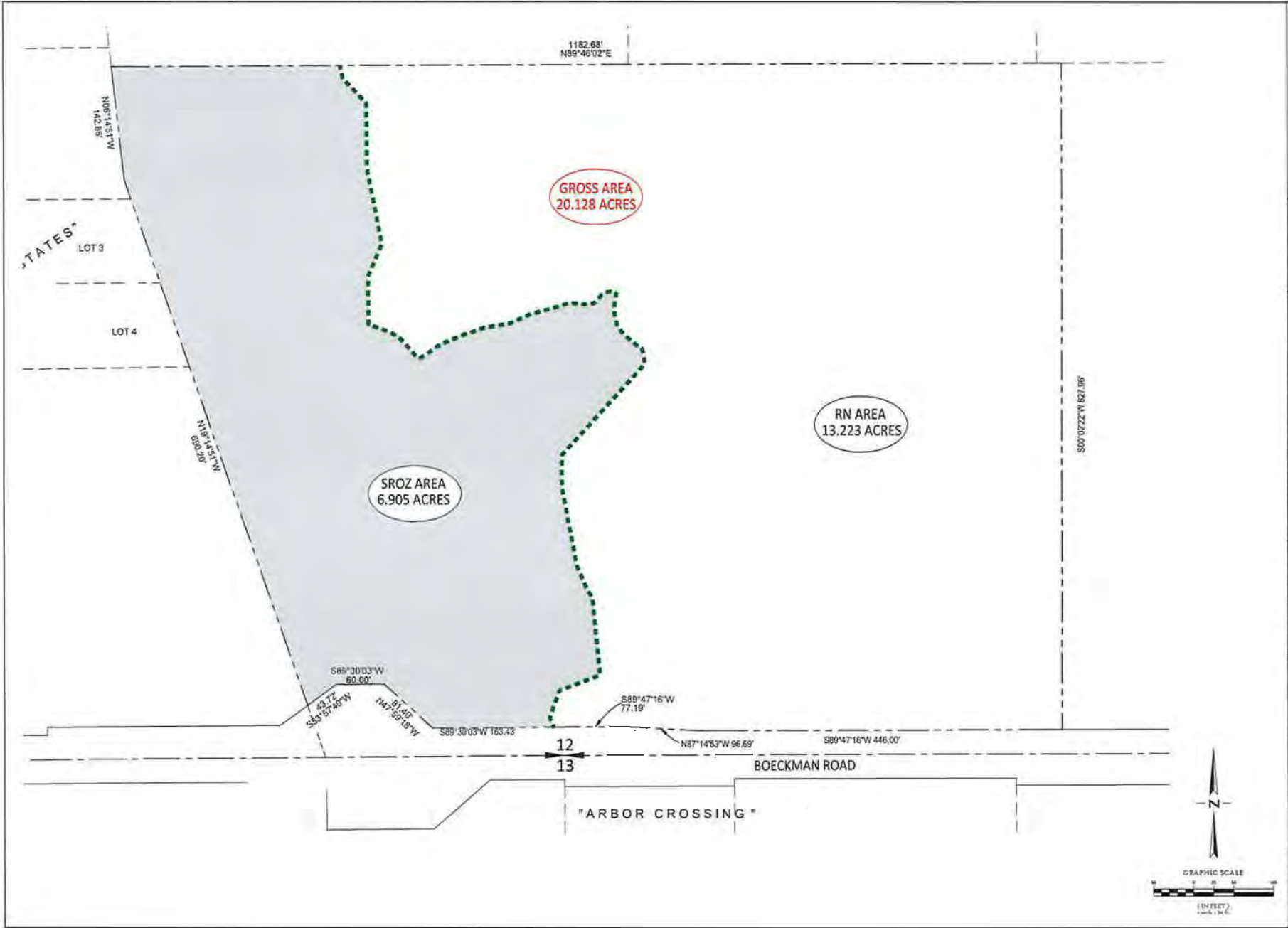
8020 SW WASHINGTON SQUARE RD.
SUITE 170
PORTLAND, OREGON 97223
PHONE: 503.253.8888
FAX: 503.253.8888
WWW.PDFGRP.COM



PIONEER DESIGN GROUP, INC.

FROG POND
CITY OF WILSONVILLE, OREGON

Zone Change Legal Descriptions

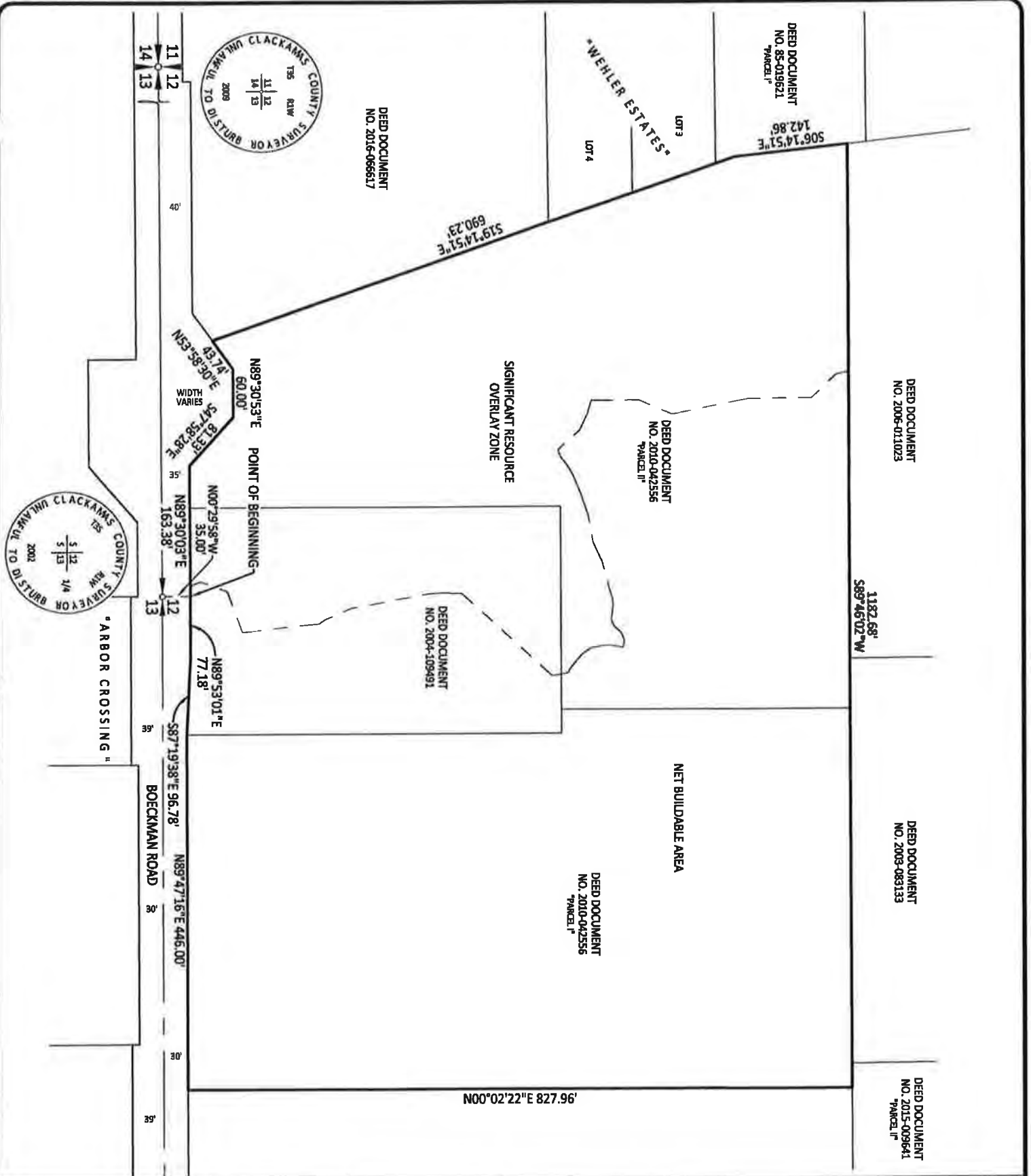


**SUBJECT PROPERTY BOUNDARY LEGAL DESCRIPTION
FROG POND
PDG PROJECT NO. 338-001**

A PORTION OF THE SOUTHEAST AND SOUTHWEST QUARTERS OF SECTION 12, TOWNSHIP 3 SOUTH, RANGE 1 WEST OF THE WILLAMETTE MERIDIAN, CLACKAMAS COUNTY, OREGON BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT ON THE NORTH RIGHT-OF-WAY LINE OF BOECKMAN ROAD, 35.00 FEET FROM THE CENTERLINE THEREOF AND BEARING NORTH 20°32'43" WEST, 37.28 FEET FROM THE SOUTH ONE-QUARTER CORNER OF SAID SECTION 12; THENCE ALONG SAID RIGHT-OF-WAY LINE THE FOLLOWING (4) COURSES; NORTH 89°30'03" EAST, 12.77 FEET; THENCE NORTH 89°53'01" EAST, 77.18 FEET; THENCE SOUTH 87°19'38" EAST, 96.78 FEET; THENCE NORTH 89°47'16" EAST, 446.00 FEET TO THE SOUTHEAST CORNER OF "PARCEL I" OF DEED DOCUMENT NO. 2010-042556; THENCE LEAVING SAID RIGHT-OF-WAY LINE, NORTH 00°02'22" EAST ALONG THE EAST LINE OF SAID "PARCEL I", 827.96 FEET TO THE NORTHEAST CORNER THEREOF; THENCE SOUTH 89°46'02" WEST ALONG THE NORTH LINE OF SAID "PARCEL I" AND THE NORTH LINE OF "PARCEL II", SAID DEED DOCUMENT, 1182.68 FEET TO THE NORTHWEST CORNER OF SAID "PARCEL II"; THENCE ALONG THE WEST BOUNDARY OF "PARCEL II" SOUTH 06°14'51" EAST, 142.86 FEET; THENCE CONTINUING ALONG SAID WEST BOUNDARY, SOUTH 19°14'51" EAST, 690.23 FEET TO THE NORTH RIGHT-OF-WAY LINE OF BOECKMAN ROAD; THENCE ALONG SAID RIGHT-OF-WAY LINE THE FOLLOWING (4) COURSES; NORTH 53°58'30" EAST, 43.74 FEET; THENCE NORTH 89°30'53" EAST, 60.00 FEET; THENCE SOUTH 47°58'28" EAST, 81.33 FEET; THENCE NORTH 89°30'03" EAST, 150.61 FEET TO THE POINT OF BEGINNING.

CONTAINING APPROXIMATELY 20.128 ACRES, MORE OR LESS.



PDG JOB NO.:
338-001

DATE:
02/13/18

SCALE:
NTS

EXHIBIT TO ACCOMPANY LEGAL DESCRIPTION



9020 SW WASHINGTON SQUARE RD
SUITE 170
PORTLAND, OREGON 97223
p 503.841.8311
f 844.715.4743
www.pd-grp.com

SUBJECT PROPERTY BOUNDARY
LOCATED IN THE SOUTHEAST AND THE SOUTHWEST QUARTERS
OF SECTION 12, TOWNSHIP 3 SOUTH, RANGE 1 WEST OF
THE WILLAMETTE MERIDIAN, CLACKAMAS COUNTY, OREGON

NET BUILDABLE AREA LEGAL DESCRIPTION

FROG POND

PDG PROJECT NO. 338-001

A PORTION OF THE SOUTHEAST AND SOUTHWEST QUARTERS OF SECTION 12, TOWNSHIP 3 SOUTH, RANGE 1 WEST OF THE WILLAMETTE MERIDIAN, CLACKAMAS COUNTY, OREGON BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT ON THE NORTH RIGHT-OF-WAY LINE OF BOECKMAN ROAD, 35.00 FEET FROM THE CENTERLINE THEREOF AND BEARING NORTH 20°32'43" WEST, 37.28 FEET FROM THE SOUTH ONE-QUARTER CORNER OF SAID SECTION 12; THENCE ALONG THE BOUNDARY OF THE SIGNIFICANT RESOURCES OVERLAY ZONE THE FOLLOWING COURSES:

NORTH 21°41'48" WEST, 1.37 FEET;
NORTH 22°42'26" WEST, 12.00 FEET;
NORTH 19°42'16" EAST, 35.68 FEET;
NORTH 69°33'51" EAST, 54.00 FEET;
NORTH 05°34'41" WEST, 96.00 FEET;
NORTH 34°55'08" WEST, 9.44 FEET;
NORTH 23°45'59" WEST, 34.27 FEET;
NORTH 10°35'37" WEST, 99.27 FEET;
NORTH 01°35'51" WEST, 11.97 FEET;
NORTH 00°13'30" EAST, 28.26 FEET;
NORTH 42°34'49" EAST, 152.87 FEET;
NORTH 03°13'45" WEST, 6.80 FEET;
NORTH 12°15'02" WEST, 13.61 FEET;
NORTH 59°50'19" WEST, 7.26 FEET;
NORTH 50°39'45" WEST, 20.56 FEET;
NORTH 37°07'06" WEST, 14.09 FEET;
NORTH 13°36'56" WEST, 13.77 FEET;
NORTH 04°35'13" WEST, 6.86 FEET;
NORTH 03°14'10" EAST, 6.85 FEET;
NORTH 08°55'50" EAST, 13.94 FEET;
NORTH 76°53'24" WEST, 7.13 FEET;
SOUTH 77°39'55" WEST, 6.14 FEET;
SOUTH 61°29'26" WEST, 6.37 FEET;
SOUTH 41°33'50" WEST, 12.61 FEET;
SOUTH 69°32'47" WEST, 7.59 FEET;
NORTH 84°06'15" WEST, 20.71 FEET;
SOUTH 82°45'06" WEST, 7.10 FEET;
SOUTH 71°56'22" WEST, 12.61 FEET;
SOUTH 75°11'54" WEST, 34.47 FEET;
SOUTH 65°48'48" WEST, 27.24 FEET;
SOUTH 79°58'39" WEST, 34.07 FEET;
SOUTH 71°05'43" WEST, 27.24 FEET;
SOUTH 67°50'33" WEST, 27.23 FEET;
SOUTH 59°02'03" WEST, 13.45 FEET;
SOUTH 51°01'23" WEST, 13.80 FEET;
SOUTH 69°07'24" WEST, 7.00 FEET;
NORTH 89°04'06" WEST, 2.36 FEET;
NORTH 42°07'01" WEST, 36.12 FEET;
NORTH 65°19'38" WEST, 21.85 FEET;
NORTH 73°21'55" WEST, 17.76 FEET;
NORTH 00°12'15" WEST, 8.97 FEET;
NORTH 00°30'12" WEST, 50.79 FEET;
NORTH 23°08'09" EAST, 44.30 FEET;
NORTH 11°08'25" WEST, 96.23 FEET;

NORTH 00°30'12" WEST, 80.94 FEET;
NORTH 42°45'28" WEST, 42.77 FEET;
NORTH 12°17'47" WEST, 15.70 FEET TO THE NORTH LINE OF SAID "PARCEL II" IN DEED DOCUMENT NO. 2010-042556; THENCE LEAVING THE SIGNIFICANT RESOURCES OVERLAY ZONE BOUNDARY, ALONG SAID NORTH "PARCEL II" LINE AND THE NORTH LINE OF "PARCEL I", SAID DEED DOCUMENT, NORTH 89°46'02" EAST, 908.68 FEET TO THE NORTHEAST CORNER OF SAID "PARCEL I"; THENCE SOUTH 00°02'22" WEST ALONG THE EAST LINE THEREOF, 827.96 FEET TO THE NORTH RIGHT-OF-WAY LINE OF BOECKMAN ROAD; THENCE ALONG SAID RIGHT-OF-WAY LINE THE FOLLOWING (4) COURSES;

SOUTH 89°47'16" WEST, 446.00 FEET; THENCE NORTH 87°19'38" WEST, 96.78 FEET; THENCE SOUTH 89°53'01" WEST, 77.18 FEET; THENCE SOUTH 89°30'03" WEST, 12.77 FEET TO THE POINT OF BEGINNING.

CONTAINING APPROXIMATELY 13.223 ACRES, MORE OR LESS.



VALID UNTIL 6-30-19

DEED DOCUMENT
NO. 2006-011023

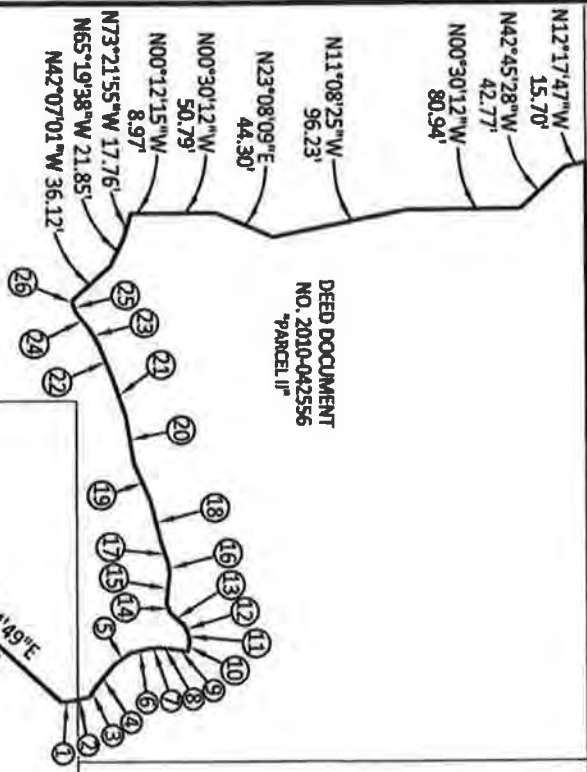
DEED DOCUMENT
NO. 2003-083133

DEED DOCUMENT
NO. 2015-009641
"PARCEL II"

897.88'
N89°46'02"E

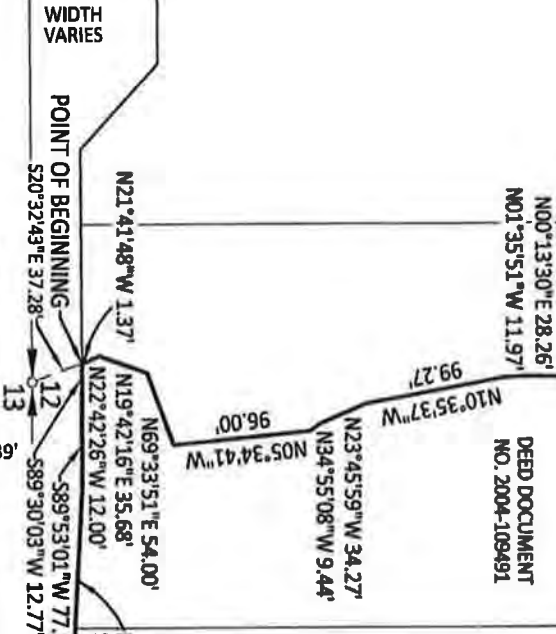
NET BUILDABLE AREA
13.223 ACRES

DEED DOCUMENT
NO. 2010-042556
"PARCEL I"



- LINE DATA
- 1 N03°13'45"W 6.80'
 - 2 N12°15'02"W 13.61'
 - 3 N59°50'19"W 7.26'
 - 4 N50°39'45"W 20.56'
 - 5 N37°07'06"W 14.09'
 - 6 N13°36'56"W 13.77'
 - 7 N04°35'13"W 6.86'
 - 8 N03°14'10"E 6.85'
 - 9 N08°51'50"E 13.94'
 - 10 N76°53'24"W 7.13'
 - 11 S77°39'55"W 6.14'
 - 12 S61°29'26"W 6.37'
 - 13 S41°33'50"W 12.61'
 - 14 S69°32'47"W 7.59'
 - 15 N84°06'15"W 20.71'
 - 16 S82°45'06"W 7.10'
 - 17 S71°56'22"W 12.61'
 - 18 S75°11'54"W 34.47'
 - 19 S65°48'48"W 27.24'
 - 20 S79°58'39"W 34.07'
 - 21 S71°05'43"W 27.24'
 - 22 S67°50'33"W 27.23'
 - 23 S59°02'03"W 13.45'
 - 24 S51°01'23"W 13.80'
 - 25 S69°07'24"W 7.00'
 - 26 N89°04'06"W 2.36'

S00°02'22"W 827.96'



BOECKMAN ROAD 36' 36' 36'

"ARBOR CROSSING"

WIDTH VARIES
POINT OF BEGINNING
S20°32'43"E 37.28'

PDG JOB NO.:
338-001

DATE:
02/13/18

SCALE:
NTS

EXHIBIT TO ACCOMPANY LEGAL DESCRIPTION



9020 SW WASHINGTON SQUARE RD
SUITE 170
PORTLAND, OREGON 97223
p 503.841.8311
f 844.715.4743
www.pd-grp.com

NET BUILDABLE AREA
LOCATED IN THE SOUTHEAST AND THE SOUTHWEST QUARTERS
OF SECTION 12, TOWNSHIP 3 SOUTH, RANGE 1 WEST OF
THE WILLAMETTE MERIDIAN, CLACKAMAS COUNTY, OREGON

SIGNIFICANT RESOURCES OVERLAY ZONE LEGAL DESCRIPTION

FROG POND

PDG PROJECT NO. 338-001

A PORTION OF THE SOUTHEAST AND SOUTHWEST QUARTERS OF SECTION 12, TOWNSHIP 3 SOUTH, RANGE 1 WEST OF THE WILLAMETTE MERIDIAN, CLACKAMAS COUNTY, OREGON BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT ON THE NORTH RIGHT-OF-WAY LINE OF BOECKMAN ROAD, 35.00 FEET FROM THE CENTERLINE THEREOF AND BEARING NORTH 20°32'43" WEST, 37.28 FEET FROM THE SOUTH ONE-QUARTER CORNER OF SAID SECTION 12; THENCE ALONG THE BOUNDARY OF THE SIGNIFICANT RESOURCES OVERLY ZONE THE FOLLOWING COURSES:

NORTH 21°41'48" WEST, 1.37 FEET;
NORTH 22°42'26" WEST, 12.00 FEET;
NORTH 19°42'16" EAST, 35.68 FEET;
NORTH 69°33'51" EAST, 54.00 FEET;
NORTH 05°34'41" WEST, 96.00 FEET;
NORTH 34°55'08" WEST, 9.44 FEET;
NORTH 23°45'59" WEST, 34.27 FEET;
NORTH 10°35'37" WEST, 99.27 FEET;
NORTH 01°35'51" WEST, 11.97 FEET;
NORTH 00°13'30" EAST, 28.26 FEET;
NORTH 42°34'49" EAST, 152.87 FEET;
NORTH 03°13'45" WEST, 6.80 FEET;
NORTH 12°15'02" WEST, 13.61 FEET;
NORTH 59°50'19" WEST, 7.26 FEET;
NORTH 50°39'45" WEST, 20.56 FEET;
NORTH 37°07'06" WEST, 14.09 FEET;
NORTH 13°36'56" WEST, 13.77 FEET;
NORTH 04°35'13" WEST, 6.86 FEET;
NORTH 03°14'10" EAST, 6.85 FEET;
NORTH 08°55'50" EAST, 13.94 FEET;
NORTH 76°53'24" WEST, 7.13 FEET;
SOUTH 77°39'55" WEST, 6.14 FEET;
SOUTH 61°29'26" WEST, 6.37 FEET;
SOUTH 41°33'50" WEST, 12.61 FEET;
SOUTH 69°32'47" WEST, 7.59 FEET;
NORTH 84°06'15" WEST, 20.71 FEET;
SOUTH 82°45'06" WEST, 7.10 FEET;
SOUTH 71°56'22" WEST, 12.61 FEET;
SOUTH 75°11'54" WEST, 34.47 FEET;
SOUTH 65°48'48" WEST, 27.24 FEET;
SOUTH 79°58'39" WEST, 34.07 FEET;
SOUTH 71°05'43" WEST, 27.24 FEET;
SOUTH 67°50'33" WEST, 27.23 FEET;
SOUTH 59°02'03" WEST, 13.45 FEET;
SOUTH 51°01'23" WEST, 13.80 FEET;
SOUTH 69°07'24" WEST, 7.00 FEET;
NORTH 89°04'06" WEST, 2.36 FEET;
NORTH 42°07'01" WEST, 36.12 FEET;
NORTH 65°19'38" WEST, 21.85 FEET;
NORTH 73°21'55" WEST, 17.76 FEET;
NORTH 00°12'15" WEST, 8.97 FEET;
NORTH 00°30'12" WEST, 50.79 FEET;
NORTH 23°08'09" EAST, 44.30 FEET;
NORTH 11°08'25" WEST, 96.23 FEET;

NORTH 00°30'12" WEST, 80.94 FEET;
NORTH 42°45'28" WEST, 42.77 FEET;
NORTH 12°17'47" WEST, 15.70 FEET TO THE NORTH LINE OF "PARCEL II" IN DEED DOCUMENT NO. 2010-042556; THENCE
ALONG THE BOUNDARY OF SAID "PARCEL II" THE FOLLOWING (7) COURSES:
SOUTH 89°46'02" WEST, 284.79 FEET;
SOUTH 06°14'51" EAST, 142.86 FEET;
SOUTH 19°14'51" EAST, 690.23 FEET TO THE NORTH RIGHT-OF-WAY LINE OF BOECKMAN ROAD;
THENCE CONTINUING ALONG SAID BOUNDARY AND SAID RIGHT-OF-WAY LINE, NORTH 53°58'30" EAST, 43.74 FEET; THENCE
NORTH 89°30'53" EAST, 60.00 FEET; THENCE SOUTH 47°58'28" EAST, 81.33 FEET; THENCE NORTH 89°30'03" EAST, 150.61 FEET
TO THE POINT OF BEGINNING.

CONTAINING APPROXIMATELY 6.905 ACRES, MORE OR LESS.



VALID UNTIL 6-30-19

DEED DOCUMENT
NO. 85-019621
"PARCEL I"

DEED DOCUMENT
NO. 2010-042556
"PARCEL II"

DEED DOCUMENT
NO. 2004-109491

DEED DOCUMENT
NO. 2016-066617

SROZ AREA
6.905 ACRES

"ARBOR CROSSING"

"WEHLER ESTATES"

- LINE DATA**
- 1 N03°13'45"W 6.80'
 - 2 N12°15'02"W 13.61'
 - 3 N59°50'19"W 7.26'
 - 4 N50°39'45"W 20.56'
 - 5 N37°07'06"W 14.09'
 - 6 N13°36'56"W 13.77'
 - 7 N04°35'13"W 6.86'
 - 8 N03°14'10"E 6.85'
 - 9 N08°55'50"E 13.94'
 - 10 N76°53'24"W 7.13'
 - 1 S77°39'55"W 6.14'
 - 2 S61°29'26"W 6.37'
 - 13 S41°33'50"W 12.61'
 - 14 S69°32'47"W 7.59'
 - 15 N84°06'15"W 20.71'
 - 16 S82°45'06"W 7.10'
 - 17 S71°56'22"W 12.61'
 - 18 S75°11'54"W 34.47'
 - 19 S65°48'48"W 27.24'
 - 20 S79°58'39"W 34.07'
 - 21 S71°05'43"W 27.24'
 - 22 S67°50'33"W 27.23'
 - 23 S59°02'03"W 13.45'
 - 24 S51°01'23"W 13.80'
 - 25 S69°07'24"W 7.00'
 - 26 N89°04'06"W 2.36'

284.79'
S89°46'02"W

N12°17'47"W 15.70'
N42°45'28"W 42.77'

N00°30'12"W 80.94'

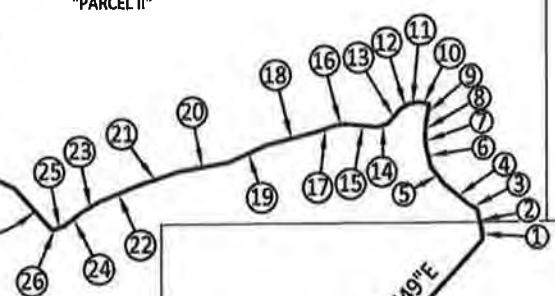
N11°08'25"W 96.23'

N23°08'09"E 44.30'

N00°30'12"W 50.79'

N00°12'15"W 8.97'

N73°21'55"W 17.76'
N65°19'38"W 21.85'
N42°07'01"W 36.12'



N42°34'49"E
152.87'

N00°13'30"E 28.26'
N01°35'51"W 11.97'

N10°35'37"W
99.27'

N23°45'59"W 34.27'
N34°55'08"W 9.44'

N05°34'41"W
96.00'

N69°33'51"E 54.00'
N19°42'16"E 35.68'
N22°42'26"W 12.00'

N89°30'53"E
60.00'

N21°41'48"W 1.37'

N89°30'03"E
150.61'

S20°32'43"E 37.28'

S19°14'51"E
52.09022'

N53°58'30"E
43.74'

WIDTH VARIES

S47°58'28"E
81.33'



SCALE: 1" = 60'

PDG JOB NO.:
338-001

DATE:
02/13/18

SCALE:
NTS

EXHIBIT TO ACCOMPANY LEGAL DESCRIPTION



9020 SW WASHINGTON SQUARE RD
SUITE 170
PORTLAND, OREGON 97223
p 503.641.8311
f 844.715.4743
www.pd-grp.com

SIGNIFICANT RESOURCES OVERLAY ZONE
LOCATED IN THE SOUTHEAST AND THE SOUTHWEST QUARTERS
OF SECTION 12, TOWNSHIP 3 SOUTH, RANGE 1 WEST OF
THE WILLAMETTE MERIDIAN, CLACKAMAS COUNTY, OREGON

DKS Trip Generation

Wilsonville Frog Pond Wolfston *Transportation Impact Study*

Developed for



Developed by



February 2018



DKS

117 Commercial St NE
Suite 310
Salem, OR 97301
503.391.8773
dksassociates.com

February 13, 2018

Steve Adams
City of Wilsonville
29799 Town Center Loop East
Wilsonville, OR 97070

Subject: Wilsonville Frog Pond Wolfston Transportation Impact Study

P17021-007

Dear Steve,

DKS Associates is pleased to submit this transportation impact study for the proposed Frog Pond Wolfston subdivision located off Boeckman Road between SW Canyon Creek Road and SW Stafford Road in Wilsonville, Oregon.

Please feel free to call if you have any questions or comments regarding this study.

Sincerely,
DKS Associates



Scott Mansur, P.E., PTOE
Transportation Engineer



DKS

TABLE OF CONTENTS

TABLE OF CONTENTS i

LIST OF FIGURES ii

LIST OF TABLES iii

CHAPTER 1: INTRODUCTION 1

CHAPTER 2: EXISTING CONDITIONS 5

 Project Site..... 5

 Study Area Roadway Network..... 5

 Pedestrian and Bicycle Facilities..... 6

 Public Transit Service 6

 Future Planned Projects..... 6

 Existing Traffic Volumes and Operations 8

CHAPTER 3: PROJECT IMPACTS 12

 Proposed Development..... 12

 Trip Generation 12

 Trip Distribution..... 13

 Future Traffic Volumes and Operating Conditions 15

 Intersection Operations..... 18

 Site Plan Evaluation..... 19

 Project Impact Summary..... 21

APPENDIX

LIST OF FIGURES

Figure 1: Study Area Aerial Photo2

Figure 2: Study Area Map3

Figure 3: Existing PM Peak Hour Traffic Volumes9

Figure 4: Trip Distribution and Project Trips14

Figure 5: Existing plus Stage II PM Peak Hour Traffic Volumes16

Figure 6: Existing plus Project plus Stage II PM Peak Hour Traffic Volumes17

LIST OF TABLES

Table 1: Key Study Area and Proposed Development Characteristics..... 4
Table 2: Study Area Roadway Characteristics (within the Study Area) 5
Table 3: Existing PM Peak Study Intersection Operations 11
Table 4: PM Peak Hour Primary Trip Generation 12
Table 5: Future Project and Stage II Intersection Operations Comparison 18
Table 6: Future Project and Stage II Intersection Operations with Mitigation 19



CHAPTER 1: INTRODUCTION

This study evaluates the transportation impacts associated with the residential development of the tax lots 31W12D 2400, 2600, and 2700 located on the north side of Boeckman Road and east of Canyon Creek Road in Wilsonville, Oregon. The project consists of a maximum of 82 single-family homes. For the purposes of a worst-case transportation evaluation, the maximum development size will be assumed for this analysis. The existing tax lots include two existing single family homes that will be removed. An aerial photo of the project location is shown in Figure 1.

This development is part of the Frog Pond West Master Plan adopted on July 17, 2017 as a supporting document to the Wilsonville Comprehensive Plan. The proposed land use and internal roadway network is consistent with the Frog Pond West Master Plan.

The purpose of this transportation impact analysis is to identify potential mitigation measures needed to offset transportation impacts that the proposed development may have on the nearby transportation network. The impact analysis is focused on the study intersections, which were selected for evaluation in coordination with City staff. The intersections are shown in Figure 2 and listed below:

- Boeckman Road/SW Parkway Avenue
- Boeckman Road/Canyon Creek Road
- Boeckman Road/Project Entrance Road (Street "A")
- Boeckman Road-Advance Road/SW Stafford Road-Wilsonville Road
- Wilsonville Road/Town Center Loop West
- Wilsonville Road/Town Center Loop East-Memorial Drive

This chapter provides an introduction to the proposed development. Table 1 lists important characteristics of the study area and proposed project.

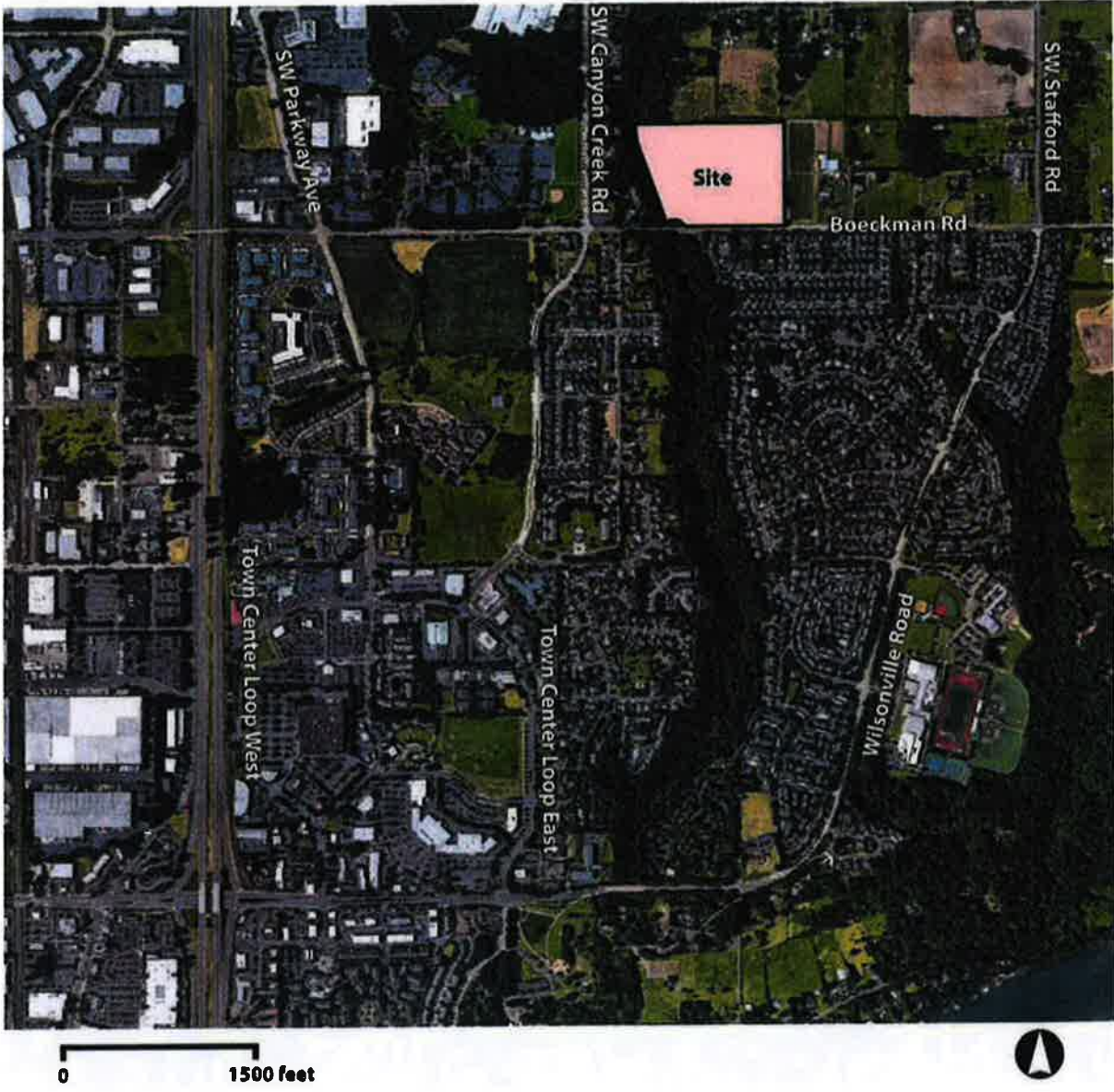


Figure 1: Study Area Aerial Photo

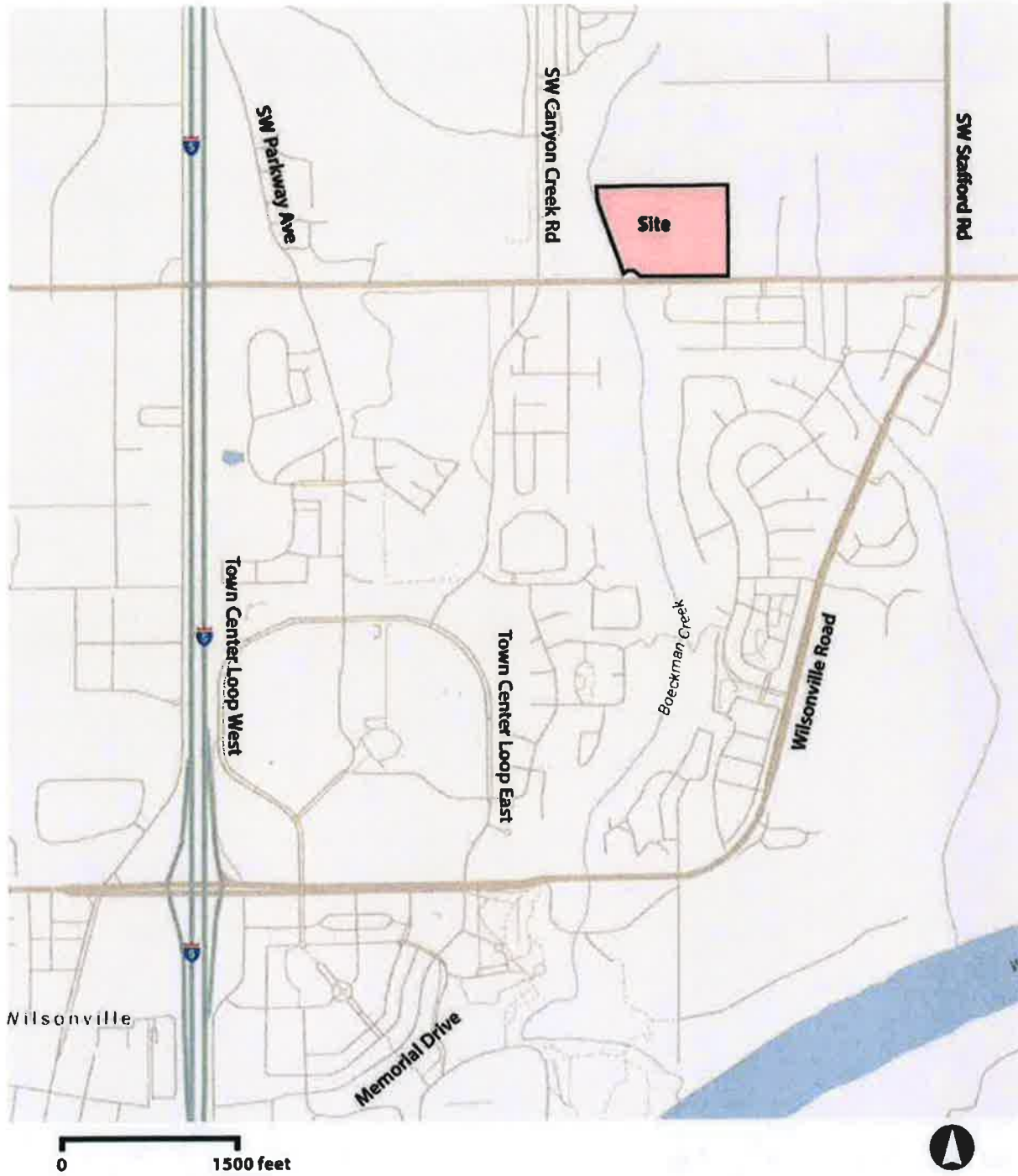


Figure 2: Study Area Map

Table 1: Key Study Area and Proposed Development Characteristics

Characteristics	Information
Study Area	
Number of Study Intersections	5
Analysis Period	Weekday PM Peak Hour (Peak hour between 4-6 PM)
Project Site	
Existing Land Use	2 existing single-family homes
Proposed Development	82 single-family homes
Project Access	One main access along the north side of Boeckman Road, east of Canyon Creek Road and west of SW Laurel Glen Street

CHAPTER 2: EXISTING CONDITIONS

This chapter provides documentation of existing study area conditions, including the study area roadway network, pedestrian and bicycle facilities, and existing traffic volumes and operations. Supporting details for volumes and operations are provided in the appendix.

Project Site

The project sponsor plans to demolish two existing homes and develop an 82-lot subdivision (80 net new homes) in the Frog Pond West Master Plan area of Wilsonville.

Study Area Roadway Network

Key roadways in the study area are summarized in Table 2 along with their existing (or proposed) roadway characteristics. The functional classifications for City of Wilsonville streets are provided in the *City of Wilsonville Transportation System Plan (TSP)*.¹

Table 2: Study Area Roadway Characteristics (within the Study Area)

Roadway	Classification	No. of Lanes	Posted Speed	Sidewalks	Bike Lanes	On-Street Parking
Boeckman Road	Minor Arterial	2	40 mph	Yes/No ^a	Yes/No	No
SW Parkway Avenue	Minor Arterial	3	40 to 45 mph ^d	Yes/No ^b	Yes/No ^b	No
Canyon Creek Road	Minor Arterial	3	30 to 35 mph ^e	Yes	Yes	No
SW Stafford Road	Major Arterial	2	45 - 35 mph	No	No	No
Wilsonville Road	Major Arterial	4	25 - 35 mph	Yes	Yes	No
Town Center Loop West	Major Arterial	4 ^c	35 mph	Yes	No	No
Town Center Loop East	Collector	3	35 mph	Yes	Yes	No
Memorial Drive	Collector	2	25 mph	Yes	Yes	No

^a No sidewalk between Canyon Creek Road and Stafford Road

^b Sidewalk and bike lane missing along segments of SW Parkway Ave

^c Only one southbound receiving lane at Wilsonville Road

^d Speed is 45 mph north of Boeckman and 40 mph south of Boeckman

^e Speed is 35 mph north of Boeckman and 30 mph south of Boeckman

¹ *Wilsonville Transportation System Plan*, Adopted by Council, June 2013.

Pedestrian and Bicycle Facilities

Near the project site, Boeckman Road is classified by the City as a minor arterial but does not currently have curbs, gutters, permanent sidewalks (temporary sidewalk exists on south side) or bike lanes. A section of Boeckman Road to the east of the project site does have curbs, gutters, sidewalk (south side), and bike lanes, however much of it does not.

Public Transit Service

South Metro Area Regional Transit (SMART) operates several fixed routes that serve Wilsonville and the surrounding area.² Route 6 travels on Boeckman Road and Canyon Creek Road and provides service between the SMART Central station in Wilsonville to the commercial area at SW Elligsen Road, Canyon Creek Road, SW Parkway Center Drive, and SW Burns Way. There are two stops along Route 6 that are located on Boeckman Road, and one stop on Canyon Creek Road at Boeckman Road.

Future Planned Projects

Higher Priority Projects

The following is a list of higher priority projects included in the Wilsonville TSP³. A map of these improvements can be seen in the appendix.

- **BW-04 Boeckman Road Bike Lanes and Sidewalk Infill:** Construct bike lanes (both sides of street) and sidewalks (south side of street) from Parkway Avenue to Canyon Creek Road. Restriping was completed in 2013 to add bike lanes. A sidewalk on the south side will be constructed when the property develops.
- **RE-12A Frog Pond West Neighborhood Collector Roads:** Construct the collector roadways within the west neighborhood as identified in the Frog Pond Area Plan.
- **RT-01A Boeckman Creek Trail (North):** Construct north-south trail through east Wilsonville following Boeckman Creek, with connections to neighborhoods, parks, and intersection roads (may need a boardwalk for various sections and would require a comprehensive public process).

² South Metro Area Regional Transit (SMART) operates several fixed routes that serve Wilsonville and make connections to TriMet in Portland, Cherriots in Salem, and Canby Area Transit. The City's transit center, "SMART Central at Wilsonville Station," provides connections to all SMART routes and to TriMet's Westside Express Service (WES) commuter rail station.

³ *Wilsonville Transportation System Plan*, Adopted by Council, June 2013.

- **RW-01 Boeckman Road Bridge and Corridor Improvements:** Widen Boeckman Road from Boberg Road to 500 feet east of Parkway Avenue to include additional travel lanes in both directions along with bike lanes and sidewalks; project includes reconstruction of the bridge over I-5 and improvement at Boeckman Road/Boberg Road and Boeckman road/Parkway Avenue intersections.
- **UU-01 Boeckman Road Dip Improvements:** Upgrade at vertical curve east of Canyon Creek Road to meet applicable cross-section standards (i.e., 3 lanes with bike lanes, sidewalks, and transit stop improvements); options should also be considered to make connections to the regional trail system and to remove the culvert and install a 2-lane bridge with pedestrian and bicycle facilities.
- **UU-02 Boeckman Road Urban Upgrade:** Upgrade along the Frog Pond West frontage to meet Frog Pond West Master Plan cross-section standards (i.e., 3 lanes with bike lanes, sidewalks, and transit stop improvements); project includes a traffic signal or roundabout at the Boeckman Road-Advance Road/Stafford Road-Wilsonville Road intersection. A traffic signal has already been constructed as part of this project at Boeckman Road-Advance Road/Stafford Road-Wilsonville Road.
- **UU-05 Parkway Avenue Urban Upgrade:** Upgrade to meet applicable cross-section standards (i.e., 3 lanes with bike lanes, sidewalks, and transit stop improvements).
- **UU-06 Stafford Road Urban Upgrade:** Upgrade to meet applicable cross-section standards (i.e., 3 lanes with bike lanes, sidewalks, and transit stop improvements).
- **UU-10 Advance Road Urban Upgrade:** Upgrade Advance Road to collector standards starting at Stafford Road to the proposed 63rd Avenue (entrance to proposed Meridian Creek Middle School). The south side has been completed with a bike lane, curbs, gutter, and a sidewalk.

Additional Planned Projects

The following is a planned but unfunded project included in the Wilsonville TSP near the project site. A map of this improvement location can be seen in the appendix.

- **LT-P4 Canyon Creek Trail:** Shared Use Path from Canyon Creek Park to Boeckman Creek Trail providing connectivity to neighborhoods to the south.

Existing Traffic Volumes and Operations

Existing PM peak hour traffic operations were analyzed at the following study intersections based on coordination with city staff:

- Boeckman Road/SW Parkway Avenue
- Boeckman Road/Canyon Creek Road
- Boeckman Road-Advance Road/SW Stafford Road-Wilsonville Road
- Wilsonville Road/Town Center Loop West
- Wilsonville Road/Town Center Loop East-Memorial Drive

Intersection turn movement volumes were collected⁴ at these intersections during two consecutive PM peak periods when schools were in session. The volume of the highest day was used in the intersection operations analysis and is shown in Figure 3. The following sections describe intersection performance measures, required operating standards, and existing operating conditions.

⁴ Traffic data for Boeckman Road/Canyon Creek Road and Boeckman Road-Advance Road/SW Stafford Road-Wilsonville Road were collected on November 29th and November 30th, 2017 by Key Data Network. Traffic data for Boeckman Road/SW Parkway Avenue, Wilsonville Road/Town Center Loop West, and Wilsonville Road/Town Center Loop East-Memorial Drive were collected on January 3rd and 4th, 2018 by Key Data Network.

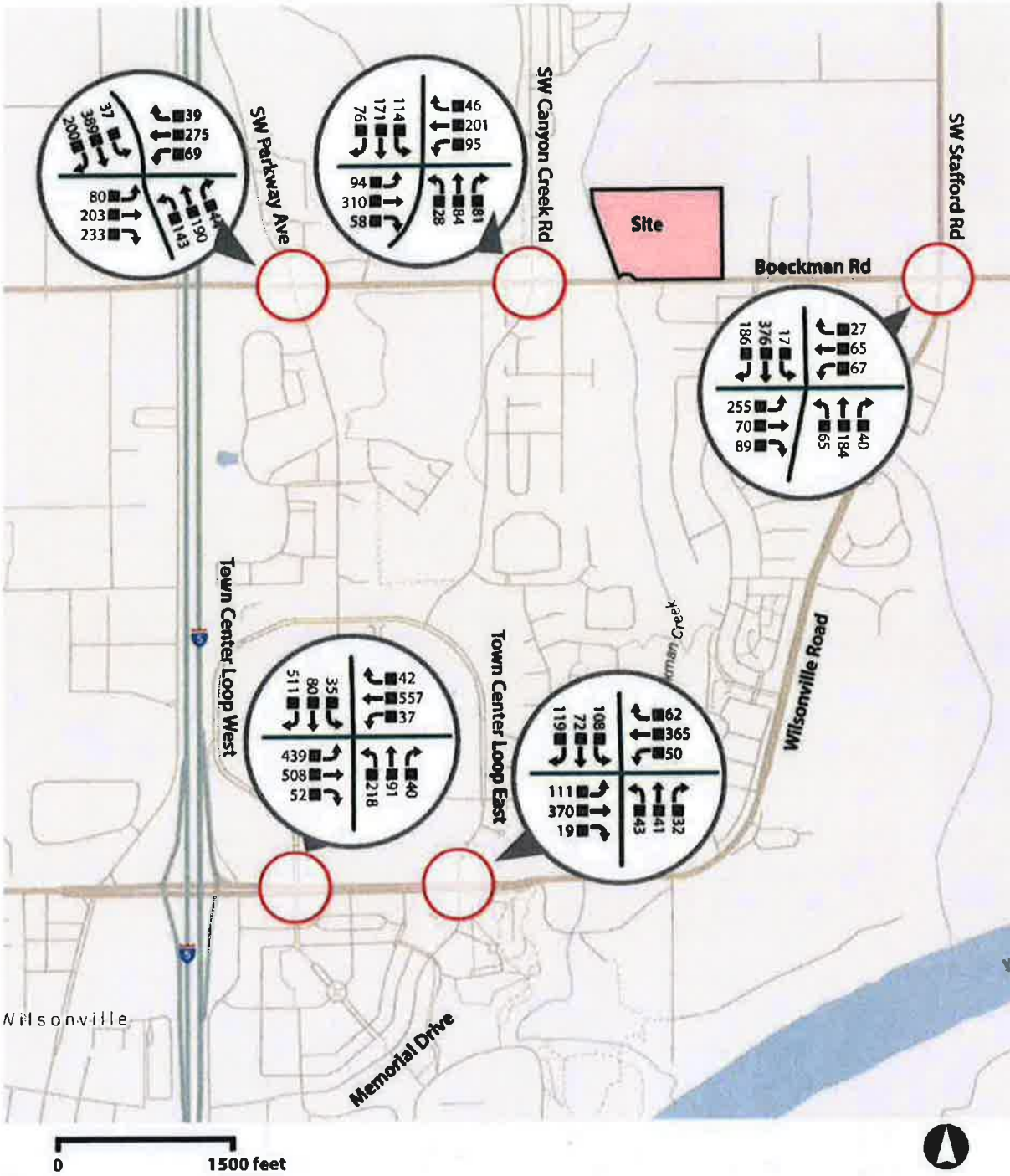


Figure 3: Existing PM Peak Hour Traffic Volumes

Intersection Performance Measures

Level of service (LOS) ratings and volume-to-capacity (v/c) ratios are two commonly used performance measures that provide a good picture of intersection operations.

- **Level of service (LOS):** A “report card” rating (A through F) based on the average delay experienced by vehicles at the intersection.⁵ LOS A, B, and C indicate conditions where traffic moves without significant delays over periods of peak hour travel demand. LOS D and E are progressively worse operating conditions. LOS F represents conditions where average vehicle delay has become excessive and demand has exceeded capacity.
- **Volume-to-capacity (v/c) ratio:** A decimal representation (typically between 0.00 and 1.00) of the proportion of capacity that is being used at a turn movement, approach leg, or intersection. It is determined by dividing the peak hour traffic volume by the hourly capacity of a given intersection or movement. A lower ratio indicates smooth operations and minimal delays. As the ratio approaches 1.00, congestion increases and performance is reduced. If the ratio is greater than 1.00, the turn movement, approach leg, or intersection is oversaturated and usually results in excessive queues and long delays.

Required Operating Standards

The City of Wilsonville requires study intersections on public streets to meet its minimum acceptable level of service (LOS) standard, which is LOS D per overall intersection for peak periods.⁶

Existing Operating Conditions

Existing traffic operations at the study intersections were determined for the PM peak hour based on the 2000 Highway Capacity Manual (HCM) methodology for signalized intersections, while unsignalized intersections were analyzed with 2010 HCM methodology.⁷ The results were then compared with the City of Wilsonville's minimum acceptable level of service (LOS) operating standard of LOS D or better. Table 3 lists the estimated delay, LOS, and v/c ratio of each study intersection. The existing study intersections currently meet mobility targets and operating standards.

⁵ A description of Level of Service (LOS) is provided in the appendix and includes a list of the delay values (in seconds) that correspond to each LOS designation.

⁶ *City of Wilsonville Code*, City of Wilsonville Section 4.140(.09)J.2., p.166.

⁷ *2000 & 2010 Highway Capacity Manual*, Transportation Research Board, Washington DC, 2000/2010.

Table 3: Existing PM Peak Study Intersection Operations

Intersection	Mobility Target/Operating Standard	Existing PM Peak		
		Delay	LOS	v/c
Boeckman Road/SW Parkway Avenue	LOS D	35.8	D	0.83
Boeckman Road/Canyon Creek Road	LOS D	24.2	C	0.85 ^a
Boeckman Road-Advance Road/SW Stafford Road-Wilsonville Road	LOS D	21.2	C	0.76
Wilsonville Road/Town Center Loop West	LOS D	38.7	D	0.65
Wilsonville Road/Town Center Loop East-Memorial Drive	LOS D	24.6	C	0.37
Delay = Average Intersection Delay (sec.)		LOS = Level of Service		v/c = Volume-to-Capacity Ratio

^a v/c shown for unsignalized intersections is the worst approach v/c

CHAPTER 3: PROJECT IMPACTS

This chapter reviews the impacts that the proposed Frog Pond Wolfston development may have on the study area transportation system. This analysis includes site plan evaluation, trip generation, trip distribution, and future year traffic volumes and operating conditions for the five study intersections.

Proposed Development

The proposed development involves demolishing two existing homes and constructing an 82-lot subdivision (80 net new homes). This development will have one access point, located on the north side of Boeckman Road. The access road will be located east of Canyon Creek Road and west of SW Laurel Glen Street. The proposed access location is consistent with the Frog Pond West Master Plan.

This new roadway is consistent with the Frog Pond Area Plan for an internal roadway network, as shown in the appendix.

Trip Generation

Trip generation is the method used to estimate the number of vehicles added to site roadways and the adjacent roadway network by a development during a specified period (i.e., such as the PM peak hour). For this study, typical ITE 10th Edition trip generation data was used which is based on national land use data.

Table 4 provides the trip generation for the proposed residential development, taking into account the removal of the 2 existing homes. The development is expected to generate approximately 82 total (52 in, 30 out) PM peak hour trips.

Table 4: PM Peak Hour Primary Trip Generation

Land Use (ITE Code)	Units	Trip Rate per Unit	In	Out	Total
Proposed Land Use					
Single-Family Detached Housing (210)	82	1.02 ^a	53	31	84
Existing Land Use to be Removed					
Single-Family Detached Housing (210)	2	1.02 ^a	1	1	2
Total Primary Trips (Proposed - Existing):			52	30	82

^a Rate back-calculated from ITE equation output

Trip Distribution

Trip distribution provides an estimate of where project-related trips would be coming from and going to. It is given as percentages at key gateways to the study area and is used to route project trips through the study intersections. Figure 4 shows the expected trip distribution and project trip routing for the additional traffic generated by the Frog Pond Wolfston project. The distribution shows 10% of trips southbound on Wilsonville Road at Boeckman Road, but only half of those trips are expected to continue through the Town Center Loop intersections. The trip distribution was estimated using the City of Wilsonville travel demand model and is consistent with what was assumed for the Frog Pond Area Plan.⁸

⁸ *Wilsonville Travel Forecast Model, Select zone model run for Frog Pond Zone.*

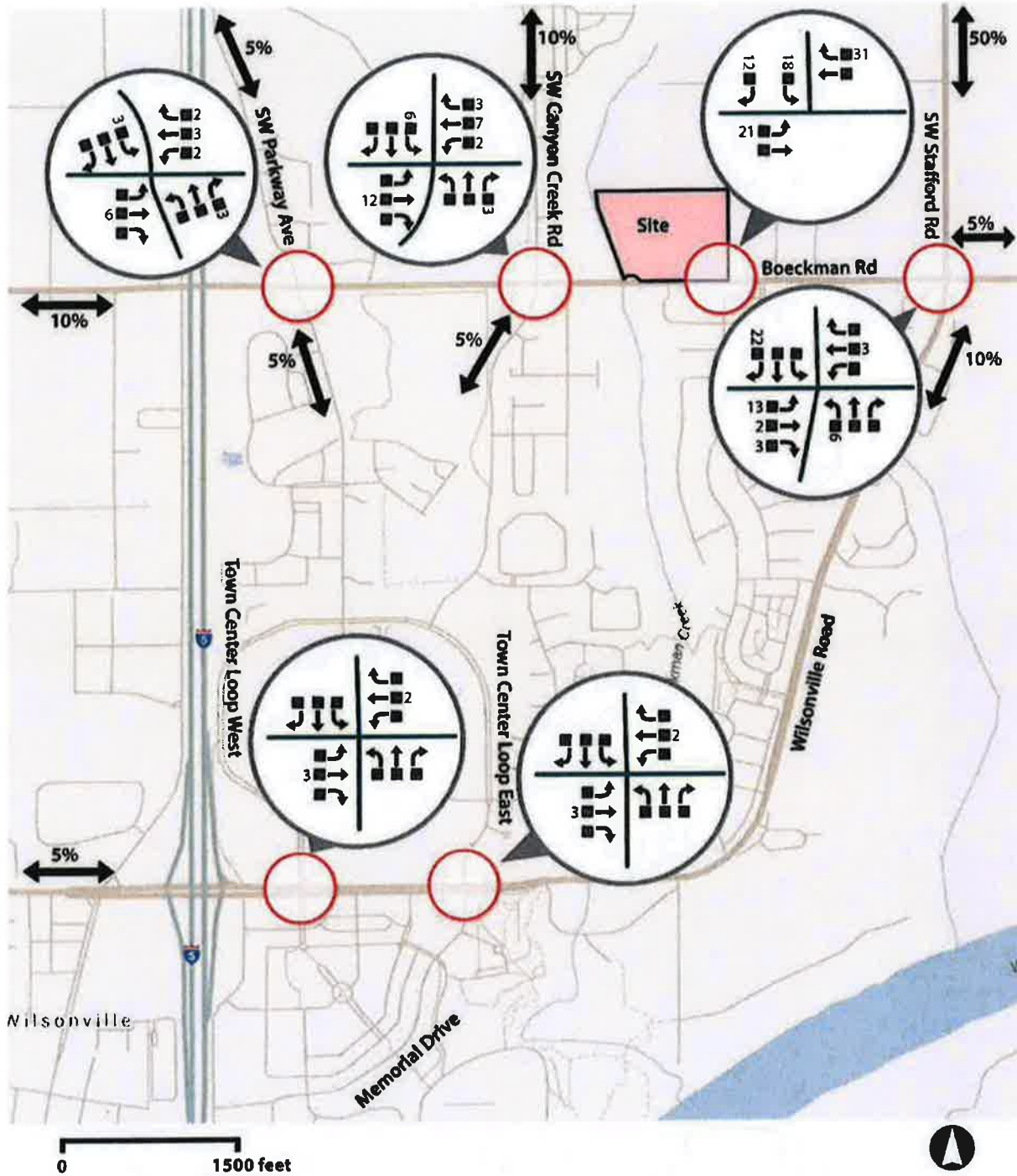


Figure 4: Trip Distribution and Project Trips

Project Trips Through City of Wilsonville Interchange Areas

The project trips through the two City of Wilsonville I-5 interchange areas were estimated based on the trip generation and distribution assumptions from the Frog Pond Area Plan:

“The primary reason why the Area Plan scenario results only in minor changes to the I-5 interchange ramp operating conditions is because the Area Plan is not dependent upon I-5 for interstate access, and as congestion on I-5 increases, alternative routes are expected to be utilized by more drivers. Due to the proximity of the project area to Stafford Road and I-205, less than 10 percent of Area Plan trips are expected to use I-5 during the p.m. peak hour. While approximately 40% of Area Plan trips are expected use Stafford Road to access I-205, only 3% are expected to access I-5 at the Elligsen Road interchange and 5% are expected to use the Wilsonville Road interchange.”⁹

Therefore proposed Frog Pond Wolfston development is expected to generate 3 PM peak hour trips through the I-5/SW Elligsen Road interchange area. The development is expected to generate 5 PM peak hour trips through the I-5/Wilsonville Road interchange area, which is consistent with the previously shown trip distribution.

Future Traffic Volumes and Operating Conditions

Future operating conditions were analyzed at the study intersections for the following future traffic scenarios. The comparison of the following scenarios enables the assessment of project impacts:

- Existing + Stage II (includes traffic from other developments with Stage II approval or are under construction)
- Existing + Project
- Existing + Project + Stage II

Future traffic volumes were estimated at the study intersection for each scenario. The future operating scenarios include various combinations of three types of traffic: existing, project, and Stage II. Stage II development trips are estimated based on the list of currently approved Stage II developments provided by City staff.¹⁰ The Stage II list and the corresponding PM peak hour trip generation estimates for these developments are included in the appendix. It is important to note that since the proposed Frog Pond West Hills subdivision is not yet approved, it was not included in the Stage II volumes.

⁹ Frog Pond Area Plan Technical Appendix D: Transportation Analyses, Frog Pond Area Plan Existing and Baseline Transportation Analysis

¹⁰ Email from Daniel Pauly, City of Wilsonville, December 6, 2017.

Figure 5 shows the PM peak hour traffic volumes used to analyze the "Existing plus Stage II" scenario. Figure 6 shows the PM peak hour traffic volumes used to analyze the "Existing plus Project plus Stage II" scenario.

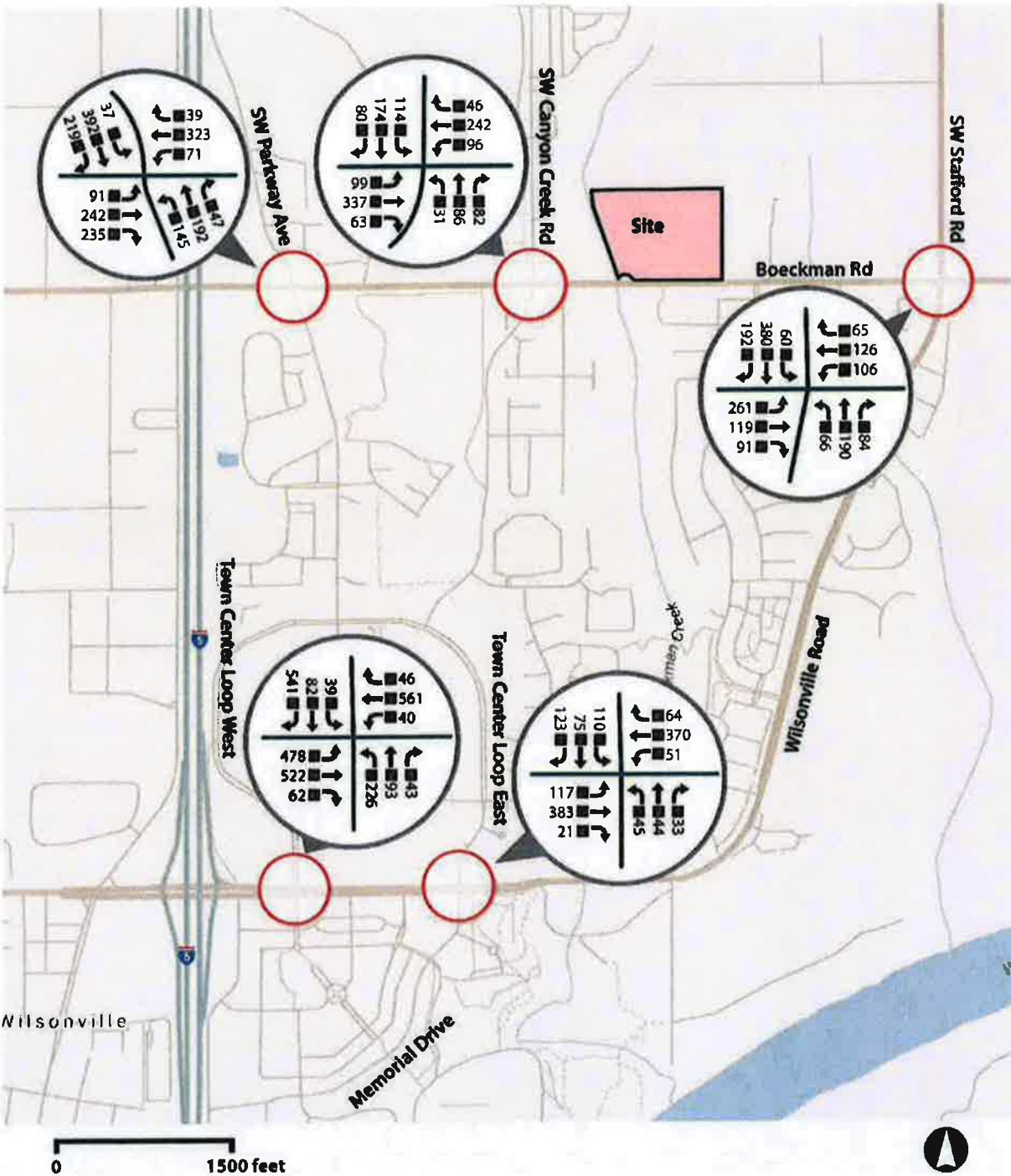


Figure 5: Existing plus Stage II PM Peak Hour Traffic Volumes

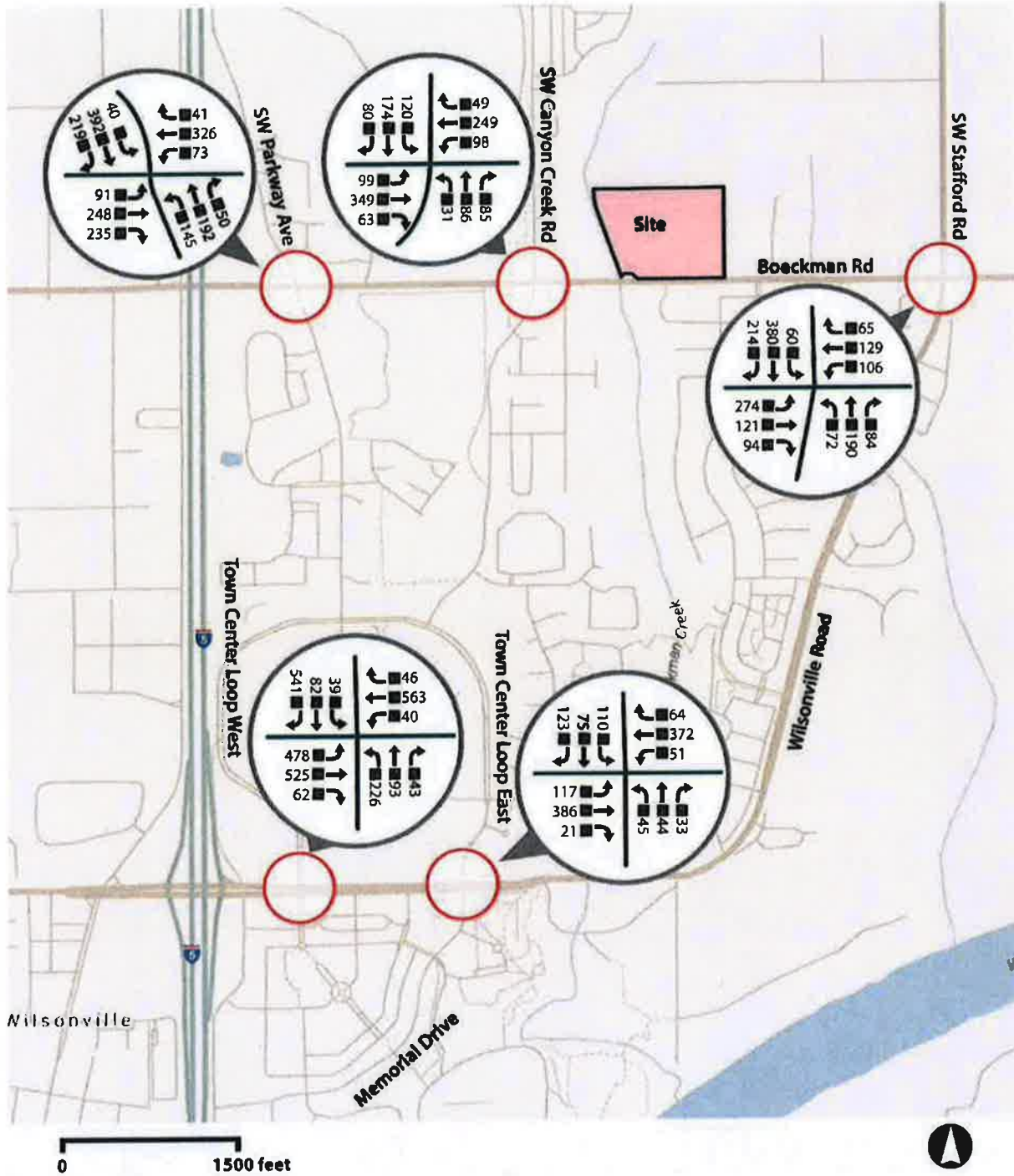


Figure 6: Existing plus Project plus Stage II PM Peak Hour Traffic Volumes

Intersection Operations

The study intersection operating conditions for the project trips after project development and future Stage II developments are listed in Table 5. All study intersections meet operating standards for “Existing plus Project” and “Existing plus Stage II” scenarios. However, the intersection of Boeckman Road/Canyon Creek Road does not meet the LOS D mobility standards in the “Existing plus Project plus Stage II” scenario. This intersection will be studied further in the next section.

Table 5: Future Project and Stage II Intersection Operations Comparison

Intersection	Mobility Target/ Operating Standard	Existing + Project			Existing + Stage II			Existing + Project + Stage II		
		Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c
Boeckman Road/SW Parkway Avenue	LOS D	36.3	D	0.84	42.2	D	0.88	42.9	D	0.89
Boeckman Road/Canyon Creek Road	LOS D	27.6	D	0.91a	33.8	D	0.97a	37.7	E	1.02a
Boeckman Road-Advance Road/SW Stafford Road-Wilsonville Road	LOS D	22.3	C	0.78	28.0	C	0.81	30.2	C	0.85
Wilsonville Road/Town Center Loop West	LOS D	38.7	D	0.65	40.2	D	0.69	40.2	D	0.69
Wilsonville Road/Town Center Loop East-Memorial Drive	LOS D	24.6	C	0.37	24.7	C	0.38	24.7	C	0.38

Delay = Average Intersection Delay (sec.) LOS = Level of Service v/c = Volume-to-Capacity Ratio

^a v/c shown for unsignalized intersections is the worst lane v/c reported

As shown, the intersection of Boeckman Road/Canyon Creek Road does not meet the LOS D mobility standards in the “Existing plus Project plus Stage II” scenario. This intersection will be studied further in the next section.

Additionally, the intersection of Boeckman Road/SW Parkway Avenue is close to falling below the LOS D standard. As the Frog Pond area develops, operations at this intersection will continue to degrade and may trigger the need for improvements at this intersection as identified as part of the City of Wilsonville TSP project RW-01: Boeckman Road Bridge and Corridor Project.

Mitigation

The intersection of Boeckman Road/Canyon Creek Road operates at an overall LOS E in the scenario with Stage II volumes and project trips added to the existing network. Therefore, mitigation measures must be explored in order to bring the operations back up to LOS D or better, in order to meet the City of Wilsonville standards.

The Wilsonville Transportation System Plan shows a traffic signal as a high priority project at the intersection of Boeckman Road/Canyon Creek Road as part of project UU-01. To mitigate

future impacts of the transportation system, it is recommended that the planned project to signalize the Boeckman Road/Canyon Creek Road intersection described in the Wilsonville TSP be completed. This mitigation was assumed in the following analysis. The same lane geometry and channelization as the existing scenario were assumed.

The construction of a new traffic signal at Boeckman Road/Canyon Creek Road should be coordinated with the other tasks in the project UU-01 Boeckman Road Dip Improvements. This project includes a bridge, sidewalks, and bike lanes across Boeckman Creek. Coordination will be necessary to avoid replacing the new traffic signal when the bridge is constructed.

The “Existing plus Project plus Stage II” scenario is shown again with the traffic signal mitigation at Boeckman Road/Canyon Creek Road in Table 6.

Table 6: Future Project and Stage II Intersection Operations with Mitigation

Intersection	Mobility Target/ Operating Standard	Existing + Project + Stage II (Mitigated)		
		Delay	LOS	v/c
Boeckman Road/Canyon Creek Road	LOS D	7.6	A	0.52
Delay = Average Intersection Delay (sec.)		v/c = Volume-to-Capacity Ratio		LOS = Level of Service

With the addition of a traffic signal at the Boeckman Road/Canyon Creek Road intersection, all study intersections meet mobility standards.

Site Plan Evaluation

A site plan showing the proposed development can be found in the appendix. The site plan shows sufficient space for two way motor vehicle circulation throughout the neighborhood.

The site access to the proposed Frog Pond Wolfston site includes one street along the north side of Boeckman Road. The access road will be located east of Canyon Creek Road and west of SW Laurel Glen Street. The proposed access location is consistent with the Frog Pond West Master Plan, as shown in the appendix. As future development in Frog Pond West occurs, additional internal streets will provide access to Stafford Road and Frog Pond Lane.

With the adoption of the Frog Pond West Infrastructure Funding Plan the City has agreed to undertake the design and re-construction of Boeckman Road adjacent to the Frog Pond West development. The developer will pay their cost share through the per lot Frog Pond West Infrastructure Supplemental Fee to be paid at the time building permits are issued. The City anticipates the project design to occur in 2018 followed by construction when sufficient supplemental fees have accrued.

Bicycle and Pedestrian Facilities

The site plan shows sidewalks on all internal streets as well as a pedestrian connection to Boeckman Road. The plan shows two connections to a trail at Boeckman Creek.

There are currently no sidewalks on the north side of Boeckman Road along the project frontage. The planned improvements for Boeckman Road as part of project UU-01 (Boeckman Road Dip Improvements) include widening the roadway to 3 lanes with bike lanes and sidewalks.

It is recommended that the developer coordinate with the City to construct either a temporary asphalt pedestrian path from the east site border to SW Stafford Road, or a crosswalk across Boeckman Road at the site entrance/Street "A" intersection and a small temporary asphalt pedestrian path just west of Willow Creek Drive. A pedestrian connection from the site to is necessary to provide safety access for children walking and biking to Boeckman Primary School, Meridian Creek Middle School, and Wilsonville High School until permanent sidewalk and bike lanes are constructed.

Access Spacing and Sight Distance

The access road to Boeckman Road is proposed between Canyon Creek Road and SW Laurel Glen Street. Canyon Creek Road would be spaced approximately 1,500 feet from the access road, but spacing would be approximately 400 feet from SW Laurel Glen Street, which does not meet the City's required spacing between intersections on a minor arterial (600 feet).

Preliminary turn lane analysis using AASHTO's methodology shows a left-turn lane in the eastbound direction of Boeckman Road is not warranted due to the low proportion of left-turns.

The Frog Pond Area Plan shows an access to Boeckman Road from this location. Since this access location is situated between the proposed development and another parcel owned by the West Linn-Wilsonville School District, it is recommended that the developer work with the School District to acquire the half-street right-of-way necessary to site this street between the respective properties.

Prior to occupancy, sight distance at any proposed access points will need to be verified, documented, and stamped by a registered professional Civil or Traffic Engineer licensed in the State of Oregon to assure that buildings, signs or landscaping does not restrict sight distance.

Project Impact Summary

The Frog Pond Wolfston development is anticipated to result in the following impacts:

Trip Generation

- The development consists of 82 single-family homes, to be built in a single phase. The development will remove 2 existing homes, for a net increase of 80 homes.
- The development is expected to generate an additional 82 (52 in, 30 out) PM peak hour trips.
- Of the 82 total project trips, 3 new PM peak hour trips are estimated to pass through the I-5/SW Elligsen Road interchange area and 5 PM peak hour trips through the I-5/Wilsonville Road interchange area.

Intersection Operations

- All of the study intersections meet operating standards for “Existing plus Project” and “Existing plus Stage II” scenarios.
- The intersection of Boeckman Road/Canyon Creek Road fails under the “Existing plus Project plus Stage II” scenario.
- Installing a new traffic signal at the intersection of Boeckman Road/Canyon Creek Road as recommended in project UU-01 in the Wilsonville TSP results in this intersection meeting mobility standards. This project should also be coordinated with the future planned bridge that will replace the existing Boeckman Road Dip as identified in project UU-01.

Site Plan Evaluation

- The proposed internal roadway network will be consistent with the Frog Pond Area Plan.
- It is recommended that the developer coordinate with the City to construct either a temporary asphalt pedestrian path from the east site border to SW Stafford Road, or a crosswalk across Boeckman Road at the site entrance/Street “A” intersection and a small temporary asphalt pedestrian path just west of Willow Creek Drive.

Access Spacing and Sight Distance

- The Frog Pond Area Plan shows an access to Boeckman Road from this location.
- Prior to occupancy, sight distance at any proposed access points will need to be verified, documented, and stamped by a registered professional Civil or Traffic Engineer licensed in the State of Oregon to assure that buildings, signs or landscaping does not restrict sight distance.

APPENDIX

City of Wilsonville TSP Planned Projects
Frog Pond Area Plan Internal Roadway Network
Existing PM Peak Hour Traffic Counts
Level of Service Descriptions
City of Wilsonville Stage II List
Frog Pond Wolfston Conceptual Plan
HCM Analysis – Existing
HCM Analysis – Existing + Stage II
HCM Analysis – Existing + Project
HCM Analysis – Existing + Project + Stage II

City of Wilsonville TSP Planned Projects

FIGURE 5-4. HIGHER PRIORITY PROJECTS (NORTHEAST QUADRANT)

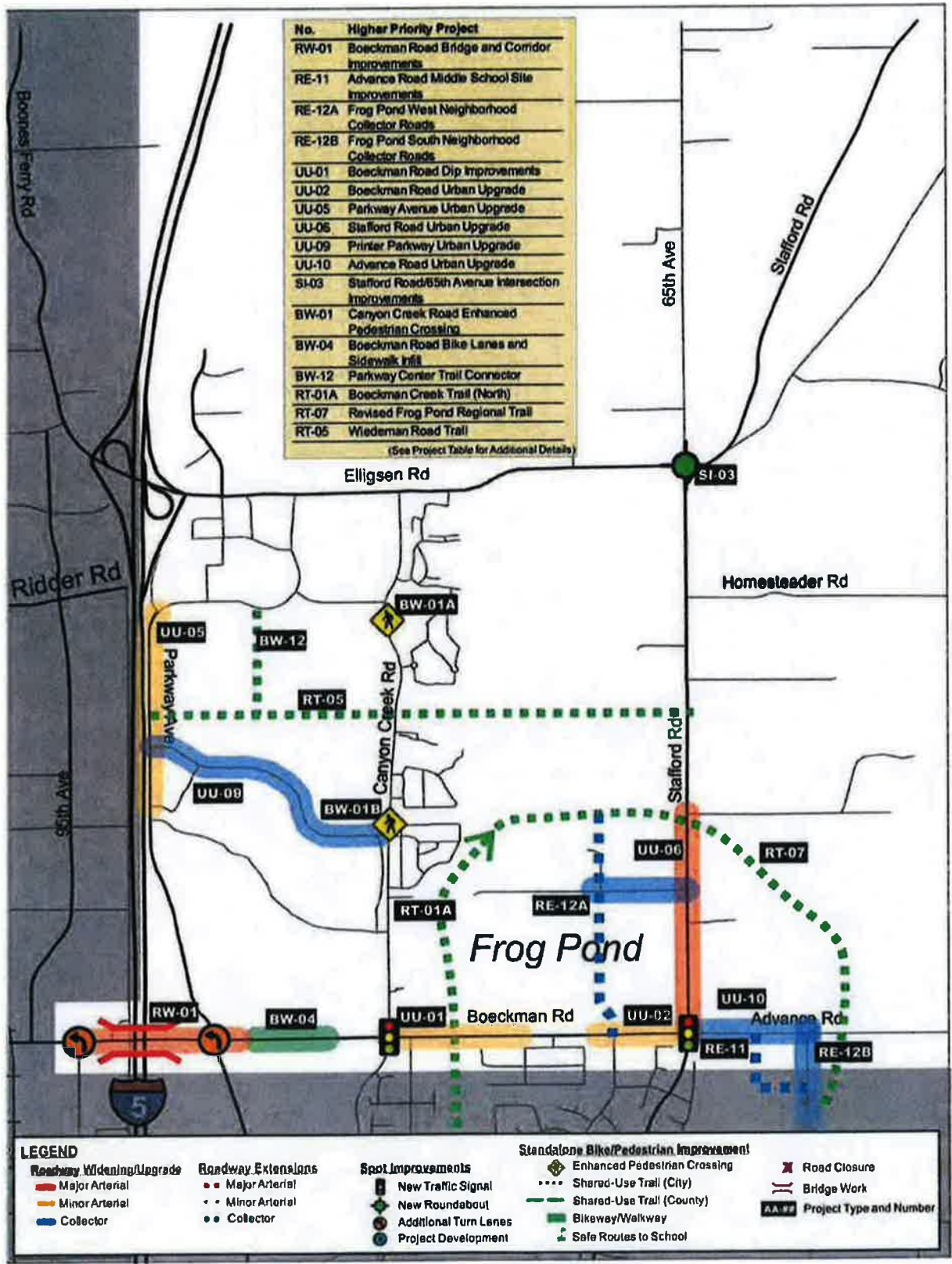
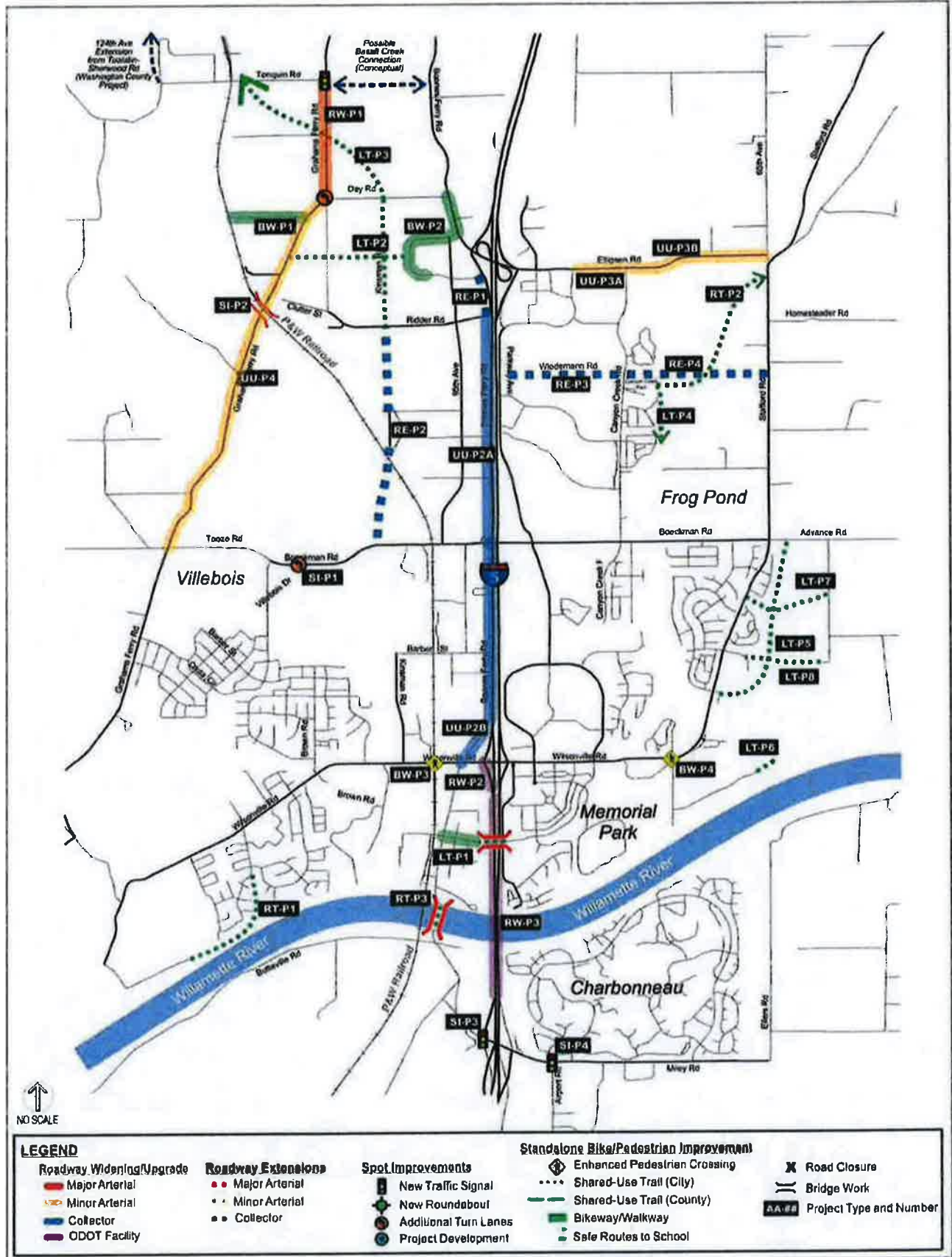


FIGURE 5-7. ADDITIONAL PLANNED PROJECTS



Frog Pond Area Plan Internal Roadway Network

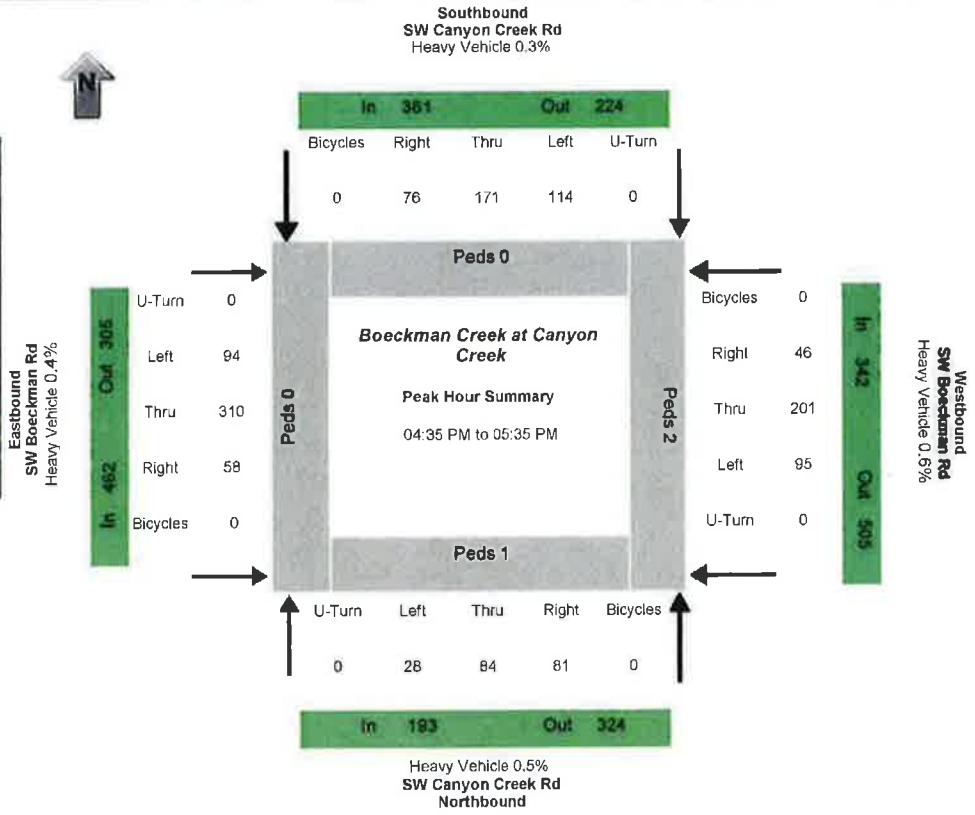
Figure 18. Street Demonstration Plan



Existing PM Peak Hour Traffic Counts

Data Provided by K-D-N.com 603-894-4224

North Street	SW Canyon Creek Rd
E/W Street	SW Boeckman Rd
City, State	Wilsonville OR
Site Notes	
Location	45.317469 - -122.757745
Start Date	Wednesday, November 29, 2017
Start Time	04:00:00 PM
Weather	
Study ID #	
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:00:00 PM
PHF (15-Min Int)	0.90



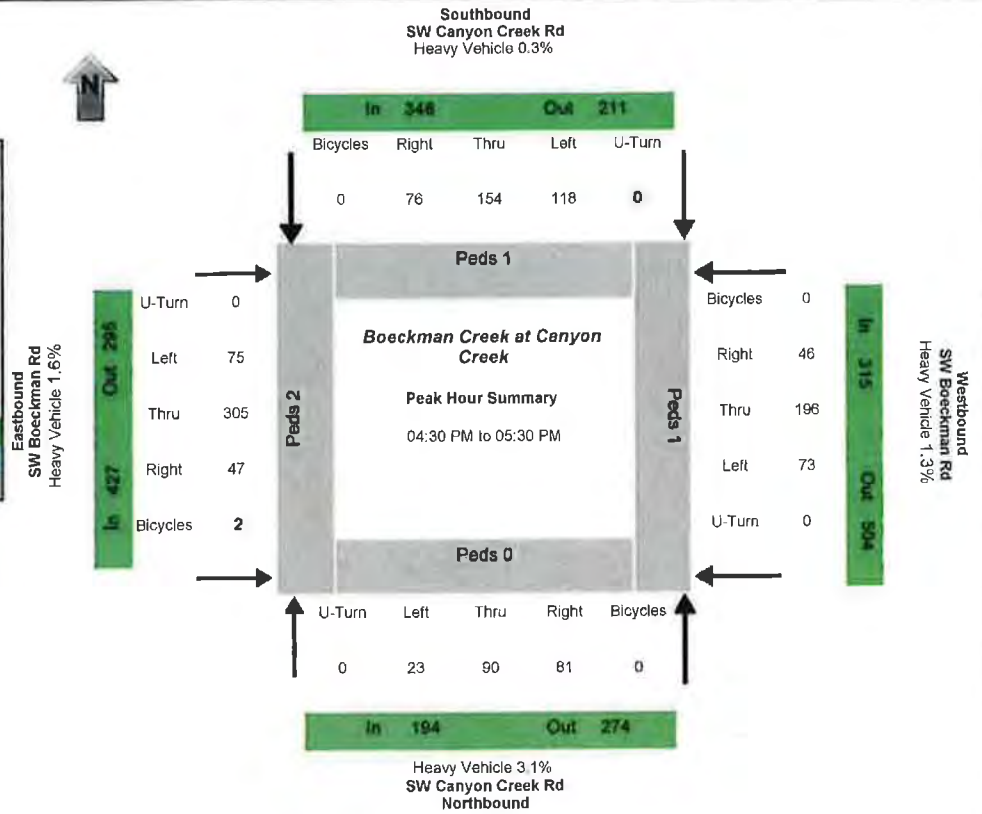
Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
84	81	0	0	114	171	76	0	94	310	58	0	95	201	46	0	193	361	462	342	324	224	305	505
Percent Heavy Vehicles																							
0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	0.0%	0.0%	2.1%	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%	0.0%	0.5%	0.3%	0.4%	0.6%	0.3%	0.9%	1.0%	0.0%

PHV - Bicycles																PHV - Pedestrians					
Northbound				Southbound				Eastbound				Westbound				in Crosswalk					
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	3

All Vehicle Volumes																		
Time	Northbound SW Canyon Creek Rd				Southbound SW Canyon Creek Rd				Eastbound SW Boeckman Rd				Westbound SW Boeckman Rd				15 Min Sum	1 HR Sum
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		
04:00:00 PM	3	7	5	0	4	6	2	0	7	21	2	0	11	11	2	0		
04:05:00 PM	2	11	7	0	8	10	7	0	5	28	4	0	8	18	5	0		
04:10:00 PM	0	6	8	0	10	9	5	0	5	24	4	0	6	9	5	0	285	
04:15:00 PM	4	7	3	0	8	11	5	0	4	23	3	0	7	13	3	0	295	
04:20:00 PM	2	4	6	0	10	8	4	0	5	18	6	0	6	14	2	0	267	
04:25:00 PM	3	7	8	0	6	10	6	0	7	18	5	0	10	18	5	0	279	
04:30:00 PM	0	5	3	0	8	7	3	0	8	24	3	0	2	23	2	0	276	
04:35:00 PM	3	10	10	0	9	18	3	0	10	23	4	0	2	19	3	0	305	
04:40:00 PM	0	3	6	0	5	14	6	0	7	28	4	0	10	17	4	0	306	
04:45:00 PM	1	9	13	0	8	14	5	0	5	29	2	0	6	17	2	0	329	
04:50:00 PM	2	8	6	0	11	16	6	0	7	21	7	0	5	14	2	0	320	
04:55:00 PM	2	5	9	0	11	9	5	0	8	20	4	0	13	13	9	0	324	1164
05:00:00 PM	2	9	9	0	7	13	9	0	6	34	2	0	14	20	6	0	344	1244
05:05:00 PM	1	10	6	0	14	18	9	0	14	29	4	0	5	14	5	0	368	1260
05:10:00 PM	5	3	4	0	8	20	5	0	9	33	6	0	5	18	3	0	379	1286
05:15:00 PM	3	5	5	0	9	17	6	0	10	26	11	0	4	21	2	0	367	1316
05:20:00 PM	2	6	6	0	14	8	9	0	5	23	7	0	7	16	3	0	344	1337
05:25:00 PM	5	8	2	0	7	15	4	0	6	22	2	0	20	16	4	0	334	1343
05:30:00 PM	2	10	5	0	11	9	9	0	7	22	5	0	4	16	3	0	318	1358
05:35:00 PM	1	7	4	0	9	12	8	0	13	25	5	0	2	9	6	0	313	1345
05:40:00 PM	2	8	6	0	9	10	8	0	8	18	2	0	6	11	3	0	295	1332
05:45:00 PM	2	7	2	0	5	17	4	0	7	17	4	0	11	10	4	0	282	1311
05:50:00 PM	2	9	3	0	7	9	6	0	6	19	2	0	9	8	5	0	266	1291
05:55:00 PM	1	4	8	0	6	6	2	0	10	16	4	0	7	9	2	0	250	1258

Data Provided by K-D-N.com 503-594-4224

From Street	SW Canyon Creek Rd
To Street	SW Boeckman Rd
City, State	Wilsonville OR
Site Notes	
Location	45.317469 - -122.757745
Start Date	Thursday, November 30, 2017
Start Time	04:00:00 PM
Weather	
Study ID #	
Peak Hour Start	04:30:00 PM
Peak 15 Min Start	04:30:00 PM
PHF (15-Min Int)	0.88



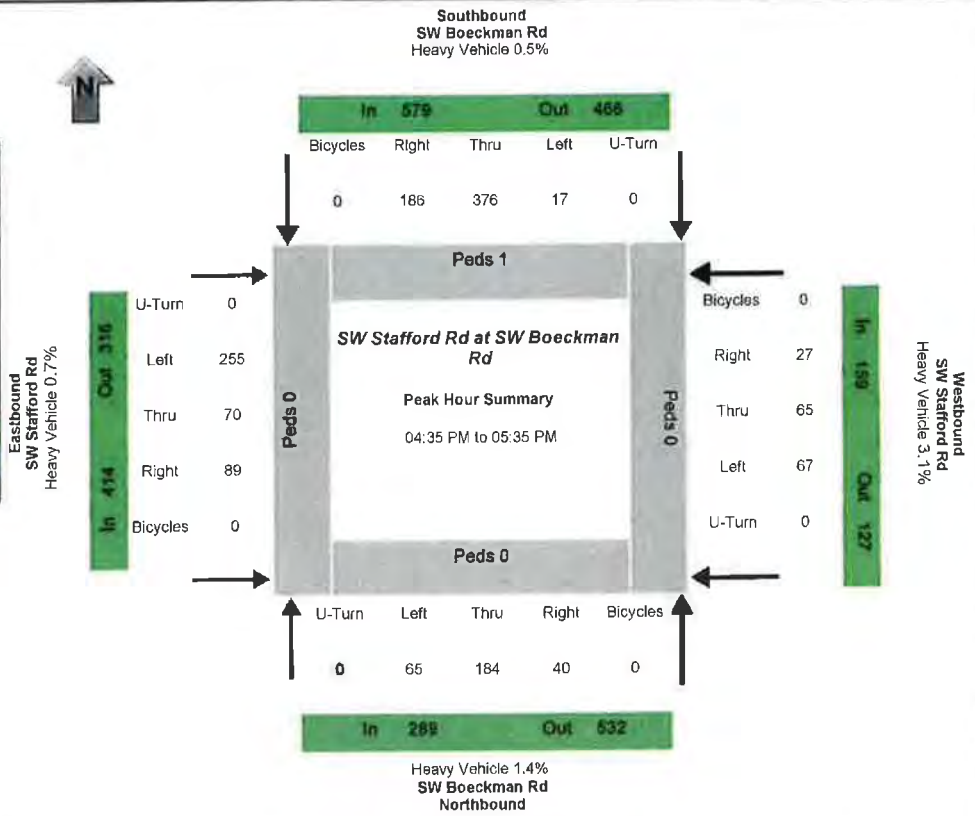
Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering		Leaving					
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
90	81	0		118	154	76	0	75	305	47	0	73	196	46	0	194	348	427	315	274	211	295	504
Percent Heavy Vehicles																							
2.2%	4.9%	0.0%		0.8%	0.0%	0.0%	0.0%	2.7%	1.3%	2.1%	0.0%	0.0%	2.0%	0.0%	0.0%	3.1%	0.3%	1.6%	1.3%	0.4%	1.8%	1.4%	1.8%

PHV - Bicycles														PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound				Sum	In Crosswalk				Sum
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		NB	SB	EB	WB	
0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	0	1	2	1	4

All Vehicle Volumes															15 Min	1 HR		
Time	Northbound SW Canyon Creek Rd				Southbound SW Canyon Creek Rd				Eastbound SW Boeckman Rd				Westbound SW Boeckman Rd				Sum	Sum
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		
04:00:00 PM	3	8	12	0	5	8	3	0	3	19	6	0	5	11	4	0		
04:05:00 PM	1	7	8	0	10	11	3	0	3	32	3	0	7	12	1	0		
04:10:00 PM	4	9	11	0	6	7	4	0	11	11	3	0	3	15	6	0	275	
04:15:00 PM	6	8	7	0	7	13	4	0	6	24	3	0	6	23	3	0	298	
04:20:00 PM	1	6	6	0	8	9	4	0	6	32	10	0	9	12	2	0	305	
04:25:00 PM	4	5	2	0	7	13	2	0	5	32	6	0	1	14	5	0	311	
04:30:00 PM	1	9	11	0	11	13	8	0	8	27	2	0	9	17	3	0	320	
04:35:00 PM	3	10	8	0	7	14	9	0	6	27	7	0	4	22	3	0	340	
04:40:00 PM	4	3	6	0	9	17	8	0	6	26	0	0	10	27	7	0	354	
04:45:00 PM	0	7	6	0	16	7	7	0	3	34	4	0	7	6	7	0	349	
04:50:00 PM	3	6	6	0	7	11	3	0	5	28	7	0	5	15	8	0	326	
04:55:00 PM	0	10	8	0	10	9	2	0	9	26	4	0	3	21	3	0	313	1263
05:00:00 PM	3	2	3	0	9	11	6	0	5	14	1	0	7	16	4	0	269	1258
05:05:00 PM	4	4	5	0	6	17	10	0	7	19	4	0	4	10	4	0	279	1262
05:10:00 PM	0	6	5	0	5	12	5	0	6	35	3	0	2	18	1	0	272	1260
05:15:00 PM	1	7	12	0	15	17	6	0	7	22	6	0	7	7	3	0	301	1259
05:20:00 PM	1	10	7	0	17	12	8	0	6	20	7	0	4	14	1	0	314	1261
05:25:00 PM	3	10	7	0	9	14	6	0	5	27	2	0	11	23	2	0	335	1264
05:30:00 PM	1	4	10	0	10	10	4	0	7	31	8	0	5	12	4	0	332	1271
05:35:00 PM	2	9	4	0	8	11	6	0	7	30	5	0	4	17	4	0	332	1253
05:40:00 PM	1	10	2	0	8	11	8	1	11	12	5	0	5	20	5	0	312	1232
05:45:00 PM	1	9	6	0	9	13	5	0	8	24	1	0	5	16	1	0	304	1226
05:50:00 PM	1	4	5	0	5	8	4	0	3	25	3	0	8	12	3	0	278	1203
05:55:00 PM	0	7	1	0	7	13	3	0	6	17	3	0	3	10	1	0	250	1169

Data Provided by K-D-N.com 503-594-4224

Street	SW Boeckman Rd
E/W street	SW Stafford Rd
City, State	Wilsonville OR
Site Notes	
Location	45.317534 - -122.743731
Start Date	Wednesday, November 29, 2017
Start Time	04:00:00 PM
Weather	
Study ID #	
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	04:35:00 PM
PHF (15-Min Int)	0.90



Peak-Hour Volumes (PHV)

Northbound		Southbound				Eastbound				Westbound				Entering				Leaving					
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
184	40	0	0	17	376	186	0	255	70	89	0	67	65	27	0	289	579	414	159	532	466	316	127

Percent Heavy Vehicles

0.0%	0.5%	7.5%	0.0%	0.0%	0.8%	0.0%	0.0%	0.8%	0.0%	1.1%	0.0%	4.5%	3.1%	0.0%	0.0%	1.4%	0.5%	0.7%	3.1%	1.3%	0.6%	0.6%	2.4%
------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------

PHV - Bicycles

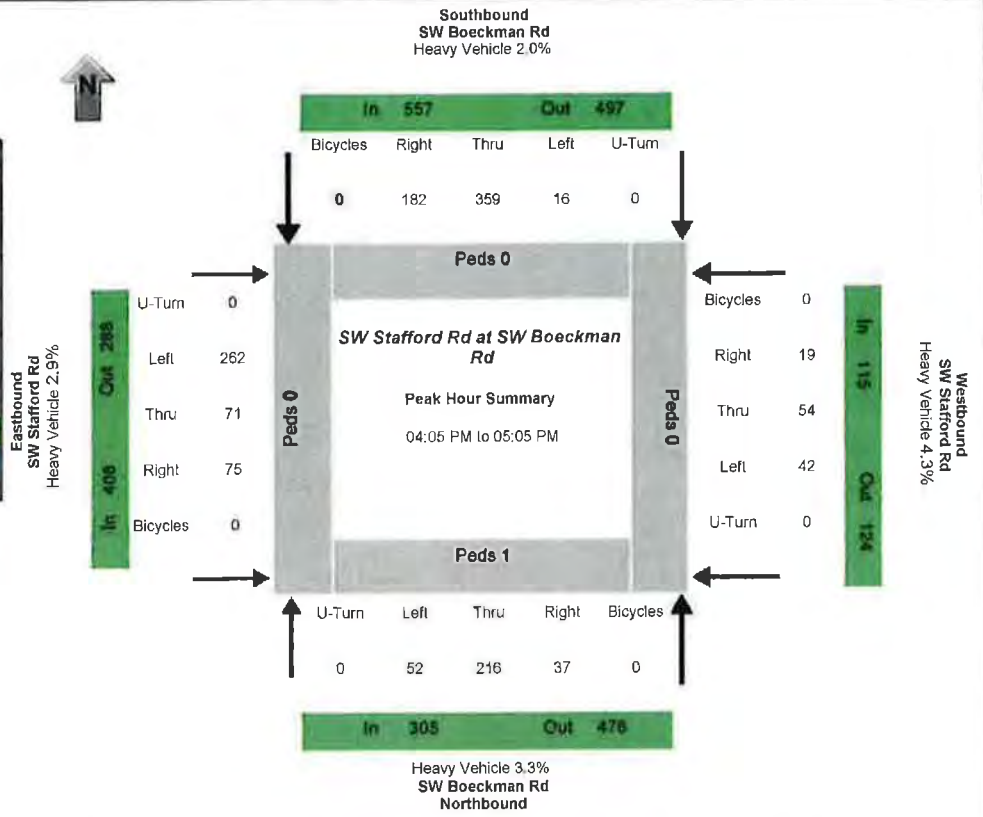
PHV - Bicycles															PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound				In Crosswalk						
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1

All Vehicle Volumes

Time	Northbound SW Boeckman Rd				Southbound SW Boeckman Rd				Eastbound SW Stafford Rd				Westbound SW Stafford Rd				15 Min Sum	1 HR Sum
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		
04:00:00 PM	6	13	4	0	1	31	14	0	18	5	2	0	6	2	6	0		
04:05:00 PM	3	15	2	0	2	32	14	0	22	8	4	0	8	6	1	0		
04:10:00 PM	3	20	3	0	1	17	7	0	22	5	7	0	1	4	1	0	316	
04:15:00 PM	8	12	3	0	1	31	12	0	18	6	6	0	2	5	1	0	313	
04:20:00 PM	5	16	3	0	0	25	19	0	16	7	4	0	1	0	2	0	283	
04:25:00 PM	5	16	3	0	1	29	16	0	20	5	1	0	1	5	0	0	304	
04:30:00 PM	3	16	2	0	1	26	12	0	17	5	6	0	5	4	0	0	296	
04:35:00 PM	6	19	2	0	0	37	12	0	22	4	3	0	7	7	4	0	321	
04:40:00 PM	5	21	6	0	2	37	18	0	21	4	1	0	5	4	4	0	347	
04:45:00 PM	11	14	6	0	2	31	10	0	28	15	12	0	8	11	3	0	408	
04:50:00 PM	2	14	5	0	3	25	8	0	17	10	10	0	7	2	2	0	353	
04:55:00 PM	8	19	3	0	1	24	25	0	19	4	7	0	4	5	1	0	375	1342
05:00:00 PM	3	10	2	0	1	32	16	0	22	5	6	0	8	11	2	0	344	1353
05:05:00 PM	7	16	1	0	3	31	10	0	28	4	6	0	7	4	3	0	356	1363
05:10:00 PM	4	12	4	0	0	23	21	0	25	3	10	0	3	4	4	0	349	1375
05:15:00 PM	1	16	4	0	1	30	17	0	23	3	3	0	12	4	1	0	344	1384
05:20:00 PM	3	13	0	0	2	37	17	0	23	12	11	0	2	5	0	0	352	1412
05:25:00 PM	6	27	9	0	2	31	24	0	9	2	8	0	0	6	0	0	365	1436
05:30:00 PM	7	11	0	0	0	38	9	0	16	4	7	0	3	2	3	0	353	1441
05:35:00 PM	5	13	4	0	0	27	12	0	10	2	11	0	3	2	0	0	317	1408
05:40:00 PM	2	14	2	0	1	30	13	0	19	3	13	0	3	5	0	0	296	1385
05:45:00 PM	9	2	2	0	1	29	11	0	12	4	4	0	3	0	1	0	272	1313
05:50:00 PM	3	12	1	0	1	25	18	0	9	3	3	0	3	3	0	0	264	1289
05:55:00 PM	2	8	1	0	0	19	10	0	9	4	4	0	1	2	0	0	219	1229

Data Provided by K-D-N.com 603-694-4224

North Street	SW Boeckman Rd
E/W Street	SW Stafford Rd
City, State	Wilsonville OR
Site Notes	
Location	45.317534 - -122.743731
Start Date	Thursday, November 30, 2017
Start Time	04:00:00 PM
Weather	
Study ID #	
Peak Hour Start	04:05:00 PM
Peak 15 Min Start	04:35:00 PM
PHF (15-Min Int)	0.92



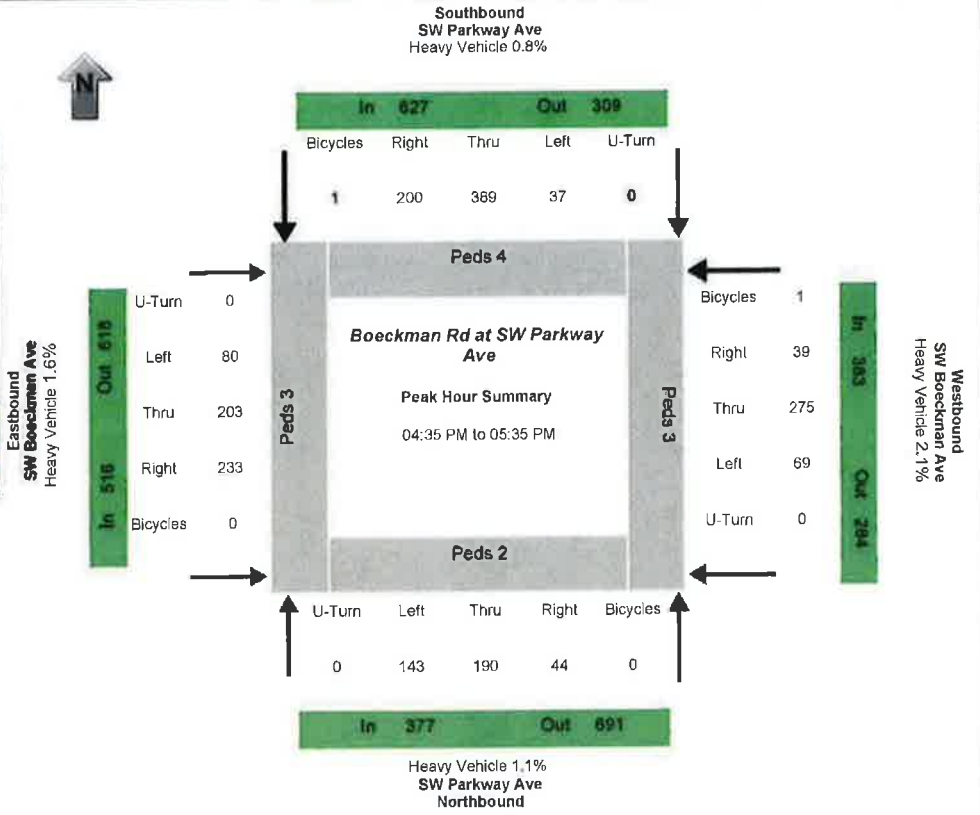
Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering		Leaving					
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	216	37	0	16	359	182	0	262	71	75	0	42	54	19	0	305	557	408	115	476	497	288	124
Percent Heavy Vehicles																							
0.0%	1.9%	5.4%	0.0%	0.0%	1.4%	3.3%	0.0%	1.5%	5.6%	5.3%	0.0%	7.1%	1.9%	5.3%	0.0%	3.3%	2.0%	2.9%	4.3%	2.5%	1.8%	3.8%	4.8%

PHV - Bicycles																PHV - Pedestrians					
Northbound				Southbound				Eastbound				Westbound				in Crosswalk					
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1

All Vehicle Volumes																		
Time	Northbound SW Boeckman Rd				Southbound SW Boeckman Rd				Eastbound SW Stafford Rd				Westbound SW Stafford Rd				15 Min Sum	1 HR Sum
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		
04:00:00 PM	5	12	3	0	1	20	12	0	17	6	1	0	5	1	5	0		
04:05:00 PM	5	11	5	0	1	22	13	0	23	12	5	0	6	11	1	0		
04:10:00 PM	5	25	1	0	3	24	16	0	23	7	5	0	3	3	0	0	318	
04:15:00 PM	3	18	3	0	1	28	16	0	19	3	9	0	4	7	4	0	343	
04:20:00 PM	2	21	1	0	1	42	13	0	21	5	3	0	3	3	0	0	346	
04:25:00 PM	2	13	6	0	1	35	14	0	27	7	3	0	1	2	3	0	348	
04:30:00 PM	5	15	2	0	1	37	18	0	18	9	7	0	3	1	0	0	347	
04:35:00 PM	6	25	3	0	0	27	20	0	28	4	3	0	5	7	2	0	357	
04:40:00 PM	6	20	4	0	3	36	20	0	23	2	4	0	3	5	1	0	370	
04:45:00 PM	5	22	1	0	1	35	11	0	27	5	9	0	4	2	1	0	378	
04:50:00 PM	4	16	3	0	1	23	12	0	24	3	9	0	2	7	3	0	357	
04:55:00 PM	4	15	2	0	3	28	21	0	20	5	8	0	0	2	1	0	339	1372
05:00:00 PM	4	14	6	0	0	28	8	0	13	6	10	0	8	3	3	0	317	1385
05:05:00 PM	4	10	8	0	0	24	10	0	19	3	4	0	5	2	2	0	301	1361
05:10:00 PM	2	10	5	0	0	36	19	0	25	2	4	0	9	3	1	0	308	1362
05:15:00 PM	3	17	2	0	1	25	8	0	19	4	10	0	4	6	4	0	310	1352
05:20:00 PM	4	20	5	0	1	40	16	0	22	6	7	0	2	3	0	0	345	1360
05:25:00 PM	6	15	6	0	0	28	24	0	14	7	8	0	3	1	0	0	341	1358
05:30:00 PM	2	15	3	0	3	19	13	0	27	3	9	0	7	3	0	0	342	1347
05:35:00 PM	2	16	2	0	1	27	15	0	27	2	5	0	2	0	0	0	315	1318
05:40:00 PM	9	15	2	0	2	24	17	0	13	1	4	0	3	2	2	0	297	1285
05:45:00 PM	4	11	1	0	1	29	13	0	20	0	8	0	1	1	1	0	283	1252
05:50:00 PM	4	12	5	0	1	27	14	0	8	3	18	0	4	2	1	0	283	1244
05:55:00 PM	2	13	2	0	0	22	6	0	9	3	9	0	2	2	0	0	261	1207

Data Provided by K-D-N.com 503-594-4224

W. street	SW Parkway Ave
E/W street	SW Boeckman Ave
City, State	Wilsonville OR
Site Notes	
Location	45.317437 - -122.765886
Start Date	Wednesday, January 03, 2018
Start Time	04:00:00 PM
Weather	
Study ID #	
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:05:00 PM
PHF (15-Min Int)	0.82



Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering		Leaving					
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
190	44	0	0	37	389	200	0	80	203	233	0	69	275	39	0	377	626	516	383	691	309	618	284

Percent Heavy Vehicles																							
Northbound				Southbound				Eastbound				Westbound				Entering		Leaving					
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
1.6%	0.0%	0.0%	0.0%	0.0%	1.0%	0.5%	0.0%	1.3%	1.5%	1.7%	0.0%	2.9%	2.2%	0.0%	0.0%	1.1%	0.8%	1.6%	2.1%	1.4%	1.3%	1.3%	1.1%

PHV - Bicycles																PHV - Pedestrians					
Northbound				Southbound				Eastbound				Westbound				In Crosswalk					
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum
0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	2	2	4	3	3	12

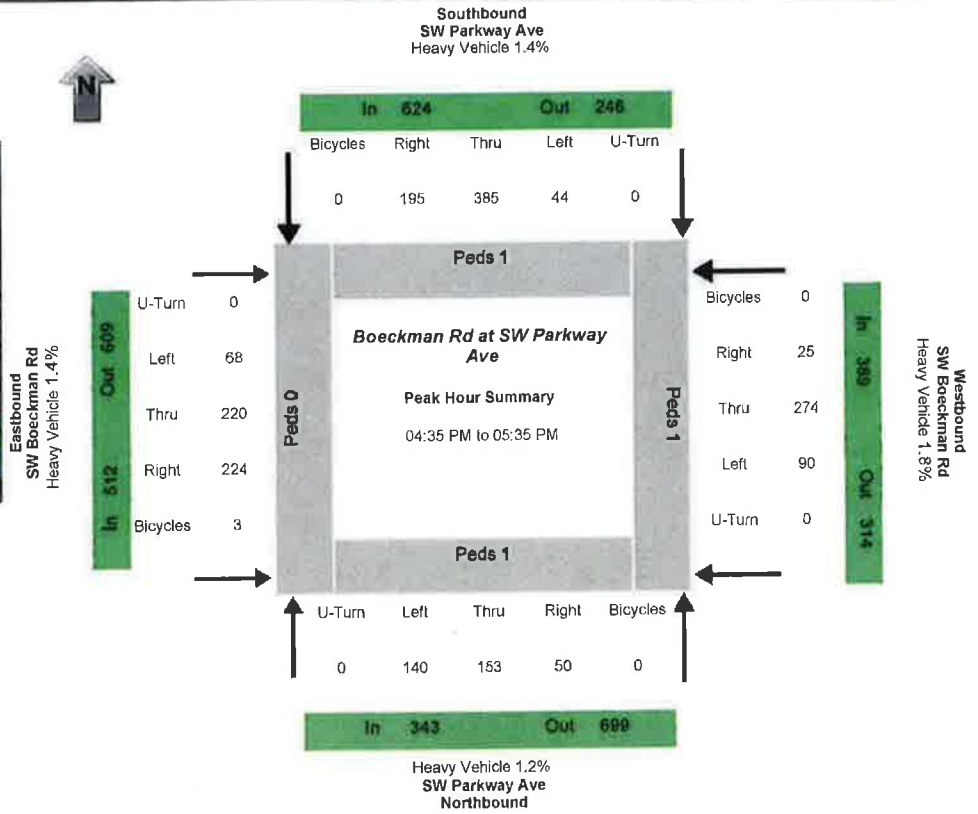
All Vehicle Volumes																		
Time	Northbound SW Parkway Ave				Southbound SW Parkway Ave				Eastbound SW Boeckman Ave				Westbound SW Boeckman Ave				15 Min Sum	1 HR Sum
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		
04:00:00 PM	8	15	1	0	3	15	9	0	7	21	22	0	6	20	3	0		
04:05:00 PM	17	15	5	0	7	24	14	0	7	20	16	0	5	11	6	0		
04:10:00 PM	15	14	4	0	1	21	14	0	9	18	10	0	10	19	0	0	412	
04:15:00 PM	13	20	4	0	3	20	12	0	8	23	20	0	11	24	3	0	443	
04:20:00 PM	7	13	2	0	1	19	12	0	6	26	20	0	7	26	0	0	435	
04:25:00 PM	12	12	3	0	2	45	14	0	3	12	12	0	4	10	3	0	432	
04:30:00 PM	10	19	5	0	5	24	8	0	4	20	21	0	4	15	5	0	411	
04:35:00 PM	5	15	4	0	2	38	18	0	8	21	29	0	10	23	4	0	447	
04:40:00 PM	12	12	4	0	3	32	8	0	3	18	26	0	4	11	1	0	447	
04:45:00 PM	19	20	3	0	3	26	13	0	4	12	22	0	9	25	2	0	465	
04:50:00 PM	8	13	4	0	1	24	17	0	11	16	21	0	7	25	3	0	440	
04:55:00 PM	7	26	2	0	1	38	25	0	4	15	16	0	4	19	2	0	465	1785
05:00:00 PM	13	17	4	0	3	35	14	0	8	9	23	0	3	26	3	0	455	1784
05:05:00 PM	16	21	3	0	1	35	18	0	7	14	24	0	5	23	6	0	488	1810
05:10:00 PM	15	13	3	0	4	36	20	0	5	22	13	0	6	34	4	0	508	1852
05:15:00 PM	15	20	3	0	4	25	26	0	4	14	14	0	5	32	4	0	516	1857
05:20:00 PM	16	18	4	0	2	24	19	0	12	25	14	0	3	27	2	0	506	1881
05:25:00 PM	11	9	4	0	9	34	13	0	4	23	15	0	4	10	3	0	458	1868
05:30:00 PM	6	9	6	0	4	45	9	0	10	16	16	0	7	20	5	0	456	1902
05:35:00 PM	4	11	5	0	8	32	19	0	8	15	16	0	3	29	1	0	444	1878
05:40:00 PM	7	10	2	0	2	26	14	0	3	15	12	0	14	24	4	0	438	1879
05:45:00 PM	7	20	6	0	1	35	13	0	4	9	16	0	8	24	2	0	427	1864
05:50:00 PM	11	12	4	0	1	38	15	0	5	12	13	0	6	27	3	0	423	1861
05:55:00 PM	7	12	4	0	4	38	10	0	3	17	17	0	11	13	0	0	426	1840



KEY DATA NETWORK

Data Provided by K-D-N.com 803-694-4224

From Street	SW Parkway Ave
E/W Street	SW Boeckman Rd
City, State	Wilsonville OR
Site Notes	
Location	45.317437 -122.785886
Start Date	Thursday, January 04, 2018
Start Time	04:00:00 PM
Weather	
Study ID #	
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	04:40:00 PM
PHF (15-Min Int)	0.96



Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
153	50	0	0	44	385	195	0	68	220	224	0	90	274	25	0	343	624	512	389	699	246	609	314
Percent Heavy Vehicles																							
2.0%	0.0%	0.0%	0.0%	0.0%	1.8%	1.0%	0.0%	2.9%	0.8%	1.3%	0.0%	2.2%	1.8%	0.0%	0.0%	1.2%	1.4%	1.4%	1.8%	1.7%	2.0%	1.3%	0.6%

PHV- Bicycles																PHV - Pedestrians					
Northbound				Southbound				Eastbound				Westbound				in Crosswalk					
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum
0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3	1	1	0	1	3

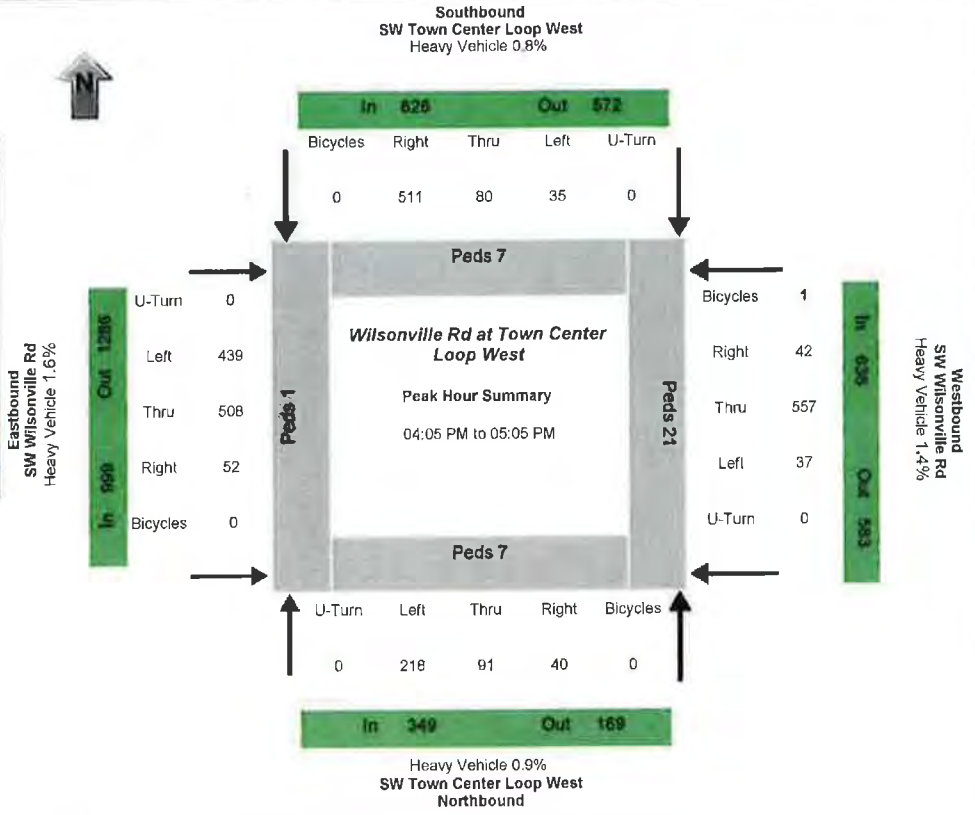
Time	All Vehicle Volumes																				15 Min Sum	1 HR Sum
	Northbound SW Parkway Ave				Southbound SW Parkway Ave				Eastbound SW Boeckman Rd				Westbound SW Boeckman Rd									
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn						
04:00:00 PM	18	7	4	0	3	20	11	0	15	18	17	0	2	14	5	0						
04:05:00 PM	1	14	9	0	3	42	14	0	10	21	17	0	5	18	2	0						
04:10:00 PM	16	7	4	0	6	20	9	0	10	19	21	0	3	22	1	0	429					
04:15:00 PM	11	13	3	0	3	32	20	0	6	15	17	0	5	19	0	0	438					
04:20:00 PM	13	7	4	0	0	27	8	0	11	25	17	0	7	18	0	0	419					
04:25:00 PM	9	9	6	0	3	25	16	0	5	25	13	0	3	20	3	0	418					
04:30:00 PM	9	13	2	0	2	26	15	0	11	15	19	0	7	17	3	0	413					
04:35:00 PM	10	9	4	0	3	24	17	0	11	24	16	0	12	18	3	0	429					
04:40:00 PM	15	16	9	0	12	34	15	0	4	15	16	0	10	23	1	0	462					
04:45:00 PM	11	8	3	0	2	38	19	0	8	24	20	0	5	17	3	0	476					
04:50:00 PM	18	20	3	0	4	28	17	0	6	20	17	0	7	25	1	0	488					
04:55:00 PM	14	13	5	0	2	34	10	0	7	19	16	0	9	19	1	0	465	1774				
05:00:00 PM	19	19	2	0	3	27	21	0	7	17	15	0	4	25	1	0	473	1768				
05:05:00 PM	8	10	3	0	3	28	18	0	4	20	29	0	9	29	7	0	477	1811				
05:10:00 PM	14	16	1	0	2	38	21	0	2	13	17	0	4	23	2	0	479	1824				
05:15:00 PM	8	10	6	0	4	43	19	0	3	16	19	0	11	22	1	0	483	1844				
05:20:00 PM	7	12	4	0	4	35	13	0	7	28	21	0	5	22	0	0	471	1893				
05:25:00 PM	7	7	5	0	1	28	13	0	5	18	23	0	7	27	0	0	461	1897				
05:30:00 PM	9	15	5	0	4	32	12	0	6	8	15	0	7	24	3	0	437	1858				
05:35:00 PM	12	14	5	0	1	23	16	0	7	19	12	0	5	20	1	0	416	1850				
05:40:00 PM	10	12	4	0	8	27	16	0	4	13	13	0	8	16	1	0	407	1812				
05:45:00 PM	7	8	2	0	3	25	15	0	7	17	10	0	6	17	3	0	387	1780				
05:50:00 PM	9	5	5	0	2	17	12	0	4	20	10	0	10	19	1	0	366	1730				
05:55:00 PM	7	7	2	0	3	33	12	0	3	10	18	0	5	25	1	0	360	1707				

K-D-N

KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224

North Street	SW Town Center Loop West
E/W street	SW Wilsonville Rd
City, State	Wilsonville OR
Site Notes	
Location	45.30292 - -122.765886
Start Date	Wednesday, January 03, 2018
Start Time	04:00:00 PM
Weather	
Study ID #	
Peak Hour Start	04:05:00 PM
Peak 15 Min Start	04:35:00 PM
PHF (15-Min Int)	0.98



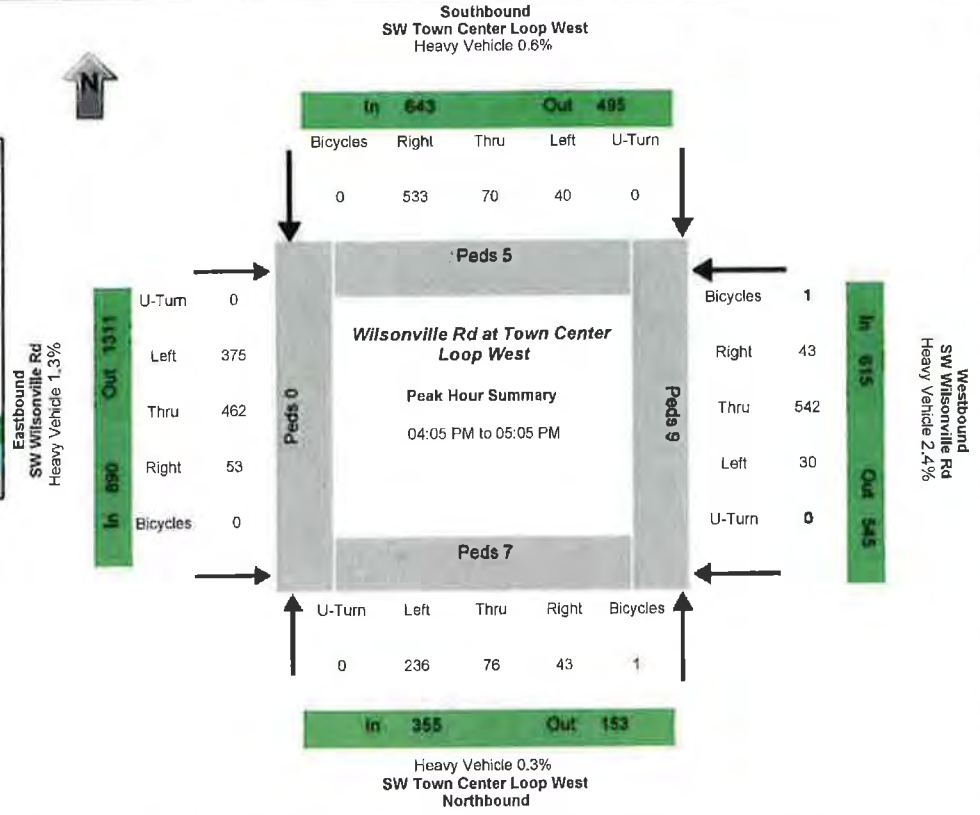
Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
91	40	0	0	35	80	511	0	439	508	52	0	37	557	42	0	349	626	999	636	169	572	1286	583
Percent Heavy Vehicles																							
0.0%	1.1%	0.0%	0.0%	0.0%	1.3%	0.8%	0.0%	1.6%	1.8%	0.0%	0.0%	0.0%	1.6%	0.0%	0.0%	0.9%	0.8%	1.6%	1.4%	0.8%	1.4%	1.2%	1.5%

PHV- Bicycles														PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound				in Crosswalk					
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	7	7	1	21	36

All Vehicle Volumes																		
Time	Northbound SW Town Center Loop West				Southbound SW Town Center Loop West				Eastbound SW Wilsonville Rd				Westbound SW Wilsonville Rd				15 Min Sum	1 HR Sum
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		
04:00:00 PM	14	8	1	0	2	4	28	0	35	44	0	0	7	53	3	0		
04:05:00 PM	15	3	5	0	4	5	52	0	36	42	5	0	6	46	1	0		
04:10:00 PM	29	14	2	0	2	8	50	0	37	38	3	0	2	35	0	0	639	
04:15:00 PM	15	2	7	0	0	6	66	0	33	36	2	0	2	39	4	0	651	
04:20:00 PM	15	4	1	0	4	4	34	0	31	40	5	0	1	38	2	0	630	
04:25:00 PM	22	8	1	0	6	8	46	0	60	63	3	0	6	36	3	0	654	
04:30:00 PM	18	6	4	0	2	10	32	0	17	40	3	0	3	46	4	0	628	
04:35:00 PM	21	9	3	0	3	8	37	0	38	51	3	0	3	54	4	0	659	
04:40:00 PM	6	3	4	0	2	9	49	0	50	53	6	0	6	44	4	0	650	
04:45:00 PM	24	11	1	0	2	2	52	0	39	33	4	0	4	29	2	0	668	
04:50:00 PM	20	12	2	0	5	9	33	0	33	38	7	0	1	60	7	0	685	
04:55:00 PM	17	7	6	0	1	2	31	0	36	45	7	0	3	52	7	0	646	2591
05:00:00 PM	16	12	2	0	4	11	49	0	39	40	6	0	0	36	4	0	663	2610
05:05:00 PM	23	2	2	0	4	8	53	0	25	42	6	0	3	36	5	0	645	2599
05:10:00 PM	16	6	5	0	2	7	48	0	26	46	3	0	4	49	2	0	641	2593
05:15:00 PM	9	1	5	0	2	8	54	0	29	41	5	0	7	42	0	0	626	2585
05:20:00 PM	13	6	1	0	3	9	56	0	30	35	4	0	7	35	0	0	616	2585
05:25:00 PM	17	5	2	0	3	9	31	0	28	31	6	0	2	41	0	0	577	2516
05:30:00 PM	24	6	1	0	0	6	37	0	19	46	3	0	1	46	1	0	566	2523
05:35:00 PM	16	3	7	0	5	10	41	0	33	31	7	0	7	48	0	0	575	2501
05:40:00 PM	21	8	2	0	3	7	40	0	34	44	1	0	3	41	4	0	608	2474
05:45:00 PM	11	6	3	0	3	3	28	0	33	37	6	0	1	48	7	0	602	2457
05:50:00 PM	24	7	1	0	7	1	34	0	28	41	9	0	3	40	1	0	590	2426
05:55:00 PM	8	6	2	0	7	5	41	0	23	37	5	0	4	60	3	0	583	2409

Data Provided by K-D-N.com 503-694-4224

North Street	SW Town Center Loop West
E/W Street	SW Wilsonville Rd
City, State	Wilsonville OR
Site Notes	
Location	45.302881 - -122.765756
Start Date	Thursday, January 04, 2018
Start Time	04:00:00 PM
Weather	
Study ID #	
Peak Hour Start	04:05:00 PM
Peak 15 Min Start	04:05:00 PM
PHF (15-Min Int)	0.96



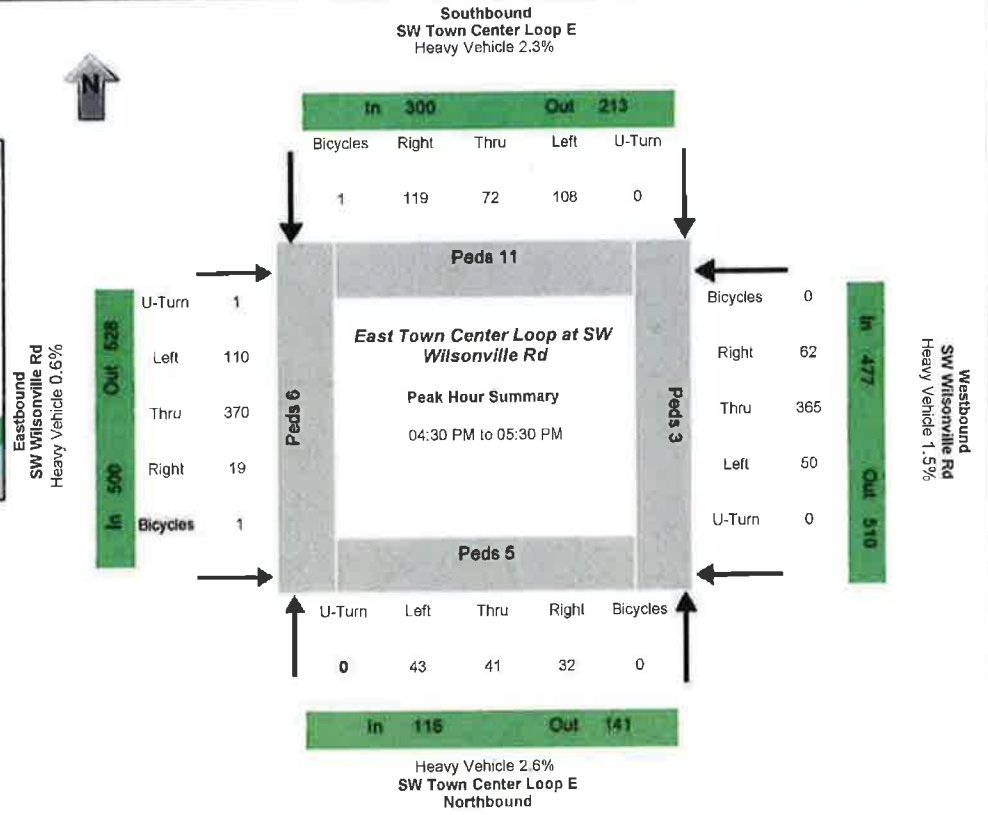
Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
76	43	0	0	40	70	533	0	375	462	53	0	30	542	43	0	355	643	890	615	153	494	1311	545
Percent Heavy Vehicles																							
0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.8%	0.0%	0.5%	2.2%	0.0%	0.0%	0.0%	2.6%	2.3%	0.0%	0.3%	0.6%	1.3%	2.4%	0.0%	0.6%	1.4%	1.8%

PHV - Bicycles																PHV - Pedestrians					
Northbound				Southbound				Eastbound				Westbound				in Crosswalk					
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum
0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	7	5	0	9	21

All Vehicle Volumes																		
Time	Northbound SW Town Center Loop West				Southbound SW Town Center Loop West				Eastbound SW Wilsonville Rd				Westbound SW Wilsonville Rd				15 Min Sum	1 HR Sum
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		
04:00:00 PM	23	6	1	0	1	11	36	0	23	47	6	0	2	35	2	0		
04:05:00 PM	28	7	4	0	2	4	35	0	29	30	5	0	1	50	5	0		
04:10:00 PM	19	6	3	0	2	6	48	0	44	40	3	0	4	54	2	0	634	
04:15:00 PM	22	6	2	0	3	3	53	0	31	40	4	0	4	42	3	0	654	
04:20:00 PM	18	8	5	0	2	5	36	0	24	38	2	0	2	42	7	0	631	
04:25:00 PM	20	5	3	0	3	5	40	0	24	39	2	0	3	58	5	0	606	
04:30:00 PM	15	7	3	0	1	10	50	0	34	37	4	0	1	42	2	0	599	
04:35:00 PM	20	7	3	0	3	9	51	0	34	50	8	0	4	27	1	0	630	
04:40:00 PM	21	9	4	0	6	8	47	0	24	32	2	0	3	54	4	0	638	
04:45:00 PM	17	5	2	0	4	5	26	0	32	43	5	0	2	48	2	0	623	
04:50:00 PM	18	4	7	0	6	7	50	0	46	45	5	0	0	44	3	0	636	
04:55:00 PM	16	4	4	0	2	5	54	0	31	31	3	0	4	31	4	0	613	2491
05:00:00 PM	26	8	4	0	4	3	43	0	22	37	10	0	2	42	4	0	627	2503
05:05:00 PM	14	5	1	0	3	5	50	0	31	42	3	0	4	45	5	0	602	2501
05:10:00 PM	17	6	2	0	4	6	53	0	33	45	2	0	2	47	2	0	632	2489
05:15:00 PM	21	5	0	0	2	13	45	0	20	25	6	0	5	37	4	0	610	2459
05:20:00 PM	16	1	4	0	2	8	34	0	40	56	2	0	1	41	4	0	611	2481
05:25:00 PM	13	7	5	0	3	10	35	0	29	41	5	0	4	47	1	0	592	2475
05:30:00 PM	23	4	3	0	3	4	35	0	30	32	8	0	1	34	4	0	590	2450
05:35:00 PM	18	5	9	0	5	4	40	0	23	28	5	0	0	31	4	0	553	2404
05:40:00 PM	22	6	8	0	4	6	36	0	38	43	7	0	6	46	2	0	577	2414
05:45:00 PM	15	5	2	0	2	5	38	0	45	29	4	0	2	32	4	0	579	2406
05:50:00 PM	17	4	3	0	4	8	40	0	28	42	3	0	5	21	3	0	585	2351
05:55:00 PM	20	2	2	0	4	7	39	0	25	42	5	0	2	33	6	0	548	2349

Date Provided by K-D-N.com 603-694-4224

W/O Street	SW Town Center Loop E
E/W Street	SW Wilsonville Rd
City, State	Wilsonville OR
Site Notes	
Location	45.30295 -122.760307
Start Date	Wednesday, January 03, 2016
Start Time	04:00:00 PM
Weather	
Study ID #	
Peak Hour Start	04:30:00 PM
Peak 15 Min Start	04:45:00 PM
PHF (15-Min Int)	0.96



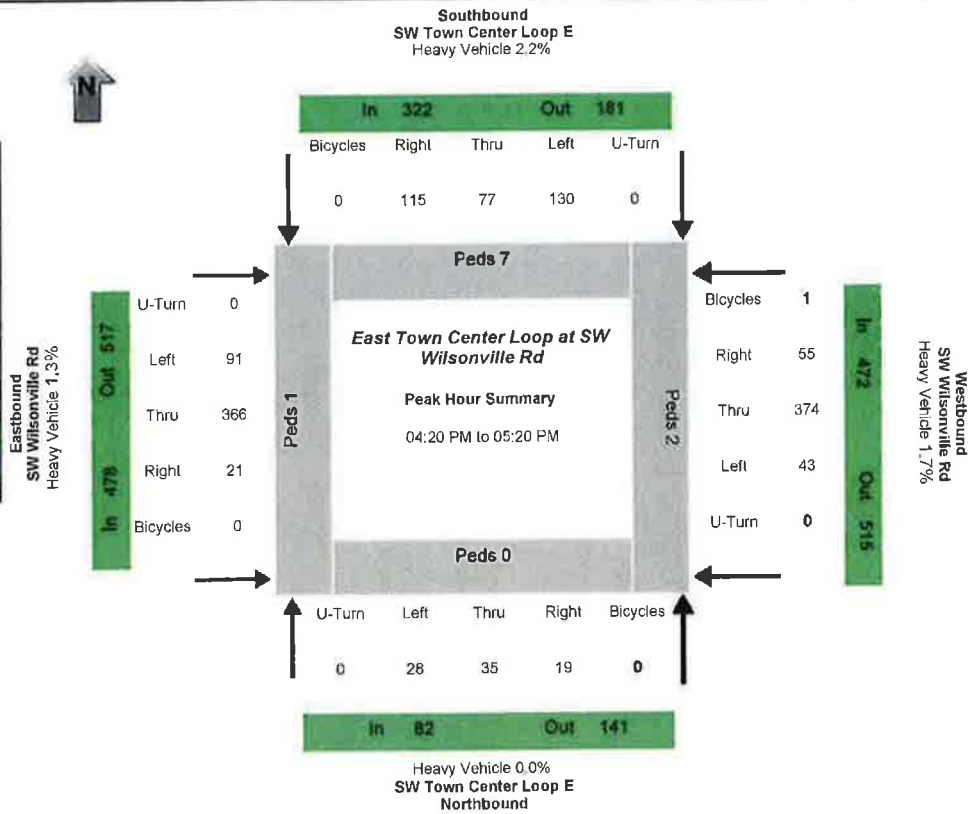
Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering		Leaving					
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
41	32	0		108	72	119	0	110	370	19	1	50	365	62	0	116	299	500	477	141	213	528	510
Percent Heavy Vehicles																							
0.0%	2.4%	6.3%	0.0%	2.8%	2.8%	1.7%	0.0%	1.8%	0.3%	0.0%	0.0%	2.0%	0.8%	4.8%	0.0%	2.6%	2.3%	0.6%	1.5%	2.1%	2.8%	0.9%	1.2%

PHV- Bicycles														PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound				in Crosswalk					
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum
0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	2	5	11	6	3	25

Time	Northbound SW Town Center Loop E				Southbound SW Town Center Loop E				Eastbound SW Wilsonville Rd				Westbound SW Wilsonville Rd				15 Min Sum	1 HR Sum
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		
04:00:00 PM	4	1	4	0	5	5	21	0	5	34	1	0	3	33	6	0		
04:05:00 PM	2	2	2	0	8	1	12	0	3	28	2	0	6	31	7	0		
04:10:00 PM	4	3	3	0	13	9	5	0	11	15	5	0	2	28	4	0	328	
04:15:00 PM	1	4	2	0	10	4	19	0	17	28	1	0	0	20	6	0	318	
04:20:00 PM	1	4	2	0	6	4	10	0	10	33	3	0	5	33	7	0	332	
04:25:00 PM	3	2	1	0	7	4	9	0	13	21	1	0	5	44	3	0	343	
04:30:00 PM	9	6	0	0	13	7	10	0	10	29	3	0	5	26	3	0	352	
04:35:00 PM	4	5	0	0	2	5	10	0	6	43	0	0	3	25	5	0	342	
04:40:00 PM	0	1	1	0	7	6	11	0	7	31	2	0	2	28	6	0	334	
04:45:00 PM	6	6	3	0	6	7	14	0	9	15	1	0	5	36	0	0	330	
04:50:00 PM	4	2	1	0	12	6	10	0	11	33	4	0	4	39	4	0	351	
04:55:00 PM	6	1	3	0	9	4	11	0	9	34	2	0	2	33	4	0	364	1369
05:00:00 PM	0	3	7	0	8	5	8	0	7	37	1	0	3	24	4	0	354	1354
05:05:00 PM	3	2	2	0	13	7	6	0	9	25	2	0	1	35	7	0	337	1363
05:10:00 PM	3	3	3	0	9	9	13	0	10	39	2	0	7	27	4	0	348	1359
05:15:00 PM	2	3	1	0	4	8	11	0	8	29	2	0	4	24	8	0	344	1380
05:20:00 PM	5	5	6	0	12	3	7	0	12	24	0	1	4	27	2	0	341	1371
05:25:00 PM	1	3	5	0	13	3	8	0	12	32	0	0	10	41	6	0	348	1392
05:30:00 PM	0	0	3	0	5	0	6	0	8	21	2	0	7	34	5	0	334	1362
05:35:00 PM	2	2	2	0	9	12	11	0	8	30	0	0	6	34	7	0	348	1377
05:40:00 PM	2	0	2	0	11	11	12	0	8	29	2	0	2	32	2	0	327	1385
05:45:00 PM	1	1	0	0	7	4	6	0	7	32	2	0	3	27	4	0	330	1362
05:50:00 PM	1	3	3	0	8	5	6	0	2	38	1	0	3	27	4	0	308	1334
05:55:00 PM	0	4	4	0	8	11	14	0	6	26	3	0	2	42	4	0	319	1340

Data Provided by K-D-N.com 503-594-4224

North Street	SW Town Center Loop E
E/W Street	SW Wilsonville Rd
City, State	Wilsonville OR
Site Notes	
Location	45,30295 - -122.760307
Start Date	Thursday, January 04, 2018
Start Time	04:00:00 PM
Weather	
Study ID #	
Peak Hour Start	04:20:00 PM
Peak 15 Min Start	04:35:00 PM
PHF (15-Min Int)	0.98



Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering		Leaving					
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
35	19	0	0	130	77	115	0	91	366	21	0	43	374	55	0	82	322	478	472	141	181	517	515

Percent Heavy Vehicles																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0.0%	0.0%	0.0%	0.0%	1.5%	1.3%	3.5%	0.0%	4.4%	0.6%	0.0%	0.0%	2.3%	1.3%	3.6%	0.0%	0.0%	2.2%	1.3%	1.7%	1.4%	3.3%	1.7%	0.8%

PHV- Bicycles														PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound				in Crosswalk		Sum			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	7	1	2	10

All Vehicle Volumes																		
Time	Northbound SW Town Center Loop E				Southbound SW Town Center Loop E				Eastbound SW Wilsonville Rd				Westbound SW Wilsonville Rd				15 Min Sum	1 HR Sum
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		
04:00:00 PM	1	3	3	0	5	3	9	0	6	28	2	0	2	29	4	0		
04:05:00 PM	1	3	3	0	11	4	13	0	6	22	3	0	3	41	4	0		
04:10:00 PM	2	1	1	0	5	3	13	0	4	30	1	0	5	28	6	0	306	
04:15:00 PM	3	4	0	0	3	4	8	0	8	30	1	0	2	40	3	0	319	
04:20:00 PM	1	1	1	0	12	5	13	0	8	34	1	0	7	47	2	0	337	
04:25:00 PM	1	4	1	0	11	7	8	0	7	25	4	0	3	28	5	0	343	
04:30:00 PM	7	5	1	0	6	3	7	0	6	33	2	0	0	20	8	0	355	
04:35:00 PM	3	2	0	0	5	10	9	0	8	34	3	0	3	30	6	0	323	
04:40:00 PM	2	2	3	0	11	5	7	0	9	29	1	0	4	30	4	0	325	
04:45:00 PM	1	5	3	0	12	12	20	0	5	24	0	0	4	30	3	0	348	
04:50:00 PM	0	2	1	0	12	7	7	0	5	42	2	0	3	28	4	0	339	
04:55:00 PM	8	2	2	0	15	6	5	0	10	24	0	0	6	34	5	0	345	1322
05:00:00 PM	4	3	0	0	8	2	12	0	5	33	3	0	2	30	2	0	331	1331
05:05:00 PM	2	1	1	0	10	7	10	0	11	31	3	0	3	28	4	0	330	1329
05:10:00 PM	1	6	0	0	12	5	9	0	8	28	1	0	3	32	7	0	327	1341
05:15:00 PM	1	2	0	0	16	8	9	0	8	29	1	0	5	35	5	0	342	1354
05:20:00 PM	0	3	5	0	10	9	12	0	7	36	1	0	4	34	2	0	353	1345
05:25:00 PM	2	2	1	0	9	3	8	0	10	22	1	0	4	29	5	0	338	1336
05:30:00 PM	1	0	5	0	8	8	6	0	8	28	4	0	4	24	3	0	318	1337
05:35:00 PM	3	3	3	0	7	6	5	0	9	31	1	0	3	38	3	0	307	1329
05:40:00 PM	1	2	2	0	4	2	4	0	6	41	0	0	2	30	3	0	308	1319
05:45:00 PM	0	1	3	0	7	4	4	0	2	31	2	0	1	20	9	0	293	1284
05:50:00 PM	0	2	3	0	4	2	4	0	13	33	1	0	1	36	5	0	285	1275
05:55:00 PM	0	0	2	0	9	5	10	0	7	29	0	0	3	26	5	0	284	1257

Level of Service Descriptions

TRAFFIC LEVELS OF SERVICE

Analysis of traffic volumes is useful in understanding the general nature of traffic in an area, but by itself indicates neither the ability of the street network to carry additional traffic nor the quality of service afforded by the street facilities. For this, the concept of level of service has been developed to subjectively describe traffic performance. Level of service can be measured at intersections and along key roadway segments.

Levels of service categories are similar to report card ratings for traffic performance. Intersections are typically the controlling bottlenecks of traffic flow and the ability of a roadway system to carry traffic efficiently is generally diminished in their vicinities. Levels of Service A, B and C indicate conditions where traffic moves without significant delays over periods of peak travel demand. Level of service D and E are progressively worse peak hour operating conditions and F conditions represent where demand exceeds the capacity of an intersection. Most urban communities set level of service D as the minimum acceptable level of service for peak hour operation and plan for level of service C or better for all other times of the day. The Highway Capacity Manual provides level of service calculation methodology for both intersections and arterials¹. The following two sections provide interpretations of the analysis approaches.

¹ *2000 Highway Capacity Manual*, Transportation Research Board, Washington D.C., 2000, Chapter 16 and 17.

UNSIGNALIZED INTERSECTIONS (Two-Way Stop Controlled)

Unsignalized intersection level of service is reported for the major street and minor street (generally, left turn movements). The method assesses available and critical gaps in the traffic stream which make it possible for side street traffic to enter the main street flow. The 2010 Highway Capacity Manual describes the detailed methodology. It is not unusual for an intersection to experience level of service E or F conditions for the minor street left turn movement. It should be understood that, often, a poor level of service is experienced by only a few vehicles and the intersection as a whole operates acceptably.

Unsignalized intersection levels of service are described in the following table.

Level-of-Service Criteria: Automobile Mode

Control Delay (s/vehicle)	LOS by Volume-to-Capacity Ratio	
	$v/c \leq 1.0$	$v/c > 1.0$
0-10	A	F
>10-15	B	F
>15-25	C	F
>25-35	D	F
>35-50	E	F
>50	F	F

Note: The LOS criteria apply to each lane on a given approach and to each approach on the minor street.
LOS is not calculated for major-street approaches or for the intersection as a whole

SIGNALIZED INTERSECTIONS

For signalized intersections, level of service is evaluated based upon average vehicle delay experienced by vehicles entering an intersection. Control delay (or signal delay) includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. In previous versions of this chapter of the HCM (1994 and earlier), delay included only stopped delay. As delay increases, the level of service decreases. Calculations for signalized and unsignalized intersections are different due to the variation in traffic control. The 2000 Highway Capacity Manual provides the basis for these calculations.

Level of Service	Delay (secs.)	Description
A	<10.00	Free Flow/Insignificant Delays: No approach phase is fully utilized by traffic and no vehicle waits longer than one red indication. Most vehicles do not stop at all. Progression is extremely favorable and most vehicles arrive during the green phase.
B	10.1-20.0	Stable Operation/Minimal Delays: An occasional approach phase is fully utilized. Many drivers begin to feel somewhat restricted within platoons of vehicles. This level generally occurs with good progression, short cycle lengths, or both.
C	20.1-35.0	Stable Operation/Acceptable Delays: Major approach phases fully utilized. Most drivers feel somewhat restricted. Higher delays may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level, and the number of vehicles stopping is significant.
D	35.1-55.0	Approaching Unstable/Tolerable Delays: The influence of congestion becomes more noticeable. Drivers may have to wait through more than one red signal indication. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high v/c ratios. The proportion of vehicles not stopping declines, and individual cycle failures are noticeable.
E	55.1-80.0	Unstable Operation/Significant Delays: Volumes at or near capacity. Vehicles may wait through several signal cycles. Long queues form upstream from intersection. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are a frequent occurrence.
F	>80.0	Forced Flow/Excessive Delays: Represents jammed conditions. Queues may block upstream intersections. This level occurs when arrival flow rates exceed intersection capacity, and is considered to be unacceptable to most drivers. Poor progression, long cycle lengths, and v/c ratios approaching 1.0 may contribute to these high delay levels.

Source: 2000 Highway Capacity Manual, Transportation Research Board, Washington D.C.

City of Wilsonville Stage II List

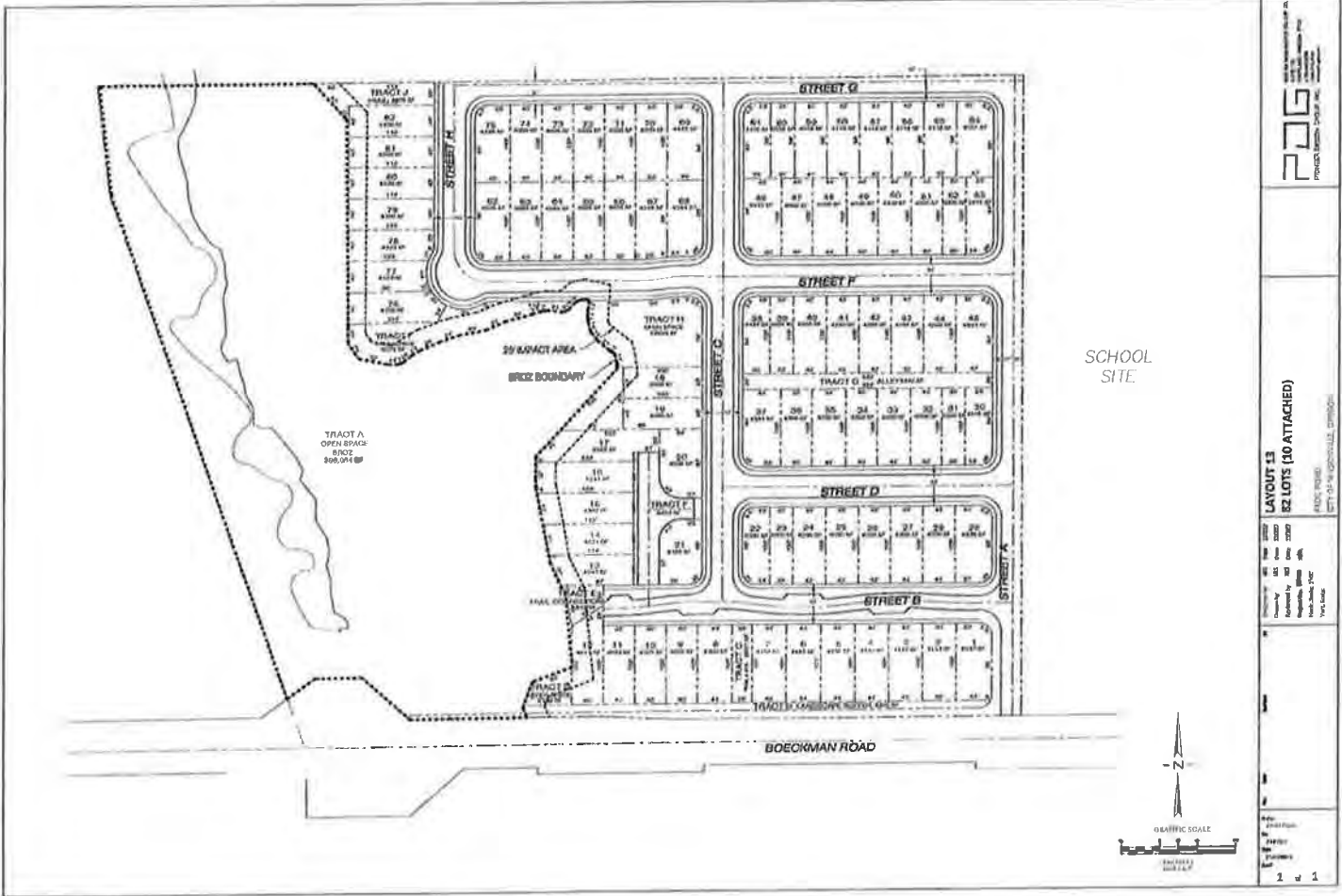
Updated by D. Poley 12.06.17

Stage II Approved									
Project	Land Use	Status	Size	Total PM Peak Trips	Trip Allocation			Net New (Primary + Diverted) PM Peak Hour Trips not yet active	
					Internal	Pass-By	Diverted	In	Out
1st Park Subdivision	Residential	Not built	12 units				8	4	12
Hydro-Tonix Recent agreement with the City, the project is expected to start in one year and will be active	Office/Ten-Space	Not built	60.8 KSF				44	16	60
Mercedes Benz (Phase 2)	Auto Dealership	Not built					20	24	44
Renaissance Boat Club (Water Zone Change TO)	Residential (Single Family)	30 homes sold and occupied	83 Lots				2	1	3
Shredding Systems (SC) T does not include paint canopy and another canopy	Industrial/Commercial	Not built	66.8 KSF				20	46	66
Four Corner PM (at 2nd) Trip distribution to Miller Park store	*Fast Food (Pad 2)	Not built	7.5 KSF				18	34.8*	
Uses marked with *** have not been built and PM peak hr trip sum exceeds remaining vested trip level by 2 trips. It has yet to be determined how to allocate trips between remaining buildings.	**High Turnover Restaurant (Pad 1)	Not built	7.5 KSF				24	17.81*	
	***Miles Fast store	Not built	1.0 KSF				4	6.12*	
	Remaining Approved Total								85
Wilburville Road Business Park Phase II	Phase 2 - office (2-story building on west parcel)	Partially built	21.7 KSF				15	78	93
Claekamas Community College Pole Training Yard Expansion	Educational	Not built		0			0	0	0
University Health Services	Medical Health Facility	Not built	42K						
14-Lot Single-Family Subdivision at 28500 and 28530 SW Parkway South Rd South	Residential	Under construction	14				9	27	36
SURF Energy (Minimal impact, no PM Peak indicated in traffic impact analysis)	Industrial	Not built							
Charlemagne Range 40-lot Subdivision	Residential	Under construction	40 lots				29	13	42
Munson's Carpet	Warehouse/Retail	Under construction	17K Industrial 3.5K Retail				11	24	35
MIRI SW Woodman Phase 1	Manufacturing	Under construction	155K				38	47	85
Wilson Garden Inn	Hotel	Not built	118 units				11	15	26

Stage II Approved - Vibrotilt														
Project	Phase	Status	Size	Units	Land Use			Total PM Peak Trips	Trip Allocation Percentage		Net New (Primary + Diverted) PM Peak Hour Trips			
					App	Retail	School		Internal	Pass-By	Diverted	In	Out	Total
North (Entirety)	Residential	Partially built, 304 homes sold and occupied		440			10					71	53	124
Grande Pointe (Phase 1 South)	Grande Pointe	Partially built, 54 homes sold and occupied		300				114				42	24	66
East	Residential	Partially built, 477 homes (436 single family and 41 town homes) sold and occupied		526			42					31	18	49
Central	Residential	Partially built, 511 homes (188 single family, 118 condos/town homes, 305 apartments) occupied		75			410	480.2 KSF				170	87	257

Pending Projects for Which Traffic Analysis has been completed (except Vibrotilt)											
Project	Land Use	Status	Size	Total PM Peak Trips	Trip Allocation Percentage			Net New (Primary + Diverted) PM Peak Hour Trips			
					Internal	Pass-By	Diverted	In	Out	Total	
Mercedes Benz Expansion	Commercial	Land Use Application Not Submitted	55 KSF						18	18	36

Frog Pond Wolfston Conceptual Plan



P26
 PROJECT ARCHITECTS, INC.
 1000 W. 10th Street
 Oklahoma City, OK 73106
 Phone: (405) 233-1234
 Fax: (405) 233-1235
 Website: www.p26.com

LAYOUT 13
82 LOTS (80 ATTACHED)
 PROJECT NO. 13
 CITY OF OKLAHOMA, OKLAHOMA

DATE: 08/14/13
 DRAWN BY: JAC
 CHECKED BY: JAC
 SCALE: 1" = 40'

1 of 1

HCM Analysis – Existing

Intersection	
Intersection Delay, s/veh	24.2
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔		↔	↔		↔	↔	
Traffic Vol, veh/h	94	310	58	95	201	46	28	84	81	114	171	76
Future Vol, veh/h	94	310	58	95	201	46	28	84	81	114	171	76
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	0	0	0	1	0	4	0	0	0	1	0
Mvmt Flow	104	344	64	106	223	51	31	93	90	127	190	84
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	34.9	19.3	16	19.4
HCM LOS	D	C	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	51%	0%	84%	0%	81%	0%	69%
Vol Right, %	0%	49%	0%	16%	0%	19%	0%	31%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	28	165	94	368	95	247	114	247
LT Vol	28	0	94	0	95	0	114	0
Through Vol	0	84	0	310	0	201	0	171
RT Vol	0	81	0	58	0	46	0	76
Lane Flow Rate	31	183	104	409	106	274	127	274
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.078	0.414	0.237	0.852	0.247	0.593	0.3	0.595
Departure Headway (Hd)	9.077	8.13	8.165	7.502	8.417	7.784	8.531	7.81
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	393	440	438	482	424	461	419	461
Service Time	6.877	5.93	5.949	5.286	6.21	5.576	6.32	5.598
HCM Lane V/C Ratio	0.079	0.416	0.237	0.849	0.25	0.594	0.303	0.594
HCM Control Delay	12.7	16.6	13.5	40.4	14	21.4	15	21.5
HCM Lane LOS	B	C	B	E	B	C	B	C
HCM 95th-tile Q	0.3	2	0.9	8.7	1	3.8	1.2	3.8

HCM Signalized Intersection Capacity Analysis

1: SW Parkway Ave & Boeckman Rd

01/16/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	203	233	69	275	39	143	190	44	37	389	200
Future Volume (vph)	80	203	233	69	275	39	143	190	44	37	389	200
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	10	11	12	12	12	12	13	13	12
Total Lost time (s)	4.0	4.5		4.0	4.5		4.0	4.5		4.0	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.92		1.00	0.98		1.00	0.97		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1845	1691		1636	1765		1787	1808		1861	1829	
Flt Permitted	0.32	1.00		0.16	1.00		0.11	1.00		0.59	1.00	
Satd. Flow (perm)	614	1691		272	1765		200	1808		1165	1829	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	221	253	75	299	42	155	207	48	40	423	217
RTOR Reduction (vph)	0	46	0	0	6	0	0	8	0	0	18	0
Lane Group Flow (vph)	87	428	0	75	335	0	155	247	0	40	622	0
Confl. Peds. (#/hr)	4		2	2		4	3		3	3		3
Confl. Bikes (#/hr)						1						1
Heavy Vehicles (%)	1%	2%	2%	3%	2%	0%	1%	2%	0%	0%	1%	1%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8			6			2		
Actuated Green, G (s)	31.9	25.7		31.1	25.3		45.5	37.7		37.9	33.9	
Effective Green, g (s)	31.9	25.7		31.1	25.3		45.5	37.7		37.9	33.9	
Actuated g/C Ratio	0.35	0.28		0.34	0.28		0.50	0.42		0.42	0.38	
Clearance Time (s)	4.0	4.5		4.0	4.5		4.0	4.5		4.0	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	301	481		181	495		238	755		520	687	
v/s Ratio Prot	0.02	c0.25		c0.03	0.19		c0.06	0.14		0.00	c0.34	
v/s Ratio Perm	0.08			0.12			0.27			0.03		
v/c Ratio	0.29	0.89		0.41	0.68		0.65	0.33		0.08	0.91	
Uniform Delay, d1	20.5	30.9		22.3	28.8		18.1	17.7		15.5	26.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	18.3		1.5	3.7		6.2	0.3		0.1	15.4	
Delay (s)	21.0	49.2		23.8	32.5		24.4	18.0		15.6	42.1	
Level of Service	C	D		C	C		C	B		B	D	
Approach Delay (s)		44.8			30.9			20.4			40.5	
Approach LOS		D			C			C			D	

Intersection Summary






















HCM 2000 Control Delay	35.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	90.2	Sum of lost time (s)	17.0
Intersection Capacity Utilization	83.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

3: SW Wilsonville Rd/SW Stafford Rd & Boeckman Rd/SW Advance Rd






















01/16/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	255	70	89	67	65	27	65	184	40	17	376	186
Future Volume (vph)	255	70	89	67	65	27	65	184	40	17	376	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	11	11	12	12	12	12	12	12	12
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		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.97		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1728	1837	1565	1660	1719		1805	1809		1805	1794	
Flt Permitted	0.44	1.00	1.00	0.71	1.00		0.18	1.00		0.61	1.00	
Satd. Flow (perm)	793	1837	1565	1234	1719		335	1809		1150	1794	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	283	78	99	74	72	30	72	204	44	19	418	207
RTOR Reduction (vph)	0	0	76	0	21	0	0	8	0	0	19	0
Lane Group Flow (vph)	283	78	23	74	81	0	72	240	0	19	606	0
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	1%	0%	1%	5%	3%	0%	0%	1%	8%	0%	1%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8	4			6			2		
Actuated Green, G (s)	24.3	16.8	16.8	10.7	7.7		36.2	33.2		31.6	30.9	
Effective Green, g (s)	24.3	16.8	16.8	10.7	7.7		36.2	33.2		31.6	30.9	
Actuated g/C Ratio	0.34	0.23	0.23	0.15	0.11		0.50	0.46		0.44	0.43	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	426	430	366	201	184		230	837		513	773	
v/s Ratio Prot	c0.11	0.04		0.02	0.05		c0.01	0.13		0.00	c0.34	
v/s Ratio Perm	c0.11		0.01	0.04			0.14			0.02		
v/c Ratio	0.66	0.18	0.06	0.37	0.44		0.31	0.29		0.04	0.78	
Uniform Delay, d1	18.9	22.0	21.3	27.2	30.0		12.1	11.9		11.3	17.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.9	0.2	0.1	1.1	1.7		0.8	0.2		0.0	5.2	
Delay (s)	22.8	22.2	21.4	28.3	31.6		12.8	12.1		11.4	22.7	
Level of Service	C	C	C	C	C		B	B		B	C	
Approach Delay (s)		22.4			30.2			12.3			22.4	
Approach LOS		C			C			B			C	
Intersection Summary												
HCM 2000 Control Delay			21.2				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			71.7				Sum of lost time (s)		18.0			
Intersection Capacity Utilization			66.8%				ICU Level of Service		C			
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Signalized Intersection Capacity Analysis

4: Town Center Lp West & Wilsonville Rd

01/16/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	439	508	52	37	557	42	218	91	40	35	80	511
Future Volume (vph)	439	508	52	37	557	42	218	91	40	35	80	511
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0		4.5	4.5		5.0	5.0	4.5
Lane Util. Factor	0.97	0.95		1.00	0.95		*0.95	0.91		1.00	0.95	0.95
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	0.99		1.00	0.97		1.00	0.89	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	0.98		0.95	1.00	1.00
Satd. Flow (prot)	3000	3484		1805	3501		1698	2600		1805	1575	1519
Flt Permitted	0.95	1.00		0.95	1.00		0.95	0.98		0.95	1.00	1.00
Satd. Flow (perm)	3000	3484		1805	3501		1698	2600		1805	1575	1519
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	448	518	53	38	568	43	222	93	41	36	82	521
RTOR Reduction (vph)	0	6	0	0	4	0	0	17	0	0	92	249
Lane Group Flow (vph)	448	565	0	38	607	0	120	219	0	36	214	48
Confl. Peds. (#/hr)	7		7	7		7	1		21	21		1
Confl. Bikes (#/hr)							1					
Heavy Vehicles (%)	2%	2%	0%	0%	2%	0%	1%	1%	0%	0%	1%	1%
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	Prot
Protected Phases	5	2		1	6		8	8		4	4	4
Permitted Phases												
Actuated Green, G (s)	20.1	55.1		5.1	40.1		14.4	14.4		17.9	17.9	17.9
Effective Green, g (s)	20.1	54.6		5.1	39.6		14.4	14.4		17.4	17.4	17.9
Actuated g/C Ratio	0.18	0.50		0.05	0.36		0.13	0.13		0.16	0.16	0.16
Clearance Time (s)	4.0	4.5		4.0	4.5		4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.5	4.3		2.5	4.3		2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	548	1729		83	1260		222	340		285	249	247
v/s Ratio Prot	c0.15	0.16		0.02	c0.17		0.07	c0.08		0.02	c0.14	0.03
v/s Ratio Perm												
v/c Ratio	0.82	0.33		0.46	0.48		0.54	0.65		0.13	0.86	0.20
Uniform Delay, d1	43.2	16.7		51.1	27.3		44.7	45.4		39.8	45.1	39.8
Progression Factor	1.00	1.00		1.31	0.88		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	9.0	0.5		2.9	1.3		2.1	3.7		0.1	24.6	0.3
Delay (s)	52.2	17.2		69.9	25.3		46.8	49.1		39.9	69.7	40.1
Level of Service	D	B		E	C		D	D		D	E	D
Approach Delay (s)		32.6			27.9			48.3			54.3	
Approach LOS		C			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			38.7				HCM 2000 Level of Service				D	
HCM 2000 Volume to Capacity ratio			0.65									
Actuated Cycle Length (s)			110.0				Sum of lost time (s)			18.5		
Intersection Capacity Utilization			77.5%				ICU Level of Service				D	
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

5: Memorial Dr/Town Center Lp East & Wilsonville Rd

01/16/2018



Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations		↔	↑	↗	↖	↕		↖	↗		↖	↗
Traffic Volume (vph)	1	110	370	19	50	365	62	43	41	32	108	72
Future Volume (vph)	1	110	370	19	50	365	62	43	41	32	108	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor		1.00	1.00	1.00	1.00	0.95		1.00	1.00		1.00	1.00
Frpb, ped/bikes		1.00	1.00	0.95	1.00	0.99		1.00	0.98		1.00	1.00
Flpb, ped/bikes		0.99	1.00	1.00	0.99	1.00		1.00	1.00		1.00	1.00
Fr		1.00	1.00	0.85	1.00	0.98		1.00	0.93		1.00	1.00
Flt Protected		0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00
Satd. Flow (prot)		1749	1900	1527	1759	3428		1805	1682		1752	1845
Flt Permitted		0.45	1.00	1.00	0.49	1.00		0.95	1.00		0.95	1.00
Satd. Flow (perm)		837	1900	1527	906	3428		1805	1682		1752	1845
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)	1	115	385	20	52	380	65	45	43	33	112	75
RTOR Reduction (vph)	0	0	0	8	0	8	0	0	28	0	0	0
Lane Group Flow (vph)	0	116	385	12	52	437	0	45	48	0	113	75
Confl. Peds. (#/hr)		11		5	5		11	6		3	3	
Confl. Bikes (#/hr)				1								
Heavy Vehicles (%)	0%	2%	0%	0%	2%	1%	5%	0%	2%	6%	3%	3%
Turn Type	custom	pm+pt	NA	Perm	pm+pt	NA		Prot	NA		Prot	NA
Protected Phases		5	2		1	6		3	8		7	4
Permitted Phases	5	2		2	6							
Actuated Green, G (s)		74.6	66.6	66.6	69.6	64.1		7.1	9.5		12.4	14.8
Effective Green, g (s)		74.6	66.6	66.6	69.6	64.1		7.1	9.5		12.4	14.8
Actuated g/C Ratio		0.68	0.61	0.61	0.63	0.58		0.06	0.09		0.11	0.13
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		633	1150	924	615	1997		116	145		197	248
v/s Ratio Prot		c0.01	c0.20		0.00	0.13		0.02	0.03		c0.06	c0.04
v/s Ratio Perm		0.11		0.01	0.05							
v/c Ratio		0.18	0.33	0.01	0.08	0.22		0.39	0.33		0.57	0.30
Uniform Delay, d1		6.3	10.7	8.6	7.8	11.0		49.4	47.3		46.3	42.9
Progression Factor		2.00	1.98	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2		0.1	0.8	0.0	0.1	0.3		2.1	1.3		4.0	0.7
Delay (s)		12.6	22.0	8.7	7.8	11.2		51.5	48.6		50.3	43.6
Level of Service		B	C	A	A	B		D	D		D	D
Approach Delay (s)			19.4			10.9			49.7			45.3
Approach LOS			B			B			D			D

Intersection Summary

HCM 2000 Control Delay	24.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 5: Memorial Dr/Town Center Lp East & Wilsonville Rd

01/16/2018



Movement	SBR
Lane Configurations	↑
Traffic Volume (vph)	119
Future Volume (vph)	119
Ideal Flow (vphpl)	1900
Total Lost time (s)	4.0
Lane Util. Factor	1.00
Frbp, ped/bikes	0.96
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1523
Flt Permitted	1.00
Satd. Flow (perm)	1523
Peak-hour factor, PHF	0.96
Adj. Flow (vph)	124
RTOR Reduction (vph)	107
Lane Group Flow (vph)	17
Confl. Peds. (#/hr)	6
Confl. Bikes (#/hr)	1
Heavy Vehicles (%)	2%
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Actuated Green, G (s)	14.8
Effective Green, g (s)	14.8
Actuated g/C Ratio	0.13
Clearance Time (s)	4.0
Vehicle Extension (s)	3.0
Lane Grp Cap (vph)	204
v/s Ratio Prot	
v/s Ratio Perm	0.01
v/c Ratio	0.08
Uniform Delay, d1	41.7
Progression Factor	1.00
Incremental Delay, d2	0.2
Delay (s)	41.8
Level of Service	D
Approach Delay (s)	
Approach LOS	
Intersection Summary	

HCM Analysis – Existing + Stage II

Intersection	
Intersection Delay, s/veh	33.8
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Traffic Vol, veh/h	99	337	63	96	242	46	31	86	82	114	174	80
Future Vol, veh/h	99	337	63	96	242	46	31	86	82	114	174	80
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	0	0	0	1	0	4	0	0	0	1	0
Mvmt Flow	110	374	70	107	269	51	34	96	91	127	193	89
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0





















Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	54.4	26.3	17.6	22.4
HCM LOS	F	D	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	51%	0%	84%	0%	84%	0%	69%
Vol Right, %	0%	49%	0%	16%	0%	16%	0%	31%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	31	168	99	400	96	288	114	254
LT Vol	31	0	99	0	96	0	114	0
Through Vol	0	86	0	337	0	242	0	174
RT Vol	0	82	0	63	0	46	0	80
Lane Flow Rate	34	187	110	444	107	320	127	282
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.092	0.45	0.262	0.975	0.261	0.729	0.318	0.65
Departure Headway (Hd)	9.628	8.678	8.564	7.899	8.818	8.201	9.027	8.296
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	372	414	420	458	407	442	399	435
Service Time	7.382	6.432	6.31	5.644	6.568	5.951	6.776	6.046
HCM Lane V/C Ratio	0.091	0.452	0.262	0.969	0.263	0.724	0.318	0.648
HCM Control Delay	13.4	18.4	14.3	64.3	14.7	30.1	16	25.3
HCM Lane LOS	B	C	B	F	B	D	C	D
HCM 95th-tile Q	0.3	2.3	1	12.2	1	5.8	1.3	4.5

HCM Signalized Intersection Capacity Analysis

1: SW Parkway Ave & Boeckman Rd

01/17/2018






















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	91	242	235	71	323	39	145	192	47	37	392	219
Future Volume (vph)	91	242	235	71	323	39	145	192	47	37	392	219
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	10	11	12	12	12	12	13	13	12
Total Lost time (s)	4.0	4.5		4.0	4.5		4.0	4.5		4.0	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	0.98		1.00	0.97		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1845	1704		1636	1770		1787	1806		1861	1822	
Flt Permitted	0.26	1.00		0.15	1.00		0.11	1.00		0.58	1.00	
Satd. Flow (perm)	508	1704		251	1770		201	1806		1135	1822	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	99	263	255	77	351	42	158	209	51	40	426	238
RTOR Reduction (vph)	0	38	0	0	5	0	0	8	0	0	20	0
Lane Group Flow (vph)	99	480	0	77	388	0	158	252	0	40	644	0
Confl. Peds. (#/hr)	4		2	2		4	3		3	3		3
Confl. Bikes (#/hr)						1						1
Heavy Vehicles (%)	1%	2%	2%	3%	2%	0%	1%	2%	0%	0%	1%	1%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8			6			2		
Actuated Green, G (s)	34.3	27.9		33.3	27.4		45.2	37.4		37.8	33.7	
Effective Green, g (s)	34.3	27.9		33.3	27.4		45.2	37.4		37.8	33.7	
Actuated g/C Ratio	0.37	0.30		0.36	0.30		0.49	0.41		0.41	0.37	
Clearance Time (s)	4.0	4.5		4.0	4.5		4.0	4.5		4.0	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	281	515		179	525		232	731		497	665	
v/s Ratio Prot	0.02	c0.28		c0.03	0.22		c0.06	0.14		0.00	c0.35	
v/s Ratio Perm	0.11			0.13			0.28			0.03		
v/c Ratio	0.35	0.93		0.43	0.74		0.68	0.34		0.08	0.97	
Uniform Delay, d1	20.5	31.3		22.4	29.2		19.8	19.0		16.5	28.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	24.0		1.7	5.4		8.0	0.3		0.1	26.8	
Delay (s)	21.2	55.3		24.0	34.6		27.8	19.3		16.5	55.6	
Level of Service	C	E		C	C		C	B		B	E	
Approach Delay (s)		49.8			32.9			22.5			53.3	
Approach LOS		D			C			C			D	
Intersection Summary												
HCM 2000 Control Delay			42.2				HCM 2000 Level of Service				D	
HCM 2000 Volume to Capacity ratio			0.88									
Actuated Cycle Length (s)			92.3				Sum of lost time (s)			17.0		
Intersection Capacity Utilization			87.5%				ICU Level of Service			E		
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

3: SW Wilsonville Rd/SW Stafford Rd & Boeckman Rd/SW Advance Rd

01/17/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	261	119	91	106	126	65	66	190	84	60	380	192
Future Volume (vph)	261	119	91	106	126	65	66	190	84	60	380	192
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	11	11	12	12	12	12	12	12	12
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		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.95		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1728	1837	1565	1660	1709		1805	1758		1805	1792	
Flt Permitted	0.35	1.00	1.00	0.67	1.00		0.14	1.00		0.47	1.00	
Satd. Flow (perm)	635	1837	1565	1175	1709		274	1758		896	1792	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	290	132	101	118	140	72	73	211	93	67	422	213
RTOR Reduction (vph)	0	0	70	0	24	0	0	19	0	0	22	0
Lane Group Flow (vph)	290	132	31	118	188	0	73	285	0	67	613	0
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	1%	0%	1%	5%	3%	0%	0%	1%	8%	0%	1%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8	4			6			2		
Actuated Green, G (s)	30.6	23.0	23.0	17.0	13.9		30.8	27.7		30.6	27.6	
Effective Green, g (s)	30.6	23.0	23.0	17.0	13.9		30.8	27.7		30.6	27.6	
Actuated g/C Ratio	0.41	0.31	0.31	0.23	0.19		0.41	0.37		0.41	0.37	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	438	564	481	287	317		176	651		403	661	
v/s Ratio Prot	c0.11	0.07		0.02	0.11		c0.02	0.16		0.01	c0.34	
v/s Ratio Perm	c0.16		0.02	0.08			0.15			0.06		
v/c Ratio	0.66	0.23	0.06	0.41	0.59		0.41	0.44		0.17	0.93	
Uniform Delay, d1	16.3	19.3	18.3	24.1	27.9		16.7	17.7		13.7	22.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.7	0.2	0.1	1.0	3.0		1.6	0.5		0.2	19.1	
Delay (s)	20.0	19.5	18.4	25.1	30.8		18.3	18.2		13.9	41.7	
Level of Service	C	B	B	C	C		B	B		B	D	
Approach Delay (s)		19.6			28.8			18.2			39.1	
Approach LOS		B			C			B			D	
Intersection Summary												
HCM 2000 Control Delay			28.0			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.81									
Actuated Cycle Length (s)			74.8			Sum of lost time (s)		18.0				
Intersection Capacity Utilization			75.4%			ICU Level of Service				D		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 4: Town Center Lp West & Wilsonville Rd

01/17/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	478	522	62	40	561	46	226	93	43	39	82	541
Future Volume (vph)	478	522	62	40	561	46	226	93	43	39	82	541
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0		4.5	4.5		5.0	5.0	4.5
Lane Util. Factor	0.97	0.95		1.00	0.95		*0.95	0.91		1.00	0.95	0.95
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frft	1.00	0.98		1.00	0.99		1.00	0.97		1.00	0.89	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	0.98		0.95	1.00	1.00
Satd. Flow (prot)	3000	3477		1805	3498		1698	2600		1805	1572	1519
Flt Permitted	0.95	1.00		0.95	1.00		0.95	0.98		0.95	1.00	1.00
Satd. Flow (perm)	3000	3477		1805	3498		1698	2600		1805	1572	1519
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	488	533	63	41	572	47	231	95	44	40	84	552
RTOR Reduction (vph)	0	7	0	0	5	0	0	16	0	0	97	257
Lane Group Flow (vph)	488	589	0	41	614	0	125	229	0	40	230	52
Confl. Peds. (#/hr)	7		7	7		7	1		21	21		1
Confl. Bikes (#/hr)							1					
Heavy Vehicles (%)	2%	2%	0%	0%	2%	0%	1%	1%	0%	0%	1%	1%
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	Prot
Protected Phases	5	2		1	6		8	8		4	4	4
Permitted Phases												
Actuated Green, G (s)	21.5	54.0		5.2	37.7		14.7	14.7		18.6	18.6	18.6
Effective Green, g (s)	21.5	53.5		5.2	37.2		14.7	14.7		18.1	18.1	18.6
Actuated g/C Ratio	0.20	0.49		0.05	0.34		0.13	0.13		0.16	0.16	0.17
Clearance Time (s)	4.0	4.5		4.0	4.5		4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.5	4.3		2.5	4.3		2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	586	1691		85	1182		226	347		297	258	256
v/s Ratio Prot	c0.16	0.17		0.02	c0.18		0.07	c0.09		0.02	c0.15	0.03
v/s Ratio Perm												
v/c Ratio	0.83	0.35		0.48	0.52		0.55	0.66		0.13	0.89	0.20
Uniform Delay, d1	42.5	17.5		51.1	29.2		44.6	45.3		39.3	45.0	39.3
Progression Factor	1.00	1.00		1.31	0.88		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	9.7	0.6		3.1	1.6		2.3	4.0		0.2	29.5	0.3
Delay (s)	52.2	18.0		70.2	27.4		46.9	49.3		39.4	74.4	39.6
Level of Service	D	B		E	C		D	D		D	E	D
Approach Delay (s)		33.4			30.1			48.5			56.5	
Approach LOS		C			C			D			E	
Intersection Summary												
HCM 2000 Control Delay			40.2			HCM 2000 Level of Service			D			
HCM 2000 Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			18.5			
Intersection Capacity Utilization			79.5%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 5: Memorial Dr/Town Center Lp East & Wilsonville Rd

01/17/2018

Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	1	116	383	21	51	370	64	45	44	33	110	75
Future Volume (vph)	1	116	383	21	51	370	64	45	44	33	110	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor		1.00	1.00	1.00	1.00	0.95		1.00	1.00		1.00	1.00
Frpb, ped/bikes		1.00	1.00	0.95	1.00	0.99		1.00	0.98		1.00	1.00
Flpb, ped/bikes		0.99	1.00	1.00	0.99	1.00		1.00	1.00		1.00	1.00
Frt		1.00	1.00	0.85	1.00	0.98		1.00	0.94		1.00	1.00
Flt Protected		0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00
Satd. Flow (prot)		1751	1900	1527	1759	3426		1805	1686		1752	1845
Flt Permitted		0.45	1.00	1.00	0.48	1.00		0.95	1.00		0.95	1.00
Satd. Flow (perm)		826	1900	1527	888	3426		1805	1686		1752	1845
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)	1	121	399	22	53	385	67	47	46	34	115	78
RTOR Reduction (vph)	0	0	0	9	0	8	0	0	27	0	0	0
Lane Group Flow (vph)	0	122	399	13	53	444	0	47	53	0	115	78
Confl. Peds. (#/hr)		11		5	5		11	6		3	3	
Confl. Bikes (#/hr)				1								
Heavy Vehicles (%)	0%	2%	0%	0%	2%	1%	5%	0%	2%	6%	3%	3%
Turn Type	custom	pm+pt	NA	Perm	pm+pt	NA		Prot	NA		Prot	NA
Protected Phases		5	2		1	6		3	8		7	4
Permitted Phases	5	2		2	6							
Actuated Green, G (s)		74.5	66.3	66.3	69.1	63.6		7.1	9.7		12.5	15.1
Effective Green, g (s)		74.5	66.3	66.3	69.1	63.6		7.1	9.7		12.5	15.1
Actuated g/C Ratio		0.68	0.60	0.60	0.63	0.58		0.06	0.09		0.11	0.14
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		628	1145	920	601	1980		116	148		199	253
v/s Ratio Prot		c0.01	c0.21		0.00	0.13		0.03	0.03		c0.07	c0.04
v/s Ratio Perm		0.12		0.01	0.05							
v/c Ratio		0.19	0.35	0.01	0.09	0.22		0.41	0.36		0.58	0.31
Uniform Delay, d1		6.3	11.0	8.8	8.0	11.2		49.4	47.2		46.2	42.7
Progression Factor		1.93	1.93	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2		0.1	0.8	0.0	0.1	0.3		2.3	1.5		4.0	0.7
Delay (s)		12.4	22.0	8.8	8.1	11.5		51.7	48.7		50.3	43.4
Level of Service		B	C	A	A	B		D	D		D	D
Approach Delay (s)			19.3			11.1			49.8			45.1
Approach LOS			B			B			D			D
Intersection Summary												
HCM 2000 Control Delay			24.7			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.38									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			46.3%			ICU Level of Service			A			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 5: Memorial Dr/Town Center Lp East & Wilsonville Rd

01/17/2018

Movement	SBR
Lane Configurations	
Traffic Volume (vph)	123
Future Volume (vph)	123
Ideal Flow (vphpl)	1900
Total Lost time (s)	4.0
Lane Util. Factor	1.00
Frbp, ped/bikes	0.96
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1523
Flt Permitted	1.00
Satd. Flow (perm)	1523
Peak-hour factor, PHF	0.96
Adj. Flow (vph)	128
RTOR Reduction (vph)	110
Lane Group Flow (vph)	18
Confl. Peds. (#/hr)	6
Confl. Bikes (#/hr)	1
Heavy Vehicles (%)	2%
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Actuated Green, G (s)	15.1
Effective Green, g (s)	15.1
Actuated g/C Ratio	0.14
Clearance Time (s)	4.0
Vehicle Extension (s)	3.0
Lane Grp Cap (vph)	209
v/s Ratio Prot	
v/s Ratio Perm	0.01
v/c Ratio	0.08
Uniform Delay, d1	41.4
Progression Factor	1.00
Incremental Delay, d2	0.2
Delay (s)	41.6
Level of Service	D
Approach Delay (s)	
Approach LOS	
Intersection Summary	

HCM Analysis – Existing + Project

Intersection	
Intersection Delay, s/veh	27.6
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Traffic Vol, veh/h	94	322	58	97	208	49	28	84	84	120	171	76
Future Vol, veh/h	94	322	58	97	208	49	28	84	84	120	171	76
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	0	0	0	1	0	4	0	0	0	1	0
Mvmt Flow	104	358	64	108	231	54	31	93	93	133	190	84
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	42.3	21.2	16.8	20.5
HCM LOS	E	C	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	50%	0%	85%	0%	81%	0%	69%
Vol Right, %	0%	50%	0%	15%	0%	19%	0%	31%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	28	168	94	380	97	257	120	247
LT Vol	28	0	94	0	97	0	120	0
Through Vol	0	84	0	322	0	208	0	171
RT Vol	0	84	0	58	0	49	0	76
Lane Flow Rate	31	187	104	422	108	286	133	274
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.081	0.434	0.243	0.906	0.258	0.634	0.325	0.614
Departure Headway (Hd)	9.33	8.375	8.385	7.724	8.63	7.992	8.781	8.057
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	384	429	430	473	416	451	411	450
Service Time	7.083	6.127	6.103	5.442	6.379	5.741	6.503	5.779
HCM Lane V/C Ratio	0.081	0.436	0.242	0.892	0.26	0.634	0.324	0.609
HCM Control Delay	12.9	17.4	13.8	49.3	14.4	23.7	15.7	22.8
HCM Lane LOS	B	C	B	E	B	C	C	C
HCM 95th-tile Q	0.3	2.1	0.9	10.1	1	4.3	1.4	4

HCM Signalized Intersection Capacity Analysis
 1: SW Parkway Ave & Boeckman Rd

01/17/2018






















Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	209	233	71	278	41	143	190	47	40	389	200
Future Volume (vph)	80	209	233	71	278	41	143	190	47	40	389	200
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	10	11	12	12	12	12	13	13	12
Total Lost time (s)	4.0	4.5		4.0	4.5		4.0	4.5		4.0	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frft	1.00	0.92		1.00	0.98		1.00	0.97		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1845	1693		1636	1763		1787	1805		1861	1829	
Flt Permitted	0.31	1.00		0.16	1.00		0.11	1.00		0.59	1.00	
Satd. Flow (perm)	607	1693		268	1763		200	1805		1151	1829	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	227	253	77	302	45	155	207	51	43	423	217
RTOR Reduction (vph)	0	44	0	0	6	0	0	8	0	0	18	0
Lane Group Flow (vph)	87	436	0	77	341	0	155	250	0	43	622	0
Confl. Peds. (#/hr)	4		2	2		4	3		3	3		3
Confl. Bikes (#/hr)						1						1
Heavy Vehicles (%)	1%	2%	2%	3%	2%	0%	1%	2%	0%	0%	1%	1%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8			6			2		
Actuated Green, G (s)	32.2	26.0		31.6	25.7		45.4	37.6		38.0	33.9	
Effective Green, g (s)	32.2	26.0		31.6	25.7		45.4	37.6		38.0	33.9	
Actuated g/C Ratio	0.36	0.29		0.35	0.28		0.50	0.42		0.42	0.37	
Clearance Time (s)	4.0	4.5		4.0	4.5		4.0	4.5		4.0	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	300	485		182	500		236	749		514	684	
v/s Ratio Prot	0.02	c0.26		c0.03	0.19		c0.06	0.14		0.00	c0.34	
v/s Ratio Perm	0.08			0.12			0.27			0.03		
v/c Ratio	0.29	0.90		0.42	0.68		0.66	0.33		0.08	0.91	
Uniform Delay, d1	20.5	31.0		22.3	28.8		18.4	18.0		15.6	26.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	19.1		1.6	3.8		6.4	0.3		0.1	15.9	
Delay (s)	21.1	50.1		23.8	32.7		24.8	18.3		15.7	42.8	
Level of Service	C	D		C	C		C	B		B	D	
Approach Delay (s)		45.7			31.1			20.7			41.1	
Approach LOS		D			C			C			D	
Intersection Summary												
HCM 2000 Control Delay			36.3			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.84									
Actuated Cycle Length (s)			90.6			Sum of lost time (s)			17.0			
Intersection Capacity Utilization			84.2%			ICU Level of Service				E		
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

3: SW Wilsonville Rd/SW Stafford Rd & Boeckman Rd/SW Advance Rd

01/17/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	268	72	92	67	68	27	71	184	40	17	376	208
Future Volume (vph)	268	72	92	67	68	27	71	184	40	17	376	208
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	11	11	12	12	12	12	12	12	12
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		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Fr _t	1.00	1.00	0.85	1.00	0.96		1.00	0.97		1.00	0.95	
Fl _t Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1728	1837	1565	1660	1722		1805	1809		1805	1787	
Fl _t Permitted	0.44	1.00	1.00	0.70	1.00		0.16	1.00		0.61	1.00	
Satd. Flow (perm)	798	1837	1565	1232	1722		305	1809		1150	1787	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	298	80	102	74	76	30	79	204	44	19	418	231
RTOR Reduction (vph)	0	0	78	0	20	0	0	8	0	0	21	0
Lane Group Flow (vph)	298	80	24	74	86	0	79	240	0	19	628	0
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	1%	0%	1%	5%	3%	0%	0%	1%	8%	0%	1%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8	4			6			2		
Actuated Green, G (s)	24.8	17.3	17.3	10.9	7.9		37.2	34.2		32.6	31.9	
Effective Green, g (s)	24.8	17.3	17.3	10.9	7.9		37.2	34.2		32.6	31.9	
Actuated g/C Ratio	0.34	0.24	0.24	0.15	0.11		0.51	0.47		0.45	0.44	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	427	434	369	200	185		216	845		518	778	
v/s Ratio Prot	c0.12	0.04		0.02	0.05		c0.01	0.13		0.00	c0.35	
v/s Ratio Perm	c0.12		0.02	0.04			0.17			0.02		
v/c Ratio	0.70	0.18	0.07	0.37	0.47		0.37	0.28		0.04	0.81	
Uniform Delay, d ₁	19.5	22.3	21.7	27.7	30.7		12.6	12.0		11.4	18.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d ₂	4.9	0.2	0.1	1.2	1.9		1.1	0.2		0.0	6.1	
Delay (s)	24.4	22.5	21.8	28.9	32.5		13.7	12.2		11.4	24.1	
Level of Service	C	C	C	C	C		B	B		B	C	
Approach Delay (s)		23.6			31.0			12.5			23.7	
Approach LOS		C			C			B			C	
Intersection Summary												
HCM 2000 Control Delay			22.3			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.78									
Actuated Cycle Length (s)			73.2			Sum of lost time (s)		18.0				
Intersection Capacity Utilization			69.2%			ICU Level of Service				C		
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Signalized Intersection Capacity Analysis

4: Town Center Lp West & Wilsonville Rd

01/17/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	439	511	52	37	559	42	218	91	40	35	80	511
Future Volume (vph)	439	511	52	37	559	42	218	91	40	35	80	511
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0		4.5	4.5		5.0	5.0	4.5
Lane Util. Factor	0.97	0.95		1.00	0.95		0.95	0.91		1.00	0.95	0.95
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	0.99		1.00	0.97		1.00	0.89	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	0.98		0.95	1.00	1.00
Satd. Flow (prot)	3000	3485		1805	3501		1698	2600		1805	1575	1519
Flt Permitted	0.95	1.00		0.95	1.00		0.95	0.98		0.95	1.00	1.00
Satd. Flow (perm)	3000	3485		1805	3501		1698	2600		1805	1575	1519
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	448	521	53	38	570	43	222	93	41	36	82	521
RTOR Reduction (vph)	0	6	0	0	4	0	0	17	0	0	92	249
Lane Group Flow (vph)	448	568	0	38	609	0	120	219	0	36	214	48
Confl. Peds. (#/hr)	7		7	7		7	1		21	21		1
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	2%	2%	0%	0%	2%	0%	1%	1%	0%	0%	1%	1%
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	Prot
Protected Phases	5	2		1	6		8	8		4	4	4
Permitted Phases												
Actuated Green, G (s)	20.1	55.1		5.1	40.1		14.4	14.4		17.9	17.9	17.9
Effective Green, g (s)	20.1	54.6		5.1	39.6		14.4	14.4		17.4	17.4	17.9
Actuated g/C Ratio	0.18	0.50		0.05	0.36		0.13	0.13		0.16	0.16	0.16
Clearance Time (s)	4.0	4.5		4.0	4.5		4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.5	4.3		2.5	4.3		2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	548	1729		83	1260		222	340		285	249	247
v/s Ratio Prot	c0.15	0.16		0.02	c0.17		0.07	c0.08		0.02	c0.14	0.03
v/s Ratio Perm												
v/c Ratio	0.82	0.33		0.46	0.48		0.54	0.65		0.13	0.86	0.20
Uniform Delay, d1	43.2	16.7		51.1	27.3		44.7	45.4		39.8	45.1	39.8
Progression Factor	1.00	1.00		1.32	0.88		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	9.0	0.5		2.9	1.3		2.1	3.7		0.1	24.6	0.3
Delay (s)	52.2	17.2		70.4	25.3		46.8	49.1		39.9	69.7	40.1
Level of Service	D	B		E	C		D	D		D	E	D
Approach Delay (s)		32.5			27.9			48.3			54.3	
Approach LOS		C			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			38.7			HCM 2000 Level of Service			D			
HCM 2000 Volume to Capacity ratio			0.65									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			18.5			
Intersection Capacity Utilization			77.5%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 5: Memorial Dr/Town Center Lp East & Wilsonville Rd

01/17/2018



Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	1	110	373	19	50	367	62	43	41	32	108	72
Future Volume (vph)	1	110	373	19	50	367	62	43	41	32	108	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor		1.00	1.00	1.00	1.00	0.95		1.00	1.00		1.00	1.00
Frbp, ped/bikes		1.00	1.00	0.95	1.00	0.99		1.00	0.98		1.00	1.00
Flpb, ped/bikes		0.99	1.00	1.00	0.99	1.00		1.00	1.00		1.00	1.00
Frt		1.00	1.00	0.85	1.00	0.98		1.00	0.93		1.00	1.00
Flt Protected		0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00
Satd. Flow (prot)		1750	1900	1527	1759	3429		1805	1682		1752	1845
Flt Permitted		0.45	1.00	1.00	0.49	1.00		0.95	1.00		0.95	1.00
Satd. Flow (perm)		835	1900	1527	901	3429		1805	1682		1752	1845
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)	1	115	389	20	52	382	65	45	43	33	112	75
RTOR Reduction (vph)	0	0	0	8	0	8	0	0	28	0	0	0
Lane Group Flow (vph)	0	116	389	12	52	439	0	45	48	0	113	75
Confl. Peds. (#/hr)		11		5	5		11	6		3	3	
Confl. Bikes (#/hr)				1								
Heavy Vehicles (%)	0%	2%	0%	0%	2%	1%	5%	0%	2%	6%	3%	3%
Turn Type	custom	pm+pt	NA	Perm	pm+pt	NA		Prot	NA		Prot	NA
Protected Phases		5	2		1	6		3	8		7	4
Permitted Phases	5	2		2	6							
Actuated Green, G (s)		74.6	66.6	66.6	69.6	64.1		7.1	9.5		12.4	14.8
Effective Green, g (s)		74.6	66.6	66.6	69.6	64.1		7.1	9.5		12.4	14.8
Actuated g/C Ratio		0.68	0.61	0.61	0.63	0.58		0.06	0.09		0.11	0.13
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		632	1150	924	612	1998		116	145		197	248
v/s Ratio Prot		c0.01	c0.20		0.00	0.13		0.02	0.03		c0.06	c0.04
v/s Ratio Perm		0.11		0.01	0.05							
v/c Ratio		0.18	0.34	0.01	0.08	0.22		0.39	0.33		0.57	0.30
Uniform Delay, d1		6.3	10.8	8.6	7.8	11.0		49.4	47.3		46.3	42.9
Progression Factor		1.99	1.98	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2		0.1	0.8	0.0	0.1	0.3		2.1	1.3		4.0	0.7
Delay (s)		12.6	22.1	8.7	7.8	11.2		51.5	48.6		50.3	43.6
Level of Service		B	C	A	A	B		D	D		D	D
Approach Delay (s)			19.5			10.9			49.7			45.3
Approach LOS			B			B			D			D

Intersection Summary			
HCM 2000 Control Delay	24.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	45.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 5: Memorial Dr/Town Center Lp East & Wilsonville Rd

01/17/2018

Movement	SBR
Lane Configurations	7
Traffic Volume (vph)	119
Future Volume (vph)	119
Ideal Flow (vphpl)	1900
Total Lost time (s)	4.0
Lane Util. Factor	1.00
Frbp, ped/bikes	0.96
Fipb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1523
Flt Permitted	1.00
Satd. Flow (perm)	1523
Peak-hour factor, PHF	0.96
Adj. Flow (vph)	124
RTOR Reduction (vph)	107
Lane Group Flow (vph)	17
Confl. Peds. (#/hr)	6
Confl. Bikes (#/hr)	1
Heavy Vehicles (%)	2%
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Actuated Green, G (s)	14.8
Effective Green, g (s)	14.8
Actuated g/C Ratio	0.13
Clearance Time (s)	4.0
Vehicle Extension (s)	3.0
Lane Grp Cap (vph)	204
v/s Ratio Prot	
v/s Ratio Perm	0.01
v/c Ratio	0.08
Uniform Delay, d1	41.7
Progression Factor	1.00
Incremental Delay, d2	0.2
Delay (s)	41.8
Level of Service	D
Approach Delay (s)	
Approach LOS	
Intersection Summary	

HCM Analysis – Existing + Project + Stage II

Intersection	
Intersection Delay, s/veh	37.7
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↙	↑		↙	↑		↙	↑		↙	↑	
Traffic Vol, veh/h	99	349	63	98	249	49	31	86	85	120	174	80
Future Vol, veh/h	99	349	63	98	249	49	31	86	85	120	174	80
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	0	0	0	1	0	4	0	0	0	1	0
Mvmt Flow	110	388	70	109	277	54	34	96	94	133	193	89
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0





















Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	63.9	28.1	18	22.7
HCM LOS	F	D	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	50%	0%	85%	0%	84%	0%	69%
Vol Right, %	0%	50%	0%	15%	0%	16%	0%	31%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	31	171	99	412	98	298	120	254
LT Vol	31	0	99	0	98	0	120	0
Through Vol	0	86	0	349	0	249	0	174
RT Vol	0	85	0	63	0	49	0	80
Lane Flow Rate	34	190	110	458	109	331	133	282
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.091	0.459	0.265	1.019	0.267	0.754	0.335	0.652
Departure Headway (Hd)	9.807	8.849	8.68	8.017	8.958	8.337	9.19	8.458
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	368	410	417	458	404	437	393	429
Service Time	7.507	6.549	6.379	5.716	6.658	6.037	6.89	6.158
HCM Lane V/C Ratio	0.092	0.463	0.264	1	0.27	0.757	0.338	0.657
HCM Control Delay	13.5	18.8	14.5	75.8	14.9	32.4	16.5	25.7
HCM Lane LOS	B	C	B	F	B	D	C	D
HCM 95th-tile Q	0.3	2.3	1.1	13.6	1.1	6.3	1.4	4.5

HCM Signalized Intersection Capacity Analysis

1: SW Parkway Ave & Boeckman Rd

01/19/2018






















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	91	248	235	73	326	41	145	192	50	40	392	219
Future Volume (vph)	91	248	235	73	326	41	145	192	50	40	392	219
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	10	11	12	12	12	12	13	13	12
Total Lost time (s)	4.0	4.5		4.0	4.5		4.0	4.5		4.0	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	0.98		1.00	0.97		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1845	1706		1636	1768		1787	1803		1861	1822	
Flt Permitted	0.26	1.00		0.14	1.00		0.11	1.00		0.57	1.00	
Satd. Flow (perm)	498	1706		249	1768		202	1803		1122	1822	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	99	270	255	79	354	45	158	209	54	43	426	238
RTOR Reduction (vph)	0	37	0	0	5	0	0	9	0	0	20	0
Lane Group Flow (vph)	99	488	0	79	394	0	158	254	0	43	644	0
Confl. Peds. (#/hr)	4		2	2		4	3		3	3		3
Confl. Bikes (#/hr)						1						1
Heavy Vehicles (%)	1%	2%	2%	3%	2%	0%	1%	2%	0%	0%	1%	1%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8			6			2		
Actuated Green, G (s)	34.6	28.2		33.6	27.7		45.1	37.3		37.9	33.7	
Effective Green, g (s)	34.6	28.2		33.6	27.7		45.1	37.3		37.9	33.7	
Actuated g/C Ratio	0.37	0.30		0.36	0.30		0.49	0.40		0.41	0.36	
Clearance Time (s)	4.0	4.5		4.0	4.5		4.0	4.5		4.0	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	279	519		178	528		231	726		492	663	
v/s Ratio Prot	0.02	c0.29		c0.03	0.22		c0.06	0.14		0.00	c0.35	
v/s Ratio Perm	0.11			0.13			0.27			0.03		
v/c Ratio	0.35	0.94		0.44	0.75		0.68	0.35		0.09	0.97	
Uniform Delay, d1	20.4	31.4		22.4	29.3		19.9	19.2		16.5	29.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	25.4		1.8	5.7		8.1	0.3		0.1	27.7	
Delay (s)	21.2	56.8		24.2	35.0		28.0	19.5		16.6	56.6	
Level of Service	C	E		C	C		C	B		B	E	
Approach Delay (s)		51.2			33.2			22.7			54.2	
Approach LOS		D			C			C			D	
Intersection Summary												
HCM 2000 Control Delay			42.9			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.89									
Actuated Cycle Length (s)			92.6			Sum of lost time (s)		17.0				
Intersection Capacity Utilization			87.9%			ICU Level of Service				E		
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis






















3: SW Wilsonville Rd/SW Stafford Rd & Boeckman Rd/SW Advance Rd

01/19/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	274	121	94	106	129	65	72	190	84	60	380	214
Future Volume (vph)	274	121	94	106	129	65	72	190	84	60	380	214
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	11	11	12	12	12	12	12	12	12
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		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.95		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1728	1837	1565	1660	1710		1805	1758		1805	1786	
Flt Permitted	0.34	1.00	1.00	0.67	1.00		0.14	1.00		0.47	1.00	
Satd. Flow (perm)	618	1837	1565	1173	1710		269	1758		898	1786	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	304	134	104	118	143	72	80	211	93	67	422	238
RTOR Reduction (vph)	0	0	72	0	24	0	0	19	0	0	24	0
Lane Group Flow (vph)	304	134	32	118	191	0	80	285	0	67	636	0
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	1%	0%	1%	5%	3%	0%	0%	1%	8%	0%	1%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8	4			6			2		
Actuated Green, G (s)	30.8	23.2	23.2	17.0	13.9		31.4	28.3		31.2	28.2	
Effective Green, g (s)	30.8	23.2	23.2	17.0	13.9		31.4	28.3		31.2	28.2	
Actuated g/C Ratio	0.41	0.31	0.31	0.22	0.18		0.42	0.37		0.41	0.37	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	433	563	480	283	314		174	658		406	666	
v/s Ratio Prot	c0.11	0.07		0.02	0.11		c0.02	0.16		0.01	c0.36	
v/s Ratio Perm	c0.17		0.02	0.08			0.17			0.06		
v/c Ratio	0.70	0.24	0.07	0.42	0.61		0.46	0.43		0.17	0.95	
Uniform Delay, d1	16.7	19.6	18.5	24.5	28.4		17.2	17.7		13.7	23.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.1	0.2	0.1	1.0	3.3		1.9	0.5		0.2	24.0	
Delay (s)	21.8	19.8	18.6	25.5	31.7		19.2	18.1		13.9	47.0	
Level of Service	C	B	B	C	C		B	B		B	D	
Approach Delay (s)		20.7			29.5			18.3			44.0	
Approach LOS		C			C			B			D	
Intersection Summary												
HCM 2000 Control Delay			30.2				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.85									
Actuated Cycle Length (s)			75.6				Sum of lost time (s)			18.0		
Intersection Capacity Utilization			78.0%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 4: Town Center Lp West & Wilsonville Rd

01/19/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	478	525	62	40	563	46	226	93	43	39	82	541
Future Volume (vph)	478	525	62	40	563	46	226	93	43	39	82	541
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0		4.5	4.5		5.0	5.0	4.5
Lane Util. Factor	0.97	0.95		1.00	0.95		*0.95	0.91		1.00	0.95	0.95
Frb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	1.00
Fipb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.99		1.00	0.97		1.00	0.89	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	0.98		0.95	1.00	1.00
Satd. Flow (prot)	3000	3477		1805	3498		1698	2600		1805	1572	1519
Flt Permitted	0.95	1.00		0.95	1.00		0.95	0.98		0.95	1.00	1.00
Satd. Flow (perm)	3000	3477		1805	3498		1698	2600		1805	1572	1519
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	488	536	63	41	574	47	231	95	44	40	84	552
RTOR Reduction (vph)	0	7	0	0	5	0	0	16	0	0	97	257
Lane Group Flow (vph)	488	592	0	41	616	0	125	229	0	40	230	52
Confl. Peds. (#/hr)	7		7	7		7	1		21	21		1
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	2%	2%	0%	0%	2%	0%	1%	1%	0%	0%	1%	1%
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	Prot
Protected Phases	5	2		1	6		8	8		4	4	4
Permitted Phases												
Actuated Green, G (s)	21.5	54.0		5.2	37.7		14.7	14.7		18.6	18.6	18.6
Effective Green, g (s)	21.5	53.5		5.2	37.2		14.7	14.7		18.1	18.1	18.6
Actuated g/C Ratio	0.20	0.49		0.05	0.34		0.13	0.13		0.16	0.16	0.17
Clearance Time (s)	4.0	4.5		4.0	4.5		4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.5	4.3		2.5	4.3		2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	586	1691		85	1182		226	347		297	258	256
v/s Ratio Prot	c0.16	0.17		0.02	c0.18		0.07	c0.09		0.02	c0.15	0.03
v/s Ratio Perm												
v/c Ratio	0.83	0.35		0.48	0.52		0.55	0.66		0.13	0.89	0.20
Uniform Delay, d1	42.5	17.5		51.1	29.2		44.6	45.3		39.3	45.0	39.3
Progression Factor	1.00	1.00		1.32	0.88		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	9.7	0.6		3.1	1.6		2.3	4.0		0.2	29.5	0.3
Delay (s)	52.2	18.1		70.6	27.4		46.9	49.3		39.4	74.4	39.6
Level of Service	D	B		E	C		D	D		D	E	D
Approach Delay (s)		33.4			30.1			48.5			56.5	
Approach LOS		C			C			D			E	
Intersection Summary												
HCM 2000 Control Delay			40.2			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			18.5			
Intersection Capacity Utilization			79.5%			ICU Level of Service				D		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 5: Memorial Dr/Town Center Lp East & Wilsonville Rd

01/19/2018

Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	1	116	386	21	51	372	64	45	44	33	110	75
Future Volume (vph)	1	116	386	21	51	372	64	45	44	33	110	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor		1.00	1.00	1.00	1.00	0.95		1.00	1.00		1.00	1.00
Frpb, ped/bikes		1.00	1.00	0.95	1.00	0.99		1.00	0.98		1.00	1.00
Flpb, ped/bikes		0.99	1.00	1.00	0.99	1.00		1.00	1.00		1.00	1.00
Frt		1.00	1.00	0.85	1.00	0.98		1.00	0.94		1.00	1.00
Flt Protected		0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00
Satd. Flow (prot)		1751	1900	1527	1760	3427		1805	1686		1752	1845
Flt Permitted		0.45	1.00	1.00	0.48	1.00		0.95	1.00		0.95	1.00
Satd. Flow (perm)		823	1900	1527	884	3427		1805	1686		1752	1845
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)	1	121	402	22	53	388	67	47	46	34	115	78
RTOR Reduction (vph)	0	0	0	9	0	8	0	0	27	0	0	0
Lane Group Flow (vph)	0	122	402	13	53	447	0	47	53	0	115	78
Confl. Peds. (#/hr)		11		5	5		11	6		3	3	
Confl. Bikes (#/hr)				1								
Heavy Vehicles (%)	0%	2%	0%	0%	2%	1%	5%	0%	2%	6%	3%	3%
Turn Type	custom	pm+pt	NA	Perm	pm+pt	NA		Prot	NA		Prot	NA
Protected Phases		5	2		1	6		3	8		7	4
Permitted Phases	5	2		2	6							
Actuated Green, G (s)		74.5	66.3	66.3	69.1	63.6		7.1	9.7		12.5	15.1
Effective Green, g (s)		74.5	66.3	66.3	69.1	63.6		7.1	9.7		12.5	15.1
Actuated g/C Ratio		0.68	0.60	0.60	0.63	0.58		0.06	0.09		0.11	0.14
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		626	1145	920	599	1981		116	148		199	253
v/s Ratio Prot		c0.01	c0.21		0.00	0.13		0.03	0.03		c0.07	c0.04
v/s Ratio Perm		0.12		0.01	0.05							
v/c Ratio		0.19	0.35	0.01	0.09	0.23		0.41	0.36		0.58	0.31
Uniform Delay, d1		6.3	11.0	8.8	8.0	11.3		49.4	47.2		46.2	42.7
Progression Factor		1.93	1.93	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2		0.1	0.8	0.0	0.1	0.3		2.3	1.5		4.0	0.7
Delay (s)		12.4	22.0	8.8	8.1	11.5		51.7	48.7		50.3	43.4
Level of Service		B	C	A	A	B		D	D		D	D
Approach Delay (s)			19.3			11.2			49.8			45.1
Approach LOS			B			B			D			D
Intersection Summary												
HCM 2000 Control Delay			24.7									
HCM 2000 Volume to Capacity ratio			0.38									
Actuated Cycle Length (s)			110.0						16.0			
Intersection Capacity Utilization			46.4%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 5: Memorial Dr/Town Center Lp East & Wilsonville Rd

01/19/2018

Movement	SBR
Lane Configurations	1
Traffic Volume (vph)	123
Future Volume (vph)	123
Ideal Flow (vphpl)	1900
Total Lost time (s)	4.0
Lane Util. Factor	1.00
Frbp, ped/bikes	0.96
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1523
Flt Permitted	1.00
Satd. Flow (perm)	1523
Peak-hour factor, PHF	0.96
Adj. Flow (vph)	128
RTOR Reduction (vph)	110
Lane Group Flow (vph)	18
Confl. Peds. (#/hr)	6
Confl. Bikes (#/hr)	1
Heavy Vehicles (%)	2%
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Actuated Green, G (s)	15.1
Effective Green, g (s)	15.1
Actuated g/C Ratio	0.14
Clearance Time (s)	4.0
Vehicle Extension (s)	3.0
Lane Grp Cap (vph)	209
v/s Ratio Prot	
v/s Ratio Perm	0.01
v/c Ratio	0.08
Uniform Delay, d1	41.4
Progression Factor	1.00
Incremental Delay, d2	0.2
Delay (s)	41.6
Level of Service	D
Approach Delay (s)	
Approach LOS	
Intersection Summary	

HCM Signalized Intersection Capacity Analysis

2: Canyon Creek Rd & Boeckman Rd

01/19/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	99	349	63	98	249	49	31	86	85	120	174	80
Future Volume (vph)	99	349	63	98	249	49	31	86	85	120	174	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	11	12	13	12	12	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flt	1.00	0.98		1.00	0.98		1.00	0.93		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1711	1789		1803	1777		1793	1738		1800	1798	
Flt Permitted	0.56	1.00		0.42	1.00		0.59	1.00		0.64	1.00	
Satd. Flow (perm)	1010	1789		790	1777		1107	1738		1209	1798	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	110	388	70	109	277	54	34	96	94	133	193	89
RTOR Reduction (vph)	0	16	0	0	17	0	0	64	0	0	47	0
Lane Group Flow (vph)	110	442	0	109	314	0	34	126	0	133	235	0
Confl. Peds. (#/hr)			1	1					2	2		
Heavy Vehicles (%)	2%	0%	0%	0%	1%	0%	4%	0%	0%	0%	1%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	12.1	12.1		12.1	12.1		9.6	9.6		9.6	9.6	
Effective Green, g (s)	12.1	12.1		12.1	12.1		9.6	9.6		9.6	9.6	
Actuated g/C Ratio	0.41	0.41		0.41	0.41		0.32	0.32		0.32	0.32	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	411	728		321	723		357	561		390	581	
v/s Ratio Prot		c0.25			0.18			0.07			c0.13	
v/s Ratio Perm	0.11			0.14			0.03			0.11		
v/c Ratio	0.27	0.61		0.34	0.43		0.10	0.23		0.34	0.40	
Uniform Delay, d1	5.9	6.9		6.1	6.3		7.0	7.3		7.6	7.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	1.4		0.6	0.4		0.1	0.2		0.5	0.5	
Delay (s)	6.2	8.4		6.7	6.8		7.1	7.5		8.2	8.3	
Level of Service	A	A		A	A		A	A		A	A	
Approach Delay (s)		7.9			6.7			7.5			8.3	
Approach LOS		A			A			A			A	
Intersection Summary												
HCM 2000 Control Delay			7.6				HCM 2000 Level of Service			A		
HCM 2000 Volume to Capacity ratio			0.52									
Actuated Cycle Length (s)			29.7				Sum of lost time (s)			8.0		
Intersection Capacity Utilization			58.3%				ICU Level of Service			B		
Analysis Period (min)			15									
c Critical Lane Group												

SROZ/SRIR

**Boeckman Road Frog Pond Area
Morgan Farms
Significant Resource Impact Report**

Date: Revised April 20, 2018
To: Kerry Rappold, Natural Resources Manager
From: C. Mirth Walker, PWS, Senior Wetland Scientist
CC: Mike Morse, Regional Project Director, Pahlisch Homes, Inc.
Ben Altman, Senior Planner, Project Manager, Pioneer Design Group, Inc.,
Subject: Boeckman Road Frog Pond Area Morgan Farms Significant Resource Impact
Report
7331 and 7447 SW Boeckman Road
Tax Map 3 1W 12D Tax Lots 2400, 2600, and 2700, Clackamas County, Oregon

INTRODUCTION:

The applicant proposes to build a residential subdivision on the subject site, including two trailheads, and the City of Wilsonville (City) plans to construct future pedestrian connections east of Boeckman Creek and north of Boeckman Road. The subject site is located at 7331 and 7447 SW Boeckman Road just east of the current City limits (Figure 1). The site is composed of Tax Lots 2400, 2600, and 2700 on Tax Map 3 1W 12D, Clackamas County, Oregon (Figures 2a and 2b) and based on site survey, is 20.13 acres in size. The land is proposed for annexation into the City.

The Wilsonville City Code (2013) Significant Resource Overlay Zone (SROZ) ordinance (Section 4.139.00) provides specific protections for significant natural resources such as:

- a significant Goal 5 natural resource,
- lands protected under Metro's Urban Growth Management Functional Plan Title 3 (Water Quality Resource Areas),
- riparian corridors, and
- significant wildlife habitat.

This memorandum presents the natural resources delineated on-site and identifies which are locally significant natural resources, lists proposed impacts to natural resources as a result of the proposed development, provides a comparison of the existing condition SROZ and the City's previous SROZ mapping, and offers site development recommendations.

SWCA Environmental Consultants (SWCA) submitted a wetland and waters delineation report to the Oregon Department of State Lands (DSL) for concurrence under WD 2017-0361, dated November 7, 2017. The wetland delineation of the terrace

Wetland C was revisited this spring to determine if site conditions were still wet; the wetland re-delineation resulted in a slightly smaller size. The wetland re-delineation was re-submitted to the DSL for a new concurrence of the revised wetland area, under WD 2018-0168 in late March; the report was also submitted to the U.S. Army Corps of Engineers (USACE) for their jurisdictional determination. A joint fill permit application was also submitted to the DSL and USACE in March, 2018, under DSL file number 61059-RF and USACE file number NWP-2018-162. DSL concurrence and the fill permits are expected in July of 2018.

BACKGROUND INFORMATION:

According to the City's Natural Resource Inventory mapping presented in the Frog Pond Area Plan (Angelo Planning Group 2015; Pacific Habitat Services [PHS] 2014) (Attachment A), areas within the property have been designated as natural resources, some of which will be subject to the City's SROZ ordinance upon annexation into the City. The mapped natural resources include Boeckman Creek and its associated wetland (Wetland 1A); two streams; the Boeckman Creek riparian corridor, which serves to protect wetland and aquatic resources as well as wildlife and their habitat; and Wetlands 1B, 2A, 2B, and a portion of Wetland 3, which extends off-site to the northeast. Boeckman Creek wetlands and riparian corridor were previously inventoried, mapped, and assessed in the City's original Local Wetlands and Riparian Corridor Inventory (Fishman Environmental Services [Fishman] 1998), which was updated in 2000 (Fishman 2000). The local wetland inventory (LWI) mapping is shown on Figure 3.

The following soil units are mapped on the subject site, generally from east to west (Natural Resources Conservation Service [NRCS] 2006, 2017) (Figure 4):

- Aloha silt loam, 0%–3% and 3%–6% slopes (Unit 1A and 1B): hydric Huberly and Dayton inclusions. Aloha is a deep, somewhat poorly drained soil on broad valley terraces. It formed in stratified glaciolacustrine deposits (Gerig 1985).
- Woodburn silt loam, 8%–15% slopes (Unit 91C): hydric Huberly, Dayton, and Aquolls inclusions. Woodburn is a deep, moderately well drained soil on broad valley terraces. It formed in stratified glaciolacustrine deposits
- Xerochrepts and Haploxerolls, very steep (Unit 92F): not hydric but this map unit is known to have seeps. This map unit is on terrace escarpments.

The site is located in the Willamette River and Tributaries Gallery Forest Ecoregion 3b (Thorson et al. 2003), which includes low-gradient, meandering, river channels, broad floodplains, oxbow lakes, and meander scars. Riparian gallery forests containing ash, black cottonwood, alder, and big-leaf maple once grew on its fertile, alluvial soils, but most have been replaced by agriculture and rural residential, suburban, and urban development. Ecoregion 3b includes the major historic floodplains of the Willamette River system that rarely function today due to flood control dams upstream. Dams in the upper Willamette Basin reduce both flood frequency and flood volume, which are related to the decline of the endemic, endangered Oregon chub fish.

Adjacent ecoregions include the Prairie Terraces Ecoregion 3c and the Valley Foothills Ecoregion 3d. The nearly level to undulating Prairie Terraces Ecoregion 3c includes all of the terraces of the Willamette River upstream of the Portland/Vancouver Basin (Ecoregion 3a). Ecoregion 3c is drained by low-gradient, meandering streams and rivers. Its broad fluvial terraces once supported oak savanna and prairies that were maintained by burning; wetter areas supported Oregon ash and black cottonwood. Today, only relict native prairie remains. The poorly drained soils derived from

glaciolacustrine deposits are extensively farmed for grass seed and small grains. Grasses tolerate poor drainage and poor rooting conditions better than other crops. In addition to agriculture, the Prairie Terraces also experience the bulk of urban expansion.

The Valley Foothills Ecoregion 3d is a transitional zone between the agricultural Willamette Valley and the more heavily forested Cascade and Coast Ranges. The forest canopy of Ecoregion 3d is dominated by Oregon white oak and Douglas-fir. The Valley Foothills (3d) receive less precipitation than adjacent mountainous ecoregions. Eastern foothills are wetter than those that lie on the western side of the Willamette Valley in the lee of the Coast Range. Today, rural residential development, pastureland, vineyards, tree farms, and orchards are common in Ecoregion 3d. The foothills also serve as a wildlife corridor between the Willamette Valley and the surrounding mountains.

The geology of the site is described by Gannett and Caldwell (1998), where the site is mapped as Qs-alluvium and glacial-outburst flood sediment (Pleistocene age) silt, sand, and gravel deposited primarily by late Pleistocene glacial outburst floods, but also including glaciofluvial sediments from the Cascade Range. It includes Willamette silt, Linn gravel, lacustrine deposits, and older alluvium.

Hydrology of the site is provided by a high groundwater table and surface flow from two intermittent tributaries to the perennial Boeckman Creek, which is located in the ravine along the western portion of the site. A drain tile from east of the site has apparently recently been capped. Further information is provided below in the Wetlands and Waters section of this report.

SIGNIFICANT RESOURCE ASSESSMENT METHODOLOGY:

SWCA reviewed background information and aerial imagery prior to the field visit to identify potentially significant resources on-site and to document changes in current site conditions from previously mapped conditions. SWCA professional wetland scientists C. Mirth Walker and Tom Dee III conducted site visits to delineate wetlands, two intermittent streams, and the ordinary high water line (OHWL) of the left (east) bank of Boeckman Creek on March 24 and April 5, 2017. The right (west) bank was not delineated. SWCA mapped the riparian corridor and reviewed the previously assessed significant resources on the site.

The methodology used for delineating wetland boundaries was in accordance with the *Western Mountains, Valleys, and Coast Regional Supplement (Version 2.0; 2010)* and the 1987 *Corps of Engineers Wetlands Delineation Manual* used by DSL and the USACE. Non-wetland waters were delineated according to *Regulatory Guidance Letter 05-05* and Oregon Administrative Rules. The delineated OHWL was based on observations of scour, sediment deposition, debris wracks, and other readily observable indicators. Wetland boundaries, the OHWL, and sample plot locations were flagged in the field for survey by Pioneer Design Group (PDG).

The riparian corridor boundary was established per Section 4.139.00: the riparian corridor is a type NR-1, as shown in Figure NR-1 on page B-131 of the ordinance (Attachment B). PDG survey crew picked up the edge of canopy to define the edge of the riparian corridor wildlife habitat on the site.

The Oregon Freshwater Assessment Methodology (OFWAM) was used in the City's inventory (Fishman 2000) to determine if wetlands greater than 0.5 acre in size should be categorized as

“locally significant” wetlands. Wildlife habitat and riparian corridor resources were similarly assessed in the inventory.

Vegetation and wildlife observed on-site were recorded (Attachments C and D). Representative site photographs were documented (Attachment E).

EXISTING SITE CONDITIONS

The site includes the Boeckman Creek canyon along the western property boundary, with two steep ravines funneling surface runoff and piped runoff to the stream from the broad, flat primarily upland area to the east, where an equestrian center is located. The equestrian center is extensively cross-fenced, and several barns and sheds are present. Two single-family residences are located in the southcentral and southeast portions of the site. The equestrian center grounds are dominated by pasture grasses and both native and ornamental trees and shrubs. Dominant grasses included perennial rye grass (*Lolium perenne*), Kentucky blue grass (*Poa pratensis*), annual blue grass (*Poa annua*), meadow-foxtail (*Alopecurus pratensis*), tall fescue (*Schedonorus arundinaceus*), colonial bent grass (*Agrostis capillaris*), and orchard grass (*Dactylis glomerata*).

SIGNIFICANT AND NONSIGNIFICANT NATURAL RESOURCES:

Significant Riparian Corridor/Wildlife Habitat

The riparian corridor wildlife habitat along Boeckman Creek on the western boundary of the site consists of a big-leaf maple (*Acer macrophyllum*) forest with Douglas-fir (*Pseudotsuga menziesii*), red alder (*Alnus rubra*), and a few western red cedar (*Thuja plicata*) trees. The forest understory was dominated by Indian plum (a.k.a. oso-berry, *Oemleria cerasiformis*), vine maple (*Acer circinatum*), and beaked hazelnut (*Corylus cornuta*). Groundcover was dominated by western sword fern (*Polystichum munitum*) and Pacific waterleaf (*Hydrophyllum tenuipes*). The non-native/noxious species Himalayan blackberry (*Rubus armeniacus*), English holly (*Ilex aquifolium*), and English ivy (*Hedera helix*) are present in this habitat. The riparian corridor provides diverse wildlife habitat, with stumps, snags, and large woody debris present. The corridor was determined to be locally significant in 2000; in addition to the diverse wildlife habitat, it was assessed as having intact fish habitat, water quality, and hydrologic control functions (LWI summary sheets are included in Attachment F).

Significant Wetlands and Waters

The large wetland area on both sides of Boeckman was primarily delineated (left bank/east side only = 26,503 square feet / 0.61 acre) as a water with an OHWL, with flooding and debris mark at the toe of slope (labeled as Boeckman Creek OHWL on the survey, Figure 5). Wetland A was delineated above the OHWL near a concrete culvert structure at the downstream end of Boeckman Creek, and receives input from an intermittent stream labeled T1 (for Tributary 1). T1 receives outflow from Wetland C, located in the southeast horse pastures, via an intermittent swale (Swale C) that is culverted under two driveways before descending into the steep ravine, which we delineated as T1. A very small Wetland B was delineated above the OHWL at the confluence of Tributary 2 (T2) with Boeckman Creek, north of T1.

Wetland A (2,091 square feet / 0.05 acre) was dominated by Himalayan blackberry, reed canary grass (*Phalaris arundinacea*), and spotted touch-me-not (*Impatiens capensis*) with scattered Oregon ash (*Fraxinus latifolia*) trees and saplings. Soils displayed a depleted matrix and were saturated to the surface or flooded during our March 24, 2017, site visit. Hydrology is driven by a high groundwater table and surface flow from T1.

Wetland B (391 square feet / 0.01 acre) was dominated by Himalayan blackberry, spotted touch-me-not, coastal hedge-nettle (*Stachys chamissonis*), and skunk cabbage (*Lysichiton americanus*). Soils were not sampled but displayed redoximorphic features, and were saturated to the surface during our March 24, 2017, site visit. Hydrology was present due to a high groundwater table and toe-slope seeps.

Boeckman Creek, Boeckman Creek Wetlands A and B, and the Boeckman Creek riparian corridor and wildlife habitat are significant natural resources subject to the City's SROZ. In no case does the SROZ become narrower than what is required under Metro's Title 3 Wetland/Water Quality Resource Area requirements for perennial streams and wetlands adjacent to steep slopes.

Non-significant Wetlands and Waters

Wetland C (originally delineated as 8,957 square feet / 0.21 acre; re-delineated as 7,594 square feet, 0.17 acre) was dominated by pasture grasses, including field meadow-foxtail, Kentucky blue grass, and tall fescue. Soils displayed a depleted matrix and were saturated at 12 inches below ground surface, a fairly weak primary wetland hydrology indicator given how wet it had been prior to our April 5, 2017, site visit.

Wetland C appears to receive water from a drain tile discharge pipe located just off-site to the east. Site conditions were very wet during our 2017 field reconnaissance, and based on the amount of water present on March 24 as compared to April 5, 2017, it is highly likely that the hydrology of Wetland C dries up completely during the dry season and therefore Swale C and T1 are intermittent rather than perennial streams. T2 also likely does not flow during the dry season and was therefore also determined to be intermittent. Wetland C is less than 0.5 acre and is therefore not subject to OFWAM assessment or the City's SROZ. It still may be regulated by the DSL and USACE.

SWCA confirmed the presence of the Frog Pond Area Plan Wetland 2B (called Wetland 3 in this report); the other wetland features mapped in the upper portion of the site, listed in the Plan as Wetlands 1B, 2A, and 3, were determined to not be present on the site.

Tributary T1 should be considered significant once it enters the steep slope portion of the riparian corridor as it becomes part of the locally significant Boeckman Creek riparian corridor at that point. Swale C is not locally significant. Tributary T2 is totally contained within the locally significant Boeckman Creek riparian corridor.

PROPOSED SROZ MAP REVISIONS

The SROZ boundary along the Boeckman Creek riparian corridor and wildlife habitat is defined by the drip line of the mature forest canopy. A 25-foot Significant Resource (SR) Impact Area extends beyond the SROZ boundary. The existing condition SROZ boundary of the forested riparian habitat is shown on Figure 5. A comparison with the City's previous SROZ mapping is shown on Figure 6.

The Area of Limited Conflicting Use (ALCU) occurs between the riparian corridor break in slope to less than 25% slope, where the resource becomes wildlife habitat, and extends out to the outer edge of the forested canopy. A maximum of 5% of the ALCU may be impacted by the project development. The applicant is preserving the ALCU on the site for future use.

PROPOSED SITE DEVELOPMENT:

The applicant is proposing a residential subdivision consisting of 82 lots (Figure 7). The development is proposed outside of the SROZ and will only impact portions of the 25-foot SR Impact Area due to 14 lot lines and two storm water quality facilities, thus ensuring that there are no impacts to the SR. Impacts to the 25-foot SR Impact Area are allowed under the City's SROZ code. Therefore, a mitigation plan for these impacts is not required.

COMPLIANCE WITH CODE:

Per City Code Section 4.139.03 Administration (.02) Impact Area. *The "Impact Area" is the area adjacent to the outer boundary of a Significant Resource within which development or other alteration activities may be permitted through the review of an SRIR (Significant Resource Impact Report). Where it can be clearly determined by the Planning Director that development is only in the Impact Area and there is no impact to the Significant Resource, development may be permitted without SRIR review. The impact area is 25 feet wide unless otherwise specified in this ordinance or by the decision making body. Designation of an Impact Area is required by Statewide Planning Goal 5. The primary purpose of the Impact Area is to ensure that development does not encroach into the SROZ.*

Section 4.001.79 defines Development as: *Any human-caused change to improved or unimproved real estate, including, but not limited to, buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations located or storage of equipment or materials located within the area of special flood hazard.*

Section 4.139.04 Uses and Activities Exempt from These Regulations

A request for exemption shall be consistent with the submittal requirements listed under Section 4.139.06(.01)(B – I), as applicable to the exempt use and activity.

(.17) New Single-Family Dwelling. The construction of a new single family dwelling is exempt unless the building encroaches into the Impact Area and/or the SROZ.

- A. If the proposed building encroaches only into the Impact Area then an abbreviated SRIR may be required as specified in Section 4.139.05, unless it can be clearly determined by the Planning Director that the development proposal will have no impact on the Significant Resource. The primary purpose of the Impact Area is to insure that development does not encroach into the SROZ.*

No impacts will occur to the ALCU from the proposed site development. Small portions of the building footprints for Lots 12 and 14 are included in the Impact Area. The objective of the proposed development is to avoid impacts to the SROZ. As stated above, development is allowed within the 25-foot Impact Area, as long as it can be demonstrated that there are no impacts to the SROZ.

The GeoTech Report prepared for the project site indicates that development impacts within the 25-foot Impact Area are acceptable, so long as they are setback at least 20 feet from the break in slope. Per these recommendations, the project development footprint is set back at least 20 feet from the break in slope. The small portion of the building envelope shown on Lots 12 and 14 conform with this design guideline. The small portions of the building envelopes do not result in any physical or environmental impacts to the protected resources within the SROZ.

The proposed potential encroachments (maximum building envelopes) are minimized, with only a small portion of potential building structure encroachment for either lot:

Lot 12 – Maximum encroachment is a triangular portion of the building envelope measuring 5 by 50 feet, or 250 square feet; and setback 180 feet from the break in slope.

Lot 14 – Maximum encroachment is a trapezoidal shaped portion of the building envelope measuring 10 x 50 feet, or 450 square feet; and setback 70 feet from the break in slope.

Both lots will have a 4-foot tall open metal fence (to avoid “walling off” the trail and SROZ, as stated in the recommendations below) which will further protect the SROZ from impacts from the building envelopes. The pedestrian trail is downslope of these two lots, and provides a further buffering element to protect the SR. The 25-foot Impact Area, the fence adjacent to these two lots, and the pathway all contribute to ensure that there will be no direct encroachment or resulting development impacts occurring within the SROZ, which is consistent with Section 4.139.04(.17).

The project has minimized encroachment into the 25-foot Impact Area to the greatest extent practicable; there will be no impacts to the SROZ and therefore mitigation to compensate for impacts is not required or recommended.

The two storm water quality facilities are exempt from the SROZ regulations (Section 4.139.04 Uses and Activities Exempt from These Regulations):

(.05) Operation, maintenance, and repair of irrigation and drainage ditches, constructed ponds, wastewater facilities, stormwater detention or retention facilities, and water facilities consistent with the Stormwater Master Plan or the Comprehensive Plan.

Sustainable storm water management is a key component of the City’s Frog Pond Area Plan.

The applicant is proposing to fill Wetland C and purchase wetland mitigation bank credits from the Mud Slough Wetland Mitigation bank, which services the project area. A joint fill permit application has been submitted to the DSL and the USACE.

Pedestrian trails are allowed within the SROZ and 25 foot SR Impact Area under the City’s development code (Section 4.139.04 Uses and Activities Exempt from These Regulations):

(.08) The construction of new roads, pedestrian or bike paths into the SROZ in order to provide access to the sensitive area or across the sensitive area, provided the location of the crossing is consistent with the intent of the Wilsonville Comprehensive Plan. Roads and paths shall be constructed so as to minimize and repair disturbance to existing vegetation and slope stability.

A proposed alignment for a pedestrian trail within the SROZ is part of the City’s Frog Pond Area Plan. This trail would provide access and connectivity among neighborhoods, schools, and to educational opportunities within the riparian habitat.

Trees to be removed due to the proposed site development plan were presented by the project team's certified arborist, Morgan Holen, and submitted under separate cover. No trees will be removed from the SR on the site.

RECOMMENDATIONS:

SWCA recommends the following:

- Remove invasive plants from within the SROZ, specifically targeting Himalayan blackberry, English holly, and English ivy.
- In order to ensure that the proposed site development protects the significant resources on the site, properly install and maintain erosion prevention and control measures, and remove them once the site development is complete.
- Prior to any site clearing, grading or construction, the SROZ area shall be staked and fenced per approved plan. During construction, the SROZ area shall remain fenced and undisturbed except as allowed by an approved development permit.
- If any fencing is used, carefully integrate fencing into the landscape to guide animals toward animal crossings under, over, or around transportation corridors. Also ensure that fencing does not prevent animal access to the Boeckman Creek riparian corridor.
- Follow any other applicable habitat-friendly development practices included in the City's code.

PREPARED BY:



C. Mirth Walker, PWS
Senior Wetland Scientist

QUALIFICATIONS:

Ms. C. Mirth Walker is a Professional Wetland Scientist (No. 415, 1995) certified by the Society of Wetland Scientists Professional Certification Program (<http://wetlandcert.org/>) and is the Senior Wetland Scientist in SWCA's Portland office. She was certified as a Certified Wetland Delineator by the Seattle District USACE in 1993 under a provisional program that was not extended, and she holds a B.A. from Reed College in Biology/Psychology with an emphasis in Animal Behavior. Ms. Walker has over 27 years of experience working in the natural environment, specifically in wetlands, in urban and rural settings. Ms. Walker is a project manager, trains wetland staff, and provides quality assurance/quality control review of all natural resource deliverables. Her primary areas of expertise include conducting wetland and other waters delineations and assessments, conducting natural resource inventories and assessments, preparing joint wetland fill permit applications, preparing wetland and stream restoration and mitigation plans, and coordinating agency approvals of local, state, and federal wetland permits. Ms. Walker understands wetland permitting and regulations, and she works collaboratively with clients, team members, and agency personnel to resolve issues and provide solutions that are attainable. Ms. Walker has experience

conducting LWIs and natural resource inventories in the following cities: Adair Village (for the Lane Council of Governments [LCOG]), Ashland, Harrisburg (LCOG), Hillsboro (multiple projects), Lakeside, La Grande, Medford Urban Reserves, Mill City (LCOG), Monroe (LCOG), Scio (LCOG), Tigard, Tualatin, Stayton, and Wilsonville (while at Fishman Environmental Services, which was purchased by SWCA in 2004).

FIGURES:

Figure 1. Site location map.

Figure 2a. Tax lot map (OrMap paper base).

Figure 2b. Tax lot map (Metro RLIS digital base).

Figure 3. Local wetland inventory map.

Figure 4. Soil map.

Figure 5. Existing conditions SROZ map.

Figure 6. Comparison of existing conditions SROZ with the City's previous mapping.

Figure 7. Proposed site development plan.

ATTACHMENTS:

Attachment A. City's SROZ Map and Frog Pond Area Plan Natural Resource Inventory Map

Attachment B. Figure NR-1 from the City's SROZ ordinance

Attachment C. Vegetation Inventory

Attachment D. Wildlife Inventory

Attachment E. Representative Site Photographs

Attachment F. LWI Summary Sheets

REFERENCES

Angelo Planning Group. 2015. *Frog Pond Area Plan, A Concept Plan for Three New Neighborhoods in East Wilsonville, Final Area Plan*. Available at: <http://www.ci.wilsonville.or.us/DocumentCenter/Home/View/11299>. Approved by the Wilsonville City Council November 16, 2015. Portland, Oregon: Angelo Planning Group.

City of Wilsonville. 2013. Wilsonville Code. Planning and Land Development Chapter 4 Sections 4.100-4.141 Zoning. The Section 4.139.00. Significant Resource Overlay Zone (SROZ) Ordinance starts on Page B-129. Available at: <http://www.ci.wilsonville.or.us/DocumentCenter/Home/View/624>.

_____. 2017. The City of Wilsonville SROZ map. Dated May 2007. Available at: <http://www.ci.wilsonville.or.us/documentcenter/view/907>. Accessed July 12, 2017.

Fishman Environmental Services (Fishman). 1998. *City of Wilsonville Local Wetlands and Riparian Corridor Inventory*. Prepared for the City of Wilsonville. Approved by the Department of State Lands February 26, 1999. Portland, Oregon: Fishman Environmental Services, LLC.

_____. 2000. *City of Wilsonville Natural Resource Inventory and Goal 5/ Title 3/ Endangered Species Act Compliance and Protection Plan: Inventory Update, 1999 - 2000*. Prepared for the City of Wilsonville. Portland, Oregon: Fishman Environmental Services, LLC.

- Gannett, M.W., and R.R. Caldwell. 1998. Geologic framework of the Willamette lowland aquifer system, Oregon and Washington. U.S. Geological Survey Professional Paper 1424-A. Map Scale 1:250,000. Available at: <https://pubs.usgs.gov/pp/1424a/plate-1.pdf>.
- Gerig, A.J. 1985. Soil Survey of Clackamas County Area, Oregon. USDA Soil Conservation Service. Available at: https://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/oregon/ClackamasOR1985/ClackamasOR_1985.pdf
- Natural Resources Conservation Service (NRCS). 2006. Hydric Soils List – All Components (OR): Clackamas County Area, Oregon (Survey Version 4 dated December 22, 2006). Accessed January 2012.
- . 2017. Online soil survey. Soil Survey Version 14, September 16, 2016. Available at: <http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>. Accessed April 13, 2017.
- Pacific Habitat Services, Inc. 2014. *Wetland Inventory Results – Natural Resources Inventory for the Frog Pond and Advance Road Urban Growth Areas in Wilsonville*. Memorandum dated April 8, 2014, prepared for the City of Wilsonville. Available at: <http://or-wilsonville.civicplus.com/DocumentCenter/View/6280>. Wilsonville, Oregon: Pacific Habitat Services, Inc.
- Thorson, T.D., S.A. Bryce, D.A. Lammers, A.J. Woods, J.M. Omernik, J. Kagan, D.E. Pater, and J.A. Comstock. 2003. Ecoregions of Oregon. Color poster with map, descriptive text, summary tables, and photographs. Map Scale 1:1,500,000. Reston, Virginia: U.S. Geological Survey. Available at: <http://people.oregonstate.edu/~muirp/FuelsReductionSWOregon/ToolsResources/EcoregionsOregonLevelIIEPA.pdf>

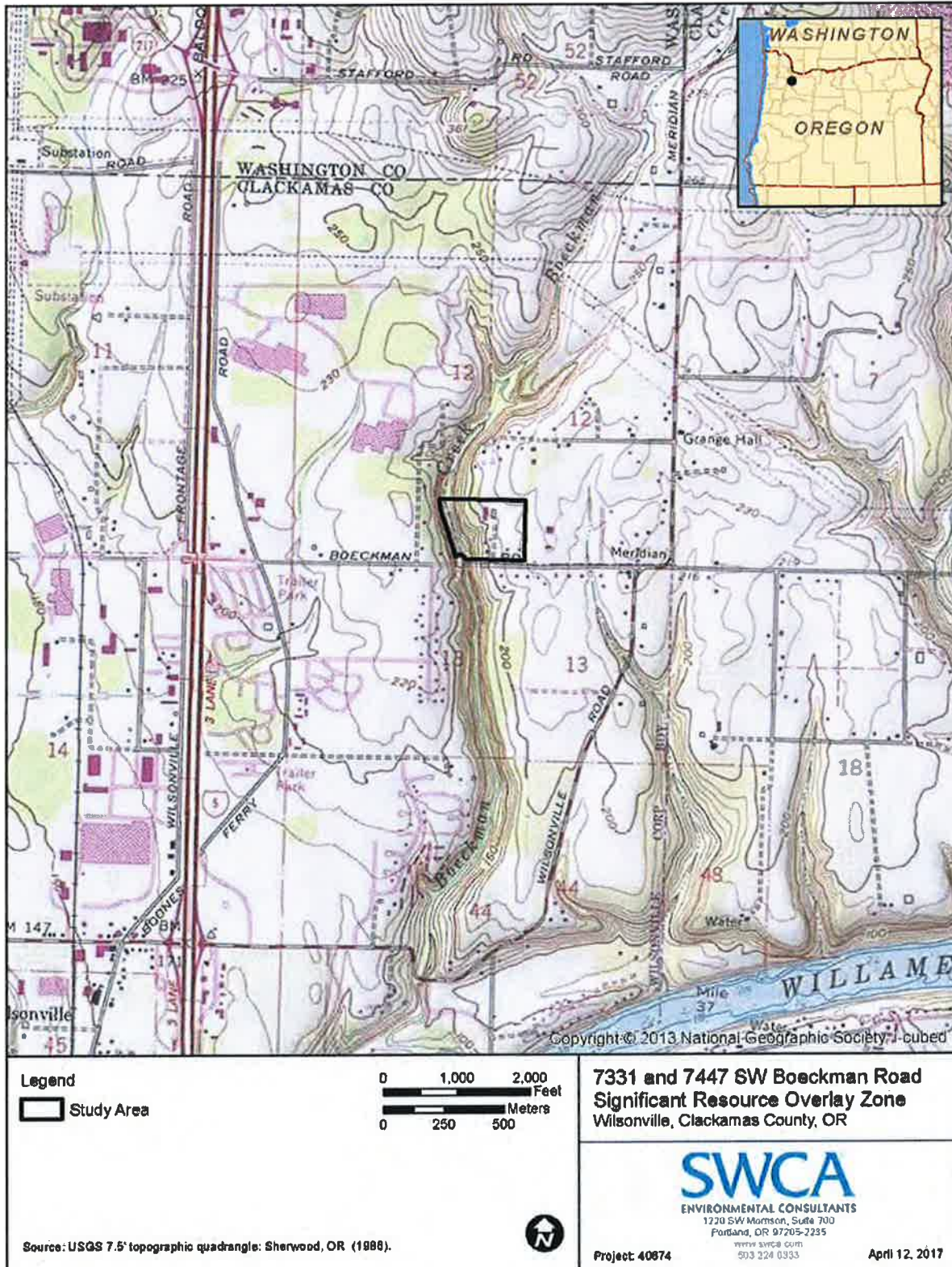


Figure 1. Site location map.

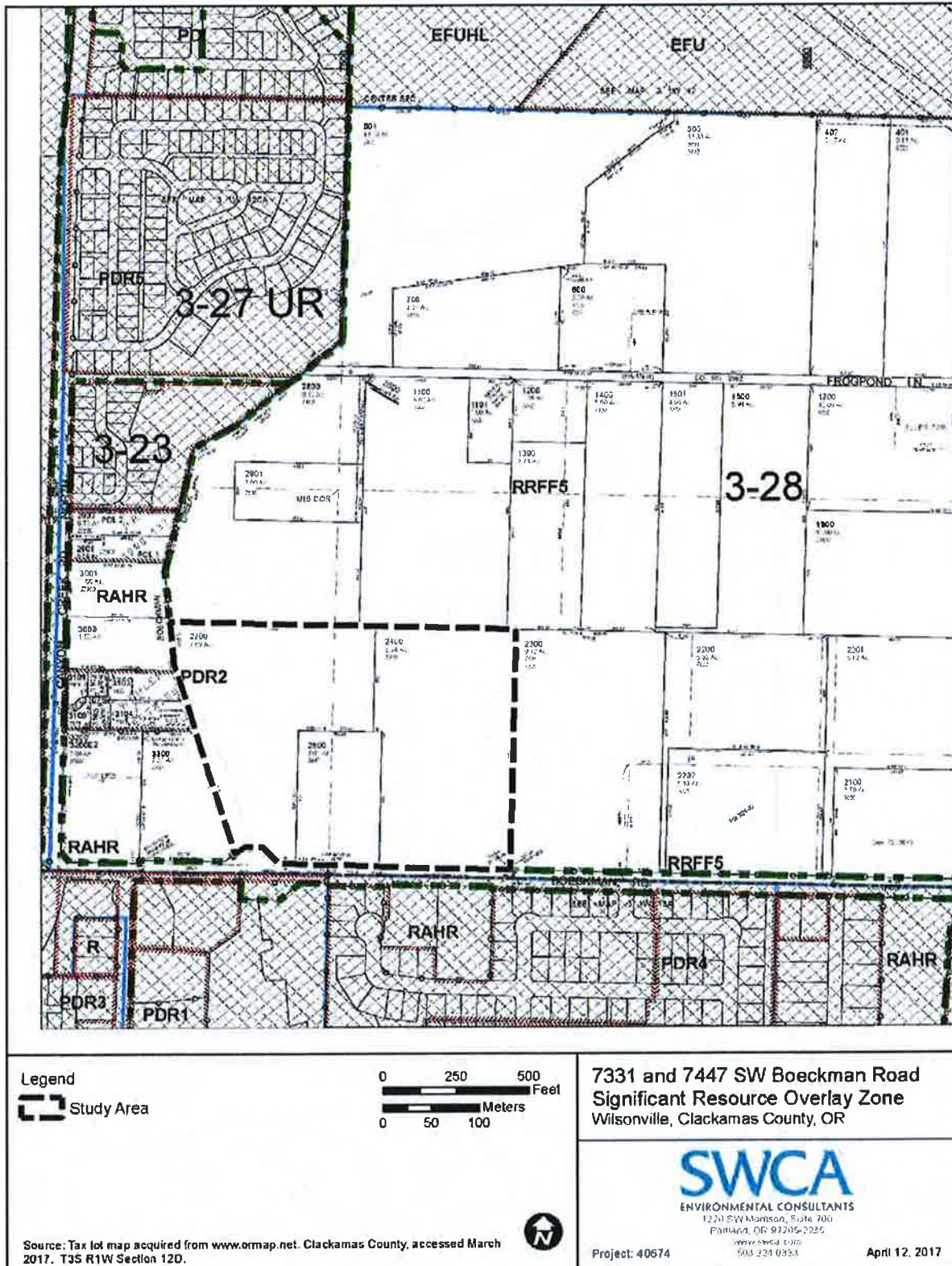


Figure 2a. Tax Lot map (ORmap paper base).



Figure 2b. Tax Lot map (Metro RLIS aerial base).

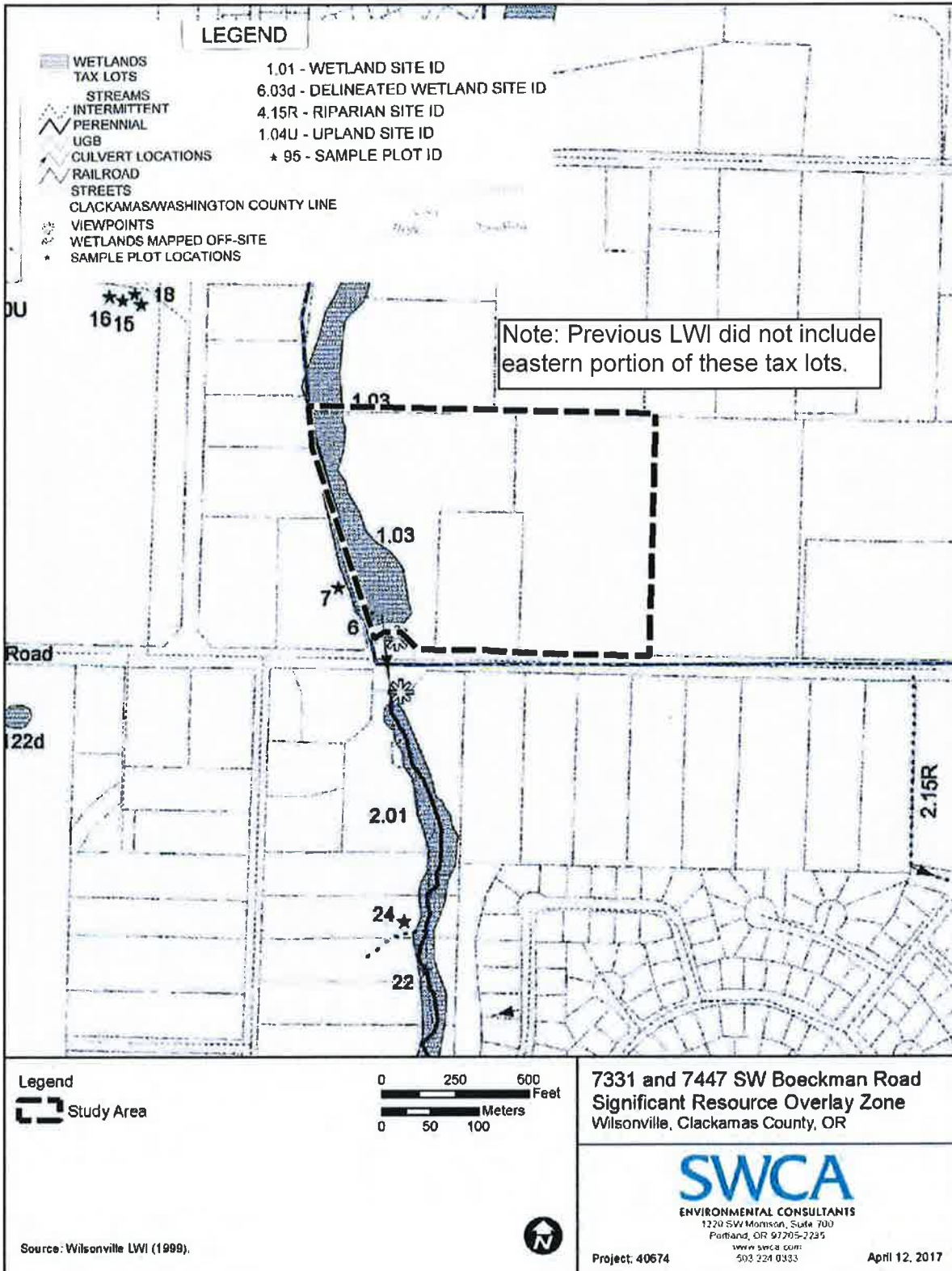
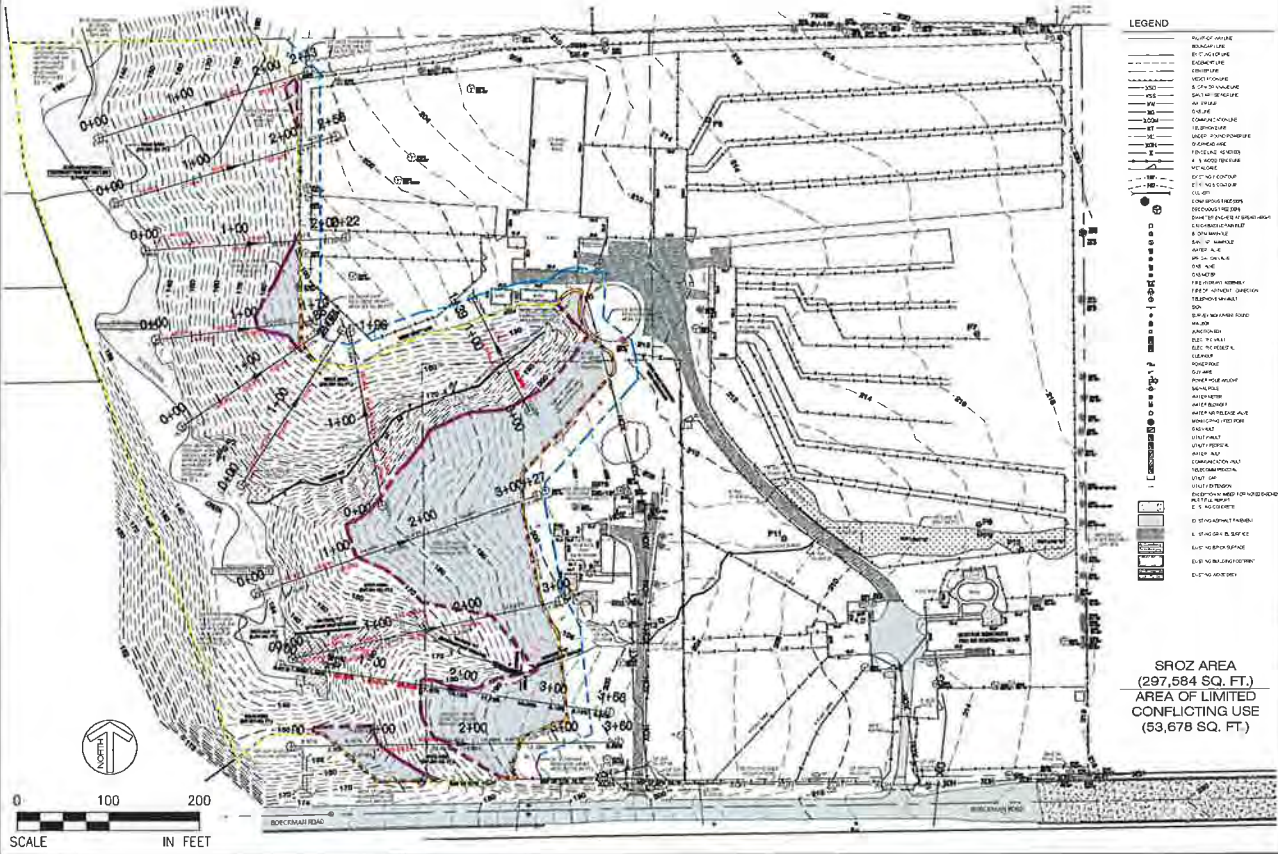


Figure 3. Local wetland inventory map.



Figure 4. Soil map.

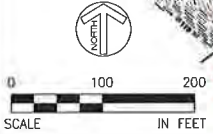
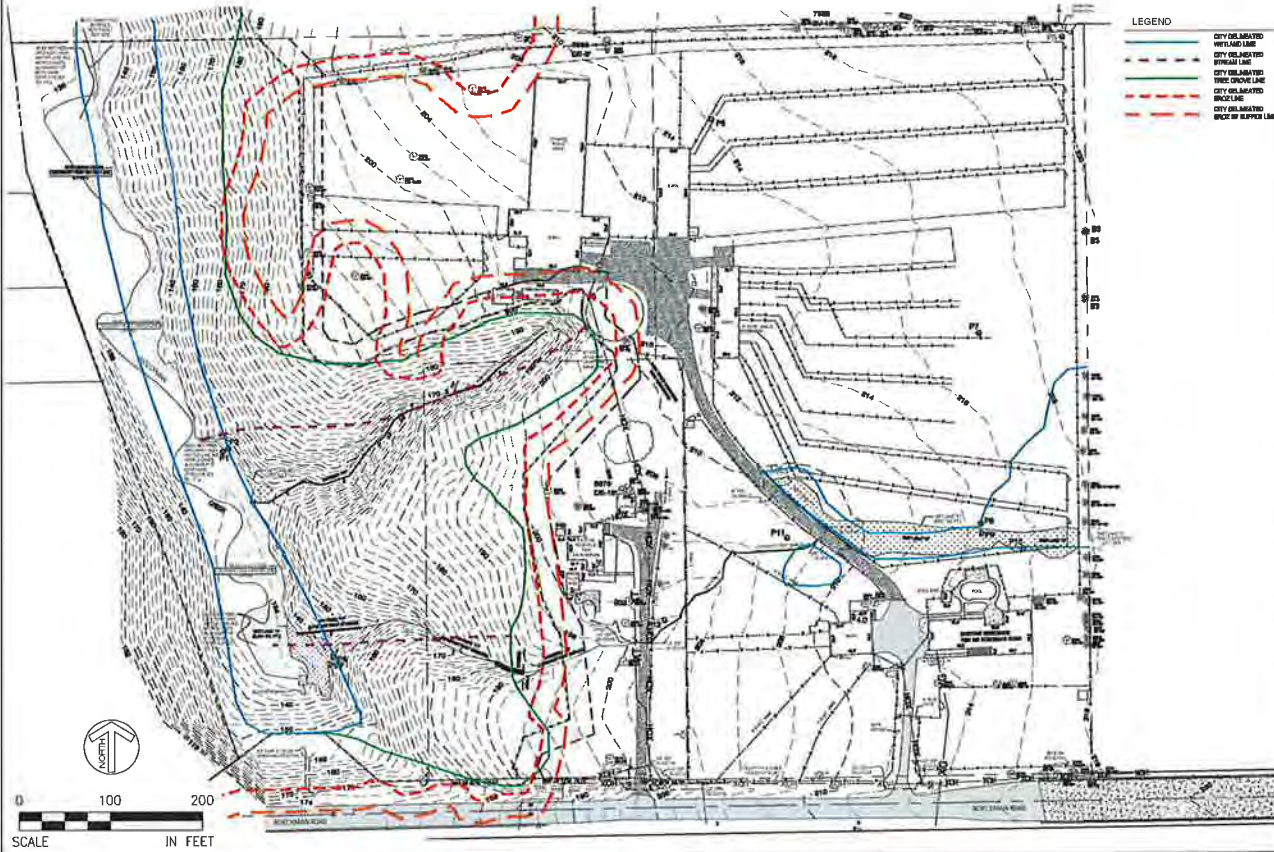
FIGURE 5
EXISTING CONDITIONS SROZ MAP



LEGEND

- 1/4" ROAD
- 1/2" ROAD
- 3/4" ROAD
- 1" ROAD
- 2" ROAD
- 3" ROAD
- 4" ROAD
- 6" ROAD
- 8" ROAD
- 12" ROAD
- 18" ROAD
- 24" ROAD
- 36" ROAD
- 48" ROAD
- 60" ROAD
- 72" ROAD
- 84" ROAD
- 96" ROAD
- 108" ROAD
- 120" ROAD
- 144" ROAD
- 168" ROAD
- 192" ROAD
- 216" ROAD
- 240" ROAD
- 288" ROAD
- 360" ROAD
- 432" ROAD
- 504" ROAD
- 576" ROAD
- 648" ROAD
- 720" ROAD
- 864" ROAD
- 1008" ROAD
- 1152" ROAD
- 1296" ROAD
- 1440" ROAD
- 1584" ROAD
- 1728" ROAD
- 1872" ROAD
- 2016" ROAD
- 2160" ROAD
- 2304" ROAD
- 2448" ROAD
- 2592" ROAD
- 2736" ROAD
- 2880" ROAD
- 3024" ROAD
- 3168" ROAD
- 3312" ROAD
- 3456" ROAD
- 3600" ROAD
- 3744" ROAD
- 3888" ROAD
- 4032" ROAD
- 4176" ROAD
- 4320" ROAD
- 4464" ROAD
- 4608" ROAD
- 4752" ROAD
- 4896" ROAD
- 5040" ROAD
- 5184" ROAD
- 5328" ROAD
- 5472" ROAD
- 5616" ROAD
- 5760" ROAD
- 5904" ROAD
- 6048" ROAD
- 6192" ROAD
- 6336" ROAD
- 6480" ROAD
- 6624" ROAD
- 6768" ROAD
- 6912" ROAD
- 7056" ROAD
- 7200" ROAD
- 7344" ROAD
- 7488" ROAD
- 7632" ROAD
- 7776" ROAD
- 7920" ROAD
- 8064" ROAD
- 8208" ROAD
- 8352" ROAD
- 8496" ROAD
- 8640" ROAD
- 8784" ROAD
- 8928" ROAD
- 9072" ROAD
- 9216" ROAD
- 9360" ROAD
- 9504" ROAD
- 9648" ROAD
- 9792" ROAD
- 9936" ROAD
- 10080" ROAD
- 10224" ROAD
- 10368" ROAD
- 10512" ROAD
- 10656" ROAD
- 10800" ROAD
- 10944" ROAD
- 11088" ROAD
- 11232" ROAD
- 11376" ROAD
- 11520" ROAD
- 11664" ROAD
- 11808" ROAD
- 11952" ROAD
- 12096" ROAD
- 12240" ROAD
- 12384" ROAD
- 12528" ROAD
- 12672" ROAD
- 12816" ROAD
- 12960" ROAD
- 13104" ROAD
- 13248" ROAD
- 13392" ROAD
- 13536" ROAD
- 13680" ROAD
- 13824" ROAD
- 13968" ROAD
- 14112" ROAD
- 14256" ROAD
- 14400" ROAD
- 14544" ROAD
- 14688" ROAD
- 14832" ROAD
- 14976" ROAD
- 15120" ROAD
- 15264" ROAD
- 15408" ROAD
- 15552" ROAD
- 15696" ROAD
- 15840" ROAD
- 15984" ROAD
- 16128" ROAD
- 16272" ROAD
- 16416" ROAD
- 16560" ROAD
- 16704" ROAD
- 16848" ROAD
- 16992" ROAD
- 17136" ROAD
- 17280" ROAD
- 17424" ROAD
- 17568" ROAD
- 17712" ROAD
- 17856" ROAD
- 18000" ROAD
- 18144" ROAD
- 18288" ROAD
- 18432" ROAD
- 18576" ROAD
- 18720" ROAD
- 18864" ROAD
- 19008" ROAD
- 19152" ROAD
- 19296" ROAD
- 19440" ROAD
- 19584" ROAD
- 19728" ROAD
- 19872" ROAD
- 20016" ROAD
- 20160" ROAD
- 20304" ROAD
- 20448" ROAD
- 20592" ROAD
- 20736" ROAD
- 20880" ROAD
- 21024" ROAD
- 21168" ROAD
- 21312" ROAD
- 21456" ROAD
- 21600" ROAD
- 21744" ROAD
- 21888" ROAD
- 22032" ROAD
- 22176" ROAD
- 22320" ROAD
- 22464" ROAD
- 22608" ROAD
- 22752" ROAD
- 22896" ROAD
- 23040" ROAD
- 23184" ROAD
- 23328" ROAD
- 23472" ROAD
- 23616" ROAD
- 23760" ROAD
- 23904" ROAD
- 24048" ROAD
- 24192" ROAD
- 24336" ROAD
- 24480" ROAD
- 24624" ROAD
- 24768" ROAD
- 24912" ROAD
- 25056" ROAD
- 25200" ROAD
- 25344" ROAD
- 25488" ROAD
- 25632" ROAD
- 25776" ROAD
- 25920" ROAD
- 26064" ROAD
- 26208" ROAD
- 26352" ROAD
- 26496" ROAD
- 26640" ROAD
- 26784" ROAD
- 26928" ROAD
- 27072" ROAD
- 27216" ROAD
- 27360" ROAD
- 27504" ROAD
- 27648" ROAD
- 27792" ROAD
- 27936" ROAD
- 28080" ROAD
- 28224" ROAD
- 28368" ROAD
- 28512" ROAD
- 28656" ROAD
- 28800" ROAD
- 28944" ROAD
- 29088" ROAD
- 29232" ROAD
- 29376" ROAD
- 29520" ROAD
- 29664" ROAD
- 29808" ROAD
- 29952" ROAD
- 30096" ROAD
- 30240" ROAD
- 30384" ROAD
- 30528" ROAD
- 30672" ROAD
- 30816" ROAD
- 30960" ROAD
- 31104" ROAD
- 31248" ROAD
- 31392" ROAD
- 31536" ROAD
- 31680" ROAD
- 31824" ROAD
- 31968" ROAD
- 32112" ROAD
- 32256" ROAD
- 32400" ROAD
- 32544" ROAD
- 32688" ROAD
- 32832" ROAD
- 32976" ROAD
- 33120" ROAD
- 33264" ROAD
- 33408" ROAD
- 33552" ROAD
- 33696" ROAD
- 33840" ROAD
- 33984" ROAD
- 34128" ROAD
- 34272" ROAD
- 34416" ROAD
- 34560" ROAD
- 34704" ROAD
- 34848" ROAD
- 34992" ROAD
- 35136" ROAD
- 35280" ROAD
- 35424" ROAD
- 35568" ROAD
- 35712" ROAD
- 35856" ROAD
- 36000" ROAD
- 36144" ROAD
- 36288" ROAD
- 36432" ROAD
- 36576" ROAD
- 36720" ROAD
- 36864" ROAD
- 37008" ROAD
- 37152" ROAD
- 37296" ROAD
- 37440" ROAD
- 37584" ROAD
- 37728" ROAD
- 37872" ROAD
- 38016" ROAD
- 38160" ROAD
- 38304" ROAD
- 38448" ROAD
- 38592" ROAD
- 38736" ROAD
- 38880" ROAD
- 39024" ROAD
- 39168" ROAD
- 39312" ROAD
- 39456" ROAD
- 39600" ROAD
- 39744" ROAD
- 39888" ROAD
- 40032" ROAD
- 40176" ROAD
- 40320" ROAD
- 40464" ROAD
- 40608" ROAD
- 40752" ROAD
- 40896" ROAD
- 41040" ROAD
- 41184" ROAD
- 41328" ROAD
- 41472" ROAD
- 41616" ROAD
- 41760" ROAD
- 41904" ROAD
- 42048" ROAD
- 42192" ROAD
- 42336" ROAD
- 42480" ROAD
- 42624" ROAD
- 42768" ROAD
- 42912" ROAD
- 43056" ROAD
- 43200" ROAD
- 43344" ROAD
- 43488" ROAD
- 43632" ROAD
- 43776" ROAD
- 43920" ROAD
- 44064" ROAD
- 44208" ROAD
- 44352" ROAD
- 44496" ROAD
- 44640" ROAD
- 44784" ROAD
- 44928" ROAD
- 45072" ROAD
- 45216" ROAD
- 45360" ROAD
- 45504" ROAD
- 45648" ROAD
- 45792" ROAD
- 45936" ROAD
- 46080" ROAD
- 46224" ROAD
- 46368" ROAD
- 46512" ROAD
- 46656" ROAD
- 46800" ROAD
- 46944" ROAD
- 47088" ROAD
- 47232" ROAD
- 47376" ROAD
- 47520" ROAD
- 47664" ROAD
- 47808" ROAD
- 47952" ROAD
- 48096" ROAD
- 48240" ROAD
- 48384" ROAD
- 48528" ROAD
- 48672" ROAD
- 48816" ROAD
- 48960" ROAD
- 49104" ROAD
- 49248" ROAD
- 49392" ROAD
- 49536" ROAD
- 49680" ROAD
- 49824" ROAD
- 49968" ROAD
- 50112" ROAD
- 50256" ROAD
- 50400" ROAD
- 50544" ROAD
- 50688" ROAD
- 50832" ROAD
- 50976" ROAD
- 51120" ROAD
- 51264" ROAD
- 51408" ROAD
- 51552" ROAD
- 51696" ROAD
- 51840" ROAD
- 51984" ROAD
- 52128" ROAD
- 52272" ROAD
- 52416" ROAD
- 52560" ROAD
- 52704" ROAD
- 52848" ROAD
- 52992" ROAD
- 53136" ROAD
- 53280" ROAD
- 53424" ROAD
- 53568" ROAD
- 53712" ROAD
- 53856" ROAD
- 54000" ROAD
- 54144" ROAD
- 54288" ROAD
- 54432" ROAD
- 54576" ROAD
- 54720" ROAD
- 54864" ROAD
- 55008" ROAD
- 55152" ROAD
- 55296" ROAD
- 55440" ROAD
- 55584" ROAD
- 55728" ROAD
- 55872" ROAD
- 56016" ROAD
- 56160" ROAD
- 56304" ROAD
- 56448" ROAD
- 56592" ROAD
- 56736" ROAD
- 56880" ROAD
- 57024" ROAD
- 57168" ROAD
- 57312" ROAD
- 57456" ROAD
- 57600" ROAD
- 57744" ROAD
- 57888" ROAD
- 58032" ROAD
- 58176" ROAD
- 58320" ROAD
- 58464" ROAD
- 58608" ROAD
- 58752" ROAD
- 58896" ROAD
- 59040" ROAD
- 59184" ROAD
- 59328" ROAD
- 59472" ROAD
- 59616" ROAD
- 59760" ROAD
- 59904" ROAD
- 60048" ROAD
- 60192" ROAD
- 60336" ROAD
- 60480" ROAD
- 60624" ROAD
- 60768" ROAD
- 60912" ROAD
- 61056" ROAD
- 61200" ROAD
- 61344" ROAD
- 61488" ROAD
- 61632" ROAD
- 61776" ROAD
- 61920" ROAD
- 62064" ROAD
- 62208" ROAD
- 62352" ROAD
- 62496" ROAD
- 62640" ROAD
- 62784" ROAD
- 62928" ROAD
- 63072" ROAD
- 63216" ROAD
- 63360" ROAD
- 63504" ROAD
- 63648" ROAD
- 63792" ROAD
- 63936" ROAD
- 64080" ROAD
- 64224" ROAD
- 64368" ROAD
- 64512" ROAD
- 64656" ROAD
- 64800" ROAD
- 64944" ROAD
- 65088" ROAD
- 65232" ROAD
- 65376" ROAD
- 65520" ROAD
- 65664" ROAD
- 65808" ROAD
- 65952" ROAD
- 66096" ROAD
- 66240" ROAD
- 66384" ROAD
- 66528" ROAD
- 66672" ROAD
- 66816" ROAD
- 66960" ROAD
- 67104" ROAD
- 67248" ROAD
- 67392" ROAD
- 67536" ROAD
- 67680" ROAD
- 67824" ROAD
- 67968" ROAD
- 68112" ROAD
- 68256" ROAD
- 68400" ROAD
- 68544" ROAD
- 68688" ROAD
- 68832" ROAD
- 68976" ROAD
- 69120" ROAD
- 69264" ROAD
- 69408" ROAD
- 69552" ROAD
- 69696" ROAD
- 69840" ROAD
- 69984" ROAD
- 70128" ROAD
- 70272" ROAD
- 70416" ROAD
- 70560" ROAD
- 70704" ROAD
- 70848" ROAD
- 70992" ROAD
- 71136" ROAD
- 71280" ROAD
- 71424" ROAD
- 71568" ROAD
- 71712" ROAD
- 71856" ROAD
- 72000" ROAD
- 72144" ROAD
- 72288" ROAD
- 72432" ROAD
- 72576" ROAD
- 72720" ROAD
- 72864" ROAD
- 73008" ROAD
- 73152" ROAD
- 73296" ROAD
- 73440" ROAD
- 73584" ROAD
- 73728" ROAD
- 73872" ROAD
- 74016" ROAD
- 74160" ROAD
- 74304" ROAD
- 74448" ROAD
- 74592" ROAD
- 74736" ROAD
- 74880" ROAD
- 75024" ROAD
- 75168" ROAD
- 75312" ROAD
- 75456" ROAD
- 75600" ROAD
- 75744" ROAD
- 75888" ROAD
- 76032" ROAD
- 76176" ROAD
- 76320" ROAD
- 76464" ROAD
- 76608" ROAD
- 76752" ROAD
- 76896" ROAD
- 77040" ROAD
- 77184" ROAD
- 77328" ROAD
- 77472" ROAD
- 77616" ROAD
- 77760" ROAD
- 77904" ROAD
- 78048" ROAD
- 78192" ROAD
- 78336" ROAD
- 78480" ROAD
- 78624" ROAD
- 78768" ROAD
- 78912" ROAD
- 79056" ROAD
- 79200" ROAD
- 79344" ROAD
- 79488" ROAD
- 79632" ROAD
- 79776" ROAD
- 79920" ROAD
- 80064" ROAD
- 80208" ROAD
- 80352" ROAD
- 80496" ROAD
- 80640" ROAD
- 80784" ROAD
- 80928" ROAD
- 81072" ROAD
- 81216" ROAD
- 81360" ROAD
- 81504" ROAD
- 81648" ROAD
- 81792" ROAD
- 81936" ROAD
- 82080" ROAD
- 82224" ROAD
- 82368" ROAD
- 82512" ROAD
- 82656" ROAD
- 82800" ROAD
- 82944" ROAD
- 83088" ROAD
- 83232" ROAD
- 83376" ROAD
- 83520" ROAD
- 83664" ROAD
- 83808" ROAD
- 83952" ROAD
- 84096" ROAD
- 84240" ROAD
- 84384" ROAD
- 84528" ROAD
- 84672" ROAD
- 84816" ROAD
- 84960" ROAD
- 85104" ROAD
- 85248" ROAD
- 85392" ROAD
- 85536" ROAD
- 85680" ROAD
- 85824" ROAD
- 85968" ROAD
- 86112" ROAD
- 86256" ROAD
- 86400" ROAD
- 86544" ROAD
- 86688" ROAD
- 86832" ROAD
- 86976" ROAD
- 87120" ROAD
- 87264" ROAD
- 87408" ROAD
- 87552" ROAD
- 87696" ROAD
- 87840" ROAD
- 87984" ROAD
- 88128" ROAD
- 88272" ROAD
- 88416" ROAD
- 88560" ROAD
- 88704" ROAD
- 88848" ROAD
- 88992" ROAD
- 89136" ROAD
- 89280" ROAD
- 89424" ROAD
- 89568" ROAD
- 89712" ROAD
- 89856" ROAD
- 90000" ROAD
- 90144" ROAD
- 90288" ROAD
- 90432" ROAD
- 90576" ROAD
- 90720" ROAD
- 90864" ROAD
- 91008" ROAD
- 91152" ROAD
- 91296" ROAD
- 91440" ROAD
- 91584" ROAD
- 91728" ROAD
- 91872" ROAD
- 92016" ROAD
- 92160" ROAD
- 92304" ROAD
- 92448" ROAD
- 92592" ROAD
- 92736" ROAD
- 92880" ROAD
- 93024" ROAD
- 93168" ROAD
- 93312" ROAD
- 93456" ROAD
- 93600" ROAD
- 93744" ROAD
- 93888" ROAD
- 94032" ROAD
- 94176" ROAD
- 94320" ROAD
- 94464" ROAD
- 94608" ROAD
- 94752" ROAD
- 94896" ROAD
- 95040" ROAD
- 95184" ROAD
- 95328" ROAD
- 95472" ROAD
- 95616" ROAD
- 95760" ROAD
- 95904" ROAD
- 96048" ROAD
- 96192" ROAD
- 96336" ROAD
- 96480" ROAD
- 96624" ROAD
- 96768" ROAD
- 96912" ROAD
- 97056" ROAD
- 97200" ROAD
- 97344" ROAD
- 97488" ROAD
- 97632" ROAD
- 97776" ROAD
- 97920" ROAD
- 98064" ROAD
- 98208" ROAD
- 98352" ROAD
- 98496" ROAD
- 98640" ROAD
- 98784" ROAD
- 98928" ROAD
- 99072" ROAD
- 99216" ROAD
- 99360" ROAD
- 99504" ROAD
- 99648" ROAD
- 99792" ROAD
- 99936" ROAD
- 100080" ROAD
- 100224" ROAD
- 100368" ROAD
- 100512" ROAD
- 100656" ROAD
- 100800" ROAD
- 100944" ROAD
- 101088" ROAD
- 101232" ROAD
- 101376" ROAD
- 101520" ROAD
- 101664" ROAD
- 101808" ROAD
- 101952" ROAD
- 102096" ROAD
- 102240" ROAD
- 102384" ROAD
- 102528" ROAD
- 102672" ROAD
- 102816" ROAD
- 102960" ROAD
- 103104" ROAD
- 103248" ROAD
- 103392" ROAD
- 103536" ROAD
- 103680" ROAD
- 103824" ROAD
- 103968" ROAD
- 104112" ROAD
- 104256" ROAD
- 104400" ROAD
- 104544" ROAD
- 104688" ROAD
- 104832" ROAD
- 104976" ROAD
- 105120" ROAD
- 105264" ROAD
- 105408" ROAD
- 105552" ROAD
- 105696" ROAD
- 105840" ROAD
- 105984" ROAD
- 106128" ROAD
- 106272" ROAD
- 106416" ROAD
- 106560" ROAD
- 106704" ROAD
- 106848" ROAD
- 106992" ROAD
- 107136" ROAD
- 107280" ROAD
- 107424" ROAD
- 107568" ROAD
- 107712" ROAD
- 107856" ROAD
- 108000" ROAD
- 108144" ROAD
- 108288" ROAD
- 108432" ROAD
- 108576" ROAD
- 108720" ROAD
- 108864" ROAD
- 109008" ROAD
- 109152" ROAD
- 109296" ROAD
- 109440" ROAD
- 109584" ROAD
- 109728" ROAD
- 109872" ROAD
- 110016" ROAD
- 110160" ROAD
- 110304" ROAD
- 110448" ROAD
- 110592" ROAD
- 110736" ROAD
- 110880" ROAD
- 111024" ROAD
- 111168" ROAD
- 111312" ROAD
- 111456" ROAD
- 111600" ROAD
- 111744" ROAD
- 111888" ROAD
- 112032" ROAD
- 112176" ROAD
- 112320" ROAD
- 112464" ROAD
- 112608" ROAD
- 112752" ROAD
- 112896" ROAD
- 113040" ROAD
- 113184" ROAD
- 113328" ROAD
- 113472" ROAD
- 113616" ROAD
- 113760" ROAD
- 113904" ROAD
- 114048" ROAD
- 114192" ROAD
- 114336" ROAD
- 114480" ROAD
- 114624" ROAD
- 114768" ROAD
- 114912" ROAD
- 115056" ROAD
- 115200" ROAD
- 115344" ROAD
- 115488" ROAD
- 115632" ROAD
- 115776" ROAD
- 115920" ROAD
- 116064" ROAD
- 116208" ROAD
- 116352" ROAD
- 116496" ROAD
- 116640" ROAD
- 116784" ROAD
- 116928" ROAD
- 117072" ROAD
- 117216" ROAD
- 117360" ROAD
- 117504" ROAD
- 117648" ROAD
- 117792" ROAD
- 117936" ROAD
- 118080" ROAD
- 118224" ROAD
- 118368" ROAD
- 118512" ROAD
- 118656" ROAD
- 118800" ROAD
- 118944" ROAD
- 119088" ROAD
- 119232" ROAD
- 119376" ROAD
- 119520" ROAD
- 119664" ROAD
- 119808" ROAD
- 119952" ROAD
- 120096" ROAD
- 120240" ROAD
- 120384" ROAD
- 120528" ROAD
- 120672" ROAD
- 120816" ROAD
- 120960" ROAD
- 121104" ROAD
- 121248" ROAD
- 121392" ROAD
- 121536" ROAD
- 121680" ROAD
- 121824" ROAD
- 121968" ROAD
- 122112" ROAD
- 122256" ROAD
- 122400" ROAD
- 122544" ROAD
- 122688" ROAD
- 122832" ROAD
- 122976" ROAD
- 123120" ROAD
- 123264" ROAD
- 123408" ROAD
- 123552" ROAD
- 123696" ROAD
- 123840" ROAD
- 123984" ROAD
- 124128" ROAD
- 124272" ROAD
- 124416" ROAD
- 124560" ROAD
- 124704" ROAD
- 124848" ROAD
- 124992" ROAD
- 125136" ROAD
- 125280" ROAD
- 125424" ROAD
- 125568" ROAD
- 125712" ROAD
- 125856" ROAD
- 126000" ROAD
- 126144" ROAD
- 126288" ROAD
- 126432" ROAD
- 126576" ROAD
- 126720" ROAD
- 126864" ROAD
- 127008" ROAD
- 127152" ROAD
- 127296" ROAD
- 127440" ROAD
- 127584" ROAD
- 127728" ROAD
- 127872" ROAD
- 1

FIGURE 6
CITY OF WILSONVILLE SROZ DELINEATION COMPARISON MAP



- LEGEND**
- CITY DELINEATED WETLAND LINE
 - - - CITY DELINEATED STREAM LINE
 - CITY DELINEATED TREE GROVE LINE
 - - - CITY DELINEATED BRICK LINE
 - - - CITY DELINEATED BRICK W/ BUFFER LINE

1000 SW WASHINGTON SQUARE RD.
SUITE 170
PORTLAND, OREGON 97223
PIONEER DESIGN GROUP, INC.
www.pdg.com

PDG
PIONEER DESIGN GROUP, INC.

Designed by	Date	07/2017
Drawn by	TCC	07/2017
Reviewed by	BA	07/2017
Project No.	338-001	REF.
Horiz. Scale:	1"=100'	
Vert. Scale:		

Project
FROG POND

No.
338-001

Type
PLANNING

Sheet
6 of 6

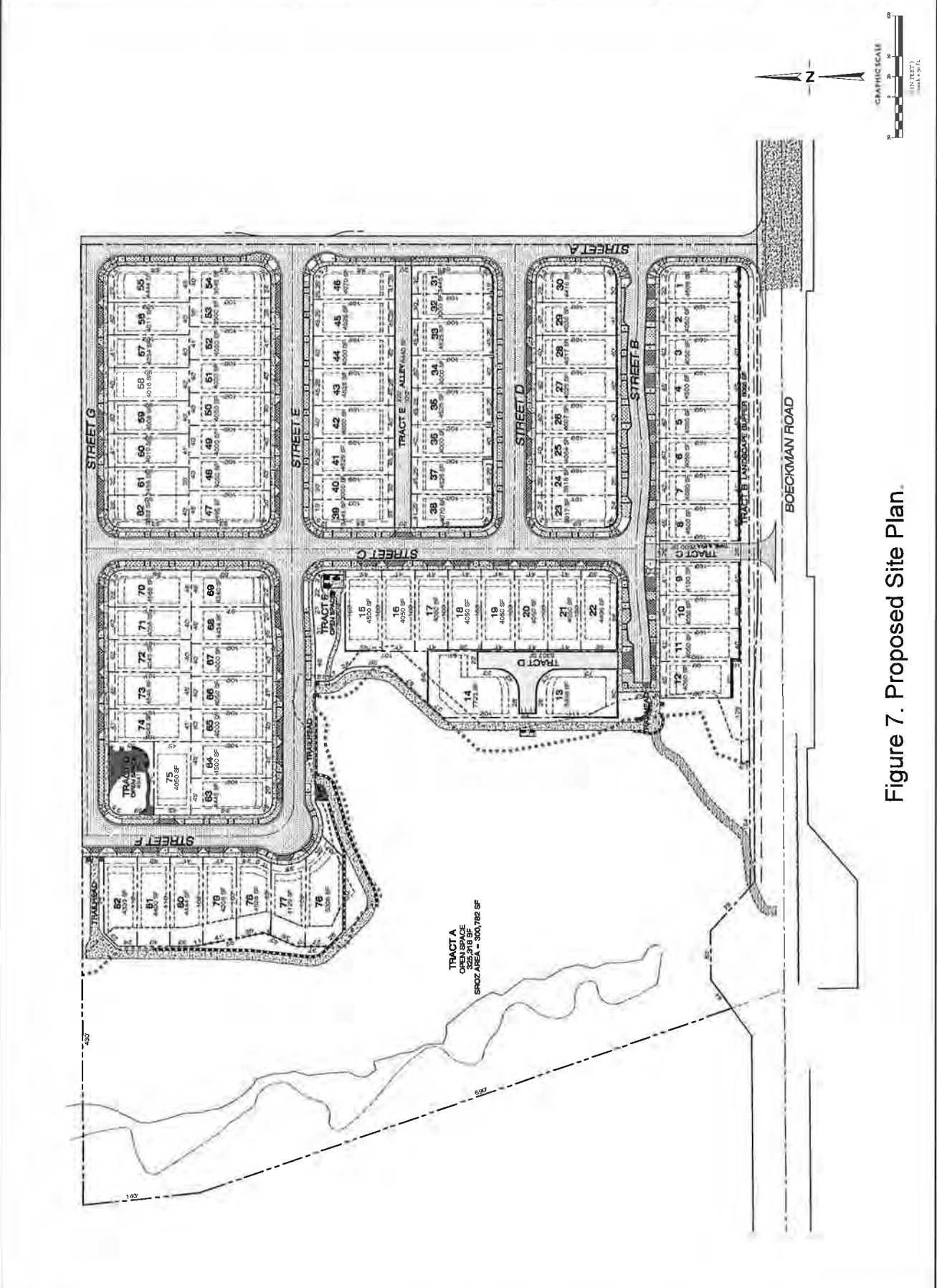


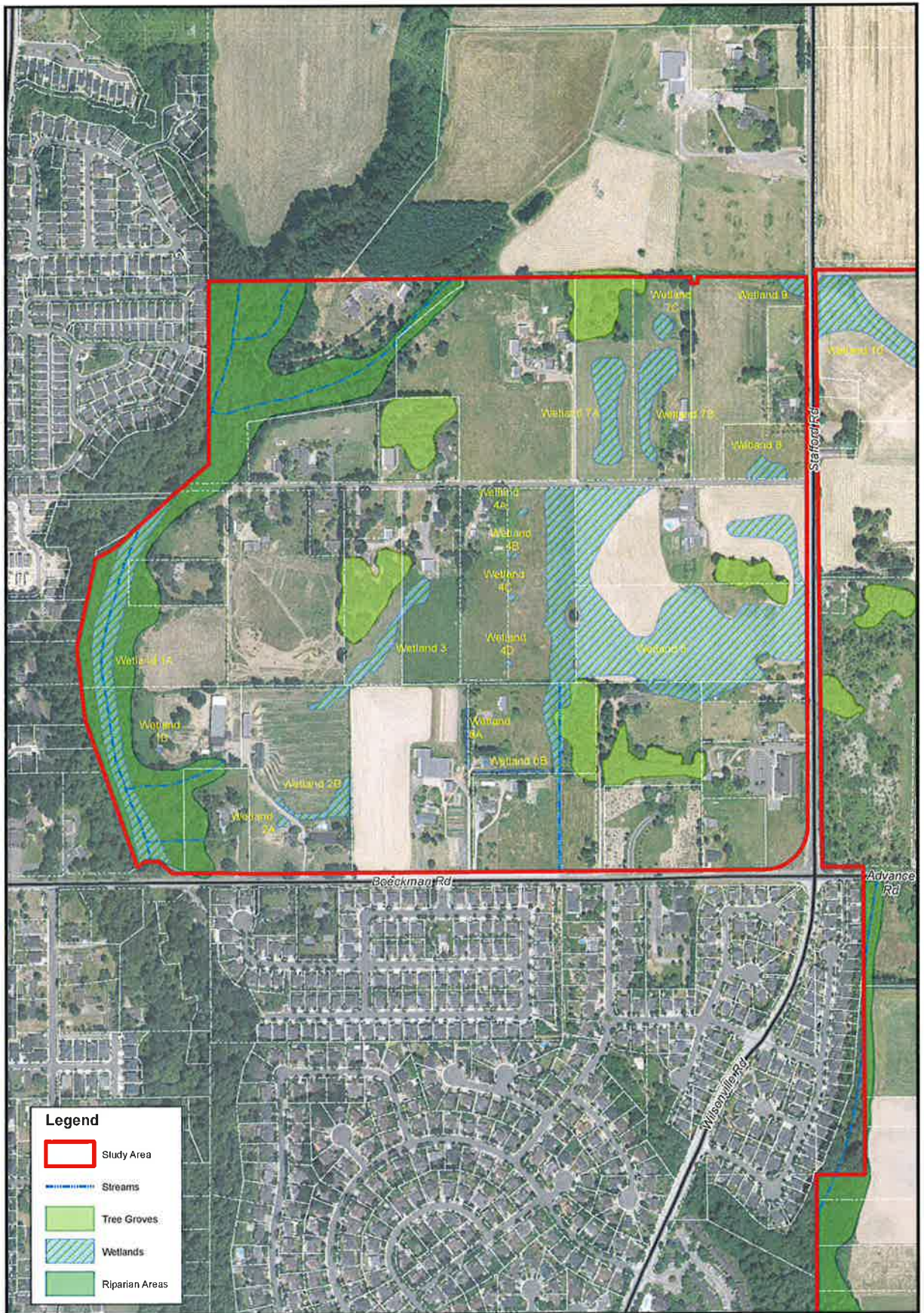
Figure 7. Proposed Site Plan.

ATTACHMENT A.

**CITY SROZ MAP AND
FROG POND AREA PLAN NATURAL RESOURCE INVENTORY MAP**

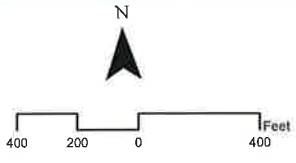


CITY MAPPED SROZ



Legend

- Study Area
- Streams
- Tree Groves
- Wetlands
- Riparian Areas



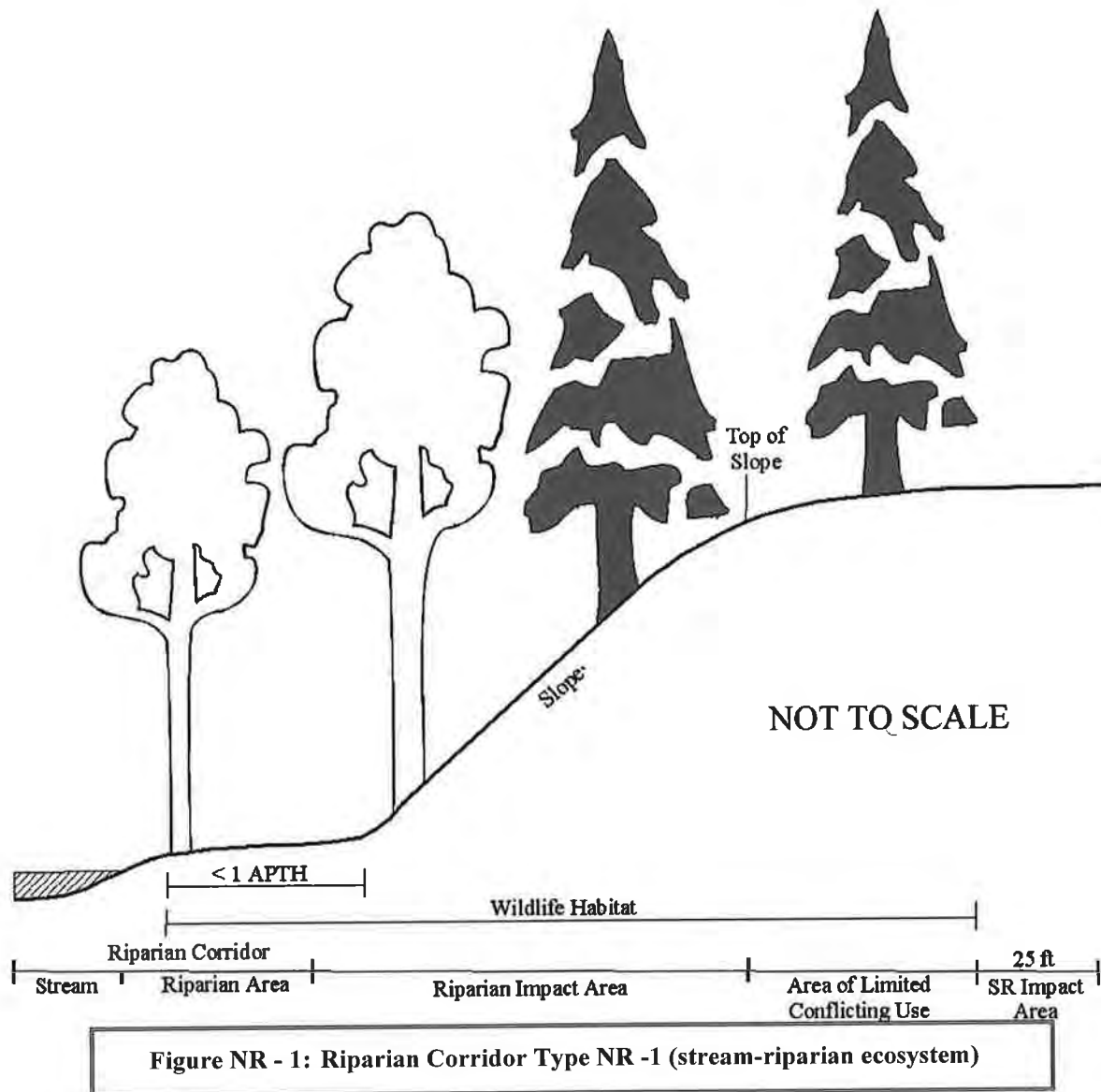
NATURAL RESOURCE INVENTORY

**MAP A
 Frog Pond and Advance Road Urban Growth Areas**

The City of Wilsonville, Oregon
 Clackamas and Washington Counties

Map Date April 8, 2014

ATTACHMENT B. FIGURE NR-1 FROM THE CITY'S SROZ ORDINANCE



Riparian area adjacent to the stream is less than one APTH wide, and has an adjacent slope. The adjacent slope is designated as riparian impact area, based on the potential for activities on the slope to have direct impacts on riparian area functions.

Notes for all riparian figures: (1) The “area of limited conflicting use” and “SR Impact Area” are regulatory areas defined in the proposed City of Wilsonville Significant Resource Overlay Zone (4.139.00). The SR Impact Area is always 25 feet wide from the edge of the significant resource (SR).

ATTACHMENT C. VEGETATION LIST

**Boeckman Creek/Road Frog Pond Area
Vegetation List
March 24, April 5, and April 18, 2017**

Common Name	Scientific Name	Wetland Indicator Status	Native and Invasive, Noxious
vine maple	<i>Acer circinatum</i>	FAC	native
big-leaf maple	<i>Acer macrophyllum</i>	FACU	native
colonial bent	<i>Agrostis capillaris</i>	FAC	non-native
red alder	<i>Alnus rubra</i>	FAC	native
field meadow-foxtail	<i>Alopecurus pratensis</i>	FAC	non-native
Italian lords and ladies	<i>Arum italicum</i>	NOL	non-native
western lady fern	<i>Athyrium cyclosorum</i>	FAC	native
shepherd's-purse	<i>Capsella bursa-pastoris</i>	FACU	non-native
Henderson's sedge	<i>Carex hendersonii</i>	FAC	native
beaked hazelnut	<i>Corylus cornuta</i>	FACU	native
orchard grass	<i>Dactylis glomerata</i>	FACU	non-native
western wahoo	<i>Euonymus occidentalis</i>	FAC	native
casacara false buckthorn	<i>Frangula purshiana</i>	FAC	native
Oregon ash	<i>Fraxinus latifolia</i>	FACW	native
sticky-willy	<i>Galium aparine</i>	FACU	native
salal	<i>Gaultheria shallon</i>	FACU	native
mannagrass	<i>Glyceria species</i>	OBL/FACW	native
English ivy	<i>Hedera helix</i>	FACU	invasive, noxious
common velvet grass	<i>Holcus lanatus</i>	FAC	non-native
Pacific waterleaf	<i>Hydrophyllum tenuipes</i>	FAC	native
English holly	<i>Ilex aquifolium</i>	FACU	non-native
spotted touch-me-not	<i>Impatiens capensis</i>	FACW	non-native
pale-yellow iris (yellow flag iris)	<i>Iris pseudacorus</i>	OBL	noxious
perennial rye grass	<i>Lolium perenne</i>	FAC	non-native
yellow-skunk-cabbage	<i>Lysichiton americanus</i>	OBL	native
dull Oregon grape, Cascade Oregon-grape	<i>Mahonia nervosa</i>	FACU	native
oso-berry	<i>Oemleria cerasiformis</i>	FACU	native
reed canary grass	<i>Phalaris arundinacea</i>	FACW	invasive
great plantain	<i>Plantago major</i>	FAC	non-native
annual blue grass	<i>Poa annua</i>	FAC	non-native
Kentucky blue grass	<i>Poa pratensis</i>	FAC	non-native
western or pineland sword fern	<i>Polystichum munitum</i>	FACU	native
balsam poplar (black cottonwood)	<i>Populus balsamifera</i>	FAC	native
sweet cherry	<i>Prunus avium</i>	FACU	non-native
English laurel	<i>Prunus laurocerasus</i>	NOL	non-native
Douglas-fir	<i>Pseudotsuga menziesii</i>	FACU	native
Oregon white oak	<i>Quercus garryana</i>	FACU	native
buttercup	<i>Ranunculus species</i>	OBL to UPL	-
coastal black gooseberry	<i>Ribes divaricatum</i>	FAC	native
Himalayan blackberry	<i>Rubus armeniacus</i>	FAC	invasive, noxious
salmon raspberry	<i>Rubus spectabilis</i>	FAC	native
curly dock	<i>Rumex crispus</i>	FAC	non-native
red elder	<i>Sambucus racemosa</i>	FACU	native
tall fescue	<i>Schedonorus arundinaceus</i>	FAC	non-native
climbing nightshade	<i>Solanum dulcamara</i>	FAC	invasive
coastal hedge-nettle	<i>Stachys chamissonis</i>	FACW	native
common dandelion	<i>Taraxacum officinale</i>	FACU	non-native
fragrant fringe-cup	<i>Tellima grandiflora</i>	FACU	native
western arborvitae (western red cedar)	<i>Thuja plicata</i>	FAC	native

piggyback-plant	<i>Tolmiea menziesii</i>	FAC	native
white clover	<i>Trifolium repens</i>	FAC	non-native
western trillium	<i>Trillium ovatum</i>	FACU	native
cultivated wheat	<i>Triticum aestivum</i>	NOL	non-native
stinging nettle	<i>Urtica dioica</i>	FAC	-
white insideout flower	<i>Vancouveria hexandra</i>	NOL	native
American false hellebore	<i>Veratrum viride</i>	FAC	native

Wetland Indicator Status and taxonomy for the Western Mountains, Valleys, and Coast Region per the National Wetland Plant List 2016 v3.3. Accessed May 3, 2016. <http://rsgisias.crrel.usace.army.mil/NWPL/>

Native per Hitchcock & Cronquist 1973 and <http://plants.usda.gov/>
 Invasive per Clean Water Services 2008: <http://cleanwaterservices.org/permits-development/design-construction-standards/>
 Noxious per ODA 2017: <http://www.oregon.gov/ODA/PLANT/WEEDS/lists.shtml>

WETLAND INDICATOR STATUS (WIS)	
OBL	Obligate Wetland Plant – Almost always occurs in wetlands (hydrophyte), rarely in uplands
FACW	Facultative Wetland Plant - Usually occur in wetlands (hydrophyte), but may occur found in non-wetlands
FAC	Facultative Plant – Occurs in wetlands (hydrophyte) and uplands (nonhydrophyte)
FACU	Facultative Upland Plant - Usually occur in non-wetlands (non-hydrophyte), but may occur in wetlands
UPL	Upland Plant - Almost always occurs in uplands (non-hydrophyte), almost never occurs in wetlands. UPL plants have a WIS in other regions
NOL	Not Listed - Plants that are not on the National Wetland Plant List are assumed to be UPL and have no WIS in any region

ATTACHMENT D. WILDLIFE INVENTORY

Boeckman Road Frog Pond Area Wildlife Inventory		
C. Mirth Walker and Tom Dee		
March 24, April 5, and April 18, 2017		
Common Name	Scientific Name	Habitat, Comments
Birds		
Canada goose	<i>Branta canadensis</i>	Fly-over
Turkey vulture	<i>Cathartes aura</i>	Fly-over
Red-tailed hawk	<i>Buteo jamaicensis</i>	Fly-over, pair present; may nest in riparian corridor/wildlife habitat
Eurasian collared-dove	<i>Streptopelia decaocto</i>	Equestrian center grounds
Mourning dove	<i>Zenaida macroura</i>	Equestrian center grounds
Downy woodpecker	<i>Picoides pubescens</i>	Riparian corridor/wildlife habitat
Hairy woodpecker	<i>Picoides villosus</i>	Riparian corridor/wildlife habitat
Northern Flicker	<i>Colaptes auratus</i>	Riparian corridor/wildlife habitat
Steller's jay	<i>Cyanocitta stelleri</i>	Equestrian center grounds
Violet-green swallow	<i>Tachycineta thalassina</i>	Equestrian center grounds
Barn swallow	<i>Hirundo rustica</i>	Equestrian center grounds
Black-capped chickadee	<i>Poecile atricapillus</i>	Both habitats*
Chestnut-backed chickadee	<i>Poecile rufescens</i>	Both habitats
Western bluebird	<i>Sialia mexicana</i>	Singlet observed both days; equestrian center grounds
American robin	<i>Turdus migratorius</i>	Both habitats
European starling	<i>Sturnus vulgaris</i>	Equestrian center grounds/buildings
Dark-eyed junco	<i>Junco hyemalis</i>	Both habitats
White-crowned sparrow	<i>Zonotrichia leucophrys</i>	Edge habitat
Golden-crowned sparrow	<i>Zonotrichia atricapilla</i>	Edge habitat
Song sparrow	<i>Melospiza melodia</i>	Both habitats
Spotted towhee	<i>Pipilo maculatus</i>	Both habitats
Brown-headed cowbird	<i>Molothrus ater</i>	Equestrian center grounds
House finch	<i>Haemorhous mexicanus</i>	Equestrian center grounds
House sparrow	<i>Passer domesticus</i>	Equestrian center grounds/buildings
Mammals		
Columbian black-tailed deer	<i>Odocoileus hemionus columbianus</i>	Track in riparian corridor
Douglas' squirrel	<i>Tamiasciurus douglasii</i>	Cone seed debris in riparian corridor
Herptiles		
Garter snake	<i>Thamnophis</i> spp.	Equestrian center grounds
Rough-skinned newt	<i>Taricha granulosa</i>	Riparian corridor/wildlife habitat
Terrestrial Mollusc		
Pacific banana slug	<i>Ariolimax columbianus</i>	Riparian corridor/wildlife habitat

*Both habitats include the riparian corridor/wildlife habitat and the equestrian center grounds.

ATTACHMENT E. REPRESENTATIVE SITE PHOTOGRAPHS



Photo A. View south of Boeckman Creek towards Boeckman Road. Photo date March 24, 2017.



Photo B. Upland Plot 2. Photo date March 24, 2017.



Photo C. View west of Boeckman Creek. Photo date March 24, 2017.



Photo D. View south of concrete drain structure. Photo date March 24, 2017.



Photo E. Close up of concrete drain structure. Photo date March 24, 2017.



Photo F. Upland Plot 3. Photo date March 24, 2017.



Photo G. Wetland A boundary. Photo date March 24, 2017.



Photo H. Tributary 1. Photo date March 24, 2017.



Photo I. View east of Wetland B and Tributary 2. Photo date March 24, 2017.



Photo J. Tributary 2. Photo date March 24, 2017.



Photo K. View east of Wetland C. Photo date April 5, 2017.



Photo L. View west of Wetland C. Photo date April 5, 2017.



Photo M. Plot 9 in Wetland C. Photo date April 5, 2017.



Photo N. View west of Swale C. Photo date March 24, 2017.



Photo O. View west of Swale C as it becomes Tributary 1 in the ravine. Photo date April 5, 2017.



Photo P. Plot 5 in northeast corner of the site. Photo date April 5, 2017.



Photo Q. View west of riparian corridor on Tributary 2. Photo date April 5, 2017.



Photo R. Boeckman Creek riparian corridor. Photo date April 18, 2017.



Photo S. Boeckman Creek riparian corridor. Photo date April 18, 2017.



Photo T. Trail into Boeckman Creek riparian corridor. Photo date April 18, 2017.



Photo U. View west of Boeckman Creek riparian corridor. Photo date April 18, 2017.



Photo V. View northwest of Boeckman Creek riparian corridor. Photo date April 18, 2017.



Photo W. View south of Boeckman Creek and concrete drain structure. Photo date April 18, 2017.



Photo X. Example of cross-fencing. Photo date April 5, 2017.



Photo Y. Cross-fencing and barns. Photo date April 5, 2017.



Photo Z. Site entrance. Photo date April 5, 2017.

ATTACHMENT F. LWI SUMMARY SHEETS

CITY OF WILSONVILLE LOCAL WETLANDS INVENTORY

WETLAND SUMMARY SHEET

WETLAND: Boeckman Creek, north 3	Site Number: 1.03 UNIT: BC
Drainage Basin: Boeckman Creek	'91 B&W Aerial #: 6-10, 6-12
Acreage: 0.40	Field Date(s): 4/22/92, 7/25/93, 8/26/97
Location: Boeckman Creek, North of Boeckman Road	
Tax Lots: 12D-2900,2901,300,3001,3100,3300, Clackamas County	Zoning: RA-1
T3S R1W Quarter Section: 12 SW	Delineation: none

General Description: Continuation of unit 1.02. Maple forest with reed canarygrass and some western red cedar. Area immediately north of culvert has large rock (rip rap) - denning location for mammals. Note: this area has been modified by flood structure: culvert has been replaced by a big catch basin; some rocks still present. This area could be nicely enhanced - pond, plantings, etc. Nice habitat, some trails. Upland Forest east and west. Culvert at Boeckman Road barrier to fish, no corridor exists to south for wildlife. Potential red legged frog noted in 1997. Connected to unit 2.01.

NWI Classification: 100% PFOC

Mapped Soils; On-site Soils: 92F Xerochrepts & Haploxerolls, very steep; 10YR 4/1 silty clay loam.

Hydrologic Source and Description: Perennial stream. West of Boeckman Creek, inundated 1 inch. Flat floodplain with 10 feet wide channel, 1 to 3 feet deep, clear. Approximately 20% slope on right bank.

Dominant Vegetation: (* = major dominant)

Trees

**Acer macrophyllum*
**Fraxinus latifolia*
Thuja plicata

Shrubs

Acer macrophyllum

Herbs/Emergents

**Phalaris arundinacea*
**Equisetum telmateia*
**Athyrium filix-femina*
Urtica dioica
Ranunculus repens
Leersia oryzoides
Glyceria spp.

Boundary Information: Upland dominated by Oregon ash, bigleaf maple, and piggy-back plant. Steep topographic break to east and west, soils break.

Wetland Functions: Provides diverse wildlife habitat and has intact fish habitat, water quality functions, and hydrologic control functions. Has potential to provide educational and recreational opportunities.

Significance: LSW (Locally Significant Wetland)

1998 data sheet
(used scientific names)

CITY OF WILSONVILLE LOCAL WETLANDS INVENTORY

WETLAND SUMMARY SHEET

WETLAND: Boeckman Creek, north 3	Site Number: 1.03 UNIT: BC
Drainage Basin: Boeckman Creek	'91 B&W Aerial #: 6-10, 6-12
Acreage: 0.40	Field Date(s): 4/22/92, 7/25/93, 8/26/97
Location: Boeckman Creek, North of Boeckman Road	
Tax Lots / County: 12D-2700,2800,2801 / Clackamas County	Zoning: RA-1
T3S R1W Quarter Section: 12 SW	Delineation: none

General Description: Continuation of unit 1.02. Maple forest with reed canarygrass and some western red cedar. Area immediately north of culvert has large rock (rip rap) - denning location for mammals. Note: this area has been modified by flood structure: culvert has been replaced by a big catch basin; some rocks still present. This area could be nicely enhanced - pond, plantings, etc. Nice habitat, some trails. Upland Forest east and west. Culvert at Boeckman Road barrier to fish, no corridor exists to south for wildlife. Potential red legged frog noted in 1997. Connected to unit 2.01. 1999 nearby resident noted dead deer in area of water control structure, has observed fish north of Boeckman Road, probably resident cutthroat trout.

NWI Classification: 100% PFOC

Mapped Soils; On-site Soils: 92F Xerochrepts & Haploxerolls, very steep; 10YR 4/1 silty clay loam.

Hydrologic Source and Description: Perennial stream. West of Boeckman Creek, inundated 1 inch. Flat floodplain with 10 feet wide channel, 1 to 3 feet deep, clear. Approximately 20% slope on right bank.

Dominant Vegetation: (* = major dominant)

Trees

*bigleaf maple
*Oregon ash
western red cedar

Shrubs

bigleaf maple

Herbs/Emergents

*reed canarygrass
*giant horsetail
*lady fern
stinging nettle
creeping buttercup
rice cutgrass
mannagrass species

Boundary Information: Upland dominated by Oregon ash, bigleaf maple, and piggy-back plant. Steep topographic break to east and west, soils break.

Wetland Functions: Provides diverse wildlife habitat and has intact fish habitat, water quality functions, and hydrologic control functions. Has potential to provide educational and recreational opportunities.

Significance: LSW (Locally Significant Wetland)

City of Wilsonville

Oregon Freshwater Wetland Assessment Method Summary Sheet

Unit BC Boeckman Creek
(1.01, 1.02, 1.03, 2.01, 2.02, 2.031, 2.04, 2.05)

Function	Evaluation Descriptor	Rationale
Wildlife Habitat	Provides Diverse	Intact wildlife corridor extending south to Willamette River; may also have red-legged frogs (1.03)
Fish Habitat	Intact	Cutthroat trout present south of Boeckman Road (at least prior to February 1996 floods)
Water Quality (pollutant removal)	Intact	Surface flow, flood plain in lower reaches, vegetation
Hydrologic Control (flood control & water supply)	Intact	Flood plain benches, vegetation
Sensitivity to Future Impacts	Potentially Sensitive	All wetlands in Wilsonville potentially sensitive to future impacts. **
Enhancement Potential*		Dump area in 1.02 could be cleaned up; enhance 1.03 N. of Boeckman Rd., clean up 2.03.
Education	Potential	
Recreation	Potential	Horse trail on east side south of Boeckman Road (recent sewer-line work in vicinity); flows through Park at south end
Aesthetic Quality	Moderately Pleasing	Small viewshed (large wetland) scores lower
Narrative Description of Overall Wetland Functions and Conditions		
Valuable corridor, the only sensitive fish stream-wetland complex in City of Wilsonville (also Corral Creek immediately to west of city limits). Neighbors interested in protecting corridor and wildlife. Beaver present in south of unit.		

*Skip Enhancement Potential if Wildlife Habitat is diverse.

**No wetlands in Wilsonville are "sensitive" to future impacts because no upstream reaches are listed as water quality limited and no non-point sources are identified. Willamette River is WQ limited; 2.05 could be affected by backwash during 100-year floods.


DSL Report
Wetland Determination

WETLAND DELINEATION / DETERMINATION REPORT COVER FORM

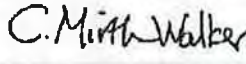
This form must be included with any wetland delineation report submitted to the Department of State Lands for review and approval. A wetland delineation report submittal is not "complete" unless the fully completed and signed report cover form and the required fee are submitted. Attach this form to the 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 form 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.

<input type="checkbox"/> Applicant <input checked="" type="checkbox"/> Owner Name, Firm and Address: Jim Wolfston 805 SW Broadway, Suite 1600 Portland, OR 97205	Business phone # 503-806-0526 Mobile phone # (optional) E-mail: Jim@collegenet.com
--	--

<input type="checkbox"/> Authorized Legal Agent, Name and Address:	Business phone # Mobile phone # E-mail:
--	---

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: Jim Wolfston Signature: 
 Date: August 15, 2017 Special instructions regarding site access: Contact consultant (horses present).

Project and Site Information (using decimal degree format for lat/long, enter centroid of site or start & end points of linear project)			
Project Name: Boeckman Road Frog Pond Area	Latitude: 45.318682 °N	Longitude: -122.753678 °W	
Proposed Use: Residential subdivision	Tax Map # 31 W 12D		
Project Street Address (or other descriptive location): 7331 and 7447 SW Boeckman Road	Township 3S	Range 1W	Section 12 QQ D
City: Wilsonville County: Clackamas	Tax Lot(s) 2400, 2600, and 2700		
	Waterway: Boeckman Creek River Mile: N/A		
	NWI Quad(s): Sherwood and Canby, OR		

Wetland Delineation Information	
Wetland Consultant Name, Firm and Address: C. Mirth Walker, PWS No. 415 SWCA Environmental Consultants 1220 SW Morrison Street, Suite 700 Portland, OR 97205-2235	Phone # 503-224-0333 Mobile phone # 503-860-1708 E-mail: cmwalker@swca.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: <u></u>	Date: July 26, 2017

Primary Contact for report review and site access is Consultant Applicant/Owner Authorized Agent

Wetland/Waters Present? Yes No Study Area size: **20.13 acres** Total Wetland Acreage: **0.27**

Check Box Below if Applicable:		Fees:	
<input type="checkbox"/> R-F permit application submitted	<input type="checkbox"/> Mitigation bank site	<input type="checkbox"/> Wetland restoration/enhancement project (not mitigation)	<input type="checkbox"/> Industrial Land Certification Program Site
<input type="checkbox"/> Reissuance of a recently expired delineation	Previous DSL # _____ Expiration date _____		
Other Information:			
Has previous delineation/application been made on parcel?	<input type="checkbox"/> Y <input type="checkbox"/> N	If known, previous DSL # _____	
Does LWI, if any, show wetland or waters on parcel?	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N	No LWI east of Boeckman Creek.	

For Office Use Only			
DSL Reviewer: _____	Fee Paid Date: ____ / ____ / ____	DSL WD # _____	
Date Delineation Received: ____ / ____ / ____	DSL Project # _____	DSL Site # _____	
Scanned: <input type="checkbox"/> Final Scan: <input type="checkbox"/>	DSL WN # _____	DSL App. # _____	

This page intentionally left blank.

**BOECKMAN ROAD FROG POND AREA
WETLAND AND WATERS DELINEATION REPORT
TOWNSHIP 3 SOUTH, RANGE 1 WEST, SECTION 12D,
TAX LOTS 2400, 2600, AND 2700, CLACKAMAS COUNTY, OREGON**

Prepared for

Jim Wolfston
805 SW Broadway, Suite 1600
Portland, OR 97205

Prepared by

SWCA Environmental Consultants
1220 SW Morrison Street, Suite 700
Portland, OR 97205
503-224-0333
www.swca.com

July 26, 2017

SWCA Project No. 40674

This page intentionally left blank.

CONTENTS

INTRODUCTION	1
A. LANDSCAPE SETTING AND LAND USE	1
B. SITE ALTERATIONS	2
C. PRECIPITATION DATA AND ANALYSIS.....	2
D. METHODS	3
E. DESCRIPTION OF ALL WETLANDS AND OTHER NON-WETLAND WATERS	4
Wetlands	4
Non-wetland Waters	5
Uplands	7
F. DEVIATION FROM LWI OR NWI.....	7
G. MAPPING METHOD.....	7
H. ADDITIONAL INFORMATION.....	7
I. RESULTS AND CONCLUSIONS	8
J. REQUIRED DISCLAIMER	8
K. LIST OF PREPARERS.....	9

Appendices

- A. Figures
- B. Aerial Photographs
- C. Precipitation Data
- D. Wetland Determination Data Sheets
- E. Ground-Level Site Photographs
- F. Vegetation List
- G. Literature Cited and References Used
- H. LWI Data Sheets

Tables

Table 1. Precipitation Data – Monthly Averages Based on the Climate Period 1971–2000.....	2
Table 2. Precipitation Data – Day of, Two Weeks Prior to Site Visit, and Month to Date in Inches.....	3
Table 3. Soil Mapping.....	4
Table 4. Potentially Jurisdictional Wetlands and Waters	8

This page intentionally left blank.

INTRODUCTION

SWCA Environmental Consultants (SWCA) was contracted by property owner Jim Wolfston to conduct a wetland delineation on three tax lots east of Wilsonville, in Clackamas County, Oregon (Figure 1; all figures are in Appendix A). The study area encompasses the entirety of Tax Lots 2400, 2600, and 2700 in Section 12, Township 3 South, Range 1 West, Willamette Meridian (Figures 2a–2b), and based on site survey, the study area is 20.13 acres in size. The physical addresses for the properties are 7331 and 7447 SW Boeckman Road. The centroid coordinates for the study area are 45.318682, -122.753678. The study area is within the Middle Willamette Watershed (17090007).

This report describes the delineation of three wetlands and three streams. The purpose of this delineation is to facilitate a residential subdivision development in the Frog Pond urban planning area.

A. LANDSCAPE SETTING AND LAND USE

OAR141-090-0035(7)(a)

The site includes the Boeckman Creek canyon along the western property boundary, with two steep ravines funneling surface runoff and piped runoff to the stream from the broad, flat primarily upland area to the east, where an equestrian center is located. The equestrian center is extensively cross-fenced, and several barns and sheds are present. Two single-family residences are located in the southcentral and southeast portions of the site. The equestrian center grounds are dominated by pasture grasses and both native and ornamental trees and shrubs. Dominant grasses included perennial rye grass (*Lolium perenne*), Kentucky blue grass (*Poa pratensis*), annual blue grass (*Poa annua*), field meadow-foxtail (*Alopecurus pratensis*), tall fescue (*Schedonorus arundinaceus*), colonial bentgrass (*Agrostis capillaris*), and orchard grass (*Dactylis glomerata*). Riparian vegetation is dense along both sides of the creek.

Topography trends towards the southwest corner of the property. There are two houses, a small office building, an equestrian arena, a corral, and several sheds, stalls, and outbuildings on the property. Many wooden and electric fences cross the property in all directions. Tax Lots 2400 and 2700 are primarily utilized as equestrian grounds, with the exception of the residence on Tax Lot 2400. Tax Lot 2600 is in residential use and does not contain equestrian infrastructure.

Land use to the south of Boeckman Road consists of a large, dense residential development. Land use to the west of the study area is a mix of residential, commercial, light industrial, educational, and religious facilities with ample parking, sprawling campuses, and natural areas interspersed. Land use to the north and east of the study area is predominantly pastoral and agricultural.

B. SITE ALTERATIONS

OAR141-090-0035 (7)(c)

The study area has been altered significantly from its historical condition. Surface flow and groundwater hydrology have been significantly altered within the terrace portion of the study area. Several drain pipes outlet at the head of the tributary stream west of the corral. Drain pipes have been installed within the northern portion of the study area.

Boeckman Creek flows into a concrete drain in the southwest corner of the study area before flowing under Boeckman Road. The creek and associated riparian corridor upstream from the concrete drain are fairly undisturbed.

Tax Lot 2300 to the east of Tax Lot 2400 appears to have tiled their field and installed an outlet pipe that drains into the study area east of Wetland C (described below), although the tile may have been recently capped. Aerial photographs of the site are included in Appendix B.

C. PRECIPITATION DATA AND ANALYSIS

OAR141-090-0035 (7)(i)

Historic precipitation and averages were determined using the North Willamette Experiment Station WETS data (OR6151). Observed precipitation data were obtained from the National Weather Service (NWS) Aurora station. Average annual rainfall for Aurora is 42.60 inches. Monthly precipitation averages for the 3 months prior to fieldwork (March 24 and April 5, 2017) are presented in Table 1.

Table 1. Precipitation Data – Monthly Averages Based on the Climate Period 1971–2000

Month	Average (inches)	30% Chance Will Have		Observed Precipitation (inches)	Within Normal Range?
		Less Than (inches)	More Than (inches)		
December	7.31	5.01	8.72	4.55	Below Normal (62%)
January	6.59	4.35	7.91	4.30	Below Normal (65%)
February	5.51	3.92	6.53	10.38	Above Normal (188%)
March	4.69	3.56	5.46	8.06	Above Normal (171%)

Source: U.S. Department of Agriculture (USDA) 2016 and NWS 2017.

Using the typical template for antecedent rainfall (Appendix C), these data show that the overall rainfall prior to April was wetter than normal. The site was extremely wet during our March reconnaissance and had dried out slightly by our April 5, 2017, site visit. Descriptions of weather on the dates of fieldwork, 2 weeks prior to fieldwork, and the month to date (MTD) of fieldwork are provided in Table 2.

Table 2. Precipitation Data – Day of, Two Weeks Prior to Site Visit, and Month to Date in Inches

Day of Site Visit	Observed Precipitation			MTD Normal Value	Measured Variance from MTD Normal and Percentage
	Day of	2 Weeks Prior	Month to Date		
March 24	0.80	4.60	6.14	2.88	3.26 above (213%)
April 5	0.00	2.55	0.04	0.66	0.62 below (6%)

Source: USDA 2016 and NWS 2017.

The WETS table for the North Willamette Experiment Station lists the growing season start and end dates as March 1 through November 22.

D. METHODS

OAR141-090-0035 (7)(d-e), (g-h), (16)(a-b), (f), (d) or (g), (17), and (19-20)

The methodology used for determining the presence of wetlands followed the routine method of the U.S. Army Corps of Engineers (USACE) *Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast (Version 2.0)* (USACE 2010), used by both the USACE and the Oregon Department of State Lands (DSL). Fieldwork for documenting site conditions and delineating the wetland and water boundaries was conducted on March 24 and April 5, 2017, by C. Mirth Walker, Professional Wetland Scientist (PWS), and Tom Dee, PWS. Soils, vegetation, and indicators of hydrology were documented at 13 sample plot locations (Appendix D). Plot 13 was documented on April 18, 2017 by C. Mirth Walker. The wetland boundary was flagged with pink Wetland Delineation wire whip pin flags and streamers. Sample plots were marked with yellow pin flags. At the owner’s request, pin flags were removed from the horse pastures after surveying.

The ordinary high water line (OHWL) of the non-wetland waters was delineated according to the *Regulatory Guidance Letter 05-05* (USACE 2005) and Oregon Administrative Rules (OARs) (DSL 2017a). The OHWL was marked in the field with red pin flags and streamers.

According to the Natural Resources Conservation Service (NRCS) Clackamas County Area Soil Survey map (Figure 3), the upland terrace is mapped as Aloha and Woodburn silt loams. The ravine containing Boeckman Creek is mapped as Xerochrepts and Haploxerolls, very steep. Aloha silt loam is found on terraces and may contain hydric inclusions of Huberly and Dayton soils, as shown in Table 3. Woodburn silt loam is found on terraces and may contain hydric inclusions of Dayton on terraces and Aquolls in floodplains. The NRCS map unit description for Xerochrepts and Haploxerolls states that the soils do not contain hydric inclusions, although the landscape form typically contains tributary streams and abundant hillside and toeslope seeps.

Table 3. Soil Mapping

Map Unit Symbol	Map Unit Name	Hydric	Hydric Inclusion
1A, B	Aloha silt loam, 0%–3%, 3%–6% slopes	No	Huberly and Dayton
91C	Woodburn silt loam, 8%–15% slopes	No	Dayton and Aquolls
92F	Xerochrepts and Haploxerolls, very steep	No	No

Source: NRCS 2006, 2017.

Representative ground-level site photographs are included in Appendix E. A list of vegetation observed on-site with the wetland indicator status of the plants is included in Appendix F. References cited are included in Appendix G.

E. DESCRIPTION OF ALL WETLANDS AND OTHER NON-WETLAND WATERS

OAR141-090-0035 (2), (7)(b), and (17)

Wetlands

Three wetlands and three streams were identified within the study area. Wetland A was delineated above the OHWL of Boeckman Creek near a concrete culvert structure at the downstream end of Boeckman Creek, and receives input from an intermittent stream called Tributary 1. Tributary 1 receives outflow from Wetland C, located in the southeast horse pastures, via an intermittent swale (Swale C) that is culverted under two driveways before descending into the steep ravine, which was delineated as Tributary 1. A very small Wetland B was delineated above the OHWL at the confluence of Tributary 2 with Boeckman Creek, north of Tributary 1. Each resource is described below and are shown on Figure 4.

Wetland A: 0.05 acre (2,091 square feet) – Tax Lot 2700

Wetland A is classified as Palustrine Forested (PFO) wetland using the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979). The wetland is classified as Valley Slope (SV) and Riverine Flow-through (RFT) using the *Guidebook for Hydrogeomorphic (HGM)-based Assessment of Oregon Wetland and Riparian Sites: Statewide Classification and Profiles* (Adamus 2001). Wetland A consists of toeslope seeps and the floodplain of Boeckman Creek. Hydrology is provided by groundwater surfacing at the toe of the slope, hyporheic flow, and occasional overbank flooding. The wetland is contained entirely within the study area.

Hydrophytic vegetation was dominated by Himalayan blackberry (*Rubus armeniacus*), reed canary grass (*Phalaris arundinacea*) and spotted touch-me-not or jewelweed (*Impatiens capensis*) with scattered Oregon ash (*Fraxinus latifolia*) trees and saplings. Soils displayed the Depleted Matrix hydric soil indicator (F3). Hydrology indicators included the primary indicators of High Water Table (A2) and Saturation (A3).

Wetland B: 0.01 acre (391 square feet) – Tax Lot 2700

Wetland B is classified as a PFO wetland according to Cowardin and SV according to HGM. The wetland is located at the toe of a slope in the ravine, adjacent to Tributary 2 and extending upslope from the Boeckman Creek floodplain. Hydrology is provided by groundwater surfacing at the toe of the slope and hyporheic flow from Tributary 2. The wetland is contained entirely within the study area.

Hydrophytic vegetation was dominated by Himalayan blackberry, skunk cabbage (*Lysichiton americanus*), coastal hedgenettle (*Stachys chamissonis* var. *cooleyae*), and jewelweed. Soils were not documented but displayed the Depleted Matrix hydric soil indicator (F3). Hydrology indicators included the primary indicators of High Water Table (A2) and Saturation (A3).

Wetland C: 0.21 acre (8,957 square feet) – Tax Lot 2400

Wetland C is classified as Palustrine Emergent (PEM) wetland according to Cowardin and SV according to HGM. The wetland is located in a swale that slopes down from the eastern study area boundary to the driveway that leads to the equestrian center. Hydrology is provided by direct precipitation, surface flow, and a high groundwater table, and the wetland appears to receive water from a drain tile discharge pipe located just off-site to the east on Tax Lot 2300, although the drain tile may have been recently capped. The driveway impounds hydrology and conveys it through a primary culvert, which constitutes the headwaters of the intermittent Swale C, which feeds into Tributary 1. A secondary culvert is also present; downslope flow is absorbed into the soil without creating a swale or wetland. Wetland C continues off-site to the east for a short distance.

Hydrophytic vegetation was dominated by field meadow-foxtail, Kentucky bluegrass, and tall fescue. Soils displayed the Depleted Matrix hydric soil indicator (F3). Hydrology indicators included the primary indicators of Surface Water (A1) and Saturation (A3) at 12 inches below ground surface on April 5, 2017.

Site conditions were very wet during our field reconnaissance, and based on the amount of water present on March 24 as compared to April 5, 2017, it is highly likely that the hydrology of Wetland C dries up completely during the dry season and therefore Swale C and Tributary 1 are intermittent rather than perennial streams.

Non-wetland Waters

Three non-wetland waters (streams) were identified within the study area (see Figure 4).

Boeckman Creek: 0.61 acre (26,503 square feet / 891 linear feet of channel) – Tax Lot 2700

The large wetland area on both sides of Boeckman Creek was delineated (left bank/east side only) as a water with an OHWL, with flood and debris marks at the toe of the slope (labeled as Boeckman Creek OHWL on the survey, Figure 4).

Boeckman Creek is a freshwater perennial stream that is tributary to the Willamette River. The creek flows unimpeded into the study area from the north, flows through a 10- to 20-foot-wide sinuous channel and across an active floodplain, and then enters a concrete drain that conveys it beneath Boeckman Road. The channel slopes to the south at about 1%. The banks are relatively

stable and unconstrained. They are composed of silt loam and the bed is composed of cobbles, gravel, and silt. Channel complexity and floodplain roughness are high due to abundant large woody debris in the stream and on the floodplain.

The toe of the slope was delineated as the OHWL along Boeckman Creek. The delineated OHWL was based on observations of scour, sediment deposition, debris wracks, and other readily observable indicators. Floodplain debris was observed approximately 2 feet higher than the stream channel. The floodplain wetland was dominated by reed canary grass, jewelweed, and Himalayan blackberry, with scattered Oregon ash trees.

Riparian vegetation is dominated by Oregon ash, red alder (*Alnus rubra*), western red cedar (*Thuja plicata*), Douglas-fir (*Pseudotsuga menziesii*), osoberry (*Oemleria cerasiformis*), Himalayan blackberry, jewelweed, and reed canary grass. The plant community is diverse and there are only a few invasive species that cover an area of moderate size.

Tributary 1 (T1): 265 linear feet (0.01 acre / 573 square feet) and Swale C: 386 linear feet (0.01 acre / 589 square feet) – Tax Lots 2400, 2600, and 2700

Tributary 1 is a freshwater intermittent stream that is tributary to Boeckman Creek. The stream originates from water impounded by the driveway on the west side of Wetland C. Water is conveyed through two culverts beneath the driveway into Swale C. The southernmost culvert provides the majority of hydrology to a small swale that meanders across the horse pastures toward the Boeckman Creek ravine. The swale enters another culvert on Tax Lot 2600, passes beneath the driveway, flows across the yard, into the steep ravine, where it becomes Tributary 1, and finally into Boeckman Creek. The Tributary 1 channel has low sinuosity and is constrained within the ravine that contains it. The bed and banks are composed of silt loam on the terrace, silty clay loam in the ravine, and gravel where it meets Boeckman Creek. The swale slopes at about 6% across the terrace and the stream slopes about 15% (with small cascades) through the ravine. There is no channel complexity in the swale and moderate channel complexity within the ravine.

Riparian vegetation in the ravine is dominated by Oregon ash, red alder, western red cedar, Douglas-fir, osoberry, Himalayan blackberry, and English ivy (*Hedera helix*).

Tributary 2 (T2): 395 linear feet (0.02 acre / 866 square feet) – Tax Lot 2700

Tributary 2 is a freshwater intermittent stream that is tributary to Boeckman Creek. The head of the creek is located at the top of a steep ravine, just west of the corral. Four plastic pipes ranging from 4 to 8 inches in diameter emanate from the head of the ravine and supply the majority of the water to the stream. The pipes drain parts of the equestrian center but it is unclear exactly where. Sinuosity is low and the stream is constrained within its channel due to the steepness of the ravine. The walls of the ravine exceed 50% slope in many places and the channel slopes steeply to west at about 15%. The walls of the ravine are sloughing in places and there are a number of cascades over the colluvium. Debris from an old structure is scattered throughout the drainage.

Riparian vegetation is dominated by Oregon ash, red alder, western red cedar, Douglas-fir, osoberry, Himalayan blackberry, jewelweed, skunk cabbage, and reed canary grass. Blackberry is abundant in parts of the drainage where tree cover is lower.

Uplands

Uplands in the study area consist of horse pasture, residential lawn, hedgerow, riparian forest, and developed areas. The transition from wetland to upland was generally typified by a rise in elevation and change in plant community to less hydrophytic vegetation. Lawns and pasture are dominated by grasses, such as Kentucky bluegrass, field meadow-foxtail, and tall fescue. The hedgerows along the northern and eastern boundaries include tree and shrub species, such as giant sequoia (*Sequoiadendron giganteum*), Douglas-fir, western red cedar, lodgepole pine (*Pinus contorta*), osoberry, and Himalayan blackberry. Riparian forest is dominated by Oregon ash, red alder, western red cedar, Douglas-fir, osoberry, and Himalayan blackberry. Sample plots in upland areas typically included relict hydric soil indicators but lacked wetland hydrology.

F. DEVIATION FROM LWI OR NWI

OAR141-090-0035 (16)(e)

The study area is located outside of Wilsonville city limits and just outside the extent of the Wilsonville Local Wetland Inventory (LWI). The LWI boundary ends at the western study area boundary but features that were partially contained within the LWI boundary were mapped in their entirety. The Wilsonville LWI (Fishman 1999) illustrates Boeckman Creek and one wetland within the study area (Figure 5). The LWI wetland is named Unit 1.03 and corresponds to the Boeckman Creek wetland delineated as a water and Wetland A in this report. Wetland 1.03 is listed as a locally significant wetland in the Wilsonville LWI.

The results of the current wetland delineation concur with the mapping of Wetland 1.03 (SWCA mapped it mostly as a water).

G. MAPPING METHOD

OAR141-090-0035 (7)(f), (11), (12), (13), (18), and (22)

The wetland and water boundaries and sample plot locations were professionally land surveyed by Pioneer Design Group, and have a horizontal accuracy of ± 0.1 foot, with the exception of Plot 13, which is accurately located within ± 1 m (3.28 feet). The surveyed wetland and waters delineation map is shown in Figure 4.

H. ADDITIONAL INFORMATION

OAR141-090-0035 (6)(c), (16)(c), and (21)

The site does not contain a 100-year flood plain (Federal Emergency Management Agency 2017). Boeckman Creek and its tributaries are not mapped as Essential Salmonid Habitat (ESH) within the study area (DSL 2017b). The ESH map shows spring Chinook salmon (*Oncorhynchus tshawytscha*) rearing habitat near the mouth of Boeckman Creek at its confluence with the Willamette River. The concrete drain at the south end of the Boeckman Creek floodplain wetland

is a fish passage barrier, although resident cutthroat trout (*O. clarkia*) may be present based on historical observations noted in the LWI.

I. RESULTS AND CONCLUSIONS

OAR141-090-0035 (7)(j)

The boundaries of three wetlands and three streams were delineated: Wetlands A, B, and C and Boeckman Creek, Tributary 1 (includes Swale C), and Tributary 2. Wetland and waters acreage is shown in Table 4. The wetlands and waters will likely be determined to be jurisdictional by the DSL and USACE.

Table 4. Potentially Jurisdictional Wetlands and Waters

Feature ID	Acreage	Cowardin Classification	HGM Classification	Latitude, Longitude
Wetland A	0.05	PFO	SV / RFT	45.317954, -122.754881
Wetland B	0.01	PFO	SV	45.318652, -122.755100
Wetland C	0.21	PEM	SV	45.318311, -122.752325
Total wetland	0.27			
Boeckman Creek	0.61	PFO / R2 ¹	N/A	45.318638 -122.755528
Swale C	0.01	PEM / R4 ²	N/A	45.318823, -122.753109
Tributary 1	0.01	PFO / R4	N/A	45.318652, -122.754597
Tributary 2	0.02	PFO / R4	N/A	45.317959, -122.753951
Total waters	0.66			

¹Riverine Lower Perennial; ²Riverine Intermittent

J. REQUIRED DISCLAIMER

OAR141-009-0035 (7)(k)

This report documents the investigation, best professional judgment, and conclusions of the investigators. It is correct and complete to the best of our 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 DSL in accordance with Oregon Administrative Rules 141-090-0005 through 141-090-0055.

K. LIST OF PREPARERS

C. Mirth Walker



C. Mirth Walker, PWS No. 415
Senior Wetland Scientist

Tom Dee



Tom Dee, PWS No. 1971
Wetland Scientist

This page intentionally left blank.

APPENDIX A

Figures

This page intentionally left blank.

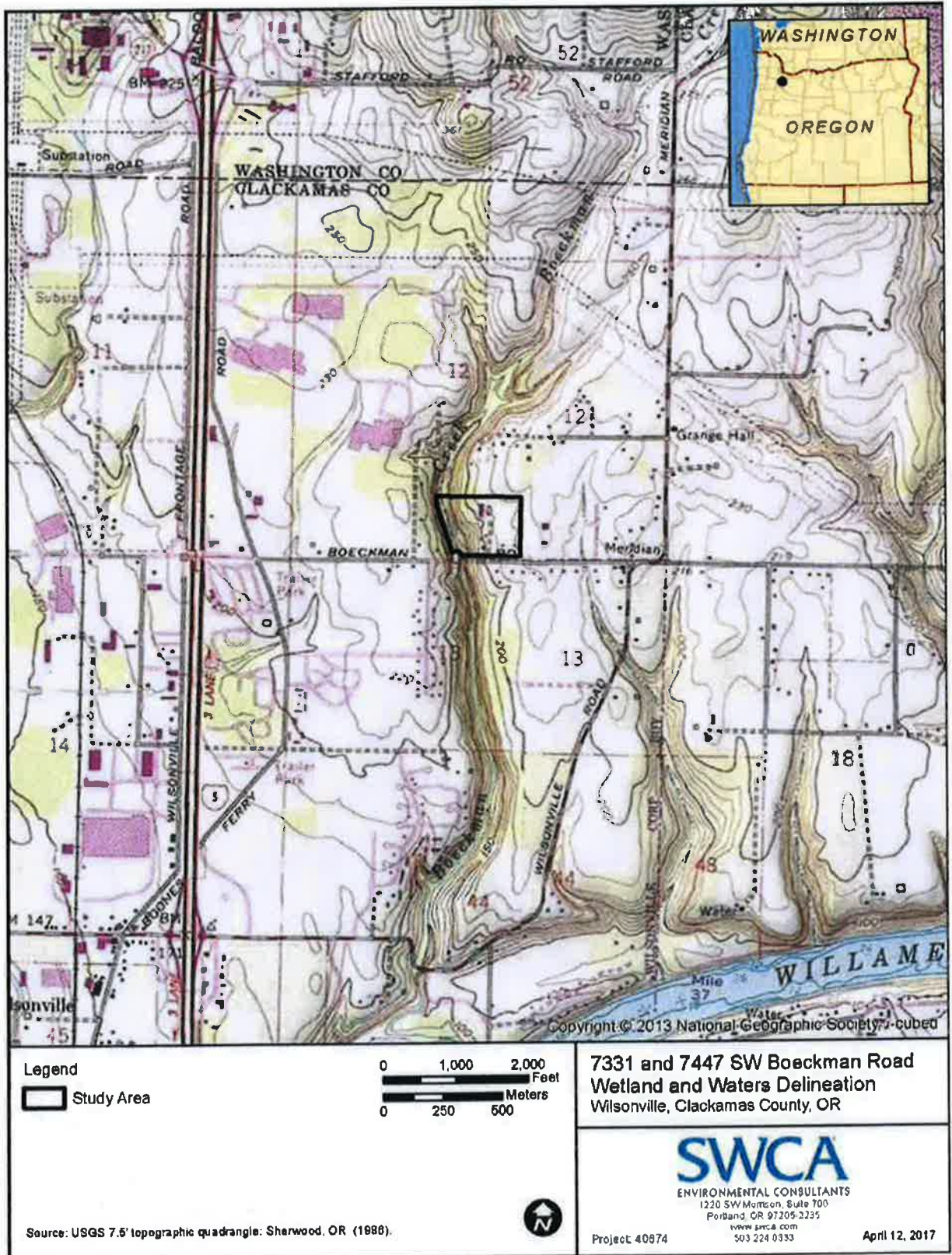


Figure 1. Site location map.

This page intentionally left blank.

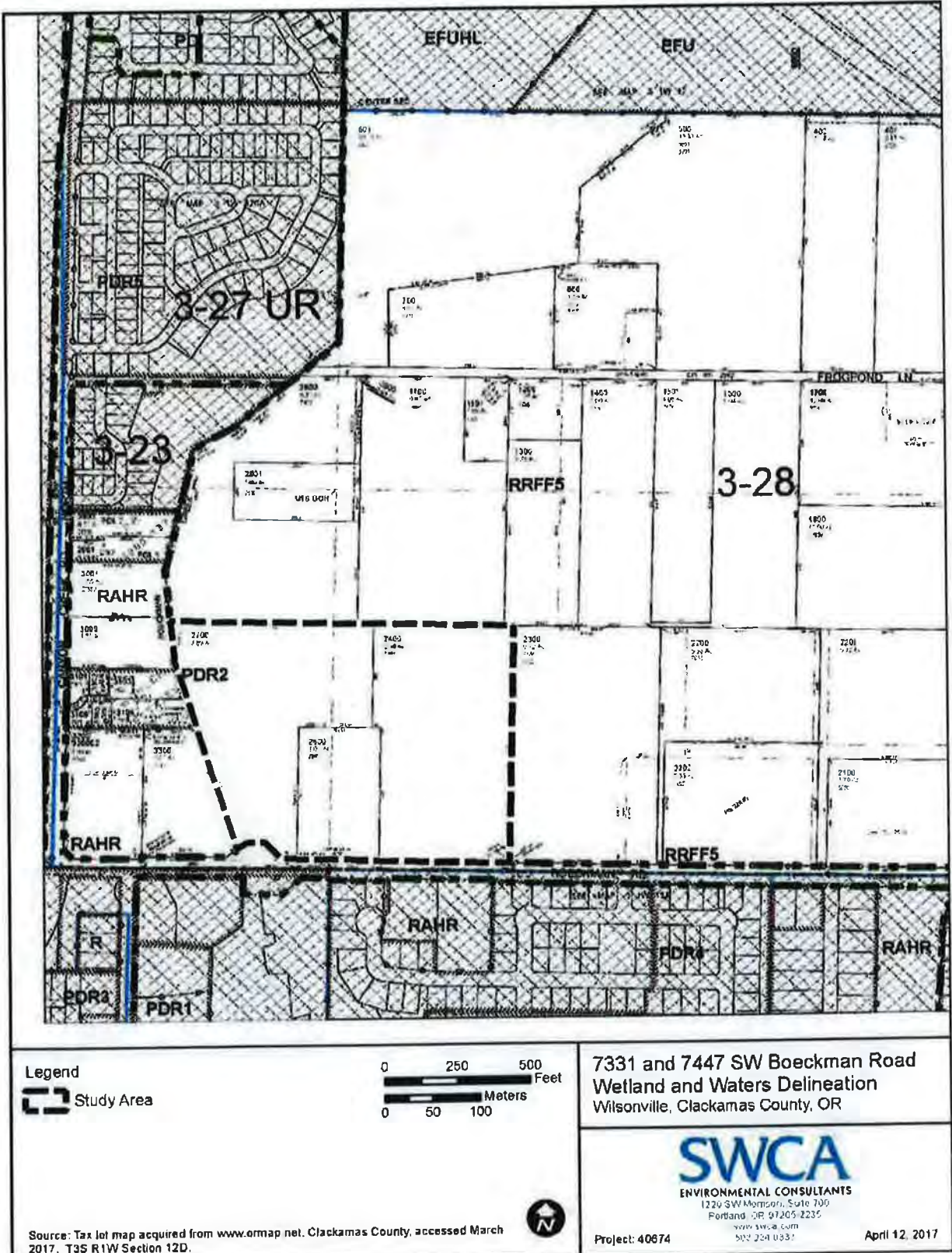


Figure 2a. Tax lot map (paper base).

This page intentionally left blank.

Boeckman Road Frog Pond Area Wetland Delineation
 SWCA Project No. 40674



Figure 2b. Tax lot map (aerial base).

This page intentionally left blank.



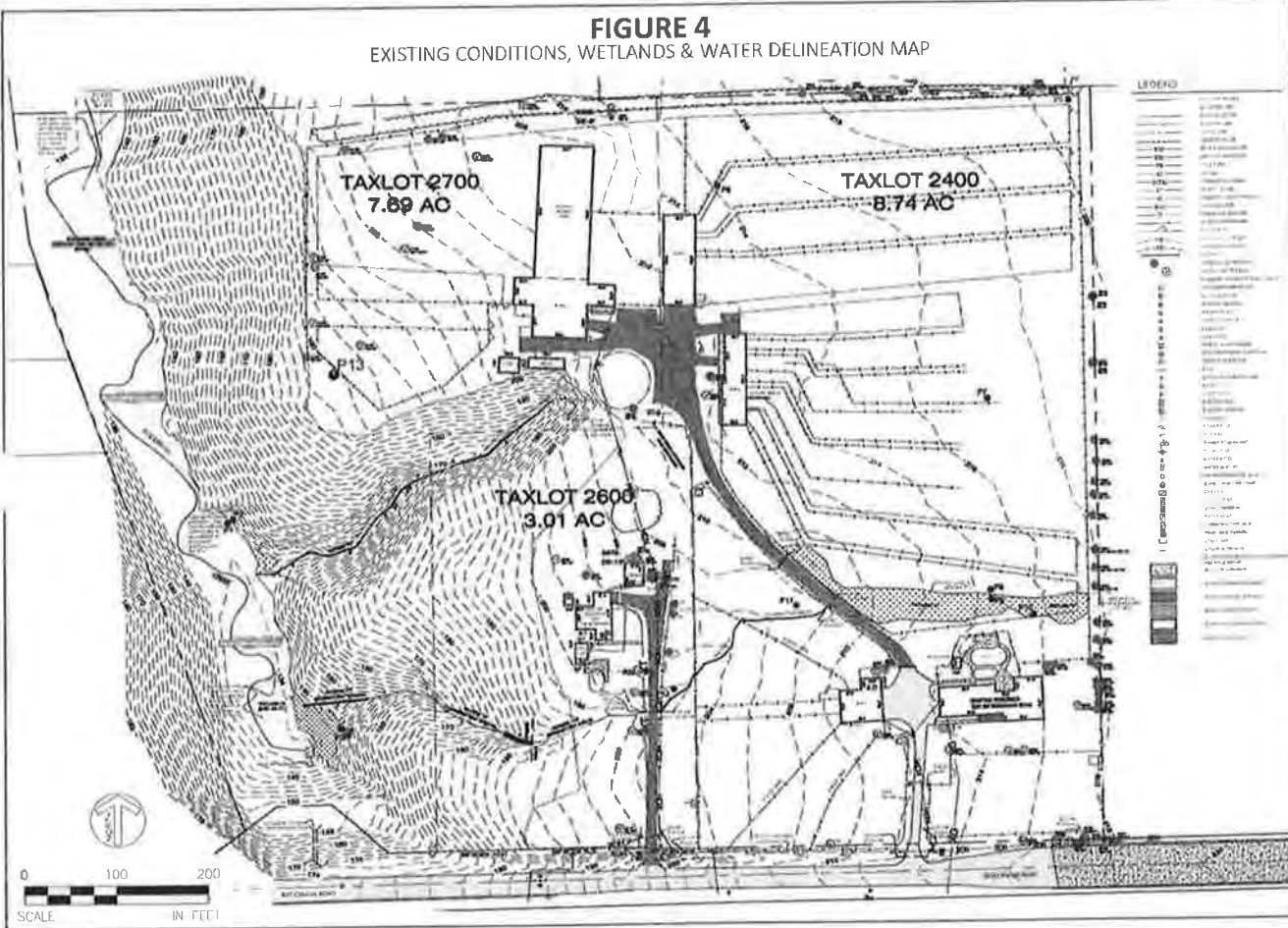
Figure 3. Soils map.

This page intentionally left blank.

31.dwg 7/24/2017 1:44:04 PM

B:\land Projects 2004\338-001\dwg\planning\Exhibits\3381_Bldg

FIGURE 4
EXISTING CONDITIONS, WETLANDS & WATER DELINEATION MAP



9050 SW WASHINGTON SQUARE RD.
SUITE 170
PORTLAND OREGON 97223
p 503.443.8286
f 844.715.4740
www.pdg-pr.com

PDG
PIONEER DESIGN GROUP, INC.

Designed by	Date	07/2017
Drawn by	TCC	07/2017
Reviewed by	BA	07/2017
Project No.	338-001	REF.
Horiz. Scale:	1"=100'	
Vert. Scale:		

Project
FROG POND

No.
338-001

Type
PLANNING

Sheet
4 of **5**

This page intentionally left blank.

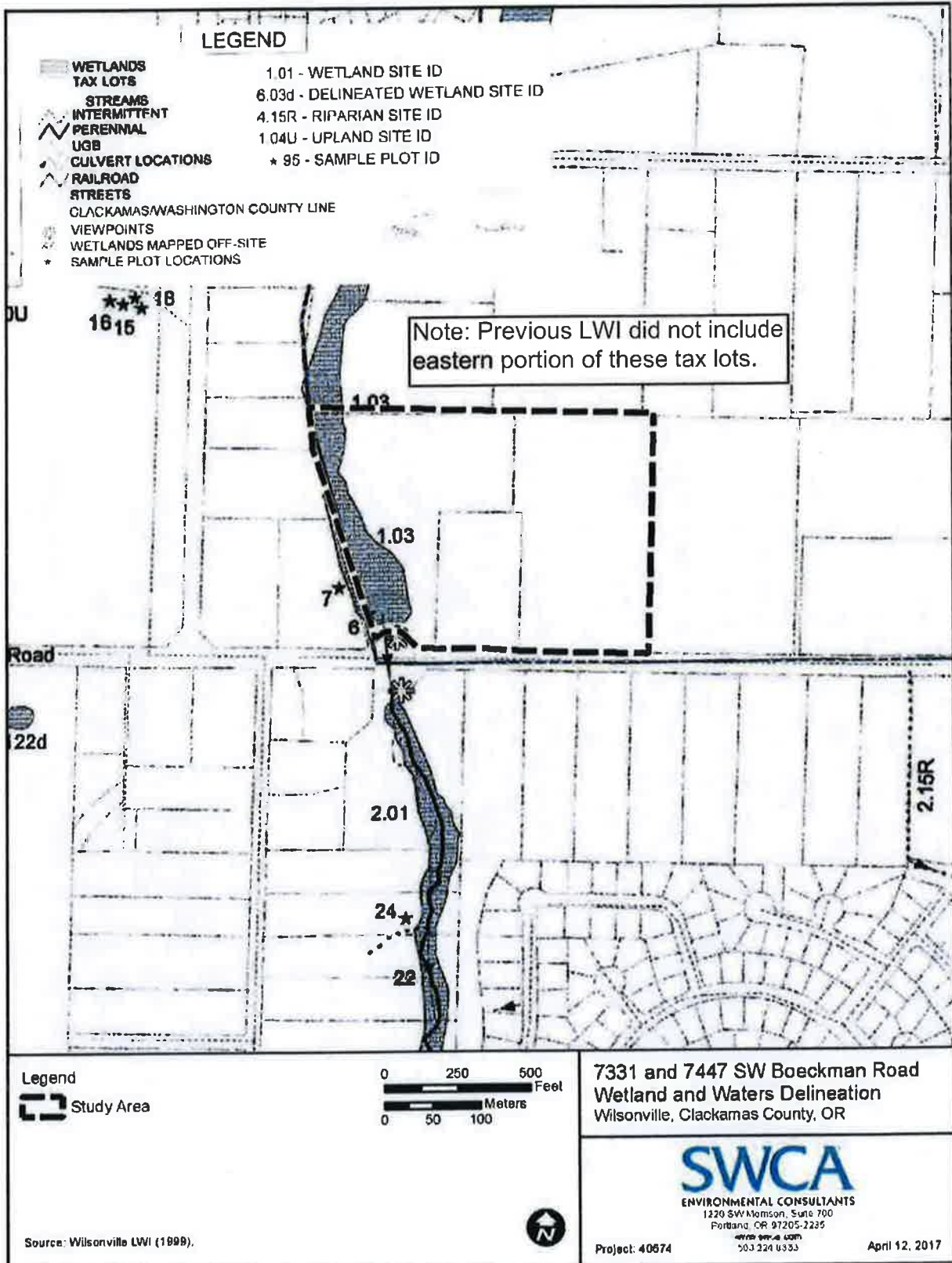
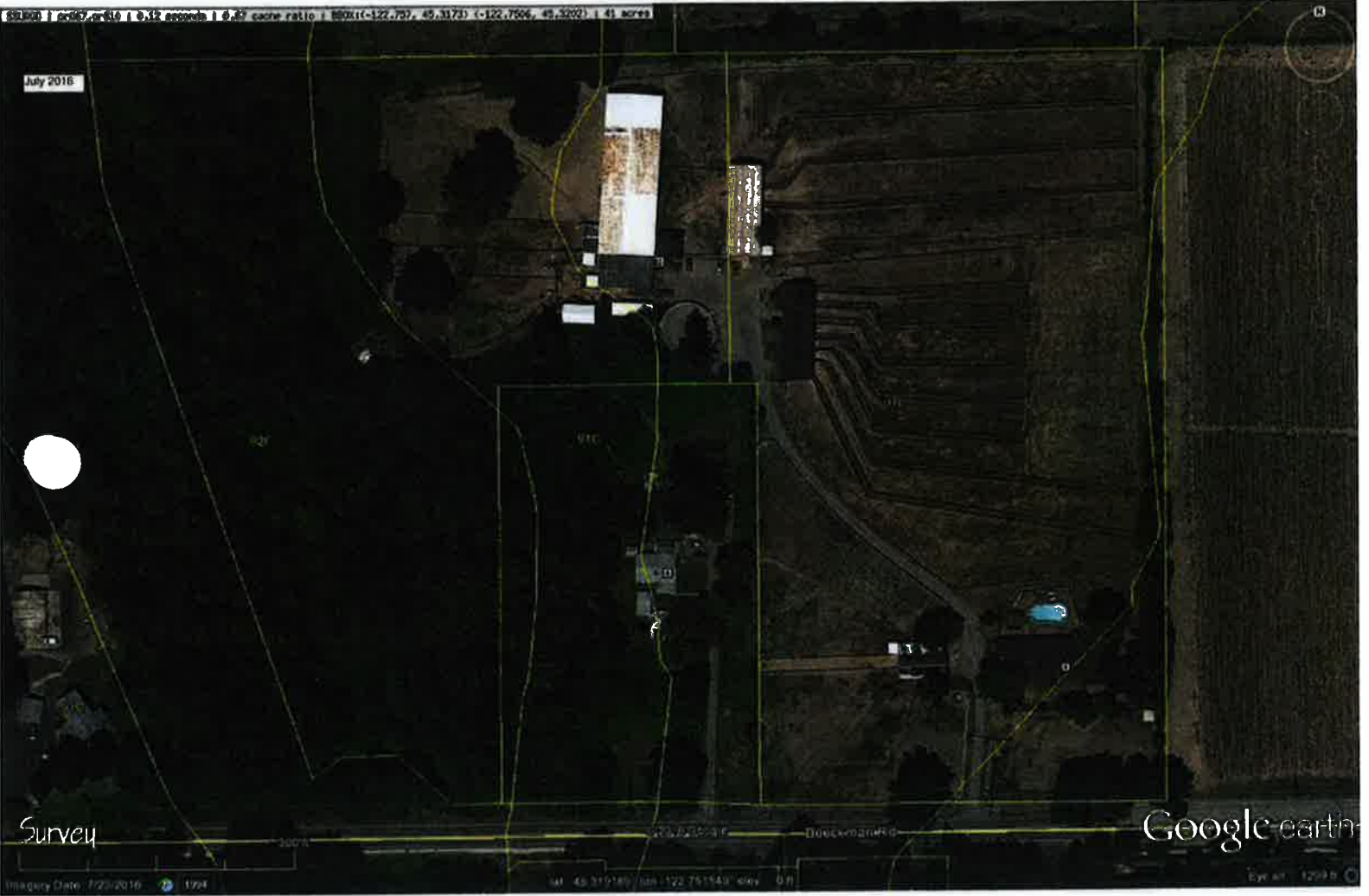


Figure 5. Local Wetland Inventory map.

This page intentionally left blank.

APPENDIX B
Aerial Photographs

This page intentionally left blank.



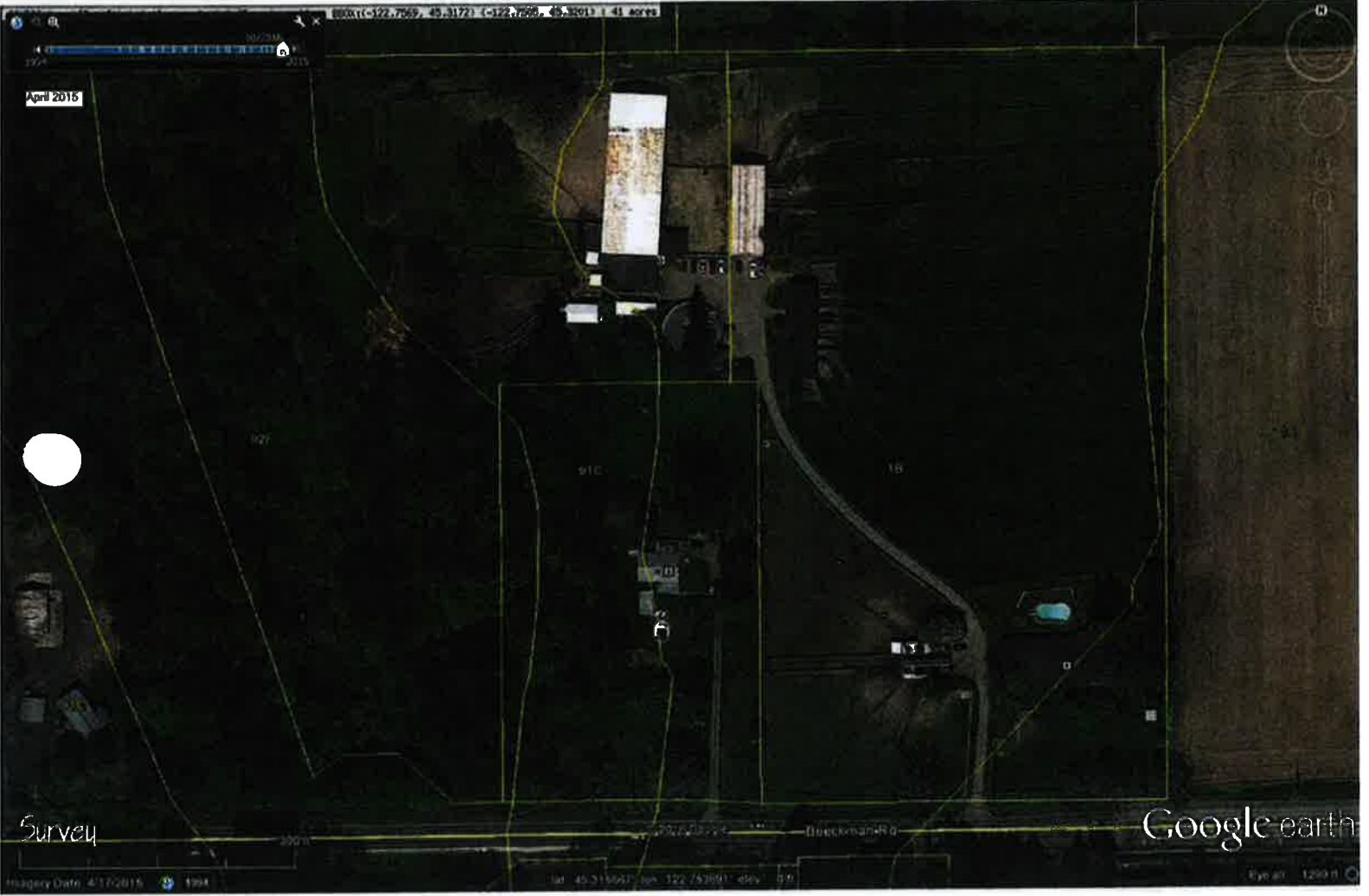
831000 | 6050000 | 0.12 | 6.47 | 830000(-122.757, 45.3173) | 831000(-122.756, 45.3202) | 41 acres

July 2016

Survey

Google earth

Imagery Date: 7/23/2016 | 1994 | Lat: 45.319785 | Lon: -122.751543 | Elev: 0 ft | Eye alt: 1209 ft



8001(-122.7659, 49.3172) (-122.7659, 49.3172) 41 acres

NOV 2014
250'

April 2015

920

910

18

Survey

Google earth

Imagery Date: 4/17/2015

lat: 49.317222, lon: -122.765911, elev: 0 ft

Eye alt: 1200 ft

551600 | 0r-610,0r067 | 1.13 seconds | 0.26 cache ratio | 800x(-122.791, 45.3000) (-122.7167, 45.3366) | 5733 acres

Boeckman Road Frog Pond Area

Aerial Photograph Dated December 2013

- Legend**
- Feature 1
 - Revrnedx
 - Wilsonville Equestrian Center



Survey
Google Earth

© 2013 Google

SSUR00 | orf10,orf07 | 1.15 seconds | 0.26 cache ratio | 800x(122,791, 45,308) (-122,7167, 45,3066) | 5733 acres

Boeckman Road Frog Pond Area

Aerial Photograph Dated July 2012



Survey
Google Earth

© 2012 Google

Boeckman Rd

400 ft

551820 | 610,0667 | 1.13 seconds | 0.26 cache ratio | BBOX:(-122.791, 49.3008) (-122.7167, 49.3366) | 9733 acres

Boeckman Road Frog Pond Area

Aerial Photograph Dated August 2011



Survey
Google Earth

© 2012 Web, Earth, Street View

Boeckman Rd

400 ft

550600 | 610.0067 | 1.13 seconds | 0.26 cache ratio | 880x(122,791, 45,308) (-122,7167, 45,3066) | 9733 acres

Boeckman Road Frog Pond Area

Aerial Photograph Dated August 2010



Survey
Google Earth

Boeckman Rd

0 400 ft

SUR00 | or010.or067 | 1.13 seconds | 0.26 cache ratio | 880x((-122.791, 45.3008) (-122.7167, 45.3566)) | 5733 acres

Boeckman Road Frog Pond Area

Aerial Photograph Dated July 2009



Survey
Google Earth

Boeckman Rd

400'

SSURGO | or010,er007 | 1.15 seconds | 0.26 cache ratio | 860x(-122.791, 45.3008) (-122.7167, 45.3366) | 9733 acres

Boeckman Road Frog Pond Area

Aerial Photograph Dated June 2008



Survey
Google Earth

Boeckman Rd

400ft

SSUR00 | or610,or057 | 1.13 seconds | 0.26 cache ratio | 880X((-122.791, 45.3098) (-122.7167, 45.3366) | 5733 Acres

Boeckman Road Frog Pond Area

Aerial Photograph Dated July 2005



Survey
Google Earth



SSUR00 | en610,er057 | 1.13 records | 0.26 cache ratio | 800(((-122.791, 45.3008), (-122.7167, 45.3366)) | 5733 acres

Boeckman Road Frog Pond Area

Aerial Photograph Dated May 2002



Survey
Google Earth

© 2002 Google Earth

4700

SSLR00 | or010,cr067 | 1.13 seconds | 0.26 cache ratio | 880X(-122.791, 45.3008) (-122.7167, 45.2966) | 5733 Acres

Boeckman Road Frog Pond Area

Aerial Photograph Dated June 1984



Survey
Google Earth

Boeckman Road

400 ft

APPENDIX C
Precipitation Data

This page intentionally left blank.

Assessing Rainfall for the Preceding 3-Month Period (Antecedent Rainfall)								Climate Period 1981-2010	
WETS Station: N WILLAMETTE EXP STN, OR6151, 1971-2000								Oct. 1	Jan. 1
Measured Rainfall: AURORA STATE AP, OR, 2016-2017 Water Year								Departure from Normal*	Departure from Normal*
Prior Month Most Recent First	WETS Rainfall Percentile		Measured Rainfall inches	Condition Dry, Wet, Normal	Condition Value (1=dry, 2=normal, 3=wet)	Month Weight	Multiply previous 2 columns	12.48	7.40
	30th	70th						-----inches-----	WYTD*
1st March	3.56	5.46	8.06	Wet	3	3	9	44.30	22.78
2nd February	3.92	6.53	10.38	Wet	3	2	6	Normal	Normal
3rd January	4.35	7.91	4.30	Dry	1	1	1	31.82	15.38
			22.74					*As of Date: 4/5/2017	
Jan-17	4.35	7.91	4.30	5.87	Dry				
Feb-17	3.92	6.53	10.38	4.75	Wet				
Mar-17	3.56	5.46	8.06	4.23	Wet				
Apr-17	2.49	4.08	4.65	3.13	Wet				
May-17	1.78	3.24	1.79	2.36	Normal				
Jun-17	1.13	2.18	1.70	2.02	Normal				
Jul-17	0.33	0.98		0.68					
Aug-17	0.29	1.12		0.66					
Sep-17	0.94	2.20		1.73					
Oct-16	1.93	4.24	9.66	3.23	Wet				
Nov-16	4.48	8.07	7.31	6.63	Normal				
Dec-16	5.01	8.72	4.55	6.58	Dry				
		37.33	46.92	52.40	41.87		Sum	16	
Rainfall of prior period was: drier than normal (sum is 6-9), normal (sum is 10-14), wetter than normal (sum is 15-18)								Wetter than Normal	

WETS Table and Measured Rainfall source: <http://aqacis.rcc-acis.org/>

Clackamas County FIPS: 41005

Normals are calculated based on climate period 1981-2010.

USDA Field Office Climate Data

Station : N WILLAMETTE EXP STN, OR6151 Creation Date: 12/19/2016
 Latitude: 4517 Longitude: 12245 Elevation: 00150
 State FIPS/County(FIPS): 41005 County Name: Clackamas
 Start yr. - 1971 End yr. - 2000

Month	Temperature (Degrees F.)			Precipitation (Inches)				
	avg daily max	avg daily min	avg	avg	30% chance will have		avg # of days w/.1 or more	avg total snow fall
					less than	more than		
January	46.9	33.0	40.0	5.94	3.86	7.14	13	0.5
February	51.0	34.5	42.8	5.07	3.26	6.11	12	0.3
March	55.9	36.8	46.4	4.28	3.26	4.98	12	0.0
April	60.5	39.7	50.1	3.14	2.10	3.75	9	0.0
May	66.9	44.5	55.7	2.50	1.59	3.02	7	0.0
June	73.0	49.3	61.2	1.75	1.00	2.13	5	0.0
July	80.1	52.8	66.5	0.73	0.20	0.87	2	0.0
August	80.4	52.7	66.6	0.83	0.18	0.96	2	0.0
September	75.3	48.7	62.0	1.77	0.80	2.21	5	0.0
October	64.1	41.8	53.0	3.36	1.69	4.10	8	0.0
November	52.3	37.6	45.0	6.48	4.39	7.75	14	0.1
December	46.2	33.1	39.7	6.75	4.57	8.07	13	0.6
Annual	-----	-----	-----	-----	37.33	46.92	---	-----
Average	62.7	42.0	52.4	-----	-----	-----	---	-----
Average	-----	-----	-----	42.60	-----	-----	101	1.7

GROWING SEASON DATES

Probability	Temperature		
	24 F or higher	28 F or higher	32 F or higher
	Beginning and Ending Dates Growing Season Length		
50 percent *	1/26 to 1/ 1 340 days	3/ 1 to 11/22 265 days	4/13 to 10/28 197 days
70 percent *	> 365 days > 365 days	2/20 to 12/ 1 283 days	4/ 6 to 11/ 4 211 days

* Percent chance of the growing season occurring between the Beginning and Ending dates.

total 1963-2007 prcp

Station : OR6151, N WILLAMETTE EXP STN
 ----- Unit = inches

yr	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec	annl
63M	1.14	4.02	6.48		4.34	1.62	0.81	0.36	1.11	3.09	5.86	4.45	33.28
64	1.36	0.83	2.93	1.21	0.94	1.67	0.74	0.58	1.49	1.52	7.21	13.84	44.32
65	8.51	M2.07	1.09	3.23	1.30	0.66	0.23	0.99	0.05	2.79	6.63	6.78	34.33
66	7.84	1.92	5.96	1.22	0.93	1.18	1.16	0.31	1.41	2.97	5.62	6.57	37.09
67	6.77	1.53	4.79	2.58	2.12	0.72	0.00	0.00	0.26	5.58	2.04	5.65	32.04
68	4.68	8.20	3.06	2.04	2.99	2.34	0.98	4.17	M2.75	M6.88	7.02	M12.46	57.57
69	7.41	M3.03	M1.45	2.99	1.76	M3.20	0.11	0.08	3.42	M4.69	2.94	M8.53	39.61
70	11.72	M5.12	M2.30	2.36	1.30	M0.31	0.07	0.00	1.38	3.49	6.94	8.92	43.91
71	7.59	3.49	5.59	3.71	1.77	2.92	0.08	0.43	3.51	3.69	6.49	M8.02	47.29
72	6.59	4.78	5.77	3.61	2.65	0.60	0.47	0.65	3.50	0.87	5.07	8.81	43.37

WETS Table

73	4.45	1.96	M2.67	1.28	1.56	1.47	0.01	0.82	2.58	2.94	13.04	10.02	42.80
74	8.24	5.48	6.28	2.23	1.98	0.96	2.31	0.02	0.26	1.62	6.56	6.53	42.47
75	6.84	4.24	2.22	2.46	1.86	1.27	0.65	2.53	0.00	5.61	4.37	6.66	38.71
76	6.32	6.68	2.82	3.00	1.48	0.57	0.95	2.41	1.18	0.85	M1.67	1.48	29.41
77	1.37	M2.80	4.26	0.64	3.82	1.54	0.83	2.69	3.23	2.45	6.61	10.52	40.76
	1.35	3.59	1.69	3.50	4.52	1.69	0.90	2.08	2.74	0.37	4.92	M3.54	34.89
	3.45	7.36	3.22	3.35	2.36	0.47	0.82	0.82	3.25	5.35	3.77	6.75	40.97
80	9.99	4.68	3.59	4.07	1.23	2.52	0.14	0.49	1.69	1.67	6.87	11.90	48.84
81	2.01	4.11	3.48	2.29	2.23	4.27	0.19	0.03	2.68	4.14	M5.39	10.27	41.09
82	6.24	6.94	3.12	8.98	M0.89	0.86	0.34	0.99	3.61	3.74	5.04	8.92	49.67
83	7.18	9.54	7.18	2.67	2.13	2.60	2.68	2.52	0.86	2.25	9.04	6.33	54.98
84	3.05	4.69	4.46	4.09	4.59	5.35	0.00	0.03	1.99	5.78	12.90	3.68	50.61
85	0.45	3.49	4.54	1.42	0.97	2.48	0.45	0.79	1.93	3.17	5.00	2.46	27.15
86	6.26	7.65	2.95	2.09	2.74	0.38	1.28	0.04	2.93	2.81	6.71	4.13	39.97
87	6.75	4.94	5.55	2.19	1.66	0.30	2.00	0.10	0.53	0.23	2.40	10.55	37.20
88	7.88	1.71	3.73	4.63	2.56	2.94	0.21	0.03	1.25	0.20	9.88	3.28	38.30
89	4.24	3.16	7.02	1.24	2.27	0.91	0.52	1.37	1.34	2.15	3.72	4.15	32.09
90	8.98	4.97	3.42	2.22	1.71	2.94	0.54	1.09	0.50	M6.18	5.00	3.39	40.94
91	2.83	3.69	4.39	4.62	4.58	2.42	0.16	0.75	0.30	3.70	7.31	5.53	40.28
92	5.34	5.23	1.46	4.28	0.19	0.63	1.31	0.48	1.88	4.83	5.15	6.71	37.49
93	M2.96	M0.26	5.32	6.30	4.25	2.20	2.44	0.30	0.00	1.35	1.39	6.90	33.67
94	4.78	6.93	3.58	1.88	1.63	1.57	0.06	0.02	1.12	6.94	8.32	7.70	44.53
95	7.65	M4.45	4.42	5.14	1.84	2.07	M0.60	1.55	1.52	5.63	10.18	7.66	52.71
96	9.09	M12.04	3.91	6.76	4.63	1.05	0.80	0.14	3.06	5.51	11.39	15.72	74.10
97	9.55	3.34	8.59	4.59	2.47	2.97	0.80	1.11	M3.38	M6.25	4.65	3.41	51.11
98	M8.98	5.73	4.91	1.42	5.57	1.27	0.22	0.25	0.90	4.69	10.96	0.54	45.44
99	7.58	9.08	4.68	1.35	2.53	1.23	0.18	0.47	0.05	2.47	7.68	4.35	41.65
0	6.21	5.15	3.46	2.15	2.39	1.40	0.01	0.00		3.21	3.04	3.16	30.18
1	1.55	1.28	3.51	0.69	1.05	1.67	0.73	1.19	0.69	3.80			16.16
2			5.59	2.44	1.35	1.83	0.07	0.24	1.95		3.22	10.02	26.71
3	8.73	2.99	7.14	5.64	1.05	0.28	0.00	0.42	0.95	2.45	4.31	9.84	43.80
4	6.19	4.04	1.09	1.07	1.92	1.63	0.12	2.52	1.74	4.34	2.71	4.46	31.83
5	1.87	0.58	5.00	2.97	5.02	2.75	0.58	0.00	2.14	M2.63	6.22	10.53	40.29
6	13.70	2.77	4.30	2.77	2.79	0.99	0.07	0.11	0.84	1.68	13.05	7.43	50.50
7	4.75	5.26	5.29	2.26	0.90	0.53	0.63	0.66					20.28

Product generated by ACIS - NOAA Regional Climate Centers.

APPENDIX D

Wetland Determination Data Sheets

This page intentionally left blank.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys and Coast Region

Project/Site: Boeckman Road / Frog Pond Area City/County: - / Clackamas Sampling Date: 3/24/2017
 Applicant/Owner: Pioneer Design Group / Tim Wolfston State: OR Sampling Point: P1
 Investigator(s): C. Mirth Walker and Tom Dee Section, Township, Range: 12, T3S, R1W / Tax Lot 2700
 Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): concave Slope (%): 0
 Subregion (LRR): A, Northwest Forests and Coast Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: 92F Xerochrepts and Haploxerolls, very steep NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No X (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 <u>X</u>	No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____
Hydric Soil Present?	Yes <u>X</u>	No _____	
Wetland Hydrology Present?	Yes <u>X</u>	No _____	
Precipitation prior to fieldwork: <u>MTD Rainfall 5.57" (0.89" above normal for March)</u>			
Remarks: <u>Boeckman Creek floodplain wetland below OHWL.</u>			

VEGETATION

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
(Plot size: <u>30' r</u>)				Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A)
1. _____	_____	_____	_____	Total Number of Dominant Species Across All Strata: <u>3</u> (B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
	<u>0%</u> = Total Cover			Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100%</u> (A/B)
Sapling/Shrub Stratum				Prevalence Index worksheet:
(Plot size: <u>10' r</u>)				Total % Cover of: _____ Multiply by: _____
1. <u>Fraxinus latifolia</u>	<u>5%</u>	<u>Yes</u>	<u>FACW</u>	OBL species <u>0</u> x 1 = <u>0</u>
3. _____	_____	_____	_____	FACW species <u>75</u> x 2 = <u>150</u>
4. _____	_____	_____	_____	FAC species <u>10</u> x 3 = <u>30</u>
5. _____	_____	_____	_____	FACU species <u>0</u> x 4 = <u>0</u>
	<u>5%</u> = Total Cover			UPL species <u>0</u> x 5 = <u>0</u>
				Column Totals: <u>85</u> (A) <u>180</u> (B)
				Prevalence Index = B/A = <u>2.12</u>
Herb Stratum				Hydrophytic Vegetation Indicators:
(Plot size: <u>5' r</u>)				<u>1</u> - Rapid Test for Hydrophytic Vegetation
1. <u>Phalaris arundinacea</u>	<u>50%</u>	<u>Yes</u>	<u>FACW</u>	<u>X</u> <u>2</u> - Dominance Test is >50%
2. <u>Impatiens capensis</u>	<u>20%</u>	<u>Yes</u>	<u>FACW</u>	<u>3</u> - Prevalence Index is ≤3.0 ¹
3. <u>Athyrium cyclosorum</u>	<u>10%</u>	<u>No</u>	<u>FAC</u>	<u>4</u> - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet)
4. _____	_____	_____	_____	<u>5</u> - Wetland Non-Vascular Plants ¹
5. _____	_____	_____	_____	Problematic Hydrophytic Vegetation ¹ (Explain)
6. _____	_____	_____	_____	¹ Indicators of hydric soil and wetland hydrology must be present.
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
	<u>80%</u> = Total Cover			
Woody Vine Stratum				
(Plot size: <u>10' r</u>)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
	<u>0%</u> = Total Cover			
% Bare Ground in Herb Stratum <u>20%</u>				

Hydrophytic Vegetation Present? Yes X No _____

Entered by: TJD QC by: CMW

Remarks: _____

SOIL

Sampling Point: P1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-18	10YR 4/1	98	10YR 4/6	2	C	M	SiL	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)		Indicators for Problematic Hydric Soils³:	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 2 cm Muck (A10)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input checked="" type="checkbox"/> Depleted Matrix (F3)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Dark Surface (F6)		³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Redox Depressions (F8)		

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes No

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)

HYDROLOGY

Wetland Hydrology Indicators:	
Primary Indicators (minimum of one required; check all that apply)	Secondary Indicators (2 or more required)
<input checked="" type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
<input checked="" type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Salt Crust (B11)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Aquatic Invertebrates (B13)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A)
	<input type="checkbox"/> Raised Ant Mounds (D6) (LRR A)
	<input type="checkbox"/> Other (Explain in Remarks)
	<input type="checkbox"/> Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes No Depth (inches): 2 (nearby)

Water Table Present? Yes No Depth (inches): 2

Saturation Present? Yes No Depth (inches): surface

(includes capillary fringe)

Wetland Hydrology Present? Yes No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: _____ Entered by: TJD QC by: CMW

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys and Coast Region

Project/Site: Boeckman Road / Frog Pond Area City/County: - / Clackamas Sampling Date: 3/24/2017
 Applicant/Owner: Pioneer Design Group / Tim Wolfston State: OR Sampling Point: P2
 Investigator(s): C. Mirth Walker and Tom Dee Section, Township, Range: 12, T3S, R1W / Tax Lot 2700
 Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): convex Slope (%): 10
 Subregion (LRR): A, Northwest Forests and Coast Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: 92F Xerochrepts and Haploxerolls, very steep NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No X (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 <u>X</u>	Is the Sampled Area within a Wetland?	Yes _____	No <u>X</u>
Hydric Soil Present?	Yes _____	No <u>X</u>			
Wetland Hydrology Present?	Yes _____	No <u>X</u>			

Precipitation prior to fieldwork: MTD Rainfall 5.57" (0.89" above normal for March)
 Remarks: _____

VEGETATION

Tree Stratum (Plot size: <u>30' r</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A)
1. <u>Acer macrophyllum</u>	<u>40%</u>	<u>Yes</u>	<u>FACU</u>	
2. <u>Alnus rubra</u>	<u>20%</u>	<u>Yes</u>	<u>FAC</u>	
3. <u>Pseudotsuga menziesii</u>	<u>10%</u>	<u>Yes</u>	<u>FACU</u>	
_____ = Total Cover				Percent of Dominant Species That Are OBL, FACW, or FAC: <u>50%</u> (A/B)
50% = Total Cover				
Sapling/Shrub Stratum (Plot size: <u>10' r</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Prevalence Index worksheet: Total % Cover of: _____ Multiply by:
1. <u>Rubus armeniacus</u>	<u>20%</u>	<u>Yes</u>	<u>FAC</u>	
_____ <u>Oemleria cerasiformis</u>	<u>20%</u>	<u>Yes</u>	<u>FACU</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
_____ = Total Cover				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.
40% = Total Cover				
Herb Stratum (Plot size: <u>5' r</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Hydrophytic Vegetation Present? Yes _____ No <u>X</u>
1. <u>Polystichum munitum</u>	<u>20%</u>	<u>Yes</u>	<u>FACU</u>	
2. <u>Impatiens capensis</u>	<u>20%</u>	<u>Yes</u>	<u>FACW</u>	
3. <u>Hydrophyllum tenuipes</u>	<u>20%</u>	<u>Yes</u>	<u>FAC</u>	
4. <u>Urtica dioica</u>	<u>1%</u>	<u>No</u>	<u>FAC</u>	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
_____ = Total Cover				
70% = Total Cover				
Woody Vine Stratum (Plot size: <u>10' r</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
_____ = Total Cover				
0% = Total Cover				
% Bare Ground in Herb Stratum <u>30%</u>				

Remarks: _____ Entered by: TJD QC by: CMW

SOIL

Sampling Point: **P2**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of Indicators.)

Depth (inches)	Matrix		Redox Features			Loc ²	Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹			
0-8	10YR 3/3	100					SiL	
8-18	10YR 4/2	100					SiL	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)		Indicators for Problematic Hydric Soils³:
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 2 cm Muck (A10)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Dark Surface (F6)	³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Redox Depressions (F8)	

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A)	<input type="checkbox"/> Raised Ant Mounds (D6) (LRR A)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Frost-Heave Hummocks (D7)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)		
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)		

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): N/A

Water Table Present? Yes _____ No X Depth (inches): >18

Saturation Present? Yes _____ No X Depth (inches): 0-1

(includes capillary fringe)

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: _____ Entered by: TJD QC by: CMW

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys and Coast Region

Project/Site: Boeckman Road / Frog Pond Area City/County: - / Clackamas Sampling Date: 3/24/2017
 Applicant/Owner: Pioneer Design Group / Tim Wolfston State: OR Sampling Point: P3
 Investigator(s): C. Mirth Walker and Tom Dee Section, Township, Range: 12, T3S, R1W / Tax Lot 2700
 Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): convex Slope (%): 5
 Subregion (LRR): A, Northwest Forests and Coast Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: 92F Xerochrepts and Haploxerolls, very steep NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No X (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 <u>X</u>	Is the Sampled Area within a Wetland? Yes _____ No <u>X</u>
Hydric Soil Present?	Yes _____	No <u>X</u>	
Wetland Hydrology Present?	Yes _____	No <u>X</u>	
Precipitation prior to fieldwork: <u>MTD Rainfall 5.57" (0.89" above normal for March)</u>			
Remarks: <u>East of water control structure/concrete culvert drain.</u>			

VEGETATION

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
(Plot size: <u>30' r</u>)				Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A)
1. <u>Acer macrophyllum</u>	<u>60%</u>	<u>Yes</u>	<u>FACU</u>	Total Number of Dominant Species Across All Strata: <u>6</u> (B)
2. <u>Pseudotsuga menziesii</u>	<u>20%</u>	<u>Yes</u>	<u>FACU</u>	
3. <u>Alnus rubra</u>	<u>10%</u>	<u>No</u>	<u>FAC</u>	Percent of Dominant Species That Are OBL, FACW, or FAC: <u>33%</u> (A/B)
4. _____	_____	_____	_____	
<u>90%</u> = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>0</u> x 2 = <u>0</u> FAC species <u>61</u> x 3 = <u>183</u> FACU species <u>135</u> x 4 = <u>540</u> UPL species <u>1</u> x 5 = <u>5</u> Column Totals: <u>197</u> (A) <u>728</u> (B) Prevalence Index = B/A = <u>3.70</u>
Sapling/Shrub Stratum (Plot size: <u>10' r</u>) 1. <u>Acer circinatum</u> <u>30%</u> <u>Yes</u> <u>FAC</u> <u>Gaultheria shallon</u> <u>10%</u> <u>Yes</u> <u>FACU</u> 3. <u>Corylus cornuta</u> <u>5%</u> <u>No</u> <u>FACU</u> 4. _____ 5. _____ _____ = Total Cover <u>45%</u>				
Herb Stratum (Plot size: <u>5' r</u>) 1. <u>Polystichum munitum</u> <u>40%</u> <u>Yes</u> <u>FACU</u> 2. <u>Hydrophyllum tenuipes</u> <u>20%</u> <u>Yes</u> <u>FAC</u> 3. <u>Carex hendersonii</u> <u>1%</u> <u>No</u> <u>FAC</u> 4. <u>Vancouveria hexandra</u> <u>1%</u> <u>No</u> <u>NOL</u> 5. _____ 6. _____ 7. _____ 8. _____ 9. _____ 10. _____ 11. _____ _____ = Total Cover <u>62%</u>				
Woody Vine Stratum (Plot size: <u>10' r</u>) 1. _____ 2. _____ _____ = Total Cover <u>0%</u>				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.
% Bare Ground in Herb Stratum <u>38%</u>				

Hydrophytic Vegetation Present? Yes _____ No X

Remarks: _____ Entered by: TJD QC by: CMW

SOIL

Sampling Point: **P3**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-11	10YR 3/2	100					SiL	
11-15	10YR 4/2	100					SiL	
15-18	10YR 4/2	85	10YR 5/6	15	C	M	SiL	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)		Indicators for Problematic Hydric Soils³:
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 2 cm Muck (A10)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Dark Surface (F6)	³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Redox Depressions (F8)	

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No **X**

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A)	<input type="checkbox"/> Raised Ant Mounds (D6) (LRR A)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Frost-Heave Hummocks (D7)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)		
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)		

Field Observations:

Surface Water Present? Yes _____ No **X** Depth (inches): N/A

Water Table Present? Yes _____ No **X** Depth (inches): >18

Saturation Present? Yes _____ No **X** Depth (inches): 0-1

(includes capillary fringe)

Wetland Hydrology Present? Yes _____ No **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: _____ Entered by: TJD QC by: CMW

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys and Coast Region

Project/Site: Boeckman Road / Frog Pond Area City/County: - / Clackamas Sampling Date: 3/24/2017
 Applicant/Owner: Pioneer Design Group / Tim Wolfston State: OR Sampling Point: P4
 Investigator(s): C. Mirth Walker and Tom Dee Section, Township, Range: 12, T3S, R1W / Tax Lot 2700
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): concave Slope (%): 3
 Subregion (LRR): A, Northwest Forests and Coast Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: 92F Xerochrepts and Haploxerolls, very steep NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No X (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 <u>X</u>	No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____
Hydric Soil Present?	Yes <u>X</u>	No _____	
Wetland Hydrology Present?	Yes <u>X</u>	No _____	
Precipitation prior to fieldwork: <u>MTD Rainfall 5.57" (0.89" above normal for March)</u>			
Remarks: <u>Wetland A.</u>			

VEGETATION

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status	
(Plot size: <u>30' r</u>)				Dominance Test worksheet:
1. _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A)
2. _____	_____	_____	_____	Total Number of Dominant Species Across All Strata: <u>2</u> (B)
3. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100%</u> (A/B)
4. _____	_____	_____	_____	Prevalence Index worksheet:
0% = Total Cover				Total % Cover of: _____ Multiply by: _____
Sapling/Shrub Stratum				OBL species <u>0</u> x 1 = <u>0</u>
(Plot size: <u>10' r</u>)				FACW species <u>80</u> x 2 = <u>160</u>
1. _____	_____	_____	_____	FAC species <u>5</u> x 3 = <u>15</u>
3. _____	_____	_____	_____	FACU species <u>1</u> x 4 = <u>4</u>
4. _____	_____	_____	_____	UPL species <u>0</u> x 5 = <u>0</u>
5. _____	_____	_____	_____	Column Totals: <u>86</u> (A) <u>179</u> (B)
0% = Total Cover				Prevalence Index = B/A = <u>2.08</u>
Herb Stratum				Hydrophytic Vegetation Indicators:
(Plot size: <u>5' r</u>)				1 - Rapid Test for Hydrophytic Vegetation
1. <u>Phalaris arundinacea</u>	<u>40%</u>	<u>Yes</u>	<u>FACW</u>	<u>X</u> 2 - Dominance Test is >50%
2. <u>Impatiens capensis</u>	<u>40%</u>	<u>Yes</u>	<u>FACW</u>	3 - Prevalence Index is ≤3.0 ¹
3. <u>Urtica dioica</u>	<u>5%</u>	<u>No</u>	<u>FAC</u>	4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet)
4. <u>Galium aparine</u>	<u>1%</u>	<u>No</u>	<u>FACU</u>	5 - Wetland Non-Vascular Plants ¹
5. _____	_____	_____	_____	Problematic Hydrophytic Vegetation ¹ (Explain)
6. _____	_____	_____	_____	¹ Indicators of hydric soil and wetland hydrology must be present.
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
86% = Total Cover				
Woody Vine Stratum				Hydrophytic Vegetation Present? Yes <u>X</u> No _____
(Plot size: <u>10' r</u>)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
0% = Total Cover				
% Bare Ground in Herb Stratum <u>14%</u>				

Remarks: all trees and shrubs rooted upslope. Entered by: TJD QC by: CMW

SOIL

Sampling Point: **P4**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-6	10YR 3/3	100					SIL	
6-18	10YR 4/1	90	10 YR 4/4	10	C	M	SIL	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)		Indicators for Problematic Hydric Soils³:	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 2 cm Muck (A10)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input checked="" type="checkbox"/> Depleted Matrix (F3)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Dark Surface (F6)		³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Redox Depressions (F8)		

Restrictive Layer (if present):
 Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)

HYDROLOGY

Wetland Hydrology Indicators:	
<u>Primary Indicators (minimum of one required: check all that apply)</u>	<u>Secondary Indicators (2 or more required)</u>
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
<input checked="" type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Salt Crust (B11)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Aquatic Invertebrates (B13)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Drainage Patterns (B10)
	<input type="checkbox"/> Dry-Season Water Table (C2)
	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
	<input type="checkbox"/> Geomorphic Position (D2)
	<input type="checkbox"/> Shallow Aquitard (D3)
	<input type="checkbox"/> FAC-Neutral Test (D5)
	<input type="checkbox"/> Raised Ant Mounds (D6) (LRR A)
	<input type="checkbox"/> Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes _____ No <input checked="" type="checkbox"/>	Depth (inches): <u>N/A</u>	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Water Table Present?	Yes <input checked="" type="checkbox"/> No _____	Depth (inches): <u>6</u>	
Saturation Present? (includes capillary fringe)	Yes <input checked="" type="checkbox"/> No _____	Depth (inches): <u>surface</u>	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: _____ Entered by: TJD QC by: CMW

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys and Coast Region

Project/Site: Boeckman Road / Frog Pond Area City/County: - / Clackamas Sampling Date: 4/5/2017
 Applicant/Owner: Pioneer Design Group / Tim Wolfston State: OR Sampling Point: P5
 Investigator(s): C. Mirth Walker and Tom Dee Section, Township, Range: 12, T3S, R1W / Tax Lot 2400
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): none Slope (%): 3
 Subregion (LRR): A, Northwest Forests and Coast Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: 1B Aloha silt loam, 3-6% slopes NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No X (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 <u>X</u>	No _____	Is the Sampled Area within a Wetland? Yes _____ No <u>X</u>
Hydric Soil Present?	Yes <u>X</u>	No _____	
Wetland Hydrology Present?	Yes _____	No <u>X</u>	
Precipitation prior to fieldwork: <u>MTD rainfall 0.06" / March was 2.58" above normal.</u>			
Remarks: <u>NE corner of site.</u>			

VEGETATION

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status	
(Plot size: <u>30' r</u>)				Dominance Test worksheet:
1. _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A)
2. _____	_____	_____	_____	Total Number of Dominant Species Across All Strata: <u>3</u> (B)
3. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100%</u> (A/B)
4. _____	_____	_____	_____	Prevalence Index worksheet:
0% = Total Cover				Total % Cover of: _____ Multiply by: _____
Sapling/Shrub Stratum				OBL species <u>0</u> x 1 = <u>0</u>
(Plot size: <u>10' r</u>)				FACW species <u>0</u> x 2 = <u>0</u>
1. _____	_____	_____	_____	FAC species <u>90</u> x 3 = <u>270</u>
3. _____	_____	_____	_____	FACU species <u>10</u> x 4 = <u>40</u>
4. _____	_____	_____	_____	UPL species <u>0</u> x 5 = <u>0</u>
5. _____	_____	_____	_____	Column Totals: <u>100</u> (A) <u>310</u> (B)
0% = Total Cover				Prevalence Index = B/A = <u>3.10</u>
Herb Stratum				Hydrophytic Vegetation Indicators:
(Plot size: <u>5' r</u>)				1 - Rapid Test for Hydrophytic Vegetation
1. <u>Lolium perenne</u>	<u>40%</u>	<u>Yes</u>	<u>FAC</u>	<u>X</u> 2 - Dominance Test is >50%
2. <u>Alopecurus pratensis</u>	<u>25%</u>	<u>Yes</u>	<u>FAC</u>	3 - Prevalence Index is ≤3.0 ¹
3. <u>Schedonorus arundinaceus</u>	<u>25%</u>	<u>Yes</u>	<u>FAC</u>	4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet)
4. <u>Dactylis glomerata</u>	<u>10%</u>	<u>No</u>	<u>FACU</u>	5 - Wetland Non-Vascular Plants ¹
5. _____	_____	_____	_____	Problematic Hydrophytic Vegetation ¹ (Explain)
6. _____	_____	_____	_____	¹ Indicators of hydric soil and wetland hydrology must be present.
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
100% = Total Cover				
Woody Vine Stratum				Hydrophytic Vegetation Present? Yes <u>X</u> No _____
(Plot size: <u>10' r</u>)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
0% = Total Cover				
% Bare Ground in Herb Stratum <u>0%</u>				

Remarks: _____ Entered by: TJD QC by: CMW

SOIL

Sampling Point: **P5**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-3	10YR 3/2	99	10YR 4/6	1	C	PL	SIL	ORZ
3-11	10YR 4/2	98	2.5YR 4/6	2	C	M / PL	SIL	
11-18	10YR 5/1	70	10YR 4/6	30	C	M	SIL	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)		Indicators for Problematic Hydric Soils³:	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 2 cm Muck (A10)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input checked="" type="checkbox"/> Depleted Matrix (F3)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Dark Surface (F6)		³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Redox Depressions (F8)		

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes No

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay) bed to 20".

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A)	<input type="checkbox"/> Raised Ant Mounds (D6) (LRR A)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Frost-Heave Hummocks (D7)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)		
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)		

Field Observations:

Surface Water Present?	Yes _____ No <input checked="" type="checkbox"/>	Depth (inches): <u>N/A</u>	Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>
Water Table Present?	Yes _____ No <input checked="" type="checkbox"/>	Depth (inches): <u>>20</u>	
Saturation Present? (includes capillary fringe)	Yes _____ No <input checked="" type="checkbox"/>	Depth (inches): <u>>20</u>	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: _____ Entered by: TJD QC by: CMW

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys and Coast Region

Project/Site: Boeckman Road / Frog Pond Area City/County: - / Clackamas Sampling Date: 4/5/2017
 Applicant/Owner: Pioneer Design Group / Tim Wolfston State: OR Sampling Point: P6
 Investigator(s): C. Mirth Walker and Tom Dee Section, Township, Range: 12, T3S, R1W / Tax Lot 2400
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): none Slope (%): 3
 Subregion (LRR): A, Northwest Forests and Coast Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: 1B Aloha silt loam, 3-6% slopes NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No X (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 <u>X</u>	No _____	Is the Sampled Area within a Wetland? Yes _____ No <u>X</u>
Hydric Soil Present?	Yes <u>X</u>	No _____	
Wetland Hydrology Present?	Yes _____	No <u>X</u>	
Precipitation prior to fieldwork: <u>MTD rainfall 0.06" / March was 2.58" above normal.</u>			
Remarks: _____			

VEGETATION

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
(Plot size: <u>30' r</u>)				Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A)
1. _____	_____	_____	_____	Total Number of Dominant Species Across All Strata: <u>4</u> (B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC: <u>75%</u> (A/B)
4. _____	_____	_____	_____	
_____	<u>0%</u>	= Total Cover		Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>0</u> x 2 = <u>0</u> FAC species <u>80</u> x 3 = <u>240</u> FACU species <u>20</u> x 4 = <u>80</u> UPL species <u>0</u> x 5 = <u>0</u> Column Totals: <u>100</u> (A) <u>320</u> (B) Prevalence Index = B/A = <u>3.20</u>
Sapling/Shrub Stratum				
(Plot size: <u>10' r</u>)				
1. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
_____	<u>0%</u>	= Total Cover		
Herb Stratum				Hydrophytic Vegetation Indicators: 1 - Rapid Test for Hydrophytic Vegetation <u>X</u> 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.
(Plot size: <u>5' r</u>)				
1. <u>Agrostis capillaris</u>	<u>40%</u>	<u>Yes</u>	<u>FAC</u>	
2. <u>Dactylis glomerata</u>	<u>20%</u>	<u>Yes</u>	<u>FACU</u>	
3. <u>Schedonorus arundinaceus</u>	<u>20%</u>	<u>Yes</u>	<u>FAC</u>	
4. <u>Alopecurus pratensis</u>	<u>20%</u>	<u>Yes</u>	<u>FAC</u>	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
_____	<u>100%</u>	= Total Cover		
Woody Vine Stratum				
(Plot size: <u>10' r</u>)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
_____	<u>0%</u>	= Total Cover		
% Bare Ground in Herb Stratum	<u>0%</u>			

Hydrophytic Vegetation Present? Yes X No _____

Entered by: TJD QC by: CMW

SOIL

Sampling Point: **P6**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-7	10YR 4/2	90	10YR 4/6	10	C	M	SIL	
7-18	10YR 5/1	80	10YR 4/6	20	C	M	SIL	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)		Indicators for Problematic Hydric Soils³:	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 2 cm Muck (A10)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input checked="" type="checkbox"/> Depleted Matrix (F3)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Dark Surface (F6)		³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Redox Depressions (F8)		

Restrictive Layer (if present):
 Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks: S = sand; SI = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A)	<input type="checkbox"/> Raised Ant Mounds (D6) (LRR A)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Frost-Heave Hummocks (D7)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)		
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)		

Field Observations:

Surface Water Present?	Yes _____ No <input checked="" type="checkbox"/>	Depth (inches): <u>N/A</u>	Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>
Water Table Present?	Yes _____ No <input checked="" type="checkbox"/>	Depth (inches): <u>>18</u>	
Saturation Present? (includes capillary fringe)	Yes _____ No <input checked="" type="checkbox"/>	Depth (inches): <u>>18</u>	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: oist at 16". Entered by: TJD QC by: CMW

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys and Coast Region

Project/Site: Boeckman Road / Frog Pond Area City/County: - / Clackamas Sampling Date: 4/5/2017
 Applicant/Owner: Pioneer Design Group / Tim Wolfston State: OR Sampling Point: P7
 Investigator(s): C. Mirth Walker and Tom Dee Section, Township, Range: 12, T3S, R1W / Tax Lot 2400
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): none Slope (%): 1
 Subregion (LRR): A, Northwest Forests and Coast Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: 1B Aloha silt loam, 3-6% slopes NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No X (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 <u>X</u>	No _____	Is the Sampled Area within a Wetland? Yes _____ No <u>X</u>
Hydric Soil Present?	Yes <u>X</u>	No _____	
Wetland Hydrology Present?	Yes _____	No <u>X</u>	
Precipitation prior to fieldwork: <u>MTD rainfall 0.06" / March was 2.58" above normal.</u>			
Remarks: _____			

VEGETATION

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status	
(Plot size: <u>30' r</u>)				Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100%</u> (A/B)
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
	0% = Total Cover			Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>0</u> x 2 = <u>0</u> FAC species <u>100</u> x 3 = <u>300</u> FACU species <u>0</u> x 4 = <u>0</u> UPL species <u>0</u> x 5 = <u>0</u> Column Totals: <u>100</u> (A) <u>300</u> (B) Prevalence Index = B/A = <u>3.00</u>
Sapling/Shrub Stratum				
(Plot size: <u>10' r</u>)				
1. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
	0% = Total Cover			
Herb Stratum				Hydrophytic Vegetation Indicators: 1 - Rapid Test for Hydrophytic Vegetation <u>X</u> 2 - Dominance Test is >50% 3 - Prevalence Index is $\leq 3.0^1$ 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.
(Plot size: <u>5' r</u>)				
1. <u>Schedonorus arundinaceus</u>	60%	Yes	FAC	
2. <u>Poa pratensis</u>	20%	Yes	FAC	
3. <u>Agrostis capillaris</u>	20%	Yes	FAC	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
	100% = Total Cover			
Woody Vine Stratum				
(Plot size: <u>10' r</u>)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
	0% = Total Cover			
% Bare Ground in Herb Stratum	0%			

Hydrophytic Vegetation Present? Yes X No _____

Remarks: _____ Entered by: TJD QC by: CMW

SOIL

Sampling Point: P7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-12	10YR 3/2	99	5YR 4/6	1	C	PL	SIL	
12-20	10YR 5/1	90	10YR 5/6	10	C	M	SIL	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 2 cm Muck (A10)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Other (Explain in Remarks)
<input checked="" type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Dark Surface (F6)	³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Redox Depressions (F8)	

Restrictive Layer (if present):
 Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)

HYDROLOGY

Wetland Hydrology Indicators:

<u>Primary Indicators (minimum of one required; check all that apply)</u>		<u>Secondary Indicators (2 or more required)</u>
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A)	<input type="checkbox"/> Raised Ant Mounds (D6) (LRR A)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Frost-Heave Hummocks (D7)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)		
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)		

Field Observations:

Surface Water Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Depth (inches): <u>N/A</u>	Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Water Table Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Depth (inches): <u>>20</u>	
Saturation Present? (includes capillary fringe)	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Depth (inches): <u>>20</u>	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: _____ Entered by: TJD QC by: CMW

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys and Coast Region

Project/Site: Boeckman Road / Frog Pond Area City/County: - / Clackamas Sampling Date: 4/5/2017
 Applicant/Owner: Pioneer Design Group / Tim Wolfston State: OR Sampling Point: P8
 Investigator(s): C. Mirth Walker and Tom Dee Section, Township, Range: 12, T3S, R1W / Tax Lot 2400
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): concave Slope (%): 2
 Subregion (LRR): A, Northwest Forests and Coast Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: 1B Aloha silt loam, 3-6% slopes NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No X (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 <u>X</u>	Is the Sampled Area within a Wetland?	Yes _____	No <u>X</u>
Hydric Soil Present?	Yes _____	No <u>X</u>			
Wetland Hydrology Present?	Yes _____	No <u>X</u>			
Precipitation prior to fieldwork: <u>MTD rainfall 0.06" / March was 2.58" above normal.</u>					
Remarks: <u>South pasture / east of road.</u>					

VEGETATION

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
(Plot size: <u>30' r</u>)				Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A)
1. _____	_____	_____	_____	Total Number of Dominant Species Across All Strata: <u>2</u> (B)
2. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC: <u>50%</u> (A/B)
3. _____	_____	_____	_____	Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____
4. _____	_____	_____	_____	
	0% = Total Cover			FACW species <u>0</u> x 2 = <u>0</u>
Sapling/Shrub Stratum				FAC species <u>70</u> x 3 = <u>210</u>
(Plot size: <u>10' r</u>)				FACU species <u>31</u> x 4 = <u>124</u>
1. _____	_____	_____	_____	UPL species <u>0</u> x 5 = <u>0</u>
3. _____	_____	_____	_____	Column Totals: <u>101</u> (A) <u>334</u> (B)
4. _____	_____	_____	_____	Prevalence Index = B/A = <u>3.31</u>
5. _____	_____	_____	_____	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.
	0% = Total Cover			
Herb Stratum				
(Plot size: <u>5' r</u>)				
1. <u>Alopecurus pratensis</u>	70%	Yes	FAC	
2. <u>Dactylis glomerata</u>	30%	Yes	FACU	
3. <u>Taraxacum officinale</u>	1%	No	FACU	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
	101% = Total Cover			
Woody Vine Stratum				
(Plot size: <u>10' r</u>)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
	0% = Total Cover			
% Bare Ground in Herb Stratum	0%			

Remarks: _____ Entered by: TJD QC by: CMW

SOIL

Sampling Point: P8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-10	10YR 3/2	100					SIL	
10-20	10YR 3/2	85	10YR 5/1	10	D	M	SiL	
			10YR 4/6	5	C	M		

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)		Indicators for Problematic Hydric Soils³:
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 2 cm Muck (A10)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Dark Surface (F6)	³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Redox Depressions (F8)	

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A)	<input type="checkbox"/> Raised Ant Mounds (D6) (LRR A)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Frost-Heave Hummocks (D7)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)		
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)		

Field Observations:

Surface Water Present? Yes _____ No Depth (inches): N/A

Water Table Present? Yes _____ No Depth (inches): >20

Saturation Present? Yes _____ No Depth (inches): >20

(includes capillary fringe)

Wetland Hydrology Present? Yes _____ No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: _____ Entered by: TJD QC by: CMW

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys and Coast Region

Project/Site: Boeckman Road / Frog Pond Area City/County: - / Clackamas Sampling Date: 4/5/2017
 Applicant/Owner: Pioneer Design Group / Tim Wolfston State: OR Sampling Point: P9
 Investigator(s): C. Mirth Walker and Tom Dee Section, Township, Range: 12, T3S, R1W / Tax Lot 2400
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): concave Slope (%): 3
 Subregion (LRR): A, Northwest Forests and Coast Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: 1B Aloha silt loam, 3-6% slopes NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No X (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 <u>X</u>	No _____	Is the Sampled Area within a Wetland?	Yes <u>X</u>	No _____
Hydric Soil Present?	Yes <u>X</u>	No _____			
Wetland Hydrology Present?	Yes <u>X</u>	No _____			
Precipitation prior to fieldwork: <u>MTD rainfall 0.06" / March was 2.58" above normal.</u>					
Remarks: <u>In Wetland C south of P9. Left pit open from 12:45 to 1:05.</u>					

VEGETATION

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A)
(Plot size: <u>30' r</u>)				
1. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100%</u> (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____	_____	_____	_____	
0% = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____
Sapling/Shrub Stratum (Plot size: <u>10' r</u>)				
1. _____	_____	_____	_____	OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>0</u> x 2 = <u>0</u> FAC species <u>90</u> x 3 = <u>270</u> FACU species <u>10</u> x 4 = <u>40</u> UPL species <u>0</u> x 5 = <u>0</u> Column Totals: <u>100</u> (A) <u>310</u> (B) Prevalence Index = B/A = <u>3.10</u>
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
_____	_____	_____	_____	
0% = Total Cover				Hydrophytic Vegetation Indicators: 1 - Rapid Test for Hydrophytic Vegetation <u>X</u> 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.
Herb Stratum (Plot size: <u>5' r</u>)				
1. <u>Alopecurus pratensis</u>	<u>40%</u>	<u>Yes</u>	<u>FAC</u>	
2. <u>Poa pratensis</u>	<u>30%</u>	<u>Yes</u>	<u>FAC</u>	
3. <u>Schedonorus arundinaceus</u>	<u>20%</u>	<u>Yes</u>	<u>FAC</u>	
4. <u>Dactylis glomerata</u>	<u>10%</u>	<u>No</u>	<u>FACU</u>	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
100% = Total Cover				
Woody Vine Stratum (Plot size: <u>10' r</u>)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
0% = Total Cover				
% Bare Ground in Herb Stratum <u>0%</u>				

Remarks: _____ Entered by: TJD QC by: CMW

SOIL

Sampling Point: **P9**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of Indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-2	10YR 3/2	100					SIL	
2-9	10YR 4/1	95	10YR 4/6	5	C	M	SIL	
9-20	10YR 5/1	75	5YR 4/6	20	C	M / PL	SIL	
			2.5YR 3/6	5	C	M		

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)		Indicators for Problematic Hydric Soils³:
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 2 cm Muck (A10)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Dark Surface (F6)	³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Redox Depressions (F8)	

Restrictive Layer (if present):
 Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)

HYDROLOGY

Wetland Hydrology Indicators:		
<u>Primary Indicators (minimum of one required; check all that apply)</u>		<u>Secondary Indicators (2 or more required)</u>
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> Drainage Patterns (B10)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A)	<input type="checkbox"/> Raised Ant Mounds (D6) (LRR A)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Frost-Heave Hummocks (D7)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)		
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)		

Field Observations:

Surface Water Present?	Yes _____ No <input checked="" type="checkbox"/>	Depth (inches): <u>N/A</u>	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Water Table Present?	Yes <input checked="" type="checkbox"/> No _____	Depth (inches): <u>17</u>	
Saturation Present? (includes capillary fringe)	Yes <input checked="" type="checkbox"/> No _____	Depth (inches): <u>12</u>	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: _____ Entered by: TJD QC by: CMW

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys and Coast Region

Project/Site: Boeckman Road / Frog Pond Area City/County: - / Clackamas Sampling Date: 4/5/2017
 Applicant/Owner: Pioneer Design Group / Tim Wolfston State: OR Sampling Point: P10
 Investigator(s): C. Mirth Walker and Tom Dee Section, Township, Range: 12, T3S, R1W / Tax Lot 2400
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): concave Slope (%): 3
 Subregion (LRR): A, Northwest Forests and Coast Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: 1B Aloha silt loam, 3-6% slopes NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No X (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 <u>X</u>	No _____	Is the Sampled Area within a Wetland?	Yes <u>X</u>	No _____
Hydric Soil Present?	Yes <u>X</u>	No _____			
Wetland Hydrology Present?	Yes <u>X</u>	No _____			
Precipitation prior to fieldwork: <u>MTD rainfall 0.06" / March was 2.58" above normal.</u>					
Remarks: <u>Wetland C.</u>					

VEGETATION

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A)
(Plot size: <u>30' r</u>)				
1. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC: <u>67%</u> (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
0% = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____
Sapling/Shrub Stratum (Plot size: <u>10' r</u>)				
1. _____	_____	_____	_____	OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>0</u> x 2 = <u>0</u> FAC species <u>70</u> x 3 = <u>210</u> FACU species <u>30</u> x 4 = <u>120</u> UPL species <u>2</u> x 5 = <u>10</u> Column Totals: <u>102</u> (A) <u>340</u> (B) Prevalence Index = B/A = <u>3.33</u>
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
0% = Total Cover				
Herb Stratum (Plot size: <u>5' r</u>)				Hydrophytic Vegetation Indicators: 1 - Rapid Test for Hydrophytic Vegetation <u>X</u> 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.
1. <u>Schedonorus arundinaceus</u>	<u>35%</u>	<u>Yes</u>	<u>FAC</u>	
2. <u>Alopecurus pratensis</u>	<u>35%</u>	<u>Yes</u>	<u>FAC</u>	
3. <u>Dactylis glomerata</u>	<u>30%</u>	<u>Yes</u>	<u>FACU</u>	
4. <u>Triticum aestivum</u>	<u>2%</u>	<u>No</u>	<u>NOL</u>	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
102% = Total Cover				Hydrophytic Vegetation Present? Yes <u>X</u> No _____
Woody Vine Stratum (Plot size: <u>10' r</u>)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
0% = Total Cover				
% Bare Ground in Herb Stratum <u>0%</u>				

Remarks: _____ Entered by: TJD QC by: CMW

SOIL

Sampling Point: **P10**

Profile Description: (Describe to the depth needed to document the Indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features			Loc ²	Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹			
0-9	10YR 3/2	100					SIL	
9-20	10YR 5/1	80	7.5YR 5/6	20	C	M	SIL	Mn Concretion

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)		Indicators for Problematic Hydric Soils³:	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 2 cm Muck (A10)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input checked="" type="checkbox"/> Depleted Matrix (F3)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Dark Surface (F6)		³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Redox Depressions (F8)		

Restrictive Layer (if present):
 Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (2 or more required)
<input checked="" type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> Drainage Patterns (B10)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A)	<input type="checkbox"/> Raised Ant Mounds (D6) (LRR A)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Frost-Heave Hummocks (D7)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)		
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)		

Field Observations:

Surface Water Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Depth (inches): 0.5	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Water Table Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Depth (inches): 15	
Saturation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (includes capillary fringe)	Depth (inches): 12	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: source - pipe discharge offsite to east and high groundwater table. Entered by: TJD QC by: CMW

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys and Coast Region

Project/Site: Boeckman Road / Frog Pond Area City/County: - / Clackamas Sampling Date: 4/5/2017
 Applicant/Owner: Pioneer Design Group / Tim Wolfston State: OR Sampling Point: P11
 Investigator(s): C. Mirth Walker and Tom Dee Section, Township, Range: 12, T3S, R1W / Tax Lot 2400
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): concave Slope (%): 3
 Subregion (LRR): A, Northwest Forests and Coast Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: 1B Aloha silt loam, 3-6% slopes NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No X (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 <u>X</u>	No _____	Is the Sampled Area within a Wetland? Yes _____ No <u>X</u>
Hydric Soil Present?	Yes <u>X</u>	No _____	
Wetland Hydrology Present?	Yes _____	No <u>X</u>	
Precipitation prior to fieldwork: <u>MTD rainfall 0.06" / March was 2.58" above normal.</u>			
Remarks: <u>Grazed horse pasture west of driveway / north of southern culvert.</u>			

VEGETATION

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status	
(Plot size: <u>30' r</u>)				Dominance Test worksheet:
1. _____	_____	_____	_____	Number of Dominant Species
2. _____	_____	_____	_____	That Are OBL, FACW, or FAC: <u>2</u> (A)
3. _____	_____	_____	_____	Total Number of Dominant
4. _____	_____	_____	_____	Species Across All Strata: <u>2</u> (B)
	0% = Total Cover			Percent of Dominant Species
Sapling/Shrub Stratum				That Are OBL, FACW, or FAC: <u>100%</u> (A/B)
(Plot size: <u>10' r</u>)				Prevalence Index worksheet:
1. _____	_____	_____	_____	Total % Cover of: <u> </u> Multiply by: _____
3. _____	_____	_____	_____	OBL species <u>0</u> x 1 = <u>0</u>
4. _____	_____	_____	_____	FACW species <u>0</u> x 2 = <u>0</u>
5. _____	_____	_____	_____	FAC species <u>66</u> x 3 = <u>198</u>
	0% = Total Cover			FACU species <u>4</u> x 4 = <u>16</u>
Herb Stratum				UPL species <u>0</u> x 5 = <u>0</u>
(Plot size: <u>5' r</u>)				Column Totals: <u>70</u> (A) <u>214</u> (B)
1. <u>Poa annua</u>	<u>40%</u>	<u>Yes</u>	<u>FAC</u>	Prevalence Index = B/A = <u>3.06</u>
2. <u>Trifolium repens</u>	<u>20%</u>	<u>Yes</u>	<u>FAC</u>	Hydrophytic Vegetation Indicators:
3. <u>Ranunculus species</u>	<u>5%</u>	<u>No</u>	<u>OBL to UPL</u>	<u>1</u> - Rapid Test for Hydrophytic Vegetation
4. <u>Rumex crispus</u>	<u>5%</u>	<u>No</u>	<u>FAC</u>	<u>X</u> <u>2</u> - Dominance Test is >50%
5. <u>Dactylis glomerata</u>	<u>2%</u>	<u>No</u>	<u>FACU</u>	<u>3</u> - Prevalence Index is ≤3.0 ¹
6. <u>Taraxacum officinale</u>	<u>1%</u>	<u>No</u>	<u>FACU</u>	<u>4</u> - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet)
7. <u>Capsella bursa-pastoris</u>	<u>1%</u>	<u>No</u>	<u>FACU</u>	<u>5</u> - Wetland Non-Vascular Plants ¹
8. <u>Plantago major</u>	<u>1%</u>	<u>No</u>	<u>FAC</u>	<u> </u> Problematic Hydrophytic Vegetation ¹ (Explain)
9. _____	_____	_____	_____	¹ Indicators of hydric soil and wetland hydrology must be present.
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
	75% = Total Cover			
Woody Vine Stratum				Hydrophytic Vegetation Present? Yes <u>X</u> No _____
(Plot size: <u>10' r</u>)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
	0% = Total Cover			
% Bare Ground in Herb Stratum	<u>25%</u>			

Remarks: _____ Entered by: TJD QC by: CMW

SOIL

Sampling Point: P11

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-9	10YR 2/2	99	10YR 5/6	1	C	M	SiL	
9-18	10YR 5/1	95	7.5YR 5/8	5	C	M	SiL	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)		Indicators for Problematic Hydric Soils³:
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 2 cm Muck (A10)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Redox Depressions (F8)	

Restrictive Layer (if present):
 Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)

HYDROLOGY

Wetland Hydrology Indicators:	
Primary Indicators (minimum of one required: check all that apply)	Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Salt Crust (B11)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Aquatic Invertebrates (B13)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Drainage Patterns (B10)
	<input type="checkbox"/> Dry-Season Water Table (C2)
	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
	<input type="checkbox"/> Geomorphic Position (D2)
	<input type="checkbox"/> Shallow Aquitard (D3)
	<input type="checkbox"/> FAC-Neutral Test (D5)
	<input type="checkbox"/> Raised Ant Mounds (D6) (LRR A)
	<input type="checkbox"/> Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes _____ No <input checked="" type="checkbox"/>	Depth (inches): <u>N/A</u>	Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>
Water Table Present?	Yes _____ No <input checked="" type="checkbox"/>	Depth (inches): <u>>18</u>	
Saturation Present? (includes capillary fringe)	Yes _____ No <input checked="" type="checkbox"/>	Depth (inches): <u>>18</u>	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: _____ Entered by: TJD QC by: CMW

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys and Coast Region

Project/Site: Boeckman Road / Frog Pond Area City/County: - / Clackamas Sampling Date: 4/5/2017
 Applicant/Owner: Pioneer Design Group / Tim Wolfston State: OR Sampling Point: P12
 Investigator(s): C. Mirth Walker and Tom Dee Section, Township, Range: 12, T3S, R1W / Tax Lot 2600
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): none Slope (%): 2
 Subregion (LRR): A, Northwest Forests and Coast Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: 1B Aloha silt loam, 3-6% slopes NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No X (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 <u>X</u>	No _____	Is the Sampled Area within a Wetland? Yes _____ No <u>X</u>
Hydric Soil Present?	Yes _____	No <u>X</u>	
Wetland Hydrology Present?	Yes <u>X</u>	No _____	
Precipitation prior to fieldwork: <u>MTD rainfall 0.06" / March was 2.58" above normal.</u>			
Remarks: <u>West of horse pasture in disturbed area east of driveway.</u>			

VEGETATION

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
(Plot size: <u>30' r</u>)				Number of Dominant Species
1. _____	_____	_____	_____	That Are OBL, FACW, or FAC: <u>2</u> (A)
2. _____	_____	_____	_____	Total Number of Dominant Species Across All Strata: <u>2</u> (B)
3. _____	_____	_____	_____	Percent of Dominant Species
4. _____	_____	_____	_____	That Are OBL, FACW, or FAC: <u>100%</u> (A/B)
	0% = Total Cover			Prevalence Index worksheet:
Sapling/Shrub Stratum (Plot size: <u>10' r</u>)				Total % Cover of: _____ Multiply by: _____
1. <u>Rubus armeniacus</u>	<u>5%</u>	<u>Yes</u>	<u>FAC</u>	OBL species <u>0</u> x 1 = <u>0</u>
3. _____	_____	_____	_____	FACW species <u>0</u> x 2 = <u>0</u>
4. _____	_____	_____	_____	FAC species <u>25</u> x 3 = <u>75</u>
5. _____	_____	_____	_____	FACU species <u>0</u> x 4 = <u>0</u>
	5% = Total Cover			UPL species <u>0</u> x 5 = <u>0</u>
Herb Stratum (Plot size: <u>5' r</u>)				Column Totals: <u>25</u> (A) <u>75</u> (B)
1. <u>Lolium perenne</u>	<u>20%</u>	<u>Yes</u>	<u>FAC</u>	Prevalence Index = B/A = <u>3.00</u>
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
	20% = Total Cover			
Woody Vine Stratum (Plot size: <u>10' r</u>)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
	0% = Total Cover			
% Bare Ground in Herb Stratum <u>80%</u>				

Hydrophytic Vegetation Indicators:

1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
3 - Prevalence Index is ≤3.0¹
4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
5 - Wetland Non-Vascular Plants¹
Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes X No _____

Remarks: _____ Entered by: TJD QC by: CMW

SOIL

Sampling Point: P12

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-9	10YR 3/3	100					SiL	
9-16	10YR 3/2	100					SiL	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)		Indicators for Problematic Hydric Soils³:
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 2 cm Muck (A10)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Dark Surface (F6)	³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Redox Depressions (F8)	

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
<input checked="" type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> Drainage Patterns (B10)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A)	<input type="checkbox"/> Raised Ant Mounds (D6) (LRR A)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Frost-Heave Hummocks (D7)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)		
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)		

Field Observations:

Surface Water Present? Yes _____ No Depth (inches): N/A

Water Table Present? Yes No _____ Depth (inches): 11

Saturation Present? Yes No _____ Depth (inches): 8

(includes capillary fringe)

Wetland Hydrology Present? Yes No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Hydrology present due to above normal rainfall and disturbance from driving through swale.

Entered by: TJD QC by: CMW

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys and Coast Region

Project/Site: Boeckman Road / Frog Pond Area City/County: - / Clackamas Sampling Date: 4/18/2017
 Applicant/Owner: Pioneer Design Group / Tim Wolfston State: OR Sampling Point: P13
 Investigator(s): C. Mirth Walker Section, Township, Range: 12, T3S, R1W / Tax Lot 2700
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): none Slope (%): 1
 Subregion (LRR): A, Northwest Forests and Coast Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: 91C, Woodburn silt loam, 8-15% slopes 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 <u>X</u>	No _____	Is the Sampled Area within a Wetland? Yes _____ No <u>X</u>
Hydric Soil Present?	Yes _____	No <u>X</u>	
Wetland Hydrology Present?	Yes _____	No <u>X</u>	
Precipitation prior to fieldwork: <u>MTD rainfall 2.00", 0.37" above normal Portland</u>			
Remarks: <u>NE corner of site.</u>			

VEGETATION

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status	
(Plot size: <u>30' r</u>)				Dominance Test worksheet:
1. _____	_____	_____	_____	Number of Dominant Species
2. _____	_____	_____	_____	That Are OBL, FACW, or FAC: <u>2</u> (A)
3. _____	_____	_____	_____	Total Number of Dominant
4. _____	_____	_____	_____	Species Across All Strata: <u>2</u> (B)
	<u>0%</u>	= Total Cover		Percent of Dominant Species
Sapling/Shrub Stratum				That Are OBL, FACW, or FAC: <u>100%</u> (A/B)
(Plot size: <u>10' r</u>)				Prevalence Index worksheet:
1. <u>Rubus armeniacus</u>	<u>3%</u>	<u>No</u>	<u>FAC</u>	Total % Cover of: _____ Multiply by: _____
3. _____	_____	_____	_____	OBL species <u>0</u> x 1 = <u>0</u>
4. _____	_____	_____	_____	FACW species <u>10</u> x 2 = <u>20</u>
5. _____	_____	_____	_____	FAC species <u>78</u> x 3 = <u>234</u>
	<u>3%</u>	= Total Cover		FACU species <u>5</u> x 4 = <u>20</u>
Herb Stratum				UPL species <u>5</u> x 5 = <u>25</u>
(Plot size: <u>5' r</u>)				Column Totals: <u>98</u> (A) <u>299</u> (B)
1. <u>Holcus lanatus</u>	<u>30%</u>	<u>Yes</u>	<u>FAC</u>	Prevalence Index = B/A = <u>3.05</u>
2. <u>Lolium perenne</u>	<u>30%</u>	<u>Yes</u>	<u>FAC</u>	
3. <u>Epilobium ciliatum</u>	<u>10%</u>	<u>No</u>	<u>FACW</u>	
4. <u>Rumex crispus</u>	<u>5%</u>	<u>No</u>	<u>FAC</u>	
5. <u>Cardamine hirsuta</u>	<u>5%</u>	<u>No</u>	<u>FACU</u>	
6. <u>Ranunculus repens</u>	<u>5%</u>	<u>No</u>	<u>FAC</u>	
7. <u>Poa pratensis</u>	<u>5%</u>	<u>No</u>	<u>FAC</u>	
8. <u>Geranium molle</u>	<u>5%</u>	<u>No</u>	<u>NOL</u>	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
	<u>95%</u>	= Total Cover		
Woody Vine Stratum				
(Plot size: <u>10' r</u>)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
	<u>0%</u>	= Total Cover		
% Bare Ground in Herb Stratum	<u>5%</u>			

Hydrophytic Vegetation Indicators:
 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
 3 - Prevalence Index is ≤3.0¹
 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 5 - Wetland Non-Vascular Plants¹
 Problematic Hydrophytic Vegetation¹ (Explain)
¹Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes X No _____

Remarks: _____ Entered by: cmw QC by: _____

SOIL

Sampling Point: P13

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-10	10YR 3/2	100					Sil	
10-21	10YR 4/3	95	10YR 4/6	5	C	M	Sil	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)		Indicators for Problematic Hydric Soils³:
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 2 cm Muck (A10)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Dark Surface (F6)	³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Redox Depressions (F8)	

Restrictive Layer (if present): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/>
--	--

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay) observed below 15".

HYDROLOGY

Wetland Hydrology Indicators:	
Primary Indicators (minimum of one required; check all that apply)	Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Salt Crust (B11)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Aquatic Invertebrates (B13)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Drainage Patterns (B10)
	<input type="checkbox"/> Dry-Season Water Table (C2)
	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
	<input type="checkbox"/> Geomorphic Position (D2)
	<input type="checkbox"/> Shallow Aquitard (D3)
	<input type="checkbox"/> FAC-Neutral Test (D5)
	<input type="checkbox"/> Raised Ant Mounds (D6) (LRR A)
	<input type="checkbox"/> Frost-Heave Hummocks (D7)

Field Observations:	Wetland Hydrology Present?
Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): N/A	Yes _____ No <input checked="" type="checkbox"/>
Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): >21	
Saturation Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): 0-3 (includes capillary fringe)	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Entered by: cmw QC by: _____

APPENDIX E

Ground-level Site Photographs

This page intentionally left blank.



Photo A. View south of Boeckman Creek towards Boeckman Road. Photo date March 24, 2017.



Photo B. Upland Plot 2. Photo date March 24, 2017.



Photo C. View west of Boeckman Creek. Photo date March 24, 2017.



Photo D. View south of concrete drain structure. Photo date March 24, 2017.



Photo E. Close up of concrete drain structure. Photo date March 24, 2017.



Photo F. Upland Plot 3. Photo date March 24, 2017.



Photo G. Wetland A boundary. Photo date March 24, 2017.



Photo H. Tributary 1. Photo date March 24, 2017.



Photo I. View east of Wetland B and Tributary 2. Photo date March 24, 2017.



Photo J. Tributary 2. Photo date March 24, 2017.



Photo K. View east of Wetland C. Photo date April 5, 2017.



Photo L. View west of Wetland C. Photo date April 5, 2017.



Photo M. Plot 9 in Wetland C. Photo date April 5, 2017.



Photo N. View west of Swale C. Photo date March 24, 2017.



Photo O. View west of Swale C as it becomes Tributary 1 in the ravine. Photo date April 5, 2017.



Photo P. Plot 5 in northeast corner of the site. Photo date April 5, 2017.



Photo Q. View west of riparian corridor on Tributary 2. Photo date April 5, 2017.



Photo R. Boeckman Creek riparian corridor. Photo date April 18, 2017.



Photo S. Boeckman Creek riparian corridor. Photo date April 18, 2017.



Photo T. Trail into Boeckman Creek riparian corridor. Photo date April 18, 2017.



Photo U. View west of Boeckman Creek riparian corridor. Photo date April 18, 2017.



Photo V. View northwest of Boeckman Creek riparian corridor. Photo date April 18, 2017.



Photo W. View south of Boeckman Creek and concrete drain structure. Photo date April 18, 2017.



Photo X. Example of cross-fencing. Photo date April 5, 2017.



Photo Y. Cross-fencing and barns. Photo date April 5, 2017.



Photo Z. Site entrance. Photo date April 5, 2017.

APPENDIX F
Vegetation List

This page intentionally left blank.

**Boeckman Creek/Road Frog Pond Area
Vegetation List
March 24, April 5, and April 18, 2017**

Common Name	Scientific Name	Wetland Indicator Status	Native and Invasive, Noxious
vine maple	<i>Acer circinatum</i>	FAC	native
big-leaf maple	<i>Acer macrophyllum</i>	FACU	native
colonial bent	<i>Agrostis capillaris</i>	FAC	non-native
red alder	<i>Alnus rubra</i>	FAC	native
field meadow-foxtail	<i>Alopecurus pratensis</i>	FAC	non-native
Italian lords and ladies	<i>Arum italicum</i>	NOL	non-native
western lady fern	<i>Athyrium cyclosorum</i>	FAC	native
shepherd's-purse	<i>Capsella bursa-pastoris</i>	FACU	non-native
Henderson's sedge	<i>Carex hendersonii</i>	FAC	native
beaked hazelnut	<i>Corylus cornuta</i>	FACU	native
orchard grass	<i>Dactylis glomerata</i>	FACU	non-native
western wahoo	<i>Euonymus occidentalis</i>	FAC	native
cascara false buckthorn	<i>Frangula purshiana</i>	FAC	native
Oregon ash	<i>Fraxinus latifolia</i>	FACW	native
sticky-willy	<i>Galium aparine</i>	FACU	native
salal	<i>Gaultheria shallon</i>	FACU	native
mannagrass	<i>Glyceria species</i>	OBL/FACW	native
English ivy	<i>Hedera helix</i>	FACU	invasive, noxious
common velvet grass	<i>Holcus lanatus</i>	FAC	non-native
Pacific waterleaf	<i>Hydrophyllum tenuipes</i>	FAC	native
English holly	<i>Ilex aquifolium</i>	FACU	non-native
spotted touch-me-not	<i>Impatiens capensis</i>	FACW	non-native
pale-yellow iris (yellow flag iris)	<i>Iris pseudacorus</i>	OBL	noxious
perennial rye grass	<i>Lolium perenne</i>	FAC	non-native
yellow-skunk-cabbage	<i>Lysichiton americanus</i>	OBL	native
dull Oregon grape, Cascade Oregon-grape	<i>Mahonia nervosa</i>	FACU	native
oso-berry	<i>Oemleria cerasiformis</i>	FACU	native
reed canary grass	<i>Phalaris arundinacea</i>	FACW	invasive
great plantain	<i>Plantago major</i>	FAC	non-native
annual blue grass	<i>Poa annua</i>	FAC	non-native
Kentucky blue grass	<i>Poa pratensis</i>	FAC	non-native
western or pineland sword fern	<i>Polystichum munitum</i>	FACU	native
balsam poplar (black cottonwood)	<i>Populus balsamifera</i>	FAC	native
sweet cherry	<i>Prunus avium</i>	FACU	non-native
English laurel	<i>Prunus laurocerasus</i>	NOL	non-native
Douglas-fir	<i>Pseudotsuga menziesii</i>	FACU	native
Oregon white oak	<i>Quercus garryana</i>	FACU	native
buttercup	<i>Ranunculus species</i>	OBL to UPL	-
coastal black gooseberry	<i>Ribes divaricatum</i>	FAC	native
Himalayan blackberry	<i>Rubus armeniacus</i>	FAC	invasive, noxious
salmon raspberry	<i>Rubus spectabilis</i>	FAC	native
curly dock	<i>Rumex crispus</i>	FAC	non-native
red elder	<i>Sambucus racemosa</i>	FACU	native
tall fescue	<i>Schedonorus arundinaceus</i>	FAC	non-native
climbing nightshade	<i>Solanum dulcamara</i>	FAC	invasive
coastal hedge-nettle	<i>Stachys chamissonis</i>	FACW	native
common dandelion	<i>Taraxacum officinale</i>	FACU	non-native
fragrant fringecup	<i>Tellima grandiflora</i>	FACU	native
western arborvitae (western red cedar)	<i>Thuja plicata</i>	FAC	native

Common Name	Scientific Name	Wetland Indicator Status	Native and Invasive, Noxious
piggyback-plant	<i>Tolmiea menziesii</i>	FAC	native
white clover	<i>Trifolium repens</i>	FAC	non-native
western trillium	<i>Trillium ovatum</i>	FACU	native
cultivated wheat	<i>Triticum aestivum</i>	NOL	non-native
stinging nettle	<i>Urtica dioica</i>	FAC	-
white insideout flower	<i>Vancouveria hexandra</i>	NOL	native
American false hellebore	<i>Veratrum viride</i>	FAC	native

Wetland Indicator Status and taxonomy for the Western Mountains, Valleys, and Coast Region per the National Wetland Plant List 2016 v3.3. Accessed May 3, 2016. <http://rsgisias.crrel.usace.army.mil/NWPL/>

Native per Hitchcock & Cronquist 1973 and <http://plants.usda.gov/>
 Invasive per Clean Water Services 2008: <http://cleanwaterservices.org/permits-development/design-construction-standards/>
 Noxious per ODA 2017: <http://www.oregon.gov/ODA/PLANT/WEEDS/lists.shtml>

WETLAND INDICATOR STATUS (WIS)	
OBL	Obligate Wetland Plant - Almost always occurs in wetlands (hydrophyte), rarely in uplands
FACW	Facultative Wetland Plant - Usually occur in wetlands (hydrophyte), but may occur found in non-wetlands
FAC	Facultative Plant - Occurs in wetlands (hydrophyte) and uplands (nonhydrophyte)
FACU	Facultative Upland Plant - Usually occur in non-wetlands (non-hydrophyte), but may occur in wetlands
UPL	Upland Plant - Almost always occurs in uplands (non-hydrophyte), almost never occurs in wetlands. UPL plants have a WIS in other regions
NOL	Not Listed - Plants that are not on the National Wetland Plant List are assumed to be UPL and have no WIS in any region

APPENDIX G

Literature Cited and References Used

This page intentionally left blank.

- Adamus, P.R. 2001. *Guidebook for Hydrogeomorphic (HGM)–based Assessment of Oregon Wetland and Riparian Sites: Statewide Classification and Profiles*. Salem, Oregon: Oregon Department of State Lands. Available at:
http://www.oregon.gov/DSL/WETLAND/docs/hydro_guide_class.pdf.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. FWS/OBS-79/31. Washington, D.C.: U.S. Fish and Wildlife Service. Available at:
<http://www.fws.gov/wetlands/documents/classification-of-wetlands-and-deepwater-habitats-of-the-united-states.pdf>.
- Environmental Laboratory. 1987. *Corps of Engineers Wetlands Delineation Manual*. Technical Report Y-87-1. Online edition. Vicksburg, Mississippi: U.S. Army Engineer Waterways Experiment Station. Available at:
<http://el.erdc.usace.army.mil/wetlands/pdfs/wlman87.pdf>.
- Environmental Protection Agency. 2017. Surf your Watershed website. Available at:
<https://cfpub.epa.gov/surf/state.cfm?statepostal=OR>. Accessed April 13, 2017.
- Fishman Environmental Services. 1999. Wilsonville Local Wetlands and Riparian Corridor Inventory. Available at: <http://www.oregon.gov/dsl/WW/Pages/Inventories.aspx>. Accessed April 12, 2017.
- Federal Emergency Management Agency. 2017. Flood Insurance Rate Map for Community Panel 41005C0234D, effective June 17, 2008. Available at:
<https://msc.fema.gov/portal/search?AddressQuery=7331%20SW%20Boeckman%20Road%2C%20wilsonville%2C%20or#searchresultsanchor>. Accessed July 24, 2017.
- Google Earth. 2017. Aerial photographs in the vicinity of 7331 Boeckman Road, Wilsonville, Oregon. Available at: <http://earth.google.com>. Accessed April 14, 2017.
- Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016. *The National Wetland Plant List: 2016 wetland ratings*. Phytoneuron 2016-30:1–17. ISSN 2153 733X. Available at:
<http://www.phytoneuron.net/> and <http://rsgisias.crrel.usace.army.mil/NWPL/>. Accessed May 3, 2016.
- National Weather Service (NWS). 2017. Portland, OR for Aurora data. Available at:
<http://w2.weather.gov/climate/index.php?wfo=pqr>. Accessed April 13, 2017.
- Natural Resources Conservation Service (NRCS). 2006. Hydric Soils List – All Components (OR): Clackamas County Area, Oregon. Survey Version 4 dated December 22, 2006. Accessed January 2012.
- . 2017. Online soil survey. Soil Survey Version 14, September 16, 2016. Available at:
<http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>. Accessed April 13, 2017.

Oregon Department of State Lands (DSL). 2017a. Administrative rules for wetland delineation report requirements and for jurisdictional determinations for the purposed of regulating fill and removal within waters of the state. Available at:
http://arcweb.sos.state.or.us/pages/rules/oars_100/oar_141/141_090.html.

———. 2017b. Essential Salmonid Habitat (ESH) map. Available at:
<http://geo.maps.arcgis.com/home/item.html?id=13f692f3add34d5ab9d50345c11f1661>.
Accessed April 13, 2017.

Oregon Map. 2017. Tax Lot Map 3 1W 12D. Available at: <http://www.ormap.net/>. Accessed April 13, 2017.

U.S. Army Corps of Engineers (USACE). 2005. *Regulatory Guidance Letter No. 05-05*, D.T. Riley. Available at:
http://www.usace.army.mil/Portals/2/docs/civilworks/regulatory/cwa_guide/app_h_rgl05-05.pdf.

———. 2010. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)*, ed. J.S. Wakeley, R.W. Lichvar, and C.V. Noble. ERDC/EL TR-10-3. Vicksburg, Mississippi: U.S. Army Engineer Research and Development Center.

U.S. Department of Agriculture (USDA). 2016. Agricultural Applied Climate Information System (AgCIS). Available at: <http://agacis.rcc-acis.org/>. Accessed December 19, 2016.

U.S. Fish and Wildlife Service. 2017. National Wetlands Inventory Mapper. Available at:
<https://www.fws.gov/wetlands/data/mapper.html>. Accessed April 13, 2017.

U.S. Geological Survey. 2017. Sherwood, Oregon. 7.5-minute topographic quadrangle. 1:24,000. Reston, Virginia: U.S. Geological Survey.

X-Rite. 2009. *Munsell Soil-Color Charts*. Revised 2009; produced 2012. Grand Rapids, Michigan: X-Rite.

APPENDIX H

Local Wetland Inventory Data Sheets

This page intentionally left blank.

CITY OF WILSONVILLE LOCAL WETLANDS INVENTORY

WETLAND SUMMARY SHEET

WETLAND: Boeckman Creek, north 3	Site Number: 1.03 UNIT: BC
Drainage Basin: Boeckman Creek	'91 B&W Aerial #: 6-10, 6-12
Acreage: 0.40	Field Date(s): 4/22/92, 7/25/93, 8/26/97
Location: Boeckman Creek, North of Boeckman Road	
Tax Lots / County: 12D-2700,2800,2801 / Clackamas County	Zoning: RA-1
T3S R1W Quarter Section: 12 SW	Delineation: none

General Description: Continuation of unit 1.02. Maple forest with reed canarygrass and some western red cedar. Area immediately north of culvert has large rock (rip rap) - denning location for mammals. Note: this area has been modified by flood structure: culvert has been replaced by a big catch basin; some rocks still present. This area could be nicely enhanced - pond, plantings, etc. Nice habitat, some trails. Upland Forest east and west. Culvert at Boeckman Road barrier to fish, no corridor exists to south for wildlife. Potential red legged frog noted in 1997. Connected to unit 2.01. 1999 nearby resident noted dead deer in area of water control structure, has observed fish north of Boeckman Road, probably resident cutthroat trout.

NWI Classification: 100% PFOC

Mapped Soils; On-site Soils: 92F Xerochrepts & Haploxerolls, very steep; 10YR 4/1 silty clay loam.

Hydrologic Source and Description: Perennial stream. West of Boeckman Creek, inundated 1 inch. Flat floodplain with 10 feet wide channel, 1 to 3 feet deep, clear. Approximately 20% slope on right bank.

Dominant Vegetation: (* = major dominant)

Trees

*bigleaf maple
*Oregon ash
western red cedar

Shrubs

bigleaf maple

Herbs/Emergents

*reed canarygrass
*giant horsetail
*lady fern
stinging nettle
creeping buttercup
rice cutgrass
mannagrass species

Boundary Information: Upland dominated by Oregon ash, bigleaf maple, and piggy-back plant. Steep topographic break to east and west, soils break.

Wetland Functions: Provides diverse wildlife habitat and has intact fish habitat, water quality functions, and hydrologic control functions. Has potential to provide educational and recreational opportunities.

Significance: LSW (Locally Significant Wetland)

WL

(#10)

WETLAND DETERMINATION DATA SHEET

Date 7/25/93 Transect No. Plot No. 1.03

Project: 0336 Wilsonville County: Clackamas 12 SW State: OR
Applicant: Area: Just north of Boeckman Road South of other plot
Vegetation, Soils, or Hydrology Disturbed? Yes X No (if yes describe on back) some rock placed
Normal Environmental Conditions? Yes X No (include weather conditions)

VEGETATION
Community Description: Maple Forest w/ Reed canopy grass PFO/PEM
Dominant Plant Species, Percent Cover, & Indicator Status:
Herbs Phalaris arundinacea 60% FACW Shrubs/Saplings
Equisetum prob. telmateia 20% FACW
Glucaria sp. 10% FACU (OBL)
(Attagrum filix-femina 5% FAC)
Trees Acer macrophyllum 30% FACU

Remarks: Some W. Red Cedar
Percent of Dominant Species OBL, FACW, and/or FAC (excluding FAC-): 2/3 = 67 %
OBL, FACW dominants outnumber FACU, NOL dominants? Y N na
Hydrophytic Vegetation Present: 1987 Yes No 1989 Yes No

SOILS

Series/Taxonomy (Subgroup): 92F Xerochrepts + Haploxerolls
Drainage Class: Perm: Control Depth: Field observations confirm mapped type? Y N
Histosol Reducing Conditions High Organic Content In Surface Layer
Histic Eplpedon Gleyed Colors Organic Streaking
Sulfidic Odor Low Chroma Colors On Hydric Soils List
Probable Aquic Moisture Regime Concretions Other (explain)

Table with columns: Depth (in), Horizon, Matrix Color, Mottle Color, Mottle Abundance/Contrast, Texture, Concretions, Rhizopheres, etc.
Handwritten entries: 10YR 3/3, 7.5YR 4/4, syclm

Remarks:
Hydric Soils Present: 1987 Yes No 1989 Yes No

HYDROLOGY

Depth of Surface Water: 0-1" (in) X Inundated west of creek
Depth to Free Water in Pit: (in) X Saturated in upper 12 in.
Depth to Saturated Soil: 0 (in) Water marks
Depth to Seepage: (in) Drift lines
Sediment deposits
Drainage patterns in wetlands
Oxidized root channels in upper 12 in.
Water-stained leaves
Local soil survey data
Other (explain); aerial photo or other data?

Remarks:
Wetland Hydrology Present: 1987 Yes No 1989 Yes No
steep topo break

WETLAND DETERMINATION:

Is this Sampling Point within a Wetland? 1987 YES NO 1989 YES NO
Remarks: Veg, topo
Determined by: cmw
RZA AGRA, Inc. revised 4/93 Page 6

Arborist Report



**Morgan Farms – Wilsonville, Oregon
Tree Maintenance and Protection Plan
February 13, 2018
Revised: March 22, 2018**

MHA16110

Purpose

This Tree Maintenance and Protection Plan for the Morgan Farms subdivision project located in Wilsonville, Oregon, is provided pursuant to City of Wilsonville Development Code, Section 4.610.40. This arborist report describes the existing trees located on and directly adjacent to the project site, as well as recommendations for tree removal, retention, mitigation, and protection. This report is based on observations made by International Society of Arboriculture (ISA) Board Certified Master Arborist (PN-6145B) and Qualified Tree Risk Assessor Morgan Holen during a site visit conducted on June 6, 2017, and subsequent coordination with Pioneer Design Group. **This report was revised on March 22, 2018 in response to the City's incompleteness letter and to provide additional discussion pertaining to the tree protection plan; changes are identified in bold underlined type.**

Scope of Work and Limitations

Morgan Holen & Associates, LLC, was contracted by the property owner, Jim Wolfston, to visually assess existing trees measuring six inches in diameter and larger in terms of general condition and suitability for preservation with development, and to develop a tree maintenance and protection plan for the project. A tree survey was provided by Pioneer Design Group illustrating the location of existing individual trees and their survey point numbers.

Visual Tree Assessment¹ was performed on existing individual trees located on and directly adjacent to the project site, except for trees located within the boundaries of the Significant Resource Overlay Zone (SROZ); however, trees located within the SROZ impact area boundary were evaluated. Individual trees were evaluated in terms of species, size, general condition, and potential construction impacts. Following the inventory fieldwork, we coordinated with Pioneer Design Group to review tree protection alternatives based on several site plan iterations, discuss and finalize treatment recommendations based on the proposed site plan, and provide specifications and notes for the Tree Removal and Protection Plan drawing.

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 Morgan Farms subdivision project is generally located at 7331 SW Boeckman Road in Wilsonville, Oregon. The existing site includes two single family residential homes and an equestrian center. The project proposes to demolish the existing infrastructure to develop the site into an 82-lot subdivision with new streets, open space tracts, and trails. The existing trees are scattered across the site, but located primarily along property boundaries and around the two existing homes. The western portion of the site is mapped as SROZ and will be preserved as open space.

¹ Visual Tree Assessment (VTA): The standard process of visual tree inspection whereby the inspector visually assesses the tree from a distance and up close, looking for defect symptoms and evaluating overall condition and vitality.

In all, 86 trees located beyond the SROZ boundary were inventoried, including 26 different tree species. Of the 86 trees, 69 (80%) are located on-site including five trees within the SROZ impact area, eight (9%) are located within the public right of way along SW Boeckman Road, and nine (11%) are located immediately off-site or on the northern property boundary under joint ownership. Table 1 provides a summary of the count of trees by species. A complete description of individual trees is provided in the enclosed tree data.

Table 1. Count of Inventoried Trees by Species – Morgan Farms, Wilsonville, OR.

Common Name	Species Name	Total	%*
ash	<i>Fraxinus</i> spp.	2	2%
bigleaf maple	<i>Acer macrophyllum</i>	2	2%
black cottonwood	<i>Populus trichocarpa</i>	3	3%
black hawthorn	<i>Crataegus douglasii</i>	1	1%
black locust	<i>Robinia pseudoacacia</i>	1	1%
blue spruce	<i>Picea pungens</i>	1	1%
cherry	<i>Prunus</i> spp.	1	1%
curly willow	<i>Salix matsudana</i>	1	1%
deciduous	unknown	5	6%
deodar cedar	<i>Cedrus deodara</i>	1	1%
Douglas-fir	<i>Pseudotsuga menziesii</i>	6	7%
English hawthorn	<i>Crataegus monogyna</i>	1	1%
fruit	unknown	5	6%
giant sequoia	<i>Sequoiadendron giganteum</i>	7	8%
Leyland cypress	<i>Cupressus × leylandii</i>	5	6%
mimosa	<i>Albizia julibrissin</i>	1	1%
Oregon white oak	<i>Quercus garryana</i>	19	22%
pine	<i>Pinus</i> spp.	5	6%
plum	<i>Prunus</i> spp.	1	1%
Port-Orford-cedar	<i>Chamaecyparis lawsoniana</i>	3	3%
quaking aspen	<i>Populus tremuloides</i>	1	1%
red maple	<i>Acer rubrum</i>	1	1%
scots pine	<i>Pinus sylvestris</i>	5	6%
serviceberry	<i>Amelanchier alnifolia</i>	2	2%
spruce	<i>Picea</i> spp.	2	2%
western redcedar	<i>Thuja plicata</i>	4	5%
Total		86	100%

*Percent total may not sum to 100 due to rounding.

No native yews (*Taxus brevifolia*) or any species listed by either the state or federal government as rare or endangered were found on the site. Oregon white oaks were most common, including eight located in the right of way along SW Boeckman Road that have been severely pruned over time for overhead utility line clearance. Most of the other trees appear to have been planted for landscaping purposes.

Tree Plan Recommendations

Of the 86 inventoried trees, 79 are planned for removal for the purposes of site development, either because adequate tree protection is not possible based on the proposed site plan or because of poor condition. This includes 70 trees located on-site and nine trees located along the northern property boundary. Prior written consent of the neighboring property owner should be obtained before trees located off-site or on the property boundary are removed.

Seven trees are planned for retention with site development, including five trees located within the SROZ impact area. However, two of the trees planned for retention within the SROZ impact area, #5129 and #5994—both Douglas-firs (*Pseudotsuga menziesii*), should be reduced in height to non-hazardous lengths and left standing as wildlife snags because they are in poor or declining condition and not sustainable. The other five trees planned for retention include one 24-inch diameter bigleaf maple (*Acer macrophyllum*) and four Oregon white oaks. One of the oaks, #5133, has boards nailed into that should be carefully removed during construction. The largest oak planned for retention is #5140, a 56-inch diameter tree in excellent condition. The site plan was modified to preserve this tree, which is relatively the best existing tree inventoried.

As shown on the Tree Protection Plan drawing, protection fencing is recommended at the driplines of protected trees or at the limits of proposed work with areas of proposed encroachment highlighted and notes regarding the need for contractor coordination with the project arborist. Areas of allowable encroachment include: reductions in tree protection fencing east of tree #5994, which will be retained as a snag, for retaining wall construction in rear of lot 15 and west of this tree at the outer edge of the dripline for trail construction; reductions in the outer portions of the dripline area north and west of tree #5140 for street grading and south of this tree for homebuilding on lot 75; reductions of up to half the dripline distance at trees #5129, #5130, #5133 and #5134 west of lots 76-79 and east of the proposed trail for fill; and a reduction in the north quadrant of the protection zone at #6119 for homebuilding. In addition, a decorative wall is proposed within the protection zone of tree #6119 in the rear of lots 11 and 12. Alternative wall construction is required to provide protection for this tree. The contractor should coordinate with the project arborist prior to adjusting protection fencing for wall construction. Within the dripline circle, columns should be excavated with hand tools only. The contractor should contact the project arborist if tree roots are encountered in order to assess root impacts and document root pruning. Between the columns, the wall should be placed at native grade with no excavation. If this approach is not feasible, it may be necessary to remove tree #6119. The contractor should coordinate with the project arborist if adjustments to the location of tree protection fencing are needed and whenever work is necessary beneath protected tree driplines regardless of the location of tree protection fencing.

As described in the enclosed tree data, individual trees were assigned a general condition rating as follows:

- D: Dead
- P: Poor Condition
- F: Fair Condition
- G: Good Condition
- E: Excellent Condition

Table 2 provides a summary of the count of trees by general condition rating and treatment.

Table 2. Count of Inventoried Trees by Treatment Recommendation and General Condition Rating.

Treatment	General Condition Rating					Total*
	D	P	F	G	E	
remove	1	7	38	24		70 (81%)
remove with adjacent owner's consent		1	6	2		9 (10%)
retain			1	2	1	4 (5%)
retain, remove boards				1		1 (1%)
retain, create snag^		1	1			2 (2%)
Total*	1 (1%)	9 (10%)	46 (53%)	29 (34%)	1 (1%)	86 (100%)

*Percent total may not sum to 100 due to rounding. ^Trees to be turned into snags require mitigation.

Numerous other trees are planned for retention within the SROZ in an open space tract along the western portion of the site. Retaining walls and paved trails are proposed in areas along the eastern edge of the protected area. The contractor should coordinate with the project arborist prior to the proposed construction where work may encroach beneath protected tree driplines.

Mitigation Requirements

All 86 inventoried trees are 6-inches or larger in diameter. The 79 trees planned for removal **and the two trees to be turned into snags** will require mitigation per Section 4.620.00; removed trees shall be replaced on a basis of one tree planted for each tree removed. Therefore, **81** trees measuring at least 2-inches in diameter shall be planted as mitigation for tree removal.

Tree Protection Standards

Trees planned for retention will need special consideration to assure their protection during construction. The following tree protection measures should be included on the Tree Removal and Protection Plan drawing:

1. **Pre-Construction Meeting.** Prior to any site activity, a pre-construction meeting with the owner, contractors, and project arborist shall take place to review tree protection measures and address questions or concerns on site.
2. **Fencing.** Trees to remain on site shall be protected by installation of tree protection fencing to prevent injury to tree trunks or roots, or soil compaction within the root protection area, which generally coincides with tree driplines. **Fences shall be a minimum 6-foot high 2-inch mesh chain link secured to a minimum 1.5-inch diameter steel or aluminum posts set to a depth of no less than 2-feet in native soil.** The contractor is responsible for coordinating with the project arborist prior to opening or making adjustments to tree protection fencing.
3. **Tree Protection Zone.** Without authorization from the Project Arborist, none of the following shall occur beneath the dripline of any protected tree:
 - a) Grade change or cut and fill;
 - b) New impervious surfaces;
 - c) Utility or drainage field placement;
 - d) Staging or storage of materials and equipment; or
 - e) Vehicle maneuvering.

The contractor shall be responsible for contacting the project arborist in a timely manner prior to working beneath protected tree driplines. Root protection zones may be entered for tasks like surveying, measuring, and, sampling. Fences must be closed upon completion of these tasks.

4. **Tagging.** All trees to remain on the site are to be designated with metal tags that are to remain in place throughout the development. Those tags shall be numbered, with the numbers keyed to the tree inventory and protection plan.
5. **Pruning.** Pruning may be needed to provide overhead clearance to avoid crown damage during construction and to remove dead and defective branches for safety. The project arborist can help identify where pruning is necessary once trees recommended for removal have been removed and the site is prepared for construction. Crown pruning shall be performed by a Qualified Tree Service.
6. **Excavation.** Excavation beneath the driplines of protected trees shall be avoided if alternatives are feasible, or else conducted under the on-site supervision of the project arborist. Excavation immediately adjacent to roots larger than 2-inches in diameter beneath the dripline of retained trees shall be by hand or other non-invasive techniques to ensure that roots are not damaged. Where feasible, major roots shall be protected by tunneling or other means to avoid destruction or damage. Exceptions can be made if, in the opinion of the project arborist, unacceptable damage will not occur to the tree. The contractor is responsible for coordinating with the project arborist in a timely manner prior to performing any excavation beneath a protected tree dripline regardless of the approved location of tree protection fencing.
7. **Surfacing.** Where new surfacing is proposed beneath the dripline of protected trees, coordinate with the project arborist to monitor construction. Avoid excavation and use a modified profile to build up from existing grade (Figure 1). The profile includes a layer of permeable geotextile fabric on the ground surface and clean crushed rock to raise the grade as needed. Surfacing may include asphalt, concrete, or other materials.

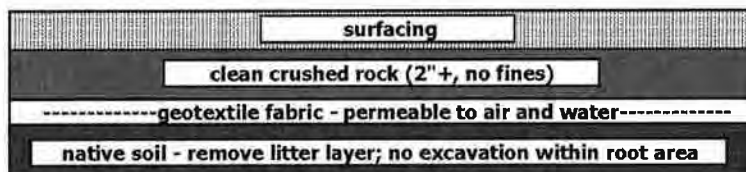


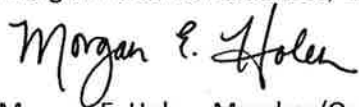
Figure 1. Sample profile for areas within Critical Root Zones. Depth of rock is dependent on grading. Technique based on best management practices.

8. **Landscaping.** Following construction and where landscaping is desired, apply approximately 3-inches of **compost or** bark mulch beneath the dripline of protected trees in a minimum 5-foot radius around tree trunks; do not pile mulch directly against tree trunks. Shrubs and ground cover plants may be planted beneath protected tree driplines, but no closer than 5-feet to tree trunks. If irrigation is used, use drip irrigation or low flow emitters installed at native grade (no trenching) only beneath the driplines of protected trees. Landscaping shall be performed by hand and with hand tools only beneath protected tree driplines; adjust the location of plants to avoid tree root impacts.

9. **Quality Assurance.** The project arborist should supervise proper execution of this plan on-call during construction activities that could encroach on retained trees. Tree protection site inspection monitoring reports should be provided to the Client and City following each site visit performed during construction.

Thank you for choosing Morgan Holen & Associates, LLC, to provide consulting arborist services for the Morgan Farms subdivision project in Wilsonville, Oregon. Please contact us if you have questions or need any additional information.

Thank you,
Morgan Holen & Associates, LLC



Morgan E. Holen, Member/Owner
ISA Board Certified Master Arborist, PN-6145B
ISA Tree Risk Assessment Qualified
Forest Biologist

Enclosures: MHA16110 Morgan Farms – Tree Data 6-6-17



No.	Type	Common Name	Species Name	DBH ¹	C-Rad ²	Cond ³	Comments	Location ⁴	Treatment
1001	Dec	ash	<i>Fraxinus</i> spp.	10,16	25	G	moderate structure, few dead branches	on-site	remove
1002	Dec	ash	<i>Fraxinus</i> spp.	16	22	P	progressive decline, dead branches, dieback	on-site	remove
1003	Dec	Oregon white oak	<i>Quercus garryana</i>	16,2x26	40	F	severe power line pruning, crown decay	ROW	remove
1004	Dec	deciduous	unknown	8	0	D	dead	on-site	remove
1005	Dec	English hawthorn	<i>Crataegus monogyna</i>	4x6	14	G	invasive species, poor structure	on-site	remove
1006	Con	deodar cedar	<i>Cedrus deodara</i>	32	22	F	crown asymmetry due to utility line pruning	on-site	remove
1007	Con	scots pine	<i>Pinus sylvestris</i>	16	16	F	poor structure, lower trunk wound on northwest face	on-site	remove
1008	Con	scots pine	<i>Pinus sylvestris</i>	20	16	F	poor structure, excessive lean, dense blackberries surrounding base	on-site	remove
5128	Dec	Oregon white oak	<i>Quercus garryana</i>	48	16	P	mostly dead	on-site	remove
5129	Con	Douglas-fir	<i>Pseudotsuga menziesii</i>	24	18	P	dead top, dead and broken branches	SROZ-IA	create snag
5130	Dec	bigleaf maple	<i>Acer macrophyllum</i>	24	24	G	moderate structure, trunk wound on east face	SROZ-IA	retain
5133	Dec	Oregon white oak	<i>Quercus garryana</i>	28	20	G	remove boards nailed to trunk on west face	SROZ-IA	retain, remove boards
5134	Dec	Oregon white oak	<i>Quercus garryana</i>	10,14	16	F	moderate structure, one-sided to west, suitable for retention along with 5133 only	SROZ-IA	retain
5135	Dec	black locust	<i>Robinia pseudoacacia</i>	9x12	16	F	invasive species, dense cluster	on-site	remove
5136	Dec	Oregon white oak	<i>Quercus garryana</i>	36	16	F	poor structure, one-sided crown with lean to northeast	on-site	remove
5137	Con	Port-Orford-cedar	<i>Chamaecyparis lawsoniana</i>	18	16	G	only assessed from south side	on-site	remove
5138	Con	Port-Orford-cedar	<i>Chamaecyparis lawsoniana</i>	18	16	G	only assessed from south side	on-site	remove
5139	Con	Port-Orford-cedar	<i>Chamaecyparis lawsoniana</i>	18	16	F	moderate structure, only assessed from south side	on-site	remove
5140	Dec	Oregon white oak	<i>Quercus garryana</i>	56	44	E	old buttress wounds	on-site	retain
5206	Dec	mimosa	<i>Albizia julibrissin</i>	20	16	P	poor structure, very poorly pruned, dieback	on-site	remove
5207	Dec	fruit	unknown	18	14	F	not maintained	on-site	remove
5234	Con	western redcedar	<i>Thuja plicata</i>	6,14	14	F	poor structure, topped	on-site	remove
5235	Con	western redcedar	<i>Thuja plicata</i>	8,14	14	F	poor structure, topped	on-site	remove
5237	Con	western redcedar	<i>Thuja plicata</i>	12	14	F	poor structure, topped	on-site	remove
5362	Dec	cherry	<i>Prunus</i> spp.	6	5	G	small weeping ornamental	on-site	remove
5363	Con	blue spruce	<i>Picea pungens</i>	10	10	G	multiple leaders	on-site	remove
5480	Dec	fruit	unknown	6,2x8	20	F	poor structure, not well maintained	on-site	remove
5484	Dec	fruit	unknown	2x8,14	20	F	poor structure, not well maintained	on-site	remove
5695	Con	giant sequoia	<i>Sequoiadendron giganteum</i>	26	14	F	dense row, suitable for retention as intact group (5695-5700 with or without 5701)	on-site	remove
5696	Con	giant sequoia	<i>Sequoiadendron giganteum</i>	36	14	F	dense row, suitable for retention as intact group (5695-5700 with or without 5701)	on-site	remove

No.	Type	Common Name	Species Name	DBH ¹	C-Rad ²	Cond ³	Comments	Location ⁴	Treatment
5697	Con	giant sequoia	<i>Sequoiadendron giganteum</i>	24	14	F	dense row, suitable for retention as intact group (5695-5700 with or without 5701)	on-site	remove
5698	Con	giant sequoia	<i>Sequoiadendron giganteum</i>	34	14	F	dense row, suitable for retention as intact group (5695-5700 with or without 5701)	on-site	remove
5699	Con	spruce	<i>Picea spp.</i>	16	14	F	dense row, suitable for retention as intact group (5695-5700 with or without 5701)	on-site	remove
5700	Con	giant sequoia	<i>Sequoiadendron giganteum</i>	24	12	F	dense row, suitable for retention as intact group (5695-5700 with or without 5701)	on-site	remove
5701	Con	spruce	<i>Picea spp.</i>	18	12	F	broken leader, suitable for retention as intact group (5695-5700 with or without 5701)	on-site	remove
5702	Con	giant sequoia	<i>Sequoiadendron giganteum</i>	36	24	G	codominant crown class with 5703	on-site	remove
5703	Con	giant sequoia	<i>Sequoiadendron giganteum</i>	44	24	G	codominant crown class with 5702, self-correcting lean	on-site	remove
5860	Dec	red maple	<i>Acer rubrum</i>	24	30	F	poor structure, trunk and crown decay	on-site	remove
5861	Con	western redcedar	<i>Thuja plicata</i>	2x14	15	G	codominant leaders	on-site	remove
5876	Dec	black cottonwood	<i>Populus trichocarpa</i>	18	16	F	inherent species limitations, one-sided crown to southwest	on-site	remove
5877	Dec	black cottonwood	<i>Populus trichocarpa</i>	16	16	F	inherent species limitations, one-sided crown to northwest	on-site	remove
5878	Dec	black cottonwood	<i>Populus trichocarpa</i>	34	22	F	inherent species limitations, large diameter scaffold branches, large buttress root to garage	on-site	remove
5994	Con	Douglas-fir	<i>Pseudotsuga menziesii</i>	48	22	F	dead branches, dead top, progressive decline	SROZ-1A	create snag
6119	Dec	Oregon white oak	<i>Quercus garryana</i>	38	40	G	codominant leaders, severe power line pruning on south side, otherwise good structure	on-site	retain
6157	Dec	Oregon white oak	<i>Quercus garryana</i>	26	28	F	severe power line pruning, codominant crown class with 6158 (retain or remove together)	ROW	remove
6158	Dec	Oregon white oak	<i>Quercus garryana</i>	22	12	F	severe power line pruning, codominant crown class with 6157 (retain or remove together)	ROW	remove
6159	Dec	Oregon white oak	<i>Quercus garryana</i>	8	6	P	topped	ROW	remove
6160	Dec	Oregon white oak	<i>Quercus garryana</i>	22	30	F	severe power line pruning, entirely one-sided to the north	ROW	remove
6161	Dec	Oregon white oak	<i>Quercus garryana</i>	20	20	F	severe power line pruning	ROW	remove
6162	Dec	Oregon white oak	<i>Quercus garryana</i>	36	32	F	severe power line pruning, crown decay, mistletoe, basal wound on south face	ROW	remove
6166	Dec	Oregon white oak	<i>Quercus garryana</i>	30	40	F	severe power line pruning, but good vigor	ROW	remove



No.	Type	Common Name	Species Name	DBH ¹	C-Rad ²	Cond ³	Comments	Location ⁴	Treatment
6262	Dec	Oregon white oak	<i>Quercus garryana</i>	48	45	F	moderate structure, dead branches, crown decay, old wound on north face likely from old codominant stem failure	on-site	remove
6264	Dec	quaking aspen	<i>Populus tremuloides</i>	12	20	F	one-sided crown	on-site	remove
6265	Dec	deciduous	unknown	20	10	F	lower trunk decay with hollow	on-site	remove
6266	Dec	fruit	unknown	2x12,14	18	F	moderate structure, not well maintained	on-site	remove
6267	Dec	curly willow	<i>Salix matsudana</i>	18	16	P	crown dieback, diseased, trunk decay with fungal fruiting bodies	on-site	remove
7572	Dec	deciduous	unknown	6	10	F	visual assessment inhibited by fence and dense vegetation surrounding trunk	boundary	remove with adjacent owners consent
7573	Dec	deciduous	unknown	6	10	F	visual assessment inhibited by fence and dense vegetation surrounding trunk	boundary	remove with adjacent owners consent
7574	Dec	deciduous	unknown	8	10	F	visual assessment inhibited by fence and dense vegetation surrounding trunk	on-site	remove
7575	Dec	fruit	unknown	2x8	10	F	poor structure, not well maintained	on-site	remove
7576	Dec	serviceberry	<i>Amelanchier alnifolia</i>	6	10	F	moderate structure	boundary	remove with adjacent owners consent
7577	Dec	serviceberry	<i>Amelanchier alnifolia</i>	8	10	F	poor structure	off-site	remove with adjacent owners consent
7578	Dec	black hawthorn	<i>Crataegus douglasii</i>	6	4	P	suppressed	off-site	remove with adjacent owners consent
7579	Con	Douglas-fir	<i>Pseudotsuga menziesii</i>	24	25	G	visual assessment inhibited by fence and dense vegetation surrounding trunk, ivy up trunk	off-site	remove with adjacent owners consent
7580	Dec	Oregon white oak	<i>Quercus garryana</i>	6	6	G	visual assessment inhibited by fence and dense vegetation surrounding trunk	on-site	remove
7581	Dec	bigleaf maple	<i>Acer macrophyllum</i>	24	16	F	visual assessment inhibited by fence and dense vegetation surrounding trunk	off-site	remove with adjacent owners consent
7582	Con	Douglas-fir	<i>Pseudotsuga menziesii</i>	10	14	F	visual assessment inhibited by fence and dense vegetation surrounding trunk	off-site	remove with adjacent owners consent
7585	Con	Douglas-fir	<i>Pseudotsuga menziesii</i>	30	20	G	visual assessment inhibited by fence and dense vegetation surrounding trunk	boundary	remove with adjacent owners consent
7586	Dec	Oregon white oak	<i>Quercus garryana</i>	8	10	G	visual assessment inhibited by fence and dense vegetation surrounding trunk	on-site	remove
7587	Dec	Oregon white oak	<i>Quercus garryana</i>	6	10	G	visual assessment inhibited by fence and dense vegetation surrounding trunk	on-site	remove
7630	Con	Leyland cypress	<i>Cupressus x leylandii</i>	28	25	G	moderate structure	on-site	remove



No.	Type	Common Name	Species Name	DBH ¹	C-Rad ²	Cond ³	Comments	Location ⁴	Treatment
7631	Con	Leyland cypress	<i>Cupressus x leylandii</i>	28	25	G	moderate structure	on-site	remove
7632	Con	Leyland cypress	<i>Cupressus x leylandii</i>	12,18	25	G	moderate structure	on-site	remove
7633	Con	Leyland cypress	<i>Cupressus x leylandii</i>	10,16,18	25	G	moderate structure	on-site	remove
7634	Con	Leyland cypress	<i>Cupressus x leylandii</i>	8,2x12,16	25	G	moderate structure	on-site	remove
7635	Con	scots pine	<i>Pinus sylvestris</i>	14	12	G	moderate structure, visual assessment inhibited by fence and dense vegetation surrounding trunk	on-site	remove
7636	Con	scots pine	<i>Pinus sylvestris</i>	14	16	P	topped, visual assessment inhibited by fence and dense vegetation surrounding trunk	on-site	remove
7637	Con	scots pine	<i>Pinus sylvestris</i>	12	10	F	forked leaders, visual assessment inhibited by fence and dense vegetation surrounding trunk	on-site	remove
7638	Con	Douglas-fir	<i>Pseudotsuga menziesii</i>	10	12	P	progressive decline	on-site	remove
7639	Con	pine	<i>Pinus spp.</i>	10	12	G	sequoia pitch moth, visual assessment inhibited by fence and dense vegetation surrounding trunk	on-site	remove
7640	Con	pine	<i>Pinus spp.</i>	8	10	G	visual assessment inhibited by fence and dense vegetation surrounding trunk	on-site	remove
7641	Con	pine	<i>Pinus spp.</i>	6	10	G	visual assessment inhibited by fence and dense vegetation surrounding trunk	on-site	remove
7642	Con	pine	<i>Pinus spp.</i>	8	10	G	moderate structure, visual assessment inhibited by fence and dense vegetation surrounding trunk	on-site	remove
7643	Con	pine	<i>Pinus spp.</i>	8	10	G	visual assessment inhibited by fence and dense vegetation surrounding trunk	on-site	remove
7653	Dec	Oregon white oak	<i>Quercus garryana</i>	34	34	G	leans to south, visual assessment inhibited by fence and dense vegetation surrounding trunk	on-site	remove
20020	Dec	plum	<i>Prunus spp.</i>	6,12	16	F	very poor structure, ivy, dead branches, large wound on south face at previous failure	on-site	remove

¹DBH is tree diameter measured at 4.5-feet above the ground level in inches; multiple trunks splitting below DBH are measured separately and individual trunk measurements are separated by a comma, except multiple trunks of the same size are indicated with an asterisk (quantity x size); ²C-Rad is the average crown radius measured in feet; ³Cond is an arborist assigned rating to generally describe the condition of individual trees as follows- Dead; Poor; Fair; Good; or Excellent Condition; and ⁴Location describes whether the tree is location on-site, off-site on adjacent private property, boundary if located on the boundary between the project site and adjacent private property, ROW if any portion of the trunk is located within the public right-of-way, or SROZ-IA if located within the Significant Resource Overlay Zone Impact Area (trees located within the SROZ were not inventoried).

TREE PROTECTION SPECIFICATIONS

1. PRE-CONSTRUCTION MEETING. PRIOR TO ANY SITE ACTIVITY, A PRE-CONSTRUCTION MEETING WITH THE OWNER, CONTRACTORS, AND PROJECT ARBORIST SHALL TAKE PLACE TO REVIEW TREE PROTECTION MEASURES AND ADDRESS QUESTIONS OR CONCERNS ON SITE.
2. FENCING. TREES TO REMAIN ON SITE SHALL BE PROTECTED BY INSTALLATION OF TREE PROTECTION FENCING TO PREVENT INJURY TO TREE TRUNKS OR ROOTS, OR SOIL COMPACTION WITHIN THE ROOT PROTECTION AREA, WHICH GENERALLY COINCIDES WITH TREE DRIPLINES. FENCES SHALL BE A MINIMUM 6-FOOT HIGH 2-INCH MESH CHAIN LINK SECURED TO A MINIMUM 1.5-INCH DIAMETER STEEL OR ALUMINUM POSTS SET TO A DEPTH OF NO LESS THAN 2-FEET IN NATIVE SOIL. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH THE PROJECT ARBORIST PRIOR TO OPENING OR MAKING ADJUSTMENTS TO TREE PROTECTION FENCING.
3. TREE PROTECTION ZONE. WITHOUT AUTHORIZATION FROM THE PROJECT ARBORIST, NONE OF THE FOLLOWING SHALL OCCUR BENEATH THE DRIPLINE OF ANY PROTECTED TREE:
 - a. GRADE CHANGE OR CUT AND FILL;
 - b. NEW IMPERVIOUS SURFACES;
 - c. UTILITY OR DRAINAGE FIELD PLACEMENT;
 - d. STAGING OR STORAGE OF MATERIALS AND EQUIPMENT; OR
 - e. VEHICLE MANEUVERING.
 THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING THE PROJECT ARBORIST IN A TIMELY MANNER PRIOR TO WORKING BENEATH PROTECTED TREE DRIPLINES. ROOT PROTECTION ZONES MAY BE ENTERED FOR TASKS LIKE SURVEYING, MEASURING, AND, SAMPLING. FENCES MUST BE CLOSED UPON COMPLETION OF THESE TASKS.
4. TAGGING. ALL TREES TO REMAIN ON THE SITE ARE TO BE DESIGNATED WITH METAL TAGS THAT ARE TO REMAIN IN PLACE THROUGHOUT THE DEVELOPMENT. THOSE TAGS SHALL BE NUMBERED, WITH THE NUMBERS KEYED TO THE TREE INVENTORY AND PROTECTION PLAN.
5. PRUNING. PRUNING MAY BE NEEDED TO PROVIDE OVERHEAD CLEARANCE TO AVOID CROWN DAMAGE DURING CONSTRUCTION AND TO REMOVE DEAD AND DEFECTIVE BRANCHES FOR SAFETY. THE PROJECT ARBORIST CAN HELP IDENTIFY WHERE PRUNING IS NECESSARY ONCE TREES RECOMMENDED FOR REMOVAL HAVE BEEN REMOVED AND THE SITE IS PREPARED FOR CONSTRUCTION. CROWN PRUNING SHALL BE PERFORMED BY A QUALIFIED TREE SERVICE.
6. EXCAVATION. EXCAVATION BENEATH THE DRIPLINES OF PROTECTED TREES SHALL BE AVOIDED IF ALTERNATIVES ARE FEASIBLE, OR ELSE CONDUCTED UNDER THE ON-SITE SUPERVISION OF THE PROJECT ARBORIST. EXCAVATION IMMEDIATELY ADJACENT TO ROOTS LARGER THAN 2-INCHES IN DIAMETER BENEATH THE DRIPLINE OF RETAINED TREES SHALL BE BY HAND OR OTHER NON-INVASIVE TECHNIQUES TO ENSURE THAT ROOTS ARE NOT DAMAGED. WHERE FEASIBLE, MAJOR ROOTS SHALL BE PROTECTED BY TUNNELING OR OTHER MEANS TO AVOID DESTRUCTION OR DAMAGE. EXCEPTIONS CAN BE MADE IF, IN THE OPINION OF THE PROJECT ARBORIST, UNACCEPTABLE DAMAGE WILL NOT OCCUR TO THE TREE. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH THE PROJECT ARBORIST IN A TIMELY MANNER PRIOR TO PERFORMING ANY EXCAVATION BENEATH A PROTECTED TREE DRIPLINE REGARDLESS OF THE APPROVED LOCATION OF TREE PROTECTION FENCING.
7. SURFACING. WHERE NEW SURFACING IS PROPOSED BENEATH THE DRIPLINE OF PROTECTED TREES, COORDINATE WITH THE PROJECT ARBORIST TO MONITOR CONSTRUCTION. AVOID EXCAVATION AND USE A MODIFIED PROFILE TO BUILD UP FROM EXISTING GRADE (FIGURE 1). THE PROFILE INCLUDES A LAYER OF PERMEABLE GEOTEXTILE FABRIC ON THE GROUND SURFACE AND CLEAN CRUSHED ROCK TO RAISE THE GRADE AS NEEDED. SURFACING MAY INCLUDE ASPHALT, CONCRETE, OR OTHER MATERIALS.

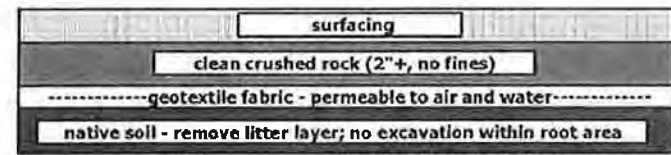
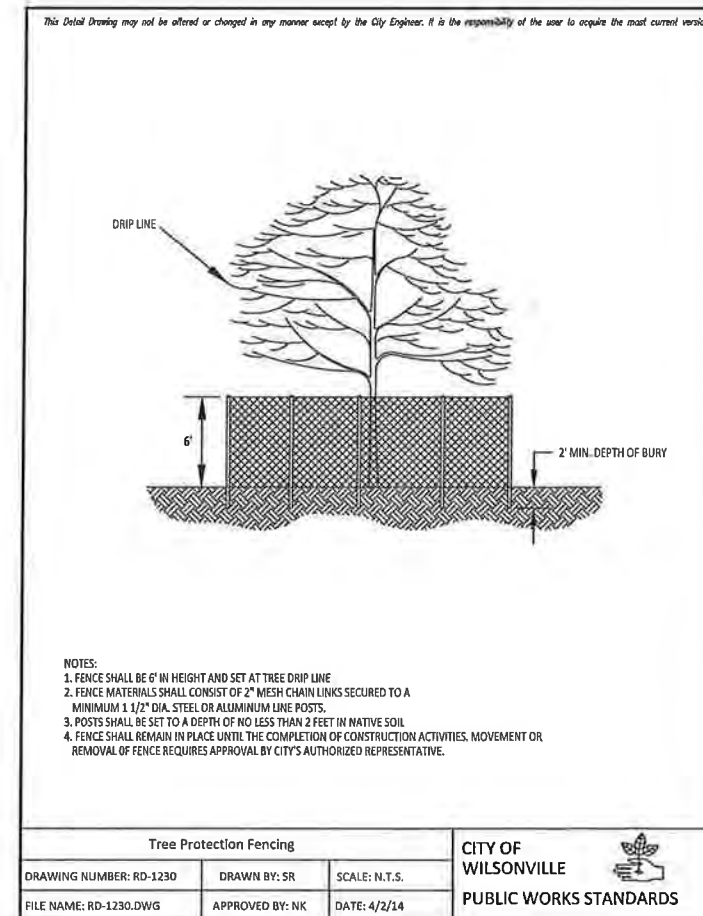


Figure 1. Sample profile for areas within Critical Root Zones. Depth of rock is dependent on grading. Technique based on best management practices

8. LANDSCAPING. FOLLOWING CONSTRUCTION AND WHERE LANDSCAPING IS DESIRED, APPLY APPROXIMATELY 3-INCHES OF MULCH BENEATH THE DRIPLINE OF PROTECTED TREES IN A MINIMUM 5-FOOT RADIUS AROUND TREE TRUNKS; DO NOT PILE MULCH DIRECTLY AGAINST TREE TRUNKS. SHRUBS AND GROUND COVER PLANTS MAY BE PLANTED BENEATH PROTECTED TREE DRIPLINES, BUT NO CLOSER THAN 5- FEET TO TREE TRUNKS. IF IRRIGATION IS USED, USE DRIP IRRIGATION OR LOW FLOW EMITTERS INSTALLED AT NATIVE GRADE (NO TRENCHING) ONLY BENEATH THE DRIPLINES OF PROTECTED TREES. LANDSCAPING SHALL BE PERFORMED BY HAND AND WITH HAND TOOLS ONLY BENEATH PROTECTED TREE DRIPLINES; ADJUST THE LOCATION OF PLANTS TO AVOID TREE ROOT IMPACTS.
9. QUALITY ASSURANCE. THE PROJECT ARBORIST SHOULD SUPERVISE PROPER EXECUTION OF THIS PLAN ON-CALL DURING CONSTRUCTION ACTIVITIES THAT COULD ENCRONCH ON RETAINED TREES. TREE PROTECTION SITE INSPECTION MONITORING REPORTS SHOULD BE PROVIDED TO THE CLIENT AND CITY FOLLOWING EACH SITE VISIT PERFORMED DURING CONSTRUCTION.



4000 SW WASHINGTON SQUARE RD.
SUITE 170
PORTLAND, OREGON 97223
P: 503.644.8888
F: 503.644.8888
www.pdg.com

PDG

PIONEER DESIGN GROUP, INC.

TREE PROTECTION SPECIFICATIONS

MORGAN FARMS
CITY OF WILSONVILLE, OREGON

Designed by	Date	Reviewed by	Date	Project No.	Horizontal Scale	Vertical Scale
MLS	02/2018	MCS	02/2018	338-001	N/A	N/A
TCC						
Reviewed by	Date	Project No.	REF.			
		338-001				

By	Revision	Date
No.		

Project: MORGAN FARMS
No.: 338-001
Type: PLANNING
Sheet

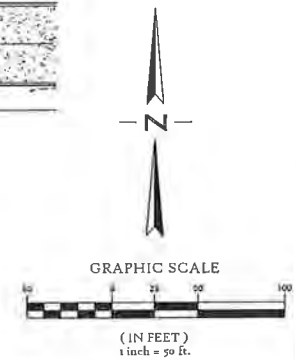
B:\Land Projects\2004\338-001\dwg\planning\338_10tree.dwg 4/25/2018 2:14:22 PM



LEGEND

- - - - - 202 EXISTING 2' CONTOUR
- - - - - 200 EXISTING 10' CONTOUR
- - - - - 202 PROPOSED 2' CONTOUR
- - - - - 200 PROPOSED 10' CONTOUR
- - - - - EXISTING TREE DRIP LINE
- - - - - PROPOSED TREE PROTECTION FENCING
- - - - - PROPOSED RETAINING WALL
- ⊗ EXISTING TREE TO REMAIN
- ⊗ EXISTING TREE TO BE REMOVED
- ⊗ PROPOSED IMPACT AREA TO EXISTING TREE DRIP LINE (SEE NOTE 3 BELOW)

- TREE PROTECTION NOTES**
- ① TREES #5129 AND #5994 SHALL BE RETAINED, BUT DE-LIMBED AND REDUCED IN HEIGHT TO NON-HAZARDOUS LENGTHS BY A QUALIFIED TREE SERVICE. COORDINATE WITH THE PROJECT ARBORIST TO DETERMINE APPROPRIATE HEIGHTS.
 - ② TREE #5133 HAS BOARDS NAILED INTO THE TRUNK THAT SHOULD BE CAREFULLY REMOVED DURING CONSTRUCTION. COORDINATE WITH THE PROJECT ARBORIST TO MONITOR THIS WORK.
 - ③ COORDINATE WITH THE PROJECT ARBORIST PRIOR TO ADJUSTING TREE PROTECTION FENCING OR WORKING BENEATH THE DRIFLINES OF TREES #5129, #5130, #5133, #5134, #5140, #5994 AND #6119.
 - ④ PRIOR WRITTEN CONSENT OF THE NEIGHBORING PROPERTY OWNER SHOULD BE OBTAINED BEFORE TREES LOCATED OFF-SITE OR ON THE PROPERTY BOUNDARY ARE REMOVED, INCLUDING TREES #7572, #7573, #7575, #7577, #7578, #7579, #7581, #7582, AND #7585.
 - ⑤ COORDINATE WITH THE PROJECT ARBORIST PRIOR TO PERFORMING RETAINING WALL AND TRAIL CONSTRUCTION ADJACENT TO THE SIGNIFICANT RESOURCE OVERLAY ZONE.
 - ⑥ COORDINATE WITH THE PROJECT ARBORIST PRIOR TO ADJUSTING THE PROTECTION FENCING FOR WALL CONSTRUCTION IN THE REAR OF LOTS 11 AND 12 WITHIN THE DRIFLINE CIRCLE. WALL COLUMNS SHALL BE EXCAVATED WITH HAND TOOLS ONLY. CONTACT THE PROJECT ARBORIST IF TREE ROOTS ARE ENCOUNTERED IN ORDER TO ASSESS ROOT IMPACTS AND DOCUMENT ROOT PRUNING BETWEEN THE COLUMNS. THE WALL SHALL BE PLACED AT NATIVE GRADE WITH NO EXCAVATION.



9020 SW WASHINGTON SQUARE RD
SUITE 170
PORTLAND, OREGON 97223
P 503 643.8888
F 503 643.7413
www.pdginc.com

PDG
PIONEER DESIGN GROUP, INC.

PRELIMINARY TREE REMOVAL & PROTECTION PLAN

MORGAN FARMS
CITY OF WILSONVILLE, OREGON

Designed by	MLS	Date	02/2018
Drawn by	TCC	Date	02/2018
Reviewed by	MLS	Date	02/2018
Project No.	338-001	REF.	
Horiz. Scale:	1" = 50'		
Vert. Scale:	N/A		
			3381_10tree.dwg

By: _____

Revision: _____

No. _____ Date _____

Project: MORGAN FARMS
No. 338-001
Type: PLANNING
Sheet: **10** of **13**

TREE PROTECTION SPECIFICATIONS

1. PRE-CONSTRUCTION MEETING. PRIOR TO ANY SITE ACTIVITY, A PRE-CONSTRUCTION MEETING WITH THE OWNER, CONTRACTORS, AND PROJECT ARBORIST SHALL TAKE PLACE TO REVIEW TREE PROTECTION MEASURES AND ADDRESS QUESTIONS OR CONCERNS ON SITE.
2. FENCING. TREES TO REMAIN ON SITE SHALL BE PROTECTED BY INSTALLATION OF TREE PROTECTION FENCING TO PREVENT INJURY TO TREE TRUNKS OR ROOTS, OR SOIL COMPACTION WITHIN THE ROOT PROTECTION AREA, WHICH GENERALLY COINCIDES WITH TREE DRIPLINES. FENCES SHALL BE A MINIMUM 6-FOOT HIGH 2-INCH MESH CHAIN LINK SECURED TO A MINIMUM 1.5-INCH DIAMETER STEEL OR ALUMINUM POSTS SET TO A DEPTH OF NO LESS THAN 2-FEET IN NATIVE SOIL. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH THE PROJECT ARBORIST PRIOR TO OPENING OR MAKING ADJUSTMENTS TO TREE PROTECTION FENCING.
3. TREE PROTECTION ZONE. WITHOUT AUTHORIZATION FROM THE PROJECT ARBORIST, NONE OF THE FOLLOWING SHALL OCCUR BENEATH THE DRIPLINE OF ANY PROTECTED TREE:
 - a. GRADE CHANGE OR CUT AND FILL;
 - b. NEW IMPERVIOUS SURFACES;
 - c. UTILITY OR DRAINAGE FIELD PLACEMENT;
 - d. STAGING OR STORAGE OF MATERIALS AND EQUIPMENT; OR
 - e. VEHICLE MANEUVERING.
 THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING THE PROJECT ARBORIST IN A TIMELY MANNER PRIOR TO WORKING BENEATH PROTECTED TREE DRIPLINES. ROOT PROTECTION ZONES MAY BE ENTERED FOR TASKS LIKE SURVEYING, MEASURING, AND, SAMPLING. FENCES MUST BE CLOSED UPON COMPLETION OF THESE TASKS.
4. TAGGING. ALL TREES TO REMAIN ON THE SITE ARE TO BE DESIGNATED WITH METAL TAGS THAT ARE TO REMAIN IN PLACE THROUGHOUT THE DEVELOPMENT. THOSE TAGS SHALL BE NUMBERED, WITH THE NUMBERS KEYED TO THE TREE INVENTORY AND PROTECTION PLAN.
5. PRUNING. PRUNING MAY BE NEEDED TO PROVIDE OVERHEAD CLEARANCE TO AVOID CROWN DAMAGE DURING CONSTRUCTION AND TO REMOVE DEAD AND DEFECTIVE BRANCHES FOR SAFETY. THE PROJECT ARBORIST CAN HELP IDENTIFY WHERE PRUNING IS NECESSARY ONCE TREES RECOMMENDED FOR REMOVAL HAVE BEEN REMOVED AND THE SITE IS PREPARED FOR CONSTRUCTION. CROWN PRUNING SHALL BE PERFORMED BY A QUALIFIED TREE SERVICE.
6. EXCAVATION. EXCAVATION BENEATH THE DRIPLINES OF PROTECTED TREES SHALL BE AVOIDED IF ALTERNATIVES ARE FEASIBLE, OR ELSE CONDUCTED UNDER THE ON-SITE SUPERVISION OF THE PROJECT ARBORIST. EXCAVATION IMMEDIATELY ADJACENT TO ROOTS LARGER THAN 2-INCHES IN DIAMETER BENEATH THE DRIPLINE OF RETAINED TREES SHALL BE BY HAND OR OTHER NON-INVASIVE TECHNIQUES TO ENSURE THAT ROOTS ARE NOT DAMAGED. WHERE FEASIBLE, MAJOR ROOTS SHALL BE PROTECTED BY TUNNELING OR OTHER MEANS TO AVOID DESTRUCTION OR DAMAGE. EXCEPTIONS CAN BE MADE IF, IN THE OPINION OF THE PROJECT ARBORIST, UNACCEPTABLE DAMAGE WILL NOT OCCUR TO THE TREE. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH THE PROJECT ARBORIST IN A TIMELY MANNER PRIOR TO PERFORMING ANY EXCAVATION BENEATH A PROTECTED TREE DRIPLINE REGARDLESS OF THE APPROVED LOCATION OF TREE PROTECTION FENCING.
7. SURFACING. WHERE NEW SURFACING IS PROPOSED BENEATH THE DRIPLINE OF PROTECTED TREES, COORDINATE WITH THE PROJECT ARBORIST TO MONITOR CONSTRUCTION. AVOID EXCAVATION AND USE A MODIFIED PROFILE TO BUILD UP FROM EXISTING GRADE (FIGURE 1). THE PROFILE INCLUDES A LAYER OF PERMEABLE GEOTEXTILE FABRIC ON THE GROUND SURFACE AND CLEAN CRUSHED ROCK TO RAISE THE GRADE AS NEEDED. SURFACING MAY INCLUDE ASPHALT, CONCRETE, OR OTHER MATERIALS.

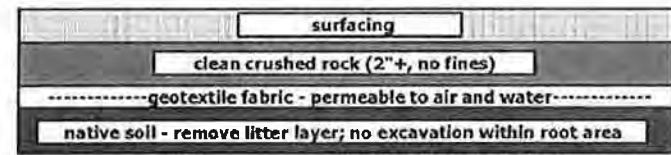
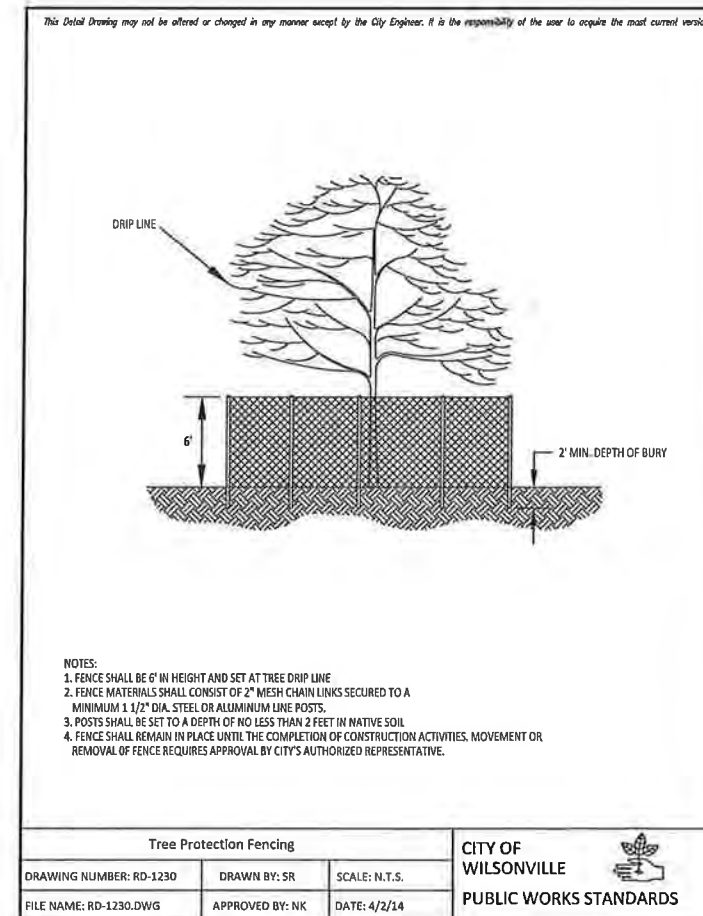


Figure 1. Sample profile for areas within Critical Root Zones. Depth of rock is dependent on grading. Technique based on best management practices

8. LANDSCAPING. FOLLOWING CONSTRUCTION AND WHERE LANDSCAPING IS DESIRED, APPLY APPROXIMATELY 3-INCHES OF MULCH BENEATH THE DRIPLINE OF PROTECTED TREES IN A MINIMUM 5-FOOT RADIUS AROUND TREE TRUNKS; DO NOT PILE MULCH DIRECTLY AGAINST TREE TRUNKS. SHRUBS AND GROUND COVER PLANTS MAY BE PLANTED BENEATH PROTECTED TREE DRIPLINES, BUT NO CLOSER THAN 5- FEET TO TREE TRUNKS. IF IRRIGATION IS USED, USE DRIP IRRIGATION OR LOW FLOW EMITTERS INSTALLED AT NATIVE GRADE (NO TRENCHING) ONLY BENEATH THE DRIPLINES OF PROTECTED TREES. LANDSCAPING SHALL BE PERFORMED BY HAND AND WITH HAND TOOLS ONLY BENEATH PROTECTED TREE DRIPLINES; ADJUST THE LOCATION OF PLANTS TO AVOID TREE ROOT IMPACTS.
9. QUALITY ASSURANCE. THE PROJECT ARBORIST SHOULD SUPERVISE PROPER EXECUTION OF THIS PLAN ON-CALL DURING CONSTRUCTION ACTIVITIES THAT COULD ENCRONCH ON RETAINED TREES. TREE PROTECTION SITE INSPECTION MONITORING REPORTS SHOULD BE PROVIDED TO THE CLIENT AND CITY FOLLOWING EACH SITE VISIT PERFORMED DURING CONSTRUCTION.



9000 SW WASHINGTON SQUARE RD.
 SUITE 170
 PORTLAND, OREGON 97223
 P 503.644.8888
 F 503.644.8888
 www.pdg.com

PIONEER DESIGN GROUP, INC.

TREE PROTECTION SPECIFICATIONS

MORGAN FARMS
CITY OF WILSONVILLE, OREGON

Designed by	Date	Reviewed by	Date	Project No.	Horizontal Scale	Vertical Scale
MLS	02/2018	MCS	02/2018	338-001	N/A	N/A
TCC						
Reviewed by	Date	Project No.	REF.			
		338-001				

By	Revision
Date	
No.	
Project	MORGAN FARMS
No.	338-001
Type	PLANNING
Sheet	

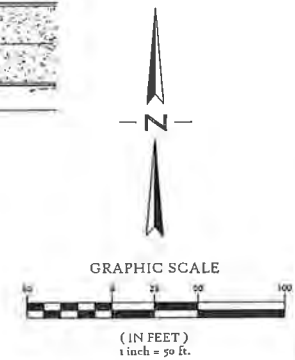
B:\Land Projects\2004\338-001\dwg\planning\338_10tree.dwg 4/25/2018 2:14:22 PM



LEGEND

- - - 202 - - - EXISTING 2' CONTOUR
- - - 200 - - - EXISTING 10' CONTOUR
- - - 202 - - - PROPOSED 2' CONTOUR
- - - 200 - - - PROPOSED 10' CONTOUR
- - - - - EXISTING TREE DRIP LINE
- - - - - PROPOSED TREE PROTECTION FENCING
- - - - - PROPOSED RETAINING WALL
- ⊗ EXISTING TREE TO REMAIN
- ⊗ EXISTING TREE TO BE REMOVED
- ⊗ PROPOSED IMPACT AREA TO EXISTING TREE DRIP LINE (SEE NOTE 3 BELOW)

- TREE PROTECTION NOTES**
- ① TREES #5129 AND #5994 SHALL BE RETAINED, BUT DE-LIMBED AND REDUCED IN HEIGHT TO NON-HAZARDOUS LENGTHS BY A QUALIFIED TREE SERVICE. COORDINATE WITH THE PROJECT ARBORIST TO DETERMINE APPROPRIATE HEIGHTS.
 - ② TREE #5133 HAS BOARDS NAILED INTO THE TRUNK THAT SHOULD BE CAREFULLY REMOVED DURING CONSTRUCTION. COORDINATE WITH THE PROJECT ARBORIST TO MONITOR THIS WORK.
 - ③ COORDINATE WITH THE PROJECT ARBORIST PRIOR TO ADJUSTING TREE PROTECTION FENCING OR WORKING BENEATH THE DRIP LINES OF TREES #5129, #5130, #5133, #5134, #5140, #5994 AND #5119.
 - ④ PRIOR WRITTEN CONSENT OF THE NEIGHBORING PROPERTY OWNER SHOULD BE OBTAINED BEFORE TREES LOCATED OFF-SITE OR ON THE PROPERTY BOUNDARY ARE REMOVED, INCLUDING TREES #7572, #7573, #7575, #7577, #7578, #7579, #7581, #7582, AND #7585.
 - ⑤ COORDINATE WITH THE PROJECT ARBORIST PRIOR TO PERFORMING RETAINING WALL AND TRAIL CONSTRUCTION ADJACENT TO THE SIGNIFICANT RESOURCE OVERLAY ZONE.
 - ⑥ COORDINATE WITH THE PROJECT ARBORIST PRIOR TO ADJUSTING THE PROTECTION FENCING FOR WALL CONSTRUCTION IN THE REAR OF LOTS 11 AND 12. WITHIN THE DRIP LINE CIRCLE, WALL COLUMNS SHALL BE EXCAVATED WITH HAND TOOLS ONLY. CONTACT THE PROJECT ARBORIST IF TREE ROOTS ARE ENCOUNTERED IN ORDER TO ASSESS ROOT IMPACTS AND DOCUMENT ROOT PRUNING BETWEEN THE COLUMNS. THE WALL SHALL BE PLACED AT NATIVE GRADE WITH NO EXCAVATION.



9020 SW WASHINGTON SQUARE RD
SUITE 170
PORTLAND, OREGON 97223
P 503 643.8888
F 503 643.7413
www.pdginc.com

PDG
PIONEER DESIGN GROUP, INC.

PRELIMINARY TREE REMOVAL & PROTECTION PLAN

MORGAN FARMS
CITY OF WILSONVILLE, OREGON

Designed by	MS	Date	02/2018
Drawn by	TCC	Date	02/2018
Reviewed by	MS	Date	02/2018
Project No.	338-001	REF.	
Horiz. Scale:	1" = 50'		
Vert. Scale:	N/A		
			3381_10tree.dwg

By _____

Revision _____

No. _____ Date _____

Project
MORGAN FARMS
No.
338-001
Type
PLANNING
Sheet
10 of **13**



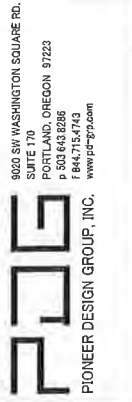
LEGEND

- RIGHT-OF-WAY LINE	□ - CATCH BASIN/DRAIN INLET
- BOUNDARY LINE	⊙ - STORM MANHOLE
- EXISTING LOT LINE	⊙ - SANITARY MANHOLE
- EASEMENT LINE	⊙ - WATER VALVE
- CENTER LINE	⊙ - IRRIGATION VALVE
- VEGETATION LINE	⊙ - GAS VALVE
- STORM DRAINAGE LINE	⊙ - GAS METER
- SANITARY SEWER LINE	⊙ - FIRE HYDRANT ASSEMBLY
- WATER LINE	⊙ - FIRE DEPT. CONNECTION
- GAS LINE	⊙ - TELEPHONE MH/VAULT
- COMMUNICATION LINE	⊙ - SIGN
- TELEPHONE LINE	⊙ - SURVEY MON. FOUND
- UNDERGROUND POWER LINE	⊙ - MAILBOX
- OVERHEAD WIRE	⊙ - JUNCTION BOX
- FENCE LINE (AS NOTED)	⊙ - ELECTRIC VAULT
- 4' - 5' WOOD FENCE LINE	⊙ - ELECTRIC PEDESTAL
- METAL GATE	⊙ - CLEANOUT
- EXISTING 2' CONTOUR	⊙ - POWER POLE
- EXISTING 10' CONTOUR	⊙ - GUY WIRE
- CULVERT	⊙ - POWER POLE W/ LIGHT
- SIGNIFICANT RESOURCE IMPACT AREA	⊙ - SIGNAL POLE
- SIGNIFICANT RESOURCE OVERLAY ZONE	⊙ - WATER METER
- TITLE 3 BOUNDARY LINE	⊙ - WATER BLOWOFF
- BREAK IN SLOPE LINE	⊙ - WATER AIR RELEASE VALVE
- EXISTING CONCRETE	⊙ - MONITORING / TEST POINT
- EXISTING ASPHALT PAVEMENT	⊙ - GAS VAULT
- EXISTING GRAVEL SURFACE	⊙ - UTILITY VAULT
- EXISTING BRICK SURFACE	⊙ - UTILITY PEDESTAL
- EXISTING BUILDING FOOTPRINT	⊙ - WATER VAULT
- EXISTING WOOD DECK	⊙ - COMMUNICATION VAULT
- EXISTING WETLANDS	⊙ - TELECOMM PEDESTAL
- EXISTING CREEK	⊙ - UTILITY CAP
	⊙ - UTILITY EXTENSION
	⊙ - CONIFEROUS TREE (DBH)
	⊙ - DECIDUOUS TREE (DBH)

SITE INFORMATION

ADDRESS: 7331 & 7447 SW BOECKMAN RD
 1/4 SECTION MAP: T3S R1W SEC 12D
 TAX LOTS: 2400, 2600 & 2700
 TOTAL SITE AREA: 20.13 AC

EXISTING CONDITIONS AND DEMOLITION PLAN

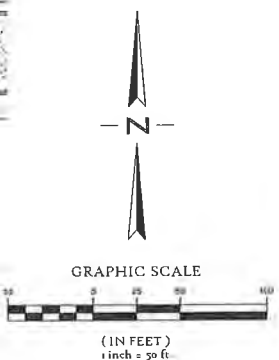


MORGAN FARMS
CITY OF WILSONVILLE, OREGON

Designed by	M/S	Date	02/2015
Drawn by	TCC	Date	02/2015
Reviewed by	M/S	Date	02/2015
Project No.	338-001	REF.	
Horizontal Scale:	1" = 50'		
Vertical Scale:	N/A		

By	
Revision	
No.	
Date	

Project: MORGAN FARMS
 No.: 338-001
 Type: PLANNING
 Sheet: 2 of 13



Geotech Report



**Real-World Geotechnical Solutions
Investigation • Design • Construction Support**

July 18, 2017
Project No. 17-4570

CollegeNet, Inc.
Mr. Jim Wolfston
805 SW Broadway, Suite 160
Portland, Oregon 97070
Phone: (503) 806-0526
Email: jim@collegenet.com

Via email with hard copies mailed upon request

**SUBJECT: PRELIMINARY GEOTECHNICAL ENGINEERING REPORT
FROG POND SUB AREA 1
7331 AND 7447 BOECKMAN ROAD
CLACKAMAS COUNTY, OREGON**

This report presents the results of geotechnical explorations conducted by GeoPacific Engineering, Inc. (GeoPacific) for the above-referenced project. The purpose of our work was to evaluate subsurface conditions at the site and provide recommendations for site development. This geotechnical study was performed in accordance with GeoPacific Proposal No. P-6062 dated April 14, 2017, and your subsequent authorization of our proposals and *General Conditions for Geotechnical Services*.

SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The subject site is located on the north side of SW Boeckman Road approximately 1,000 feet east of the intersection with Canyon Creek Road North in Clackamas County, Oregon. The site consists of tax lots 2400, 2600, and 2700, of tax map 31W12D and is approximately 20 acres in size. Based on topographical mapping provided by Pioneer Design Group, topography in the north-central, south-central, and eastern portions of the site generally slopes down to the west at grades of 10 percent or less. However, an erosional feature in the central portion of the site has side slopes of up to 50 percent and slopes in the western portion of the site slope down to the west at grades of up to about 40 percent. Vegetation in the north-central, south-central, and eastern portions of the site generally consists of grass. Vegetation in the sloped portions of the site generally consists of brush and trees. There is an existing residence with several outbuildings in the south-central portion of the site and another existing residence with a pool and a barn in the southeast portion of the site. There are also three barns and a riding area in the north-central portion of the site. The site is currently used as an equestrian center, with stables and pens covering much of the site.

It is our understanding that the proposed development will involve grading to support 90 new single-family residences, new public streets, associated underground utilities, and stormwater management facilities. The existing residences and barns will be demolished and removed from the site. We understand that it is desired to incorporate subsurface infiltration of stormwater, if feasible. At this time, no grading plan has been provided for our review. GeoPacific will finalize this geotechnical report upon the review and approval of a grading plan.

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).

According to the *Generalized Geologic Map of the Willamette Lowland*, (U.S. Geological Survey, Gannett and Caldwell, 1988), the site is underlain by Pleistocene-aged, unconsolidated silt, sand, and gravel deposited by outburst flooding of glacial Lake Missoula (Qs), generally referred to as the Willamette Formation, a 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. In the vicinity of the subject site, the Willamette Formation deposits consist of horizontally layered, micaceous, silt and silty clay.

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 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 about 10 miles northeast of the site. The Oatfield Fault occurs along the western side of the Portland Hills, and is about 8.7 miles northeast of the site. The Oatfield Fault is considered to be potentially seismogenic (Wong, et al., 2000). Mabey et al., (1996) indicate the Portland Hills Fault Zone has experienced Late Quaternary (last 780,000 years) fault movement; however, movement has not been detected in the last 20,000 years. The accuracy of the fault mapping is stated to be within 500 meters (Wong, et al., 2000). No historical seismicity is correlated with the mapped portion of the Portland Hills Fault Zone, but in 1991 a M3.5 earthquake occurred on a NW-trending shear plane located 1.3 miles east of the fault (Yelin, 1992). Although there is no definitive evidence of recent activity, the Portland Hills Fault Zone is assumed to be potentially active (Geomatrix Consultants, 1995).

Gales Creek-Newberg-Mt. Angel Structural Zone

The Gales Creek-Newberg-Mt. Angel Structural Zone is a 50-mile-long zone of discontinuous, NW-trending faults that lies about 11 miles west 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).

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 roughly along the Oregon coast at depths of between 20 and 40 miles.

SUBSURFACE CONDITIONS

Our site-specific exploration for this report was conducted on May 8, 2017. A total of 10 exploratory test pits were excavated with a medium-sized backhoe to depths ranging from 6.5 to 15 feet at the approximate locations indicated on Figures 2 & 3. It should be noted that test pit locations were located in the field by pacing distances from apparent property corners and other site features shown on the plans provided. As such, the locations of the explorations should be considered approximate.

GeoPacific 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. During exploration, GeoPacific also noted geotechnical conditions such as soil consistency, moisture and groundwater conditions. Logs of test pits are attached to this report. The following report sections are based on the exploration program and summarize subsurface conditions encountered at the site.

Topsoil Horizon: Directly underlying the ground surface in all test pits, we observed moderately to highly organic SILT (OL-ML). This organic material was classified as topsoil horizon. The topsoil was generally soft to medium stiff, dark brown, and contained fine roots throughout. The depth of topsoil in our test pits generally ranged from 6 to 18 inches bgs, but was as deep as 3 feet in localized areas.

Undocumented Fill: Directly underlying the topsoil in test pit TP-1, we observed undocumented fill material. The fill generally consisted of soft to medium stiff, brown SILT (ML) with trace organic content and a disturbed texture. The undocumented fill material extended to an approximate depth of 4 feet bgs in test pit TP-1. Based on site reconnaissance, we believe that additional undocumented fill material may be present along the top of the steep sloping area to the west of the proposed development.

Willamette Formation: Underlying the undocumented fill in test pit TP-1 and underlying the topsoil horizon in test pits TP-2 through TP-10, we observed medium stiff to very stiff, light brown, micaceous, Clayey SILT (ML) belonging to the Willamette Formation. The material generally exhibited subtle to strong orange and gray mottling and low to medium plasticity. The silt and clay contained trace sand below depths of 6.5 to 10 feet bgs in some test pits. The silt and clay extended beyond the maximum depth of exploration in all test pits (15 feet bgs).

Soil Moisture and Groundwater

On May 8, 2017, GeoPacific observed groundwater seepage in test pits TP-1 through TP-4 and TP-7. Soil moisture conditions where seepage was not encountered were generally moist. Based on well log data from nearby properties, static groundwater is estimated to be present at approximately 100 to 120 feet bgs. It is anticipated that groundwater conditions will vary depending on the season, local subsurface conditions, changes in site utilization, and other factors. Perched groundwater may be encountered in localized areas. Seeps and springs may exist in areas not explored, and may become evident during site grading.

INFILTRATION TESTING

On May 8, 2017, GeoPacific performed four infiltration tests in test pits TP-1 and TP-3, at depths ranging from 5 to 11.5 feet bgs. The location of test pits TP-1 and TP-3 are shown on Figures 2 and 3. The pushed pipe, encased falling head method was used for all tests. Infiltration testing was conducted in general accordance with the Clackamas County Stormwater Standards.

During all tests, the native soils at the infiltration test depths were pre-saturated prior to testing. Water levels were measured at 10 minute intervals with approximate head pressures ranging from 6 to 12 inches until three successive measurements showing a consistent infiltration rate were achieved. Table 2 presents a summary of our infiltration test measurement results.

Table 2 - Results of Infiltration Testing

Location	Test Method	Depth (ft)	Infiltration Rate (in/hr)	Soil Description
TP-1	Pushed Pipe	5.0	0	Clayey SILT (ML)
TP-1	Pushed Pipe	7.5	0	Clayey SILT (ML)
TP-3	Pushed Pipe	5.0	0	Clayey SILT (ML)
TP-3	Pushed Pipe	11.5	0	Clayey SILT (ML)

The measured rates presented on Table 2 do not incorporate factors of safety. The measured rates reflect vertical flow pathways only.

PRELIMINARY CONCLUSIONS AND RECOMMENDATIONS

Based on our review, we consider the proposed development to be geotechnically feasible, provided that the recommendations of this report are incorporated into the design and construction phases of the project. In our opinion, the primary geotechnical concerns associated with development at the site are potential slope stability hazards and the presence of undocumented fill along the top of the steeply sloping area.

A slope setback of at least 20 feet is recommended from the slope break, located along the western side of the proposed development. Also, due to the potential for soil infiltration to adversely affect slope stability, all stormwater quality facilities should be lined with bentonite or other impermeable barrier. Additionally, undocumented fill was encountered to a depth of 4 feet bgs in test pit TP-1. Our site reconnaissance indicates that additional fill may be present along the top of the sloped area. Recommendations for removal of undocumented fill are provided in the *Site Preparation* section of this report. The following report sections provide recommendations for site development and construction in accordance with the current applicable codes and local standards of practice.

General Slope Stability Evaluation and Slope Setbacks

For the purpose of evaluating slope stability, we reviewed published geologic mapping and LIDAR imagery, reviewed regional and site-specific topographical mapping, performed a field reconnaissance, and evaluated subsurface soil conditions in exploratory test pits.

Average slopes along the western boundary of the planned development range from approximately 30 to 50 percent grade. Exploratory test pits indicate Lots 64 through 73, the stormwater facility on Tract B, and Lots 82 through 85, which are located adjacent to the steeply sloping western boundary of the site, are generally underlain by medium stiff to stiff silt (Willamette Formation) or partially by undocumented fill. During our field reconnaissance, we observed that portions of the sloped area had been oversteepened with undocumented fill.

GeoPacific recommends a 20-foot footing-to-slope setback from the slope break for proposed structures near the slopes on the west side of the portion of the property to be developed. Figures 3 and 4 show the approximate limits of the recommended setback, measured 20 feet horizontally from the top of the steep slope area. No structural fill should be placed west of the setback line, unless rebuilding the slope after the removal of undocumented fill, if necessary. In this case, no fill should be placed above existing grade within the setback distance. The setback line shown on Figures 3 and 4 should be considered approximate and may be refined by the project civil engineer.

We recommend that fill and cut slopes for the project be planned no steeper than 2H:1V. For fill and cut slopes constructed at 2H:1V or flatter, and comprised of native material and/or engineered fill placed and compacted as recommended herein, we anticipate that adequate factors of safety against global failure will be maintained.

Homes on hillside lots require additional maintenance measures because they are subject to natural slope processes such as runoff, erosion, shallow soil sloughing, soil creep, perched groundwater, etc. The primary measures include maintaining vegetation on the slope face and protecting the slope from surface water runoff, to reduce the potential for minor sloughing and erosion. Surface water should be controlled and under no circumstance should water be allowed to flow uncontrolled over slope faces.

Site Preparation

Areas of proposed buildings, streets, and areas to receive fill should be cleared of vegetation and any organic and inorganic debris. Existing structures should be demolished and any cavities structurally backfilled. 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.

Organic-rich topsoil should then be stripped from construction areas of the site or where engineered fill is to be placed. The estimated average necessary depth of removal in undisturbed areas for moderately to highly organic soils is 8 to 12 inches. However, deeper stripping to remove large tree roots or other organics may be necessary in portions of the site. For example, moderately to highly organic topsoil horizon was encountered in test pits TP-3 through TP-5 and TP-7 through TP-9 to depths ranging from 1.5 to 3.0 feet.

It is possible that portions of the topsoil containing medium to large roots, but not much other organic content, may be remediated by ripping/tilling, root-picking, and recompacting. It may also be possible in some locations to blend this low organic material with other soils to reach an organic content of 5 percent or less in order to reuse the material as engineered fill.

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 his representative.

Any remaining undocumented fills, and subsurface structures (tile drains, basements, driveway and landscaping fill, old utility lines, septic leach fields, etc.) should be removed and the excavations backfilled with engineered fill. Disturbed native soil should either be removed and replaced, or should be ripped/tilled, root-picked, and recompacted in place. Undocumented fill was encountered to a depth of 4 feet bgs in test pit TP-1, but our site reconnaissance indicates that additional fill may be present along the top of the sloped area. Where undocumented fill is removed from the top of the steeply sloped areas, keyways may need to be constructed prior to reconstructing the slope with engineered fill, if necessary. As described in the slope stability section of this report, no fill material should be placed higher than existing grade within the slope setback distance. Removal of fill from the sloped areas should be closely monitored by the project geotechnical engineer and further recommendations may be made based on site conditions.

Once stripping and excavation 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.

Engineered Fill

All grading for the proposed development should be performed as engineered grading in accordance with the applicable building code at time of construction with the exceptions and additions noted herein. Proper test frequency and earthwork documentation usually requires daily observation and testing during stripping, rough grading, and placement of engineered fill. Imported fill material must be approved by the geotechnical engineer prior to being imported to the site. Oversize material greater than 6 inches in size should not be used within 3 feet of

foundation footings, and material greater than 12 inches in diameter should not be used in engineered fill.

Based upon our observations of existing soil conditions at the site, the existing undocumented fill soils may be suitable for re-use as engineered fill, granted that the material is free of any major organic material or inorganic debris. Re-use of undocumented fill material as engineered fill will require sorting operations and continuous observation by the geotechnical engineer.

Engineered fill should be compacted in horizontal lifts not exceeding 8 inches using standard compaction equipment. We recommend that engineered fill be compacted to at least 95 percent of the maximum dry density determined by ASTM D698 (Standard Proctor) or equivalent. Field density testing should conform to ASTM D2922 and D3017, or D1556. All engineered fill should be observed and tested by the project geotechnical engineer or his representative. Typically, one density test is performed for at least every 2 vertical feet of fill placed or every 500 yd³, whichever requires more testing. Because testing is performed on an on-call basis, we recommend that the earthwork contractor be held contractually responsible for test scheduling and frequency.

Site earthwork will be impacted by soil moisture and shallow groundwater conditions. Earthwork in wet weather would likely require extensive use of cement or lime treatment, or other special measures, at considerable additional cost compared to earthwork performed under dry-weather conditions.

Excavating Conditions and Utility Trenches

Subsurface test pit exploration indicates that, in general, utility trenches can be excavated using conventional heavy equipment such as dozers and trackhoes. 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 Silty CLAY to Clayey SILT (CL-ML) classifies 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. 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.

Saturated soils and groundwater may be encountered in utility trenches, particularly during the wet season. We anticipate that dewatering systems consisting of ditches, sumps and pumps would be adequate for control of perched groundwater. Regardless of the dewatering system used, it should be installed and operated such that in-place soils are prevented from being removed along with the groundwater.

Vibrations created by traffic and construction equipment may cause some caving and raveling of excavation walls. In such an event, lateral support for the excavation walls should be provided by the contractor to prevent loss of ground support and possible distress to existing or previously constructed structural improvements.

PVC pipe should be installed in accordance with the procedures specified in ASTM D2321. We recommend that trench backfill be compacted to at least 95% of the maximum dry density obtained by Standard Proctor ASTM D698 or equivalent. Initial backfill lift thickness for a ¾"-0 crushed aggregate base may need to be as great as 4 feet to reduce the risk of flattening underlying flexible pipe. Subsequent lift thickness should not exceed 1 foot. If imported granular fill material is used, then the lifts for large vibrating plate-compaction equipment (e.g. hoe compactor attachments) may be up to 2 feet, provided that proper compaction is being achieved and each lift is tested. Use of large vibrating compaction equipment should be carefully monitored near existing structures and improvements due to the potential for vibration-induced damage.

Adequate density testing should be performed during construction to verify that the recommended relative compaction is achieved. Typically, one density test is taken for every 4 vertical feet of backfill on each 200-lineal-foot section of trench.

Erosion Control Considerations

During our field exploration program, we did not observe soil types that would be considered highly susceptible to erosion. In our opinion, the primary concern regarding erosion potential will occur during construction, in areas that have been stripped of vegetation. Erosion at the site during construction can be minimized by implementing the project erosion control plan, which should include judicious use of straw wattles and silt fences. If used, these erosion control devices should be in place and remain in place throughout site preparation and construction.

Erosion and sedimentation of exposed soils can also be minimized by quickly re-vegetating exposed areas of soil, and by staging construction such that large areas of the project site are not denuded and exposed at the same time. Areas of exposed soil requiring immediate and/or temporary protection against exposure should be covered with either mulch or erosion control netting/blankets. Areas of exposed soil requiring permanent stabilization should be seeded with an approved grass seed mixture, or hydroseeded with an approved seed-mulch-fertilizer mixture.

Wet Weather Earthwork

Soils underlying the site are likely to be moisture sensitive and may be difficult to handle or traverse with construction equipment during periods of wet weather. Earthwork is typically most economical when performed under dry weather conditions. Earthwork performed during the wet-weather season will probably require expensive measures such as cement treatment or imported granular material to compact fill to the recommended engineering specifications. If earthwork is to be performed or fill is to be placed in wet weather or under wet conditions when soil moisture content is difficult to control, the following recommendations should be incorporated into the contract specifications.

- Earthwork should be performed in small areas to minimize exposure to wet weather. Excavation or the removal of unsuitable soils should be followed promptly by the placement and compaction of clean engineered fill. The size and type of construction equipment used may have to be limited to prevent soil disturbance. Under some circumstances, it may be necessary to excavate soils with a backhoe to minimize subgrade disturbance caused by equipment traffic;

- The ground surface within the construction area should be graded to promote run-off of surface water and to prevent the ponding of water;
- Material used as engineered fill should consist of clean, granular soil containing less than 5 percent fines. The fines should be non-plastic. Alternatively, cement treatment of on-site soils may be performed to facilitate wet weather placement;
- The ground surface within the construction area should be sealed by a smooth drum vibratory roller, or equivalent, and under no circumstances should be left uncompacted and exposed to moisture. Soils which become too wet for compaction should be removed and replaced with clean granular materials;
- Excavation and placement of fill should be observed by the geotechnical engineer to verify that all unsuitable materials are removed and suitable compaction and site drainage is achieved; and
- Straw wattles and/or geotextile silt fences should be strategically located to control erosion.

If cement or lime treatment is used to facilitate wet weather construction, GeoPacific should be contacted to provide additional recommendations and field monitoring.

Pavement Design – New Public Streets

We understand that plans for development include several new public streets. For design purposes, the proposed streets have been designated primary streets and secondary streets. All proposed streets are considered primary streets except for the small street that provides access to Lots 82 through 85, which is considered a secondary street.

Based on the results of our subsurface investigation, we assumed that the native soils will exhibit a resilient modulus of at least 4,500 psi. For design purposes, we used an ADT of 900 for the primary streets. This value was determined by assuming ten trips per day per each proposed lot. An ADT of 100 was assumed for the secondary streets. We assumed a heavy truck percentage of 3 percent. We anticipate that streets will be subjected to light traffic loading from daily traffic, occasional emergency vehicles, trash trucks, school buses, and delivery vehicles. Table 1 presents our flexible pavement design input parameters for the proposed streets. Table 2 and 3 present our minimum dry-weather pavement section for the proposed primary and secondary streets, respectively. Our designs are intended to support 20 years of vehicle traffic. Pavement calculations are attached to this report.

Table 1 - Flexible Pavement Section Design Input Parameters for Public Streets

Input Parameter	Primary Streets	Secondary Streets
Average Daily Traffic (ADT)	900	100
18-kip ESAL Initial Performance Period (20 Years)	228,102	25,345
Initial Serviceability	4.2	4.2
Terminal Serviceability	2.5	2.5
Reliability Level	85 Percent	85 Percent
Overall Standard Deviation	0.44	0.44
Streetbed Soil Resilient Modulus (PSI)	5,250	5,250
Design Structural Number	2.98	2.07

Table 2 - Recommended Minimum Dry-Weather Pavement Section for Primary Streets

Material Layer	Structural Coefficient	Section Thickness (in.)	Compaction Standard
Asphaltic Concrete (AC)	0.44	3	91%/ 92% of Rice Density AASHTO T-209
Crushed Aggregate Base ¾"-0 (leveling course)	0.12	2	95% of Modified Proctor ASTM D1557 or equivalent
Crushed Aggregate Base 1½"-0	0.12	12	95% of Modified Proctor ASTM D1557 or equivalent
Subgrade	5,250 PSI	12	95% of Standard Proctor ASTM D698 or equivalent
Total Calculated Structural Number		3.00	

Table 3 - Recommended Minimum Dry-Weather Pavement Section for Secondary Streets

Material Layer	Structural Coefficient	Section Thickness (in.)	Compaction Standard
Asphaltic Concrete (AC)	0.44	3	91%/ 92% of Rice Density AASHTO T-209
Crushed Aggregate Base ¾"-0 (leveling course)	0.12	2	95% of Modified Proctor ASTM D1557 or equivalent
Crushed Aggregate Base 1½"-0	0.12	8	95% of Modified Proctor ASTM D1557 or equivalent
Subgrade	5,250 PSI	12	95% of Standard Proctor ASTM D698 or equivalent
Total Calculated Structural Number		2.52	

Pavement subgrade should be ripped/tilled, root-picked, moisture-conditioned, and compacted to at least 95% of Standard Proctor (ASTM D698 or equivalent). Any pockets of organic debris or loose fill encountered during ripping or tilling should be removed and replaced with engineered fill (see *Site Preparation* Section). In order to verify subgrade strength, we recommend proof-rolling directly on subgrade with a loaded dump truck during dry weather and on top of base course in wet weather. Soft areas that pump, rut, or weave should be stabilized prior to paving. If pavement areas are to be constructed during wet weather, the subgrade and construction plan should be reviewed by the project geotechnical engineer at the time of construction so that condition specific recommendations can be provided. The moisture sensitive subgrade soils make the site a difficult wet weather construction project.

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.

Structural 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 12 inches below exterior grade.

The anticipated allowable soil bearing pressure is 1,500 lbs/ft² for footings bearing on competent, native soil and/or engineered fill. A maximum chimney and column load of 30 kips is 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 0.42, which includes no factor of safety. The maximum anticipated total and differential footing movements 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.

Assuming construction is accomplished as recommended herein, and for the foundation loads anticipated, we estimate total settlement of spread foundations of less than about 1 inch and differential settlement between two adjacent load-bearing components supported on competent soil of less than about ¾ inch. We anticipate that the majority of the estimated settlement will occur during construction, as loads are applied.

Wind, earthquakes, and unbalanced earth loads will subject the proposed structure to lateral forces. Lateral forces on a structure will be resisted by a combination of sliding resistance of its base or footing on the underlying soil and passive earth pressure against the buried portions of the structure. For use in design, a coefficient of friction of 0.42 may be assumed along the interface between the base of the footing and subgrade soils. Passive earth pressure for buried portions of structures may be calculated using an equivalent fluid weight of 320 pounds per cubic foot (pcf), assuming footings are cast against dense, natural soils or engineered fill. The recommended coefficient of friction and passive earth pressure values do not include a safety

factor. The upper 12 inches of soil should be neglected in passive pressure computations unless it is protected by pavement or slabs on grade.

Footing excavations should be trimmed neat and the bottom of the excavation should be carefully prepared. Loose, wet or otherwise softened soil should be removed from the footing excavation prior to placing reinforcing steel bars. GeoPacific should observe foundation excavations prior to placement of reinforcing steel and formwork, to verify that an appropriate bearing stratum has been reached and that the actual exposed soils are suitable to support the planned foundation loads.

The above foundation recommendations are for dry weather conditions. Due to the high moisture sensitivity of engineered fill and native soils, construction during wet weather is likely to require overexcavation of footings and backfill with compacted, crushed aggregate. As a result of this condition, we recommend foundation excavations be observed to verify subgrade strength.

Concrete Slabs-on-Grade

Preparation of areas beneath concrete slab-on-grade floors should be performed as recommended in the *Site Preparation* section. Care should be taken during excavation for foundations and floor slabs, to avoid disturbing subgrade soils. If subgrade soils have been adversely impacted by wet weather or otherwise disturbed, the surficial soils should be scarified to a minimum depth of 8 inches, moisture conditioned to within about 3 percent of optimum moisture content, and compacted to engineered fill specifications. Alternatively, disturbed soils may be removed and the removal zone backfilled with additional crushed rock.

For evaluation of the concrete slab-on-grade floors using the beam on elastic foundation method, a modulus of subgrade reaction of 150 kcf (87 pci) should be assumed for the medium stiff native silt soils anticipated at subgrade depth. This value assumes the concrete slab system is designed and constructed as recommended herein, with a minimum thickness of crushed rock of 8 inches beneath the slab.

Interior slab-on-grade floors should be provided with an adequate moisture break. The capillary break material should consist of ODOT open graded aggregate per ODOT Standard Specifications Table 02630-2. The minimum recommended thickness of capillary break materials on re-compacted soil subgrade is 8 inches. The total thickness of crushed aggregate will be dependent on the subgrade conditions at the time of construction, and should be verified visually by proof-rolling. Under-slab aggregate should be compacted to at least 95% of its maximum dry density as determined by ASTM D698 or equivalent.

In areas where moisture will be detrimental to floor coverings or equipment inside the proposed structure, appropriate vapor barrier and damp-proofing measures should be implemented. Appropriate design professionals should be consulted regarding vapor barrier and damp proofing systems, ventilation, building material selection and mold prevention issues, which are outside GeoPacific's area of expertise.

Footing and Roof Drains

If the proposed structures will have raised floors, 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 ft³ 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.

Permanent Below-Grade Walls

Lateral earth pressures against below-grade retaining walls will depend upon the inclination of any adjacent slopes, type of backfill, degree of wall restraint, method of backfill placement, degree of backfill compaction, drainage provisions, and magnitude and location of any adjacent surcharge loads. At-rest soil pressure is exerted on a retaining wall when it is restrained against rotation. In contrast, active soil pressure will be exerted on a wall if its top is allowed to rotate or yield a distance of roughly 0.001 times its height or greater.

If the subject retaining walls will be free to rotate at the top, they should be designed for an active earth pressure equivalent to that generated by a fluid weighing 35 pcf for level backfill against the wall. For restrained wall, an at-rest equivalent fluid pressure of 55 pcf should be used in design, again assuming level backfill against the wall. These values assume that the recommended drainage provisions are incorporated, and hydrostatic pressures are not allowed to develop against the wall.

During a seismic event, lateral earth pressures acting on below-grade structural walls will increase by an incremental amount that corresponds to the earthquake loading. Based on the Mononobe-Okabe equation and peak horizontal accelerations appropriate for the site location, seismic loading should be modeled using the active or at-rest earth pressures recommended above, plus an incremental rectangular-shaped seismic load of magnitude 6.5H, where H is the total height of the wall.

We assume relatively level ground surface below the base of the walls. As such, we recommend passive earth pressure of 320 pcf for use in design, assuming wall footings are cast against competent native soils or engineered fill. If the ground surface slopes down and away from the base of any of the walls, a lower passive earth pressure should be used and GeoPacific should be contacted for additional recommendations.

A coefficient of friction of 0.42 may be assumed along the interface between the base of the wall footing and subgrade soils. The recommended coefficient of friction and passive earth pressure values do not include a safety factor, and an appropriate safety factor should be included in design. The upper 12 inches of soil should be neglected in passive pressure computations unless it is protected by pavement or slabs on grade.

The above recommendations for lateral earth pressures assume that the backfill behind the subsurface walls will consist of properly compacted structural fill, and no adjacent surcharge loading. If the walls will be subjected to the influence of surcharge loading within a horizontal distance equal to or less than the height of the wall, the walls should be designed for the additional horizontal pressure. For uniform surcharge pressures, a uniformly distributed lateral pressure of 0.3 times the surcharge pressure should be added. Traffic surcharges may be estimated using an additional vertical load of 250 psf (2 feet of additional fill), in accordance with local practice.

The recommended equivalent fluid densities assume a free-draining condition behind the walls so that hydrostatic pressures do not build-up. This can be accomplished by placing a 12 to 18-inch wide zone of sand and gravel containing less than 5 percent passing the No. 200 sieve against the walls. A 3-inch minimum diameter perforated, plastic drain pipe should be installed at the base of the walls and connected to a suitable discharge point to remove water in this zone of sand and gravel. The drain pipe should be wrapped in filter fabric (Mirafi 140N or other as approved by the geotechnical engineer) to minimize clogging.

Wall drains are recommended to prevent detrimental effects of surface water runoff on foundations – not to dewater groundwater. Drains should not be expected to eliminate all potential sources of water entering a basement or beneath a slab-on-grade. An adequate grade to a low point outlet drain in the crawlspace is required by code. Underslab drains are sometimes added beneath the slab when placed over soils of low permeability and shallow, perched groundwater.

Water collected from the wall drains should be directed into the local storm drain system or other suitable outlet. A minimum 0.5 percent fall should be maintained throughout the drain and non-perforated pipe outlet. Down spouts and roof drains should not be connected to the wall drains in order to reduce the potential for clogging. The drains should include clean-outs to allow periodic maintenance and inspection. Grades around the proposed structure should be sloped such that surface water drains away from the building.

GeoPacific should be contacted during construction to verify subgrade strength in wall keyway excavations, to verify that backslope soils are in accordance with our assumptions, and to take density tests on the wall backfill materials.

Structures should be located a horizontal distance of at least $1.5H$ away from the back of the retaining wall, where H is the total height of the wall. GeoPacific should be contacted for additional foundation recommendations where structures are located closer than $1.5H$ to the top of any wall.

Stormwater Management

We understand that plans for project development may include stormwater management facilities, and that it is desired to incorporate subsurface disposal of stormwater. Based on the results of our infiltration testing, the Clayey SILT to Silty CLAY (CL-ML) encountered below 4 feet bgs in test pit TP-1 and below 2 feet bgs in test pit TP-3 exhibited an infiltration rate of 0 inches per hour.

Based on the results of our infiltration testing, we do not recommend using subsurface infiltration as a method of stormwater disposal at this site. Stormwater management systems should be constructed as specified by the designer and/or in accordance with the applicable stormwater design codes. Stormwater exceeding soil infiltration and/or soil storage capacities will need to be directed to a suitable surface discharge location, away from structures. Stormwater management systems may need to include overflow outlets, surface water control measures and/or be connected to the street stormdrain system, if available. In no case should uncontrolled stormwater be allowed to flow over slopes. Evaluating environmental implications of stormwater disposal at this site are beyond the scope of this study.

Stormwater Quality Facilities

We understand that water quality facilities are proposed on Tracts B and C located in the central-western and southwestern portions of the site, adjacent to the steep slopes along the western boundary. Due to the potential for soil infiltration to adversely affect slope stability, all stormwater quality facilities should be lined with bentonite or other impermeable barrier, such as a heavy plastic liner to prevent infiltration.

Seismic Design

The Oregon Department of Geology and Mineral Industries (DOGAMI), Oregon HazVu: 2016 Statewide GeoHazards Viewer indicates that the site is in an area where *very strong* ground shaking is anticipated during an earthquake. Structures should be designed to resist earthquake loading in accordance with the methodology described in the 2015 International Building Code (IBC) with applicable Oregon Structural Specialty Code (OSSC) revisions (current 2014). 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) 2016 Seismic Design Maps Summary Report are summarized in Table 4, and are based upon existing soil conditions.

Table 4 - Recommended Earthquake Ground Motion Parameters (USGS 2016)

Parameter	Value
Location (Lat, Long), degrees	45.319, -122.753
Probabilistic Ground Motion Values, 2% Probability of Exceedance in 50 yrs	
Peak Ground Acceleration (PGA _M)	0.445 g
Short Period, S _s	0.929 g
1.0 Sec Period, S ₁	0.409 g
Soil Factors for Site Class D:	
F _a	1.129
F _v	1.591
SD _s = 2/3 x F _a x S _s	0.699 g
SD ₁ = 2/3 x F _v x S ₁	0.434 g
Seismic Design Category	D

Soil Liquefaction

The Oregon Department of Geology and Mineral Industries (DOGAMI), Oregon HazVu: 2016 Statewide GeoHazards Viewer indicates that the site is in an area considered to be at *low risk* for soil liquefaction during an earthquake. Soil liquefaction is a phenomenon wherein saturated soil deposits temporarily lose strength and behave as a liquid in response to ground shaking caused by strong earthquakes. Soil liquefaction typically occurs in loose sands and granular soils located below the water table, and fine-grained soils with a plasticity index less than 15. The subsurface profile observed within our test pit explorations which extended to a maximum depth of 15 feet bgs, indicated that the site is underlain generally by medium stiff to very stiff Silty CLAY to Clayey SILT (CL-ML), which are not considered susceptible to liquefaction. Some groundwater seepage was observed within our test pits. Based on well log data from nearby properties, static groundwater is estimated to be present at 100 to 120 feet bgs.

UNCERTAINTIES AND LIMITATIONS

We have prepared this report for the owner and their consultants for use in design of this project only. This report should be provided in its entirety to prospective contractors for bidding and estimating purposes; however, the conclusions and interpretations presented in this report should not be construed as a warranty of the subsurface conditions. Experience has shown that soil and groundwater conditions can vary significantly over small distances. Inconsistent conditions can occur between explorations that may not be detected by a geotechnical study. If, during future site operations, subsurface conditions are encountered which vary appreciably from those described herein, GeoPacific should be notified for review of the recommendations of this report, and revision of such if necessary.

Sufficient geotechnical monitoring, testing and consultation should be provided during construction to confirm that the conditions encountered are consistent with those indicated by explorations. The checklist attached to this report outlines recommended geotechnical observations and testing for the project. Recommendations for design changes will be provided should conditions revealed during construction differ from those anticipated, and to verify that the geotechnical aspects of construction comply with the contract plans and specifications.

Frog Pond Sub Area 1
July 24, 2017

Within the limitations of scope, schedule and budget, GeoPacific attempted to execute these services in accordance with generally accepted professional principles and practices in the fields of geotechnical engineering and engineering geology at the time the report was prepared. No warranty, expressed or implied, is made. The scope of our work did not include environmental assessments or evaluations regarding the presence or absence of wetlands or hazardous or toxic substances in the soil, surface water, or groundwater at this site.

We appreciate this opportunity to be of service.

Sincerely,

GEO PACIFIC ENGINEERING, INC.



Daniel P. Thabault, E.I.
Engineering Staff



Benjamin G. Anderson, P.E.
Project Engineer

Attachments: References
Figures

- Figure 1 – Vicinity Map
- Figure 2 – Site Aerial Map and Exploration Locations
- Figure 3 – Site Plan and Exploration Locations
- Figure 4 – Site Topo and Exploration Locations

Exploration Logs
Site Research
Pavement Calculations
Photographic Log

REFERENCES

- 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.
- Beeson, M.H., Tolan, T.L., and Madin, I.P., 1989, Geologic map of the Lake Oswego Quadrangle, Clackamas, Multnomah, and Washington Counties, Oregon: Oregon Department of Geology and Mineral Industries Geological Map Series GMS-75, scale 1:24,000.
- Carver, G.A., 1992, Late Cenozoic tectonics of coastal northern California: American Association of Petroleum Geologists-SEPM Field Trip Guidebook, May, 1992.
- Gannet, Marshall W., and Caldwell, Rodney R., Generalized Geologic Map of the Willamette Lowland, U.S. Department of the interior, U.S. Geological Survey, 1998.
- 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.
- 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.
- Oregon Department of Geology and Mineral Industries, Statewide Geohazards Viewer, www.oregongeology.org/hazvu.
- Peterson, C.D., Darioenzo, M.E., Burns, S.F., and Burriss, 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.
- 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.
- United States Geological Survey, USGS Earthquake Hazards Program Website (earthquake.usgs.gov).
- United States Geologic Survey, 2008 NSHMP PSHA Interactive Deaggregation, Web Application, Accessed November 2014.
- 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).
- Web Soil Survey, Natural Resources Conservation Service, United States Department of Agriculture 2016 *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.



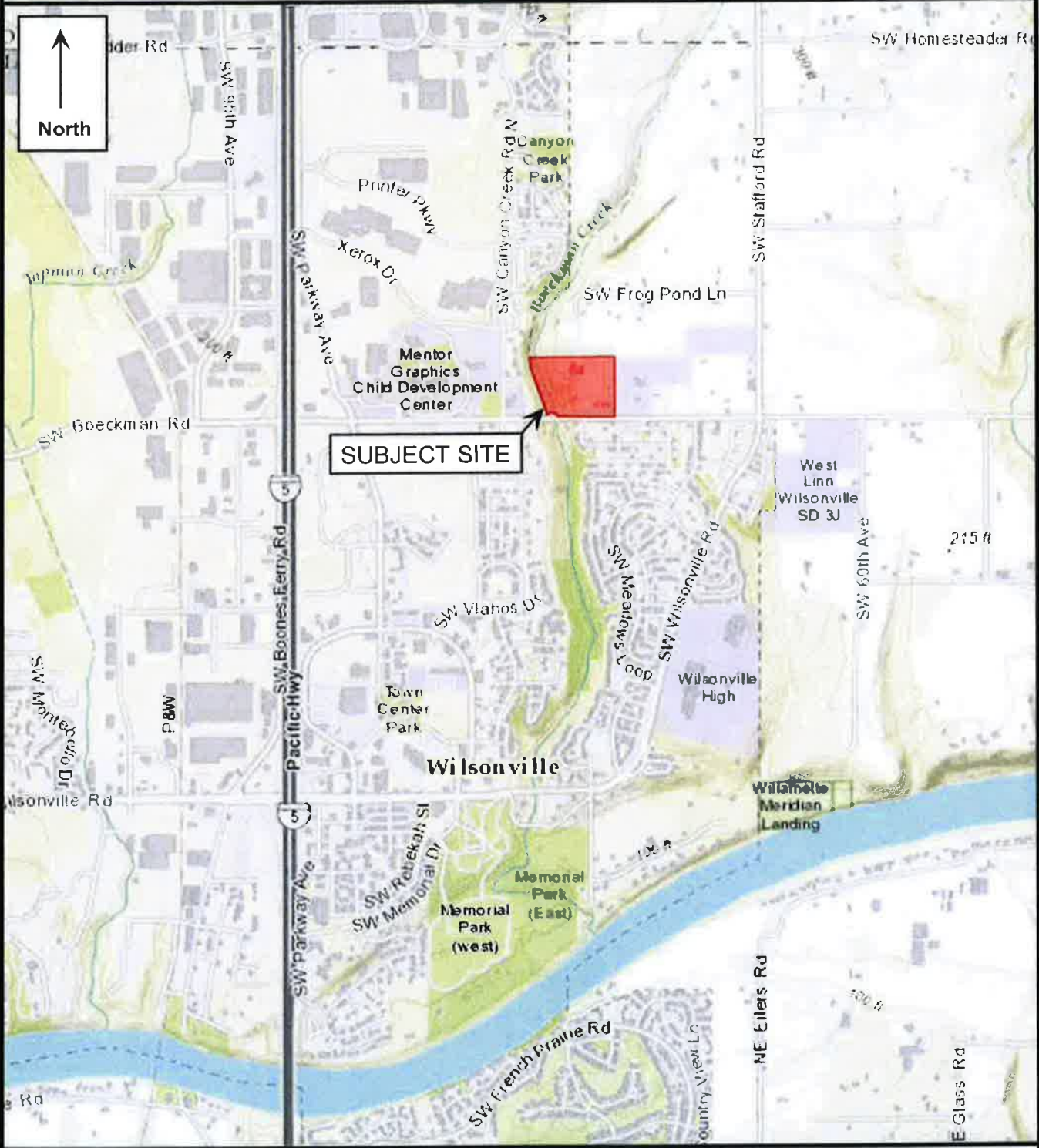
Real-World Geotechnical Solutions
Investigation • Design • Construction Support

FIGURES



14835 SW 72nd Avenue
 Portland, Oregon 97224
 Tel: (503) 598-8445 Fax: (503) 941-9281

VICINITY MAP



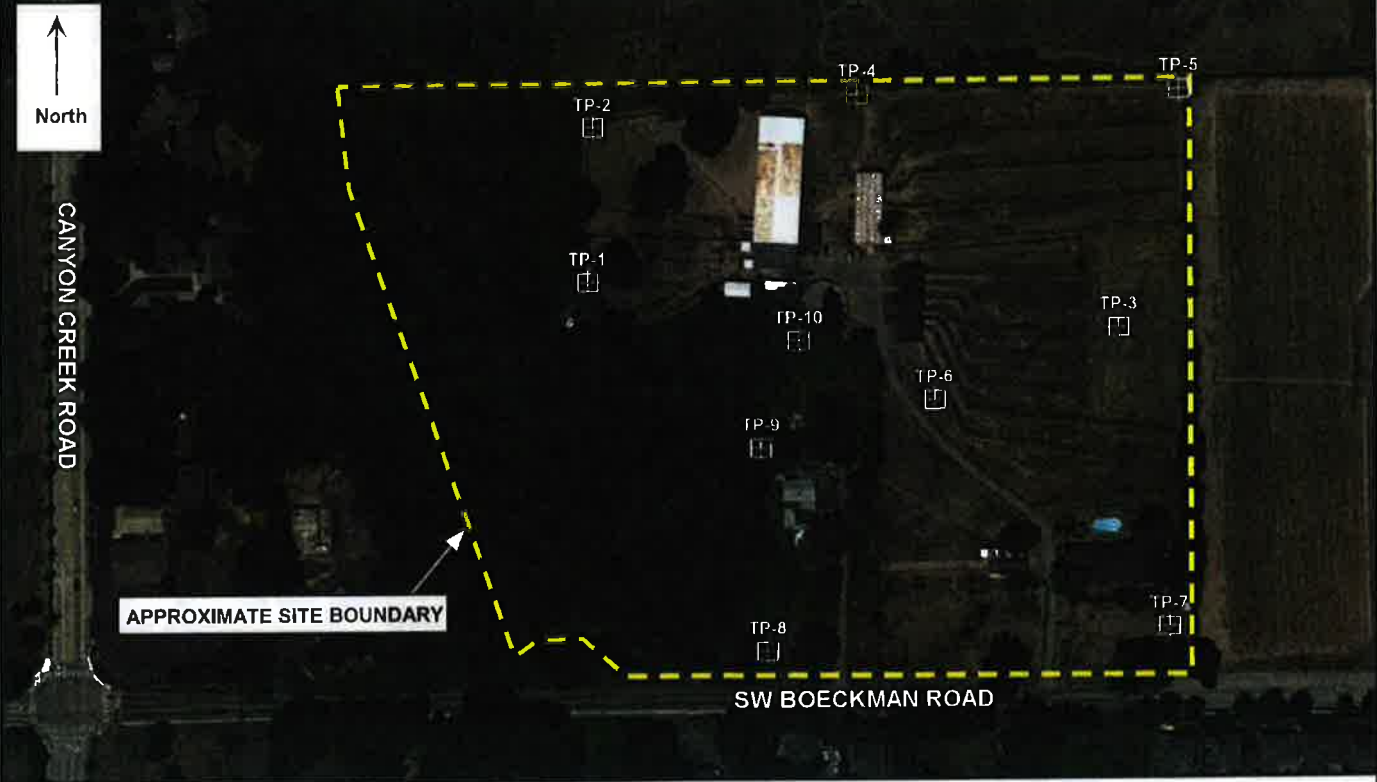
Legend Approximate Scale 1 in = 2000 ft Date: 06/21/17
Drawn by: DPT
 Base map: Dogami SLIDO, Topographic View, 2017, Website, <http://www.oregongeology.org/slido/index.html>

Project: Frog Pond - Sub Area 1 7331 and 7447 SW Boeckman Road Wilsonville, Oregon	Project No. 17-4570	FIGURE 1
---	----------------------------	-----------------



14835 SW 72nd Avenue
 Portland, Oregon 97224
 Tel: (503) 598-8445 Fax: (503) 941-9281

SITE AERIAL MAP AND EXPLORATION LOCATIONS



Legend

Approximate Location of Test Pit Exploration

APPROXIMATE SCALE
 1" = 200'



Date: 06/21/17
 Drawn by: DPT

Project: Frog Pond - Sub Area 1
 7331 and 7447 SW Boeckman Road
 Wilsonville, Oregon

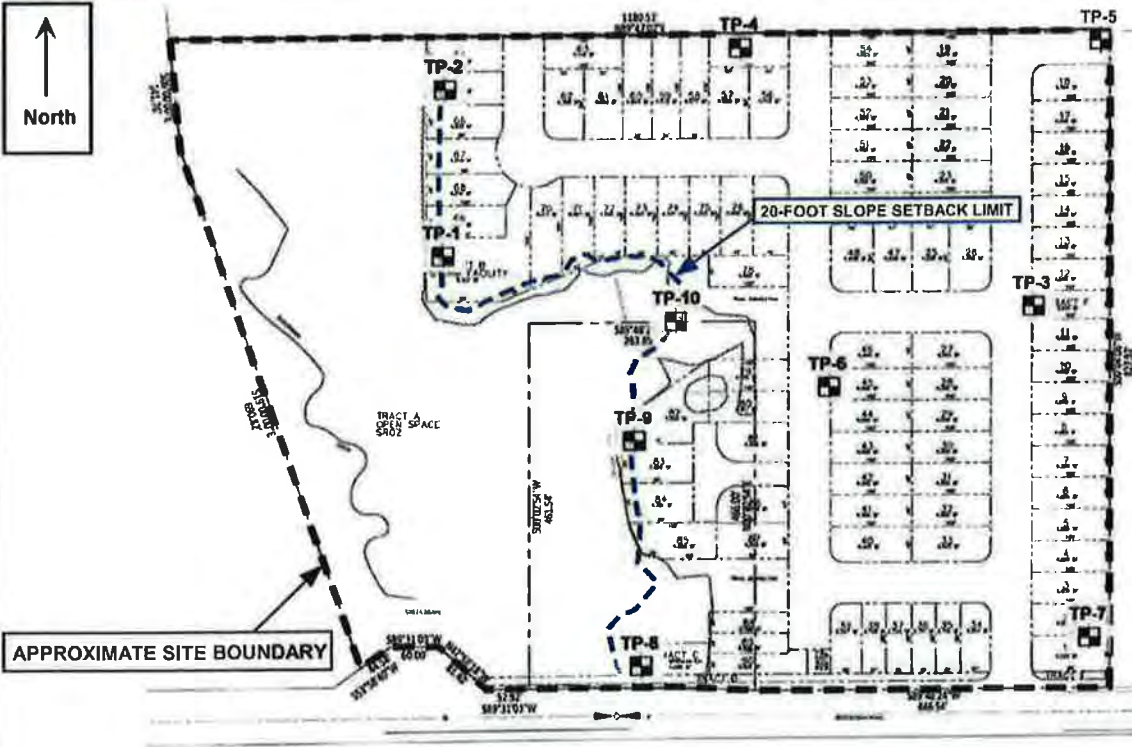
Project No. 17-4570

FIGURE 2



14838 SW 72nd Avenue
 Portland, Oregon 97224
 Tel: (503) 698-8445 Fax: (503) 941-9281

SITE PLAN AND EXPLORATION LOCATIONS



Legend

Approximate Location of Test Pit Exploration

APPROXIMATE SCALE
 1" = 180'

Date: 6/21/17
 Drawn by: DPT



Project: Frog Pond - Sub Area 1
 7331 and 7447 SW Boeckman Road
 Wilsonville, Oregon

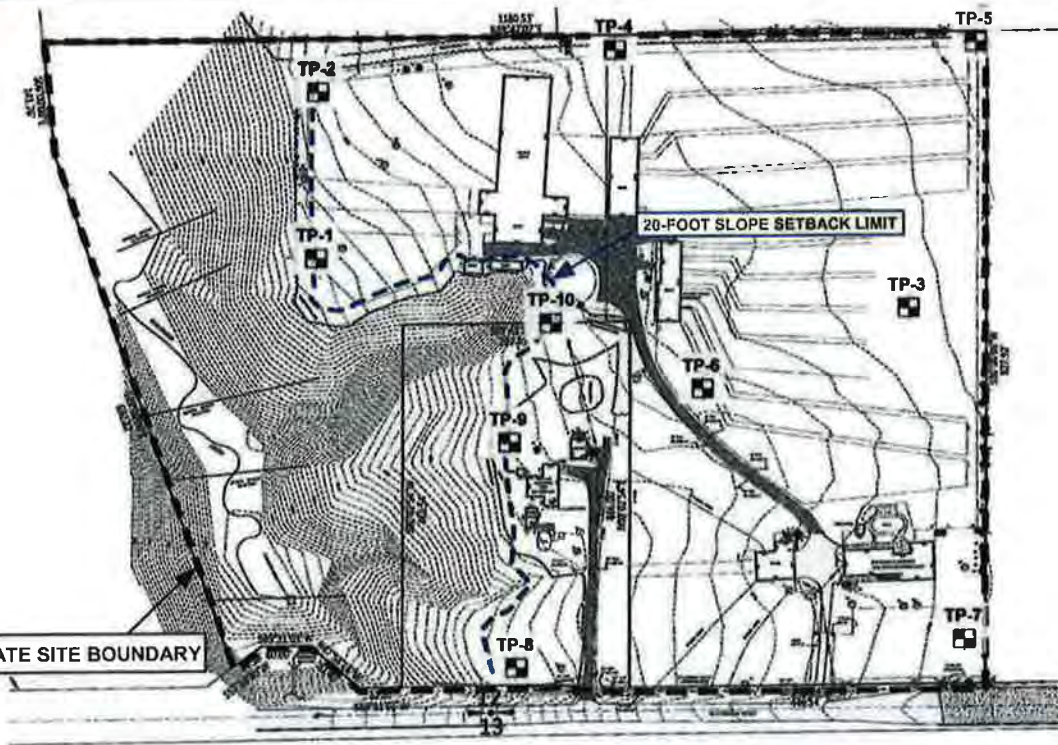
Project No. 17-4570

FIGURE 3



14835 SW 72nd Avenue
 Portland, Oregon 97224
 Tel: (503) 598-8445 Fax: (503) 941-9281

SITE TOPO AND EXPLORATION LOCATIONS



Legend

Approximate Location of Test Pit Exploration

APPROXIMATE SCALE
 1" = 180'

Date: 6/21/17
 Drawn by: DPT



Project: Frog Pond - Sub Area 1
 7331 and 7447 SW Boeckman Road
 Wilsonville, Oregon

Project No. 17-4570

FIGURE 4



Real-World Geotechnical Solutions
Investigation • Design • Construction Support

EXPLORATION LOGS




14835 SW 72nd Avenue
 Portland, Oregon 97224
 Tel: (503) 598-8445 Fax: (503) 941-9281

TEST PIT LOG

Project: Frog Pond - Sub Area 1
 7331 and 7447 SW Boeckman Road
 Wilsonville, Oregon

Project No. 17-4570

Test Pit No. TP-1

Depth (ft)	Pocket Penetrometer (tons/ft ²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
0						6-12 inches, soft to medium stiff, moderately organic SILT (OL-ML), dark brown, fine roots throughout, moist (Topsoil Horizon)
1	1.5					Soft to medium stiff, Clayey SILT (ML), brown, low to medium plasticity, trace organic content, disturbed texture, moist (Undocumented Fill)
2	1.0					
3	1.0					
4	1.5					Stiff, SILT (ML), light brown, subtle orange and gray mottling, black staining, low plasticity, micaceous, moist (Willamette Formation)
5						
6						
7						
8						
9						Grades to with trace sand
10						
11						
12						Test pit terminated at 12 feet bgs. Light perched groundwater seepage observed at 5 feet bgs.
13						
14						
15						
16						
17						

LEGEND



Bag Sample



5 Gal. Bucket Sample



Shelby Tube Sample



Seepage



Water Bearing Zone



Water Level at Abandonment

Date Excavated: 5/08/2017

Logged By: D. Thabault

Surface Elevation: ~190' amsl




14835 SW 72nd Avenue
 Portland, Oregon 97224
 Tel: (503) 598-8445 Fax: (503) 941-8281

TEST PIT LOG

Project: Frog Pond - Sub Area 1
 7331 and 7447 SW Boeckman Road
 Wilsonville, Oregon

Project No. 17-4570

Test Pit No. TP-2

Depth (ft)	Pocket Penetrometer (tons/ft ²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1	2.0					8-12 inches, medium stiff to stiff, moderately organic SILT (OL-ML), dark brown, fine roots throughout, moist (Topsoil Horizon)
2	1.5					Stiff, SILT (ML), light brown, subtle orange and gray mottling, black staining, low plasticity, micaceous, moist (Willamette Formation)
3	1.5					
4	3.5					Grades to stiff and light brown
5						
6						
7						
8						
9						
10						Grades to with trace sand
11						
12						Grades to very moist
13						
14						
15						Test pit terminated at 15 feet bgs. Very light perched groundwater seepage observed at 12 feet bgs.
16						
17						

LEGEND



100 to 1,000 g
 Bag Sample



5 Gal. Bucket Sample



Shelby Tube Sample



Seepage



Water Bearing Zone



Water Level at Abandonment

Date Excavated: 5/08/2017

Logged By: D. Thabault

Surface Elevation: ~199' amsl




14835 SW 72nd Avenue
 Portland, Oregon 97224
 Tel: (503) 598-8445 Fax: (503) 941-9281

TEST PIT LOG

Project: Frog Pond - Sub Area 1
 7331 and 7447 SW Boeckman Road
 Wilsonville, Oregon

Project No. 17-4570

Test Pit No. **TP-3**

Depth (ft)	Pocket Penetrometer (tons/ft ²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1	1.5					Soft to medium stiff, moderately organic SILT (OL-ML), dark gray to brown, fine roots throughout, moist (Topsoil Horizon)
2	1.5					Stiff to very stiff, SILT (ML), light brown, subtle orange and gray mottling, low plasticity, micaceous, moist (Willamette Formation)
3	3.5					
4	4.0					
5						
6						
7						
8						Grades to with trace sand and moist to very moist
9						
10						
11						Test pit terminated at 11 feet bgs.
12						Very light perched groundwater seepage observed at 12 feet bgs.
13						
14						
15						
16						
17						

LEGEND



Bag Sample



Bucket Sample



Shelby Tube Sample



Seepage



Water Bearing Zone



Water Level at Abandonment

Date Excavated: 5/08/2017

Logged By: D. Thabault

Surface Elevation: ~217' amsl




14835 SW 72nd Avenue
 Portland, Oregon 97224
 Tel: (503) 598-8445 Fax: (503) 941-9281

TEST PIT LOG

Project: Frog Pond - Sub Area 1
 7331 and 7447 SW Boeckman Road
 Wilsonville, Oregon

Project No. 17-4570

Test Pit No. **TP-4**

Depth (ft)	Pocket Penetrometer (tons/ft ²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1	0.5					Soft, moderately organic SILT (OL-ML), brown to dark brown, disturbed texture, fine roots and some organic debris throughout, moist (Topsoil Horizon)
2	1.0					Soft, SILT (ML), light brown, subtle orange and gray mottling, low plasticity, micaceous, moist (Willamette Formation)
3	3.0					Grades to stiff
4	3.0					
5						
6						
7						
8						Test pit terminated at 7.5 feet bgs. Very light perched groundwater seepage observed at 7 feet bgs.
9						
10						
11						
12						
13						
14						
15						
16						
17						

LEGEND



Bag Sample



Bucket Sample



Shelby Tube Sample



Seepage



Water Bearing Zone



Water Level at Abandonment

Date Excavated: 5/08/2017

Logged By: D. Thabault

Surface Elevation: ~214' amsl



14835 SW 72nd Avenue
 Portland, Oregon 97224
 Tel: (503) 598-8445 Fax: (503) 941-9281

TEST PIT LOG




Project: Frog Pond - Sub Area 1
 7331 and 7447 SW Boeckman Road
 Wilsonville, Oregon

Project No. 17-4570

Test Pit No. **TP-5**

Depth (ft)	Pocket Penetrometer (tons/ft ²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1	1.5					Soft, moderately organic SILT (OL-ML), dark brown, fine roots concentrated in 6-inch root mat, moist (Topsoil Horizon)
2	2.0					Medium stiff, SILT (ML), light brown, orange and gray mottling, low plasticity, micaceous, moist (Willamette Formation)
3	4.5					Grades to very stiff
4	4.5					
5						
6						
7						Grades to with trace sand
8						
9						Test pit terminated at 8.5 feet bgs. No groundwater seepage observed.
10						
11						
12						
13						
14						
15						
16						
17						

LEGEND

 Bag Sample
  Bucket Sample
  Shelby Tube Sample
  Seepage
  Water Bearing Zone
  Water Level at Abandonment

Date Excavated: 5/08/2017
 Logged By: D. Thabault
 Surface Elevation: ~221' amsl



14835 SW 72nd Avenue
 Portland, Oregon 97224
 Tel: (503) 598-8445 Fax: (503) 941-9281

TEST PIT LOG

Project: Frog Pond - Sub Area 1
 7331 and 7447 SW Boeckman Road
 Wilsonville, Oregon

Project No. 17-4570

Test Pit No. TP-6

Depth (ft)	Pocket Penetrometer (tons/ft ²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1	1.5					8-12 inches, soft to medium stiff, moderately organic SILT (OL-ML), dark brown, fine roots throughout, moist (Topsoil Horizon)
2	1.5					Medium stiff, SILT (ML), light brown, orange and gray mottling, low plasticity, micaceous, moist (Willamette Formation)
3	3.0					Grades to stiff
4	3.5					
5						
6						
7						
8						
9						Grades to with trace sand
10						Test pit terminated at 10 feet bgs. No groundwater seepage observed.
11						
12						
13						
14						
15						
16						
17						

LEGEND



Bag Sample



5 Gal. Bucket Sample



Shelby Tube Sample



Seepage



Water Bearing Zone



Water Level at Abandonment

Date Excavated: 5/08/2017

Logged By: D. Thabault

Surface Elevation: ~211' amsl




14835 SW 72nd Avenue
 Portland, Oregon 97224
 Tel: (503) 598-8445 Fax: (503) 941-8281

TEST PIT LOG

Project: Frog Pond - Sub Area 1
 7331 and 7447 SW Boeckman Road
 Wilsonville, Oregon

Project No. 17-4570

Test Pit No. **TP-7**

Depth (ft)	Pocket Penetrometer (tons/ft ²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1	1.5					Medium stiff, moderately organic SILT (OL-ML), dark brown, fine to medium roots throughout, moist (Topsoil Horizon)
2	3.0					Stiff to very stiff, SILT (ML), light brown, subtle orange and gray mottling, black staining, low plasticity, micaceous, moist (Willamette Formation)
3	4.0					
4	3.5					
5						
6						
7						
8						Grades to with trace sand
9						
10						
11						
12						Test pit terminated at 11.5 feet bgs. Very light groundwater seepage observed at 6 feet bgs.
13						
14						
15						
16						
17						

LEGEND



Bag Sample



Bucket Sample



Shelby Tube Sample



Seepage



Water Bearing Zone



Water Level at Abandonment

Date Excavated: 5/08/2017

Logged By: D. Thabault

Surface Elevation: ~217' amsl



14835 SW 72nd Avenue
 Portland, Oregon 97224
 Tel: (503) 598-8445 Fax: (503) 941-9281

TEST PIT LOG

Project: Frog Pond - Sub Area 1
 7331 and 7447 SW Boeckman Road
 Wilsonville, Oregon

Project No. 17-4570

Test Pit No. **TP-8**

Depth (ft)	Pocket Penetrometer (tons/ft ²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1	1.5					Medium stiff, moderately organic SILT (OL-ML), dark brown, fine to medium roots throughout, moist (Topsoil Horizon)
2	1.5					
3	3.5					Stiff, SILT (ML), light brown, subtle orange and gray mottling, trace organic content, low plasticity, micaceous, moist (Willamette Formation)
4	3.5					Grades to with no organic content
5						
6						
7						
8						Grades to with trace sand
9						
10						
11						Test pit terminated at 11 feet bgs. No groundwater seepage observed.
12						
13						
14						
15						
16						
17						

LEGEND



Bag Sample



5 Gal. Bucket Sample



Shelby Tube Sample



Seepage



Water Bearing Zone



Water Level at Abandonment

Date Excavated: 5/08/2017
 Logged By: D. Thabault
 Surface Elevation: ~196' amsl



14835 SW 72nd Avenue
 Portland, Oregon 97224
 Tel: (503) 598-8445 Fax: (503) 941-9281

TEST PIT LOG

Project: Frog Pond - Sub Area 1
 7331 and 7447 SW Boeckman Road
 Wilsonville, Oregon

Project No. 17-4570

Test Pit No. **TP-9**

Depth (ft)	Pocket Penetrometer (tons/ft ²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1	1.5					Soft to medium stiff, moderately organic SILT (OL-ML), dark brown, fine to medium roots throughout, inorganic debris above 1 foot bgs, moist (Topsoil Horizon)
2	0.5					
3	3.0					
4	2.5					Medium stiff to stiff, SILT (ML), light brown, subtle orange and gray mottling, trace organic content, low plasticity, micaceous, moist (Willamette Formation)
5						
6						
7						
8						
9						Grades to with trace sand
10						
11						
12						
13						Grades to sandy
14						
15						Test pit terminated at 15 feet bgs. No groundwater seepage observed.
16						
17						

LEGEND



100 to 1,000 g
Bag Sample



5 Gal. Bucket Sample



Shelby Tube Sample



Seepage



Water Bearing Zone



Water Level at Abandonment

Date Excavated: 5/08/2017

Logged By: D. Thabault

Surface Elevation: ~202' amsl



14835 SW 72nd Avenue
 Portland, Oregon 97224
 Tel: (503) 598-8445 Fax: (503) 941-9281

TEST PIT LOG

Project: Frog Pond - Sub Area 1
 7331 and 7447 SW Boeckman Road
 Wilsonville, Oregon

Project No. 17-4570

Test Pit No. **TP-10**

Depth (ft)	Pocket Penetrometer (tons/ft ²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1	1.5					Soft to medium stiff, moderately organic SILT (OL-ML), dark brown, fine to small roots throughout, moist (Topsoil Horizon)
2	1.5					Medium stiff, SILT (ML), light brown, subtle orange and gray mottling, low plasticity, micaceous, moist (Willamette Formation)
3	2.5					Grades to stiff
4	3.0					
5						
6						
7						Test pit terminated at 6.5 feet bgs. No groundwater seepage observed.
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

LEGEND



Bag Sample



5 Gal. Bucket



Shelby Tube Sample



Seepage



Water Bearing Zone



Water Level at Abandonment

Date Excavated: 5/08/2017

Logged By: D. Thabault

Surface Elevation: ~207' amsl



Real-World Geotechnical Solutions
Investigation • Design • Construction Support

SITE RESEARCH

USGS Design Maps Summary Report

User-Specified Input

Report Title 17-4570 - Frog Pond - Sub Area 1

Wed June 21, 2017 23:25:14 UTC

Building Code Reference Document ASCE 7-10 Standard
(which utilizes USGS hazard data available in 2008)

Site Coordinates 45.31877°N, 122.75334°W

Site Soil Classification Site Class D - "Stiff Soil"

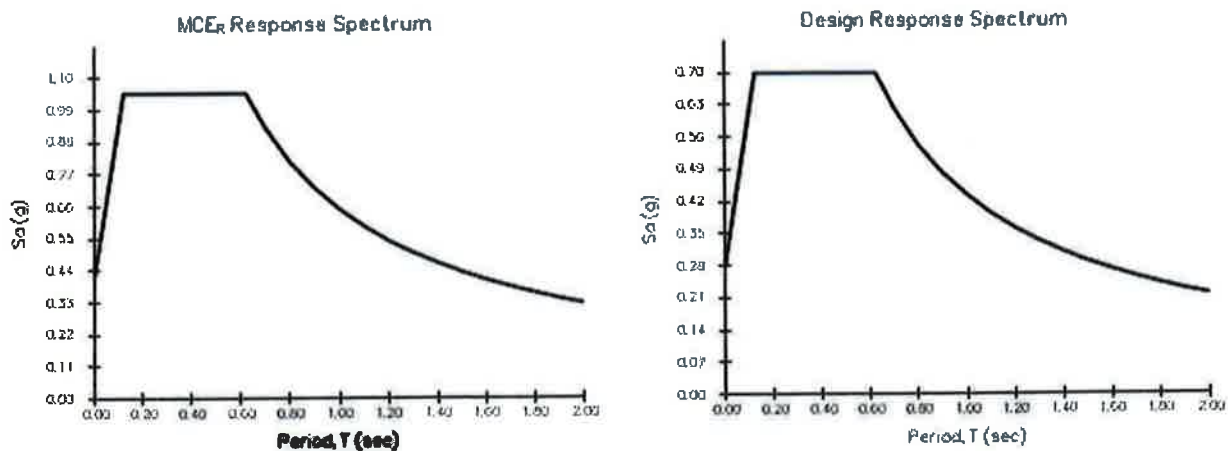
Risk Category I/II/III



USGS-Provided Output

$S_s = 0.929 \text{ g}$	$S_{MS} = 1.048 \text{ g}$	$S_{DS} = 0.699 \text{ g}$
$S_1 = 0.409 \text{ g}$	$S_{M1} = 0.651 \text{ g}$	$S_{D1} = 0.434 \text{ g}$

For information on how the S_s and S_1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.



For PGA_M , T_L , C_{RS} , and C_{R1} values, please [view the detailed report](#).

Although this information is a product of the U.S. Geological Survey, we provide no warranty, expressed or implied, as to the accuracy of the data contained therein. This tool is not a substitute for technical subject-matter knowledge.

USGS Design Maps Detailed Report

ASCE 7-10 Standard (45.31877°N, 122.75334°W)

ite 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_5) 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]

$$S_5 = 0.929 \text{ g}$$

From **Figure 22-2** ^[2]

$$S_1 = 0.409 \text{ g}$$

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

$$\text{For SI: } 1\text{ft/s} = 0.3048 \text{ m/s } \quad 1\text{lb/ft}^2 = 0.0479 \text{ kN/m}^2$$

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_s

Site Class	Mapped MCE _R Spectral Response Acceleration Parameter at Short Period				
	$S_s \leq 0.25$	$S_s = 0.50$	$S_s = 0.75$	$S_s = 1.00$	$S_s \geq 1.25$
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 $S_s = 0.929$ g, $F_s = 1.129$

Table 11.4-2: Site Coefficient F_v

Site Class	Mapped MCE _R Spectral Response Acceleration Parameter at 1-s Period				
	$S_1 \leq 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \geq 0.50$
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 $S_1 = 0.409$ g, $F_v = 1.591$

Equation (11.4-1):

$$S_{MS} = F_a S_s = 1.129 \times 0.929 = 1.048 \text{ g}$$

Equation (11.4-2):

$$S_{M1} = F_v S_1 = 1.591 \times 0.409 = 0.651 \text{ g}$$

Section 11.4.4 — Design Spectral Acceleration Parameters

Equation (11.4-3):

$$S_{DS} = \frac{2}{3} S_{MS} = \frac{2}{3} \times 1.048 = 0.699 \text{ g}$$

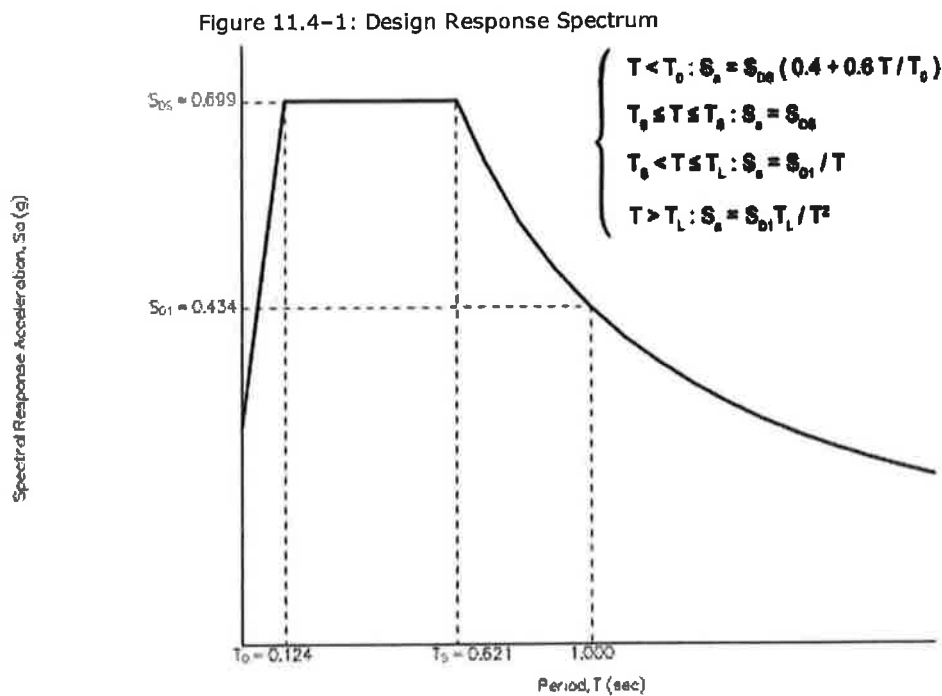
Equation (11.4-4):

$$S_{D1} = \frac{2}{3} S_{M1} = \frac{2}{3} \times 0.651 = 0.434 \text{ g}$$

Section 11.4.5 — Design Response Spectrum

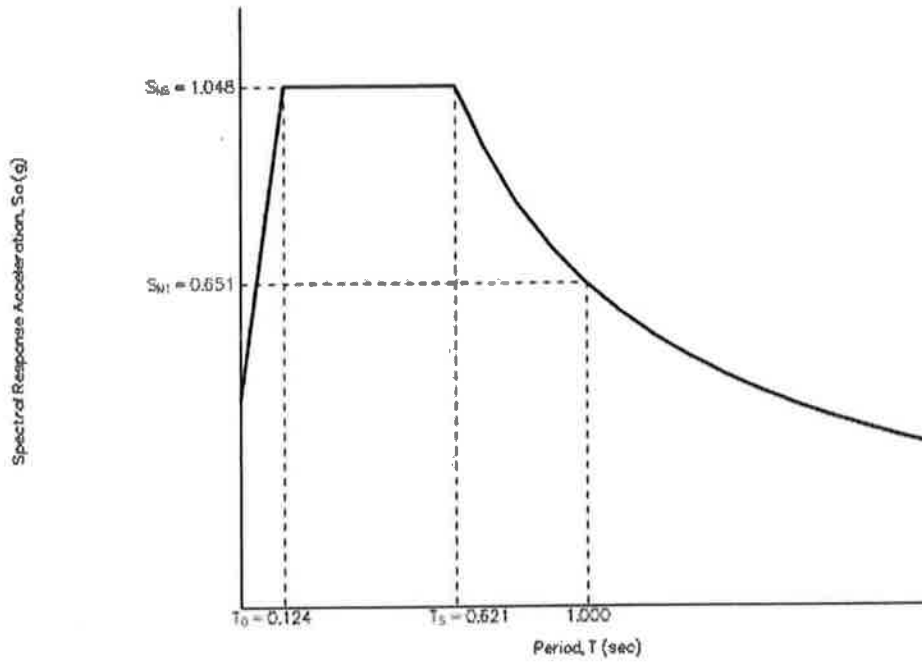
From **Figure 22-12** ^[3]

$T_L = 16$ seconds



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]

$$PGA = 0.407$$

Equation (11.8-1):

$$PGA_M = F_{PGA} PGA = 1.093 \times 0.407 = 0.445 \text{ g}$$

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 = 0.407 g, $F_{PGA} = 1.093$

Section 21.2.1.1 — Method 1 (from Chapter 21 – Site-Specific Ground Motion Procedures for Seismic Design)

From **Figure 22-17** ^[5]

$$C_{RS} = 0.898$$

From **Figure 22-18** ^[6]

$$C_{R1} = 0.871$$

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
$0.167g \leq S_{DS} < 0.33g$	B	B	C
$0.33g \leq S_{DS} < 0.50g$	C	C	D
$0.50g \leq S_{DS}$	D	D	D

For Risk Category = I and $S_{DS} = 0.699 g$, 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
$0.067g \leq S_{D1} < 0.133g$	B	B	C
$0.133g \leq S_{D1} < 0.20g$	C	C	D
$0.20g \leq S_{D1}$	D	D	D

For Risk Category = I and $S_{D1} = 0.434 g$, 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 \equiv "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: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-1.pdf
2. Figure 22-2: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-2.pdf
3. Figure 22-12: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-12.pdf
4. Figure 22-7: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-7.pdf
5. Figure 22-17: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-17.pdf
6. Figure 22-18: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-18.pdf



Real-World Geotechnical Solutions
Investigation • Design • Construction Support

PAVEMENT CALCULATIONS

DARWin(tm) - Pavement Design

A Proprietary AASHTOWARE(tm)
Computer Software Product

Flexible Structural Design Module

Project Description

17-4570 - Frog Pond - New Pavement Section Main Roads

Flexible Structural Design Module Data

18-kip ESALs Over Initial Performance Period: 228,102
Initial Serviceability: 4.2
Terminal Serviceability: 2.5
Reliability Level (%): 85
Overall Standard Deviation: .44
Roadbed Soil Resilient Modulus (PSI): 5,250
Stage Construction: 1

Calculated Structural Number: 2.98

Specified Layer Design

Layer: 1
Material Description: New Asphalt
Structural Coefficient (Ai): .44
Drainage Coefficient (Mi): 1
Layer Thickness (Di) (in): 3.00
Calculated Layer SN: 1.32

Layer: 2
Material Description: 3/4"-0 Crushed Rock
Structural Coefficient (Ai): .12
Drainage Coefficient (Mi): 1
Layer Thickness (Di) (in): 2.00
Calculated Layer SN: .24

Layer: 3
Material Description: 1 1/2"-0 Crushed Rock
Structural Coefficient (Ai): .12
Drainage Coefficient (Mi): 1
Layer Thickness (Di) (in): 12.00
Calculated Layer SN: 1.44

Total Thickness (in): 17.00
Total Calculated SN: 3.00

DARWin(tm) - Pavement Design

A Proprietary AASHTOWARE(tm)
Computer Software Product

Flexible Structural Design Module

Simple ESAL Calculation

Initial Performance Period (years): 20
Initial Two-Way Daily Traffic (ADT): 900
% Heavy Trucks (of ADT) FHWA Class 5 or Greater: 3
Number of Lanes In Design Direction: 1
Percent of All Trucks In Design Lane (%): 100
Percent Trucks In Design Direction (%): 50
Average Initial Truck Factor (ESALs/truck): 1.8
Annual Truck Factor Growth Rate (%): 0
Annual Truck Volume Growth Rate (%): 3
Growth: Simple

Total Calculated Cumulative Esals: 228,102

DARWin(tm) - Pavement Design

A Proprietary AASHTOWARE(tm)
Computer Software Product

Flexible Structural Design Module

Project Description

17-4570 - Frog Pond - New Pavement Section Secondary Roads

Flexible Structural Design Module Data

18-kip ESALs Over Initial Performance Period: 25,345
Initial Serviceability: 4.2
Terminal Serviceability: 2.5
Reliability Level (%): 85
Overall Standard Deviation: .44
Roadbed Soil Resilient Modulus (PSI): 5,250
Stage Construction: 1

Calculated Structural Number: 2.07

Specified Layer Design

Layer: 1
Material Description: New Asphalt
Structural Coefficient (Ai): .44
Drainage Coefficient (Mi): 1
Layer Thickness (Di) (in): 3.00
Calculated Layer SN: 1.32

Layer: 2
Material Description: 3/4"-0 Crushed Rock
Structural Coefficient (Ai): .12
Drainage Coefficient (Mi): 1
Layer Thickness (Di) (in): 2.00
Calculated Layer SN: .24

Layer: 3
Material Description: 1 1/2"-0 Crushed Rock
Structural Coefficient (Ai): .12
Drainage Coefficient (Mi): 1
Layer Thickness (Di) (in): 8.00
Calculated Layer SN: .96

Total Thickness (in): 13.00
Total Calculated SN: 2.52

DARWin(tm) - Pavement Design

A Proprietary AASHTOWARE(tm)
Computer Software Product

Flexible Structural Design Module

Simple ESAL Calculation

Initial Performance Period (years): 20
Initial Two-Way Daily Traffic (ADT): 100
% Heavy Trucks (of ADT) FHWA Class 5 or Greater: 3
Number of Lanes In Design Direction: 1
Percent of All Trucks In Design Lane (%): 100
Percent Trucks In Design Direction (%): 50
Average Initial Truck Factor (ESALs/truck): 1.8
Annual Truck Factor Growth Rate (%): 0
Annual Truck Volume Growth Rate (%): 3
Growth: Simple

Total Calculated Cumulative Esals: 25,345



Real-World Geotechnical Solutions
Investigation • Design • Construction Support

PHOTOGRAPHIC LOG

FROG POND – SUB AREA 1 GEOTECHNICAL SITE INVESTIGATION PHOTOGRAPHIC LOG



Excavation of Test Pit TP-1 (View to Southeast)



Infiltration Testing in Test Pit TP-1

FROG POND – SUB AREA 1 GEOTECHNICAL SITE INVESTIGATION PHOTOGRAPHIC LOG



Excavation of Test Pit TP-2 (View to Northwest)



Test Pit TP-2

FROG POND – SUB AREA 1 GEOTECHNICAL SITE INVESTIGATION PHOTOGRAPHIC LOG



Excavation of Test Pit TP-4 (View to West)



Test Pit TP-4

FROG POND – SUB AREA 1 GEOTECHNICAL SITE INVESTIGATION PHOTOGRAPHIC LOG



Excavation of Test Pit TP-5 (View to North)



Test Pit TP-5

FROG POND – SUB AREA 1 GEOTECHNICAL SITE INVESTIGATION PHOTOGRAPHIC LOG



Excavation of Test Pit TP-6 (View to Southeast)



Test Pit TP-6

FROG POND – SUB AREA 1 GEOTECHNICAL SITE INVESTIGATION PHOTOGRAPHIC LOG



Excavation of Test Pit TP-7 (View to North)



Test Pit TP-7

FROG POND – SUB AREA 1 GEOTECHNICAL SITE INVESTIGATION PHOTOGRAPHIC LOG



Excavation of Test Pit TP-8 (View to West)



Test Pit TP-8

FROG POND – SUB AREA 1 GEOTECHNICAL SITE INVESTIGATION PHOTOGRAPHIC LOG



Excavation of Test Pit TP-9 (View to West)



Test Pit TP-9

FROG POND – SUB AREA 1 GEOTECHNICAL SITE INVESTIGATION PHOTOGRAPHIC LOG

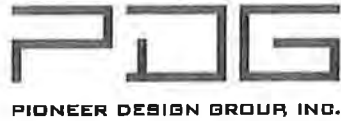


Excavation of Test Pit TP-10 (View to North)



Test Pit TP-10

Drainage Report



CIVIL LAND USE PLANNING SURVEY
P 503.643.8286 F 844.715.4743 www.pd-grp.com
9020 SW Washington Square Rd Suite 170
Portland, Oregon 97223

Preliminary Storm Drainage Report

Morgan Farm

City of Wilsonville, Oregon



VALID THROUGH 12-31-19

Date: February 6, 2018
Updated: March 27, 2018

Prepared By: T.C. Campbell, EIT
Reviewed By: Brent E. Fitch, P.E.

PDG Job No. 338-001

Applicant: Pahlisch Homes, Inc.
15333 SW Sequoia Pkwy.
Suite 190
Portland, OR 97224
(503) 317-6500

Engineer: Pioneer Design Group, Inc.
9020 SW Washington Sq. Dr.
Suite 170
Portland, OR 97223
(503) 643-8286

TABLE OF CONTENTS

NARRATIVE..... 3-9

VICINITY MAP..... 9

SOIL TYPE EXHIBIT 10-13

EXISTING CONDITIONS..... 14

COMPOSITE UTILITY PLAN 15

DRAINAGE BASIN EXHIBIT 16

IMPERVIOUS AREA CALCULATIONS 17-19

LIDA BASIN EXHIBIT..... 20

LIDA FACILITY SIZING CALCULATIONS..... 21-29

TECHNICAL APPENDICES

- APPENDIX 'A' – CITY OF WILSONVILLE MAPS
- APPENDIX 'B' – WES BMP SIZING REPORT (SOUTH BASIN)
- APPENDIX 'C' – WES BMP SIZING REPORT (NORTH BASIN)
- APPENDIX 'D' – CITY OF WILSONVILLE STORMWATER DETAILS

INTRODUCTION

This report represents the preliminary storm drainage and stormwater analysis for the Morgan Farms development project. The basis of this report is to comply with City of Wilsonville, Water Environment Services (WES), and the State of Oregon's regulations and engineering standards as well as the latest edition of the Oregon Plumbing Specialty Code (OSPC). Compiled in this report are the design criteria for the site, the hydrologic methodology, and the preliminary drainage analysis.

SITE DESCRIPTION AND LOCATION

The proposed project is an 82-lot subdivision for single-family detached and attached homes located at 7331 and 7447 SW Boeckman Road, Wilsonville, Oregon. The property is on the north side of SW Boeckman Road, east of SW Canyon Creek Road. The subject site is approximately 21.13 acres and specifically identified as tax lots 2400, 2600 & 2700 of Tax Map 3S112D. The property is zoned RN R-5 in the Frog Pond planning area.

EXISTING CONDITIONS

The site contains an existing equestrian center and two single-family homes. The majority of the eastern half of the site is a grassy field. There are two gravel driveways that serve the existing residences and the equestrian facility. The western portion of the site is wooded with an existing drainage way (Boeckman Creek) flowing near the western boundary. Trees are found across the site mostly along the northern boundary and in the heavily wooded area to the west.

The topography of the site slopes downhill towards the west and southwest from all points on the site. Grades throughout the eastern portion of the property are fairly flat ranging from 1-10%. Grades in the drainage way are extremely steep ranging from 30-60%. The site has a high point of 224 feet in the northeast corner and a relative low point in the drainage way at an elevation of 136 feet.

The predominant soils found on site are Aloha silt loams (1A & 1B), Woodburn silt loam (91C) and Xerochrepts (92F) with a corresponding hydrologic soil group (HSG) designation 'C/D', 'C' and 'B' respectively, as shown on the attached Natural Resources Conservation Service (NRCS) soil survey. Infiltration tests were performed on site and the result was the soils do not allow for any infiltration as such is reflected in the attached calculations.

PROPOSED IMPROVEMENTS

We will be constructing impervious surfaces as a result of the public and private street improvements and private driveways along with the eventual homes and sidewalks. Public utilities will be extended throughout the site for the use of the proposed lots.

Stormwater runoff from the new impervious areas created by the proposed streets and sidewalks as well as the future homes will be treated with either on-street vegetated swales or with individual planter facilities on each lot. Treated stormwater will discharge into the existing drainage way (Boeckman Creek) in Tract 'A'.

HYDROLOGY/HYDRAULIC METHODOLOGY

The site is divided into two basins. The north basin is 6.84 acres and the south basin is 6.23 acres (see attached *Drainage Basin Exhibit*). The north basin is comprised of 43 lots and 77,272 square feet of new impervious area from streets and sidewalks. The south basin contains 39 lots and 77,877 square feet of new impervious area from streets and sidewalks. These two large basins are further divided into smaller basins for the sizing of the proposed stormwater facilities (see attached *LIDA Basin Exhibit*). Runoff from these basins will be treated and detained in on-street vegetated swales and individual lot planter facilities that have been sized using the WES BMP Sizing Software.

WATER QUALITY

As required by the Water Environment Services district, we will treat runoff from any new impervious surface created as a result of the proposed development and for any existing impervious areas to remain. Runoff from the streets and sidewalks will be treated in the on-street vegetated swales. Where space allows the street side swales will treat the stormwater from the street as well as the lots. Where the roadside vegetated swales cannot treat the adjoining lots, individual LIDA facilities will be installed for the required lot treatment. These planters will connect directly into the public storm main in the street. Final designs for the individual lot planters will be submitted at time of home construction.

All facilities were sized using the WES BMP Sizing tool (see attached *BMP Sizing Reports*). The LIDA planters and swales have been designed with a 30 inch deep growing medium, which allows a 25% reduction in the overall area of the facility (see attached *LIDA Facility Sizing Calculations*). Thus, the minimum areas shown on the attached spreadsheets reflect the 25% reduction from the minimum areas calculated with the BMP Sizing tool.

SOUTH BASIN ANALYSIS

The south basin of the site incorporates LIDA Basins 1-11.

Basin 1 has a total of 3,986 square feet of impervious area, which will be treated in 248 square feet of on-street swales. This exceeds the 209 square foot minimum required to treat the impervious area.

Basin 1A consists of lot 1 which will have an individual planter installed during home construction to treat the impervious area.

Basin 2 has a total of 23,337 square feet of impervious area, which will be treated in 1,286 square feet of on-street swales. This exceeds the 1,225 square foot minimum required to treat the impervious area.

Basin 2A consists of lot 4, which will have an individual planter installed during home construction to treat the impervious area.

Basin 3 has a total of 5,485 square feet of impervious area, which will be treated in 354 square feet of on-street swales. This exceeds the 288 square foot minimum required to treat the impervious area.

Basin 3A consists of lots 9-12, which will have individual planters installed during home construction to treat the impervious area.

Basin 4 has a total of 2,157 square feet of impervious area, which will be treated in 146 square feet of on-street swales. This exceeds the 113 square foot minimum required to treat the impervious area.

Basin 4A consists of lot 30, which will have an individual planter installed during home construction to treat the impervious area.

Basin 5 has a total of 26,694 square feet of impervious area, which will be treated in 1483 square feet of on-street swales. This exceeds the 1401 square foot minimum required to treat the impervious area.

Basin 6 has a total of 13,831 square feet of impervious area, which will be treated in 740 square feet of on-street swales. This exceeds the 726 square foot minimum required to treat the impervious area.

Basin 7 consists of lots 14-21, which will have individual planters installed during home construction to treat the impervious area.

Basin 8 has a total of 8,544 square feet of impervious area, which will be treated in 380 square feet of on-street swales. This area does not meet the 449 square foot minimum required to treat the impervious area. Due to the driveway drops and street tree wells along the street frontage, the applicant is not able to provide sufficient area in this basin but is greatly overtreating in other basins.

Basin 9 has a total of 19,080 square feet of impervious area, which will be treated in 1,103 square feet of on-street swales. This exceeds the 1,002 square foot minimum required to treat the impervious area.

Basin 10 has a total of 29,010 square feet of impervious area, which will be treated in 1,674 square feet of on-street swales. This exceeds the 1,523 square foot minimum required to treat the impervious area. Due to the driveway drops and street tree wells along the southern street frontage, there is insufficient area on that side of the street to treat the stormwater from the southern half of the street. This sub-basin of Basin 10 has 7,630 square feet of impervious area and would require 401 square feet of on-street swales for treatment. Since the total possible area that could be provided in this sub-basin is 240 square feet, the applicant is over treating on the north side of the street to meet the required treatment area.

Basin 10A consists of lots 33, 35 and 37, which will have individual planters installed during home construction to treat the impervious area.

Basin 11 has a total of 3,503 square feet of impervious area, which will be treated in 244 square feet of on-street swales. This exceeds the 184 square foot minimum required to treat the impervious area.

The entire South basin has 185,127 square feet of impervious area that will be treated by 10,357 square feet of on-street swales and individual lot planters. This exceeds the 9,719 square foot minimum required to treat the impervious area.

South Basin LIDA Overview	
Total Impervious Area (Lots, Sidewalks & Streets)	185,127 S.F.
Required LIDA Area (with 25% reduction)	9,719 S.F.
Provided LIDA Area (swales and lot planters)	10,357 S.F.
Excess in LIDA Area	638 S.F.

NORTH BASIN ANALYSIS

The north basin of the site incorporates LIDA Basins 12-23.

Basin 12 has a total of 3,494 square feet of impervious area, which will be treated in 297 square feet of on-street swales. This exceeds the 183 square foot minimum required to treat the impervious area.

Basin 13 has a total of 28,396 square feet of impervious area, which will be treated in 1,602 square feet of on-street swales. This exceeds the 1,491 square foot minimum required to treat the impervious area. Due to the driveway drops and street tree wells along the northern street frontage, there is insufficient area on that side of the street to treat the stormwater from the northern half of the street. This sub-basin of Basin 13 has

7,793 square feet of impervious area and would require 409 square feet of on-street swales for treatment. Since the total possible area that could be provided in this sub-basin is 241 square feet, the applicant is over treating on the south side of the street to meet the required treatment area.

Basin 13A consists of lots 43 and 45, which will have individual planters installed during home construction to treat the impervious area.

Basin 14 has a total of 17,004 square feet of impervious area, which will be treated in 1,222 square feet of on-street swales. This exceeds the 893 square foot minimum required to treat the impervious area. Due to the driveway drops and street tree wells along the northern street frontage, there is insufficient area on that side of the street to treat the stormwater from the northern half of the street. This sub-basin of Basin 14 has 7,707 square feet of impervious area and would require 405 square feet of on-street swales for treatment. Since the total possible area that could be provided in this sub-basin is 237 square feet, the applicant is over treating on the south side of the street to meet the required treatment area.

Basin 15 has a total of 12,768 square feet of impervious area, which will be treated in 892 square feet of on-street swales. This exceeds the 670 square foot minimum required to treat the impervious area.

Basin 16 consists of lots 48-53 and 56-61, which will have individual planters installed during home construction to treat the impervious area.

Basin 17 has a total of 9,657 square feet of impervious area, which will be treated in 819 square feet of on-street swales. This exceeds the 507 square foot minimum required to treat the impervious area.

Basin 18 has a total of 9,666 square feet of impervious area, which will be treated in 819 square feet of on-street swales. This exceeds the 507 square foot minimum required to treat the impervious area.

Basin 19 consists of lots 64-68 and 71-74, which will have individual planters installed during home construction to treat the impervious area.

Basin 20 has a total of 14,123 square feet of impervious area, which will be treated in 819 square feet of on-street swales. This exceeds the 741 square foot minimum required to treat the impervious area. Due to the driveway drops and street tree wells along the western street frontage, there is insufficient area on that side of the street to treat the stormwater from the western half of the street. This sub-basin of Basin 20 has 4,552 square feet of impervious area and would require 239 square feet of on-street swales for treatment. Since the total possible area that could be provided in this sub-

basin is 123 square feet, the applicant is over treating on the east side of the street to meet the required treatment area.

Basin 21 has a total of 9,332 square feet of impervious area, which will be treated in 243 square feet of on-street swales. This area does not meet the 490 square foot minimum required to treat the impervious area. Due to the $\frac{3}{4}$ shed street there is not enough square footage between the proposed driveways and street trees to meet the requirement. Though we are short in this basin, we are greatly overtreating the stormwater in the other basins.

Basin 22 has a total of 8,582 square feet of impervious area, which will be treated in 638 square feet of on-street swales. This exceeds the 451 square foot minimum required to treat the impervious area.

Basin 23 consists of lots 76-82, which will have individual planters installed during home construction to treat the impervious area.

The entire northern basin has 195,522 square feet of impervious area that will be treated by 11,851 square feet of on-street swales and individual lot planters. This exceeds the 10,265 square foot minimum required to treat the impervious area.

North Basin LIDA Overview	
Total Impervious Area (Lots, Sidewalks & Streets)	195,522 S.F.
Required LIDA Area (with 25% reduction)	10,265 S.F.
Provided LIDA Area (swales and lot planters)	11,851 S.F.
Excess in LIDA Area	1,586 S.F.

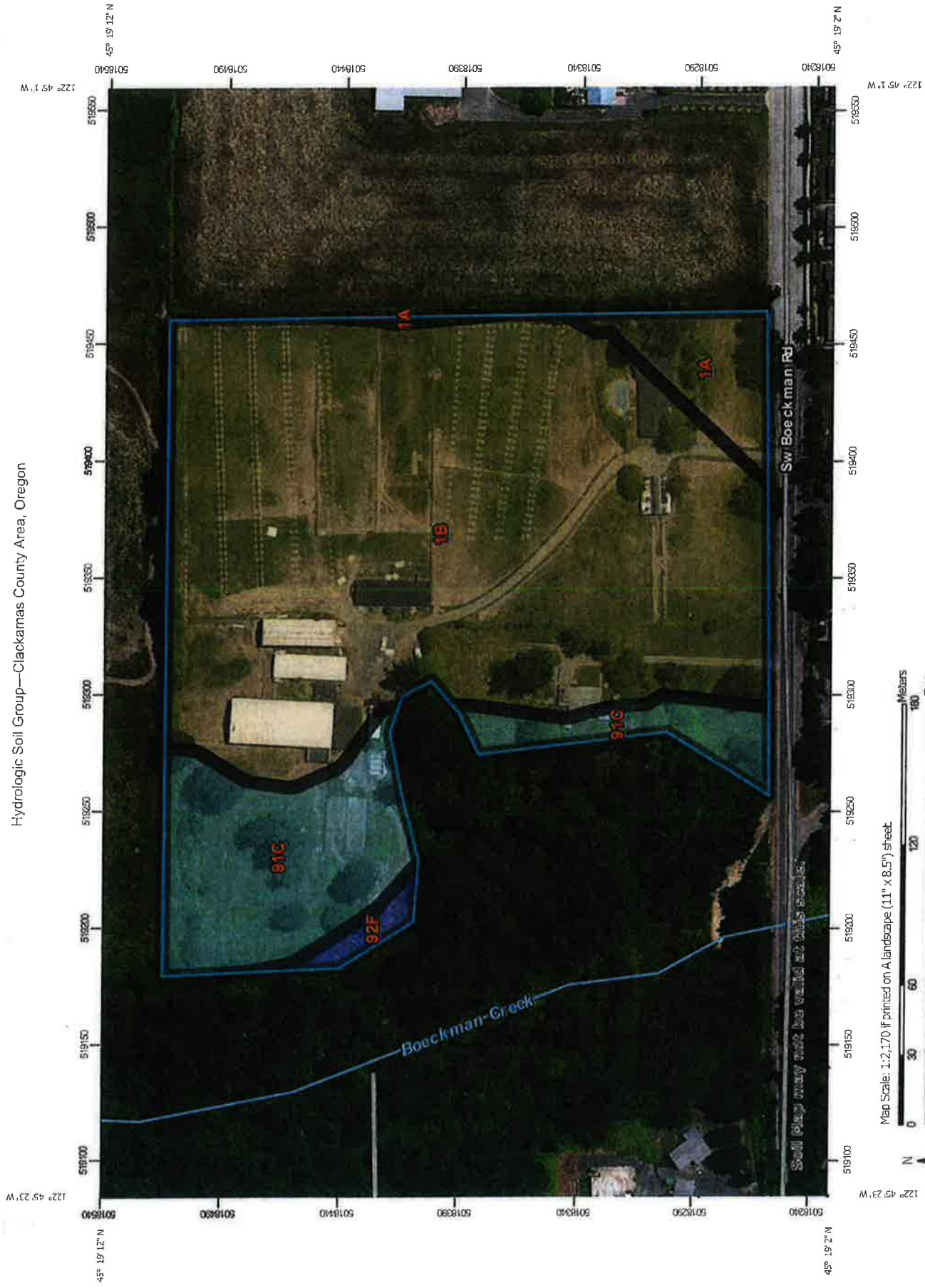
DETENTION

Stormwater runoff from the streets, sidewalks, and houses will be detained using a flow-control structure at the lower end of the combined on-street vegetated planters (see attached *City of Wilsonville detail ST-6105*). The stormwater runoff from the houses will be detained with a flow-control structure located on the outside of the planter box. The orifices were for both the vegetated swales and the planters were sized using the WES BMP Sizing tool (see attached *BMP Sizing Reports*).

CONVEYANCE

The stormwater from the street and sidewalk improvements will be conveyed to the on-street vegetated swales using curb cut outs. The stormwater from the future homes will be conveyed to the swales using storm laterals that will be installed under the sidewalks

Hydrologic Soil Group—Clackamas County Area, Oregon



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
- Water Features
 - Streams and Canals
- Transportation
 - Rails
 - Interstate Highways
 - US Routes
 - Major Roads
 - Local Roads
- Background
 - Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause **misunderstanding** of the detail of **mapping and accuracy** of soil line placement. The maps do not **show the small areas** of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Clackamas County Area, Oregon
 Survey Area Data: Version 11, Sep 16, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 8, 2010—Sep 4, 2011

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
1A	Aloha silt loam, 0 to 3 percent slopes	C/D	0.7	5.4%
1B	Aloha silt loam, 3 to 6 percent slopes	C/D	10.4	74.2%
91C	Woodburn silt loam, 8 to 15 percent slopes	C	2.7	19.0%
92F	Xerochrepts and Haploxerolls, very steep	B	0.2	1.4%
Totals for Area of Interest			13.9	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



IMPERVIOUS AREA CALCULATIONS (ENTIRE SITE)

JOB NUMBER: 338-001
 PROJECT: Morgan Farms
 FILE: 3381_prelim hydro

NEW IMPERVIOUS AREA

82 LOTS AT 2,750-SF IMPERVIOUS AREA / LOT	225,500.00 ft ²	
SIDEWALKS	32,468.00 ft ²	
STREET PAVEMENT	122,681.00 ft ²	
	380,649.00 ft²	8.74 ac

EXISTING IMPERVIOUS AREA

BUILDINGS	30,629.00 ft ²	
SIDEWALKS/DECKS	4,360.00 ft ²	
GRAVEL AT 60% IMPERVIOUS	11,151.00 ft ²	
STREET PAVEMENT	4,829.00 ft ²	
	50,969.00 ft²	1.17 ac

Total Shed Area	569,337.00 ft ²	13.07 ac
Existing Impervious Area	50,969.00 ft ²	1.17 ac
% Impervious		9.0 %
Proposed Impervious Area	380,649.00 ft ²	8.74 ac
% Impervious		66.9 %



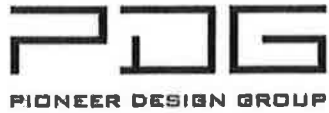
**IMPERVIOUS AREA CALCULATIONS
(SOUTH BASIN)**

JOB NUMBER: 338-001
PROJECT: Morgan Farms
FILE: 3381_prelim hydro

NEW IMPERVIOUS AREA

39 LOTS AT 2,750-SF IMPERVIOUS AREA / LOT	107,250.00 ft ²	
SIDEWALKS	15,494.00 ft ²	
STREET PAVEMENT	62,383.00 ft ²	
	<hr/>	
	185,127.00 ft ²	4.25 ac

Total Basin Area	270,415.00 ft ²	6.21 ac
Proposed Impervious Area	185,127.00 ft ²	4.25 ac
% Impervious		68.5 %



**IMPERVIOUS AREA CALCULATIONS
(NORTH BASIN)**

JOB NUMBER: 338-001
 PROJECT: Morgan Farms
 FILE: 3381_prelim hydro

NEW IMPERVIOUS AREA

43 LOTS AT 2,750-SF IMPERVIOUS AREA / LOT	118,250.00 ft ²	
SIDEWALKS	16,974.00 ft ²	
STREET PAVEMENT	60,298.00 ft ²	
	<hr/>	
	195,522.00 ft²	4.49 ac

Total Basin Area	298,922.00 ft²	6.86 ac
Proposed Impervious Area	195,522.00 ft²	4.49 ac
% Impervious		65.4 %



**LIDA FACILITY SIZING CALCULATIONS
(LIDA BASINS 1-23)**

JOB NUMBER: 338-001
 PROJECT: Morgan Farms
 FILE: 3381_prelim hydro

BASIN #1 (Street A)

SIDEWALKS	544.00 ft ²
STREET PAVEMENT	3,442.00 ft ²
	3,986.00 ft²

Proposed Impervious Area	3,986.00 ft²
Required LIDA Area (7% of impervious Area)	279.02 ft²
25% Reduced LIDA Area (30" Growing Medium)	209.27 ft²
Provided LIDA Area	247.50 ft²

BASIN #1A (Lot 1)

1 LOT AT 2,750-SF IMPERVIOUS AREA/LOT	2,750.00 ft ²
	2,750.00 ft²

Proposed Impervious Area	2,750.00 ft²
Required LIDA Area (7% of impervious Area)	192.5 ft²
25% Reduced LIDA Area (30" Growing Medium)	144.375 ft²
Provided LIDA Area (Future Planter)	150.00 ft²

BASIN #2 (Street B & lots 2-3, 5-8)

6 LOTS AT 2,750-SF IMPERVIOUS AREA / LOT	16,500.00 ft ²
SIDEWALKS	1,961.00 ft ²
STREET PAVEMENT	4,876.00 ft ²
	23,337.00 ft²

Proposed Impervious Area	23,337.00 ft²
Required LIDA Area (7% of impervious Area)	1633.59 ft²
25% Reduced LIDA Area (30" Growing Medium)	1225.19 ft²
Provided LIDA Area	1285.90 ft²

BASIN #2A (Lot 4)

1 LOT AT 2,750-SF IMPERVIOUS AREA/LOT	2,750.00 ft ²
	<hr/>
	2,750.00 ft ²

Proposed Impervious Area	2,750.00 ft²
Required LIDA Area (7% of impervious Area)	192.5 ft²
25% Reduced LIDA Area (30" Growing Medium)	144.375 ft²
Provided LIDA Area (Future Planter)	150.00 ft²

BASIN #3 (Street B & Tract C-Emergency Vehicle access)

SIDEWALKS	1,173.00 ft ²
STREET PAVEMENT	4,312.00 ft ²
	<hr/>
	5,485.00 ft ²

Proposed Impervious Area	5,485.00 ft²
Required LIDA Area (7% of impervious Area)	383.95 ft²
25% Reduced LIDA Area (30" Growing Medium)	287.96 ft²
Provided LIDA Area	353.60 ft²

BASIN #3A (Lots 9-12)

4 LOTS AT 2,750-SF IMPERVIOUS AREA/LOT	11,000.00 ft ²
	<hr/>
	11,000.00 ft ²

Proposed Impervious Area	11,000.00 ft²
Required LIDA Area (7% of impervious Area)	770.00 ft²
25% Reduced LIDA Area (30" Growing Medium)	577.5 ft²
Provided LIDA Area (Future Planters)	600.00 ft²

BASIN #4 (Street A)

SIDEWALKS	337.00 ft ²
STREET PAVEMENT	1,820.00 ft ²
	<hr/>
	2,157.00 ft ²

Proposed Impervious Area	2,157.00 ft²
Required LIDA Area (7% of impervious Area)	150.99 ft²
25% Reduced LIDA Area (30" Growing Medium)	113.24 ft²
Provided LIDA Area	146.25 ft²

BASIN #4A (Lot 30)

1 LOT AT 2,750-SF IMPERVIOUS AREA/LOT	2,750.00 ft ²
	<hr/>
	2,750.00 ft ²

Proposed Impervious Area	2,750.00 ft²
Required LIDA Area (7% of impervious Area)	192.5 ft²
25% Reduced LIDA Area (30" Growing Medium)	144.375 ft²
Provided LIDA Area (Future Planter)	150.00 ft²

BASIN #5 (Street B & lots 23-29)

7 LOTS AT 2,750-SF IMPERVIOUS AREA / LOT	19,250.00 ft ²
SIDEWALKS	1,848.00 ft ²
STREET PAVEMENT	5,596.00 ft ²
	<hr/>
	26,694.00 ft ²

Proposed Impervious Area	26,694.00 ft²
Required LIDA Area (7% of impervious Area)	1868.58 ft²
25% Reduced LIDA Area (30" Growing Medium)	1401.44 ft²
Provided LIDA Area (Future Planters)	1483.00 ft²

BASIN #6 (Street B, Tract D & lots 13 & 22)

2 LOTS AT 2,750-SF IMPERVIOUS AREA / LOT	5,500.00 ft ²
SIDEWALKS	796.00 ft ²
STREET PAVEMENT	7,535.00 ft ²
	<hr/>
	13,831.00 ft ²

Proposed Impervious Area	13,831.00 ft²
Required LIDA Area (7% of impervious Area)	968.17 ft²
25% Reduced LIDA Area (30" Growing Medium)	726.13 ft²
Provided LIDA Area	740.00 ft²

BASIN #7 (Lots 14-21)

8 LOTS AT 2,750-SF IMPERVIOUS AREA / LOT	22,000.00 ft ²
SIDEWALKS	0.00 ft ²
STREET PAVEMENT	0.00 ft ²
	<hr/>
	22,000.00 ft ²

Proposed Impervious Area	22,000.00 ft²
Required LIDA Area (7% of impervious Area)	1540 ft²
25% Reduced LIDA Area (30" Growing Medium)	1155.00 ft²
Provided LIDA Area (Future Planters)	1200.00 ft²

BASIN #8 (Street C)

SIDEWALKS	2,426.00 ft ²
STREET PAVEMENT	6,118.00 ft ²
	<hr/>
	8,544.00 ft²

Proposed Impervious Area	8,544.00 ft²
Required LIDA Area (7% of impervious Area)	598.08 ft²
25% Reduced LIDA Area (30" Growing Medium)	448.56 ft²
Provided LIDA Area	380.00 ft²
Area short of required	68.56 ft²

BASIN #9 (Street C & Lot 39)

1 LOT AT 2,750-SF IMPERVIOUS AREA / LOT	2,750.00 ft ²
SIDEWALKS	2,344.00 ft ²
STREET PAVEMENT	13,986.00 ft ²
	<hr/>
	19,080.00 ft²

Proposed Impervious Area	19,080.00 ft²
Required LIDA Area (7% of impervious Area)	1335.6 ft²
25% Reduced LIDA Area (30" Growing Medium)	1001.70 ft²
Provided LIDA Area	1103.00 ft²

BASIN #10 (Street D & Lots 31, 32, 34, 36, 38)

5 LOTS AT 2,750-SF IMPERVIOUS AREA / LOT	13,750.00 ft ²
SIDEWALKS	3,518.00 ft ²
STREET PAVEMENT	11,742.00 ft ²
	<hr/>
	29,010.00 ft²

Proposed Impervious Area	29,010.00 ft²
Required LIDA Area (7% of impervious Area)	2030.7 ft²
25% Reduced LIDA Area (30" Growing Medium)	1523.03 ft²
Provided LIDA Area	1674.00 ft²

BASIN #10 SUBBASIN (Street D South half-street)

SIDEWALKS	1,759.00 ft ²
STREET PAVEMENT	5,871.00 ft ²
	<hr/>
	7,630.00 ft²

Proposed Impervious Area	7,630.00 ft²
Required LIDA Area (7% of impervious Area)	534.1 ft²
25% Reduced LIDA Area (30" Growing Medium)	400.58 ft²
Possible LIDA Area	240.00 ft²
Area short of required	160.58 ft²

(Overtreated within Basin 10, subbasin ignored in overall basin calculations)

BASIN #10A (Lots 33, 35, 37)

3 LOTS AT 2,750-SF IMPERVIOUS AREA/LOT	8,250.00 ft ²
	<u>8,250.00 ft²</u>
Proposed Impervious Area	8,250.00 ft²
Required LIDA Area (7% of impervious Area)	577.50 ft²
25% Reduced LIDA Area (30" Growing Medium)	433.125 ft²
Provided LIDA Area (Future Planters)	450.00 ft²

BASIN #11 (Street A)

SIDEWALKS	547.00 ft ²
STREET PAVEMENT	2,956.00 ft ²
	<u>3,503.00 ft²</u>
Proposed Impervious Area	3,503.00 ft²
Required LIDA Area (7% of impervious Area)	245.21 ft²
25% Reduced LIDA Area (30" Growing Medium)	183.91 ft²
Provided LIDA Area	244.00 ft²

OVERALL SOUTH BASIN

39 LOTS AT 2,750-SF IMPERVIOUS AREA / LOT	107,250.00 ft ²
SIDEWALKS	15,494.00 ft ²
STREET PAVEMENT	62,383.00 ft ²
	<u>185,127.00 ft²</u>
Proposed Impervious Area	185,127.00 ft²
Required LIDA Area (7% of impervious Area)	12,958.89 ft²
25% Reduced LIDA Area (30" Growing Medium)	9719.17 ft²
Provided LIDA Area	10,357.25 ft²
Excess in LIDA Area	638.08 ft²

BASIN #12 (Street A)

SIDEWALKS	437.00 ft ²
STREET PAVEMENT	3,057.00 ft ²
	<u>3,494.00 ft²</u>
Proposed Impervious Area	3,494.00 ft²
Required LIDA Area (7% of impervious Area)	244.58 ft²
25% Reduced LIDA Area (30" Growing Medium)	183.44 ft²
Provided LIDA Area	297.00 ft²

BASIN #13 (Street E & Lots 40-42, 44, 46)

5 LOTS AT 2,750-SF IMPERVIOUS AREA / LOT	13,750.00 ft ²
SIDEWALKS	3,474.00 ft ²
STREET PAVEMENT	11,172.00 ft ²
	<hr/>
	28,396.00 ft²

Proposed Impervious Area	28,396.00 ft²
Required LIDA Area (7% of impervious Area)	1987.72 ft²
25% Reduced LIDA Area (30" Growing Medium)	1490.79 ft²
Provided LIDA Area	1602.00 ft²

BASIN #13 SUBBASIN (Street E North half-street)

SIDEWALKS	1,924.00 ft ²
STREET PAVEMENT	5,869.00 ft ²
	<hr/>
	7,793.00 ft²

Proposed Impervious Area	7,793.00 ft²
Required LIDA Area (7% of impervious Area)	545.51 ft²
25% Reduced LIDA Area (30" Growing Medium)	409.13 ft²
Possible LIDA Area	241.00 ft²
Area short of required	168.13 ft²

(Overtreated within Basin 13, subbasin ignored in overall basin calculations)

BASIN #13A (Lots 43 & 45)

2 LOTS AT 2,750-SF IMPERVIOUS AREA/LOT	5,500.00 ft ²
	<hr/>
	5,500.00 ft²

Proposed Impervious Area	5,500.00 ft²
Required LIDA Area (7% of impervious Area)	385.00 ft²
25% Reduced LIDA Area (30" Growing Medium)	288.75 ft²
Provided LIDA Area (Future Planters)	300.00 ft²

BASIN #14 (Street E between C & F)

SIDEWALKS	4,421.00 ft ²
STREET PAVEMENT	12,583.00 ft ²
	<hr/>
	17,004.00 ft²

Proposed Impervious Area	17,004.00 ft²
Required LIDA Area (7% of impervious Area)	1190.28 ft²
25% Reduced LIDA Area (30" Growing Medium)	892.71 ft²
Provided LIDA Area	1222.00 ft²

BASIN #14 SUBBASIN (Street E North half-street)

SIDEWALKS	1,845.00 ft ²
STREET PAVEMENT	5,862.00 ft ²
	<hr/>
	7,707.00 ft²

Proposed Impervious Area	7,707.00 ft²
Required LIDA Area (7% of impervious Area)	539.49 ft²
25% Reduced LIDA Area (30" Growing Medium)	404.62 ft²
Possible LIDA Area	237.00 ft²
Area short of required	167.62 ft²

(Overtreated within Basin 14, subbasin ignored in overall basin calculations)

BASIN #15 (Street A & lots 54 & 55)

2 LOTS AT 2,750-SF IMPERVIOUS AREA / LOT	5,500.00 ft ²
SIDEWALKS	1,240.00 ft ²
STREET PAVEMENT	6,028.00 ft ²
	<hr/>
	12,768.00 ft²

Proposed Impervious Area	12,768.00 ft²
Required LIDA Area (7% of impervious Area)	893.76 ft²
25% Reduced LIDA Area (30" Growing Medium)	670.32 ft²
Provided LIDA Area	892.00 ft²

BASIN #16 (Lots 48-53 & 56-61)

12 LOTS AT 2,750-SF IMPERVIOUS AREA / LOT	33,000.00 ft ²
SIDEWALKS	0.00 ft ²
STREET PAVEMENT	0.00 ft ²
	<hr/>
	33,000.00 ft²

Proposed Impervious Area	33,000.00 ft²
Required LIDA Area (7% of impervious Area)	2310 ft²
25% Reduced LIDA Area (30" Growing Medium)	1732.50 ft²
Provided LIDA Area (Future planters)	1800.00 ft²

BASIN #17 (Street C & Lots 47 & 62)

2 LOTS AT 2,750-SF IMPERVIOUS AREA / LOT	5,500.00 ft ²
SIDEWALKS	1,187.00 ft ²
STREET PAVEMENT	2,970.00 ft ²
	<hr/>
	9,657.00 ft²

Proposed Impervious Area	9,657.00 ft²
Required LIDA Area (7% of impervious Area)	675.99 ft²
25% Reduced LIDA Area (30" Growing Medium)	506.99 ft²
Provided LIDA Area	819.00 ft²

BASIN #18 (Street C & Lots 69 & 70)

2 LOTS AT 2,750-SF IMPERVIOUS AREA / LOT	5,500.00 ft ²
SIDEWALKS	1,188.00 ft ²
STREET PAVEMENT	2,978.00 ft ²
	<hr/>
	9,666.00 ft²

Proposed Impervious Area	9,666.00 ft²
Required LIDA Area (7% of impervious Area)	676.62 ft²
25% Reduced LIDA Area (30" Growing Medium)	507.47 ft²
Provided LIDA Area	819.00 ft²

BASIN #19 (Lots 64-68 & 71-74)

9 LOTS AT 2,750-SF IMPERVIOUS AREA / LOT	24,750.00 ft ²
	<hr/>
	24,750.00 ft²

Proposed Impervious Area	24,750.00 ft²
Required LIDA Area (7% of impervious Area)	1732.5 ft²
25% Reduced LIDA Area (30" Growing Medium)	1299.38 ft²
Provided LIDA Area (Future planters)	1350.00 ft²

BASIN #20 (Street F & Lots 63 & 75)

2 LOTS AT 2,750-SF IMPERVIOUS AREA / LOT	5,500.00 ft ²
SIDEWALKS	2,232.00 ft ²
STREET PAVEMENT	6,391.00 ft ²
	<hr/>
	14,123.00 ft²

Proposed Impervious Area	14,123.00 ft²
Required LIDA Area (7% of impervious Area)	988.61 ft²
25% Reduced LIDA Area (30" Growing Medium)	741.46 ft²
Provided LIDA Area	819.00 ft²

BASIN #20 SUBBASIN (Street F West half-street)

SIDEWALKS	1,160.00 ft ²
STREET PAVEMENT	3,392.00 ft ²
	<hr/>
	4,552.00 ft²

Proposed Impervious Area	4,552.00 ft²
Required LIDA Area (7% of impervious Area)	318.64 ft²
25% Reduced LIDA Area (30" Growing Medium)	238.98 ft²
Possible LIDA Area	123.00 ft²
Area short of required	115.98 ft²

(Overtreated within Basin 20, subbasin ignored in overall basin calculations)

BASIN #21 (Street G east of Street C)

SIDEWALKS	1,450.00 ft ²
STREET PAVEMENT	7,882.00 ft ²
	<hr/>
	9,332.00 ft²

Proposed Impervious Area	9,332.00 ft²
Required LIDA Area (7% of impervious Area)	653.24 ft²
25% Reduced LIDA Area (30" Growing Medium)	489.93 ft²
Provided LIDA Area	243.00 ft²
Area short of required	246.93 ft²

BASIN #22 (Street G west of Street C)

SIDEWALKS	1,345.00 ft ²
STREET PAVEMENT	7,237.00 ft ²
	<hr/>
	8,582.00 ft²

Proposed Impervious Area	8,582.00 ft²
Required LIDA Area (7% of impervious Area)	600.74 ft²
25% Reduced LIDA Area (30" Growing Medium)	450.56 ft²
Provided LIDA Area	638.00 ft²

BASIN #23 (Lots 76-82)

7 LOTS AT 2,750-SF IMPERVIOUS AREA / LOT	19,250.00 ft ²
SIDEWALKS	0.00 ft ²
STREET PAVEMENT	0.00 ft ²
	<hr/>
	19,250.00 ft²

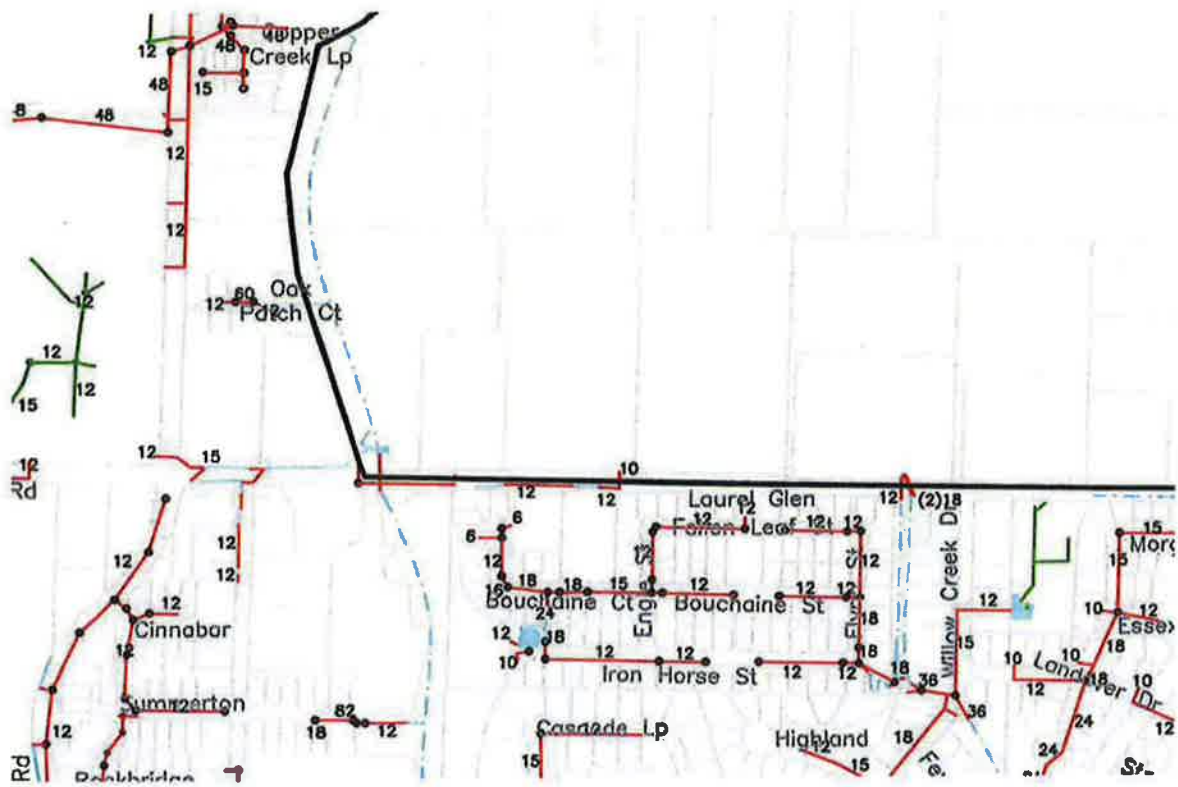
Proposed Impervious Area	19,250.00 ft²
Required LIDA Area (7% of impervious Area)	1347.50 ft²
25% Reduced LIDA Area (30" Growing Medium)	1010.63 ft²
Provided LIDA Area (Future planters)	1050.00 ft²

OVERALL NORTH BASIN

43 LOTS AT 2,750-SF IMPERVIOUS AREA / LOT	118,250.00 ft ²
SIDEWALKS	16,974.00 ft ²
STREET PAVEMENT	60,298.00 ft ²
	<hr/>
	195,522.00 ft²

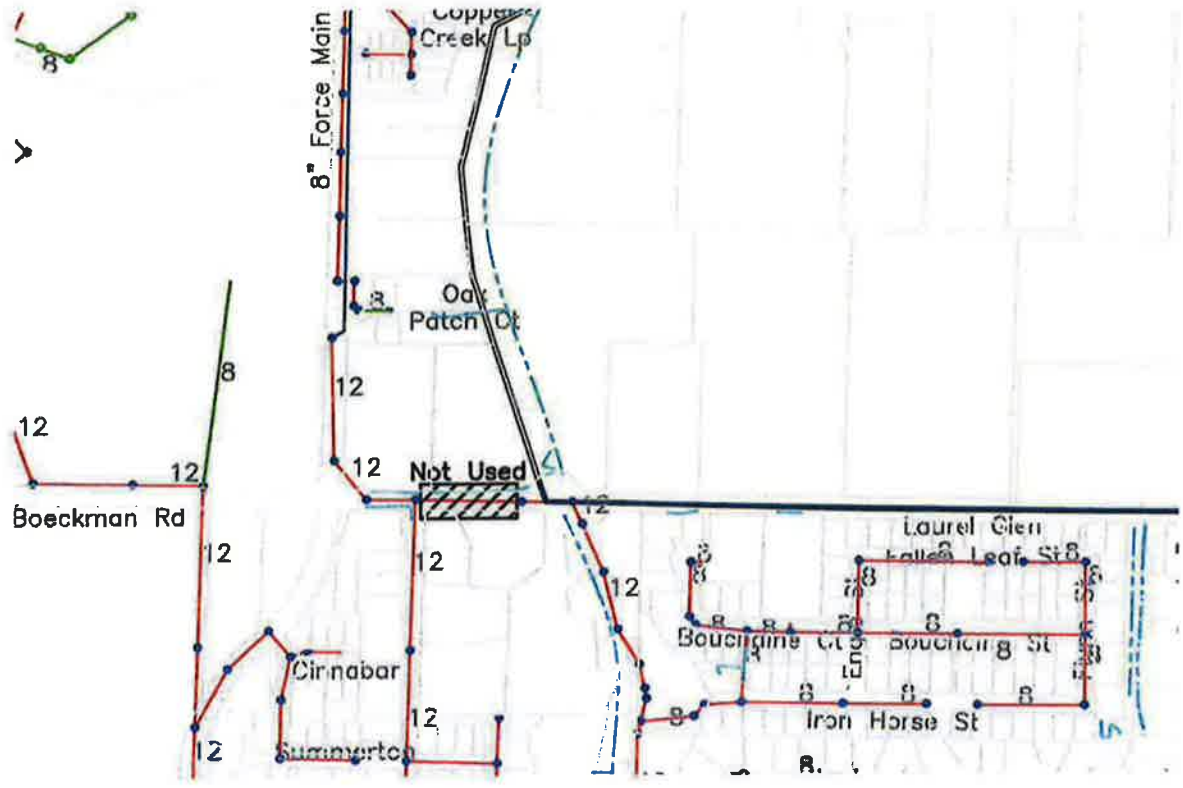
Proposed Impervious Area	195,522.00 ft²
Required LIDA Area (7% of impervious Area)	13,686.54 ft²
25% Reduced LIDA Area (30" Growing Medium)	10,264.91 ft²
Provided LIDA Area	11,851.00 ft²
Excess in LIDA Area	1586.10 ft²

APPENDIX 'A' – CITY OF WILSONVILLE MAPS





Y



**APPENDIX 'B' – WES BMP SIZING REPORT
SOUTH BASIN**

WES BMP Sizing Report

Project Information

Project Name	Morgan Farm - South Basin
Project Type	Subdivision
Location	7331 & 7447 SW Boeckman Road
Stormwater Management Area	195484
Project Applicant	Jim Wolfston
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
Basin #1: Steets & Sdwks	3,986	Grass	ConventionalConcrete	C	Basin #1- Street LIDA
Basin #1A: 1 Lot (2750 per lot)	2,750	Grass	Roofs	C	Basin #1A - LIDA Planter
Basin#2: Streets & Sdwks	6,837	Grass	ConventionalConcrete	C	Basin #2 - Street LIDA
Basin#2: 6 lots (2750 per lot)	16,500	Grass	Roofs	C	Basin #2 - Street LIDA
Basin #3: Streets & Sdwks	5,485	Grass	ConventionalConcrete	C	Basin #3 - Street LIDA
Basin #3A: 4 Lots (2750 per lot)	11,000	Grass	Roofs	C	Basin #3A - LIDA Planters
Basin #4: Streets & Sdwks	2,157	Grass	ConventionalConcrete	C	Basin #4 - Street LIDA
Basin #4A: 1 Lot (2750 per lot)	2,750	Grass	Roofs	C	Basin #4A - LIDA Planter
Basin #5: Streets & Sdwks	7,444	Grass	ConventionalConcrete	C	Basin #5 - Street LIDA
Basin #5: 7 Lots (2750 per lot)	19,250	Grass	Roofs	C	Basin #5 - Street LIDA
Basin #6:	8,331	Grass	ConventionalConcrete	C	Basin #6 -

Streets & Sdwks			Concrete			Street LIDA
Basin #6: 2 Lots (2750 per lot)	5,500	Grass	Roofs	C		Basin #6 - Street LIDA
Basin #7: 8 Lots (2750 per lot)	22,000	Grass	Roofs	C		Basin #7 - LIDA Planters
Basin #8: Streets & Sdwks	8,544	Grass	Conventional Concrete	C		Basin #8 - Street LIDA
Basin #10A: 3 Lots (2750 per lot)	8,250	Grass	Roofs	C		Basin #10A - LIDA Planters
Basin #9: Streets & Sdwks	16,330	Grass	Conventional Concrete	C		Basin #9 - Street LIDA
Basin #9: 1 Lot (2750 per lot)	2,750	Grass	Roofs	C		Basin #9 - Street LIDA
Basin #10: Streets & Sdwks	15,260	Grass	Conventional Concrete	C		Basin #10 - Street LIDA
Basin #10: 5 Lots (2750 per lot)	13,750	Grass	Roofs	C		Basin #10 - Street LIDA
Basin #11: Streets & Sdwks	3,503	Grass	Conventional Concrete	C		Basin #11 - Street LIDA
Basin #2A: 1 Lot (2750 per lot)	2,750	Grass	Roofs	C		Basin #2A - LIDA Planter

LID Facility Sizing Details

LID ID	Design Criteria	BMP Type	Facility Soil Type	Minimum Area (sq-ft)	Planned Areas (sq-ft)	Orifice Diameter (in)
Basin #7 - LIDA Planters	Flow Control and Treatment	Stormwater Planter - Filtration	Lined	1,540.0	1,200.0	1.4
Basin #1A - LIDA Planter	Flow Control and Treatment	Stormwater Planter - Filtration	Lined	192.5	150.0	0.5
Basin #2A - LIDA Planter	Flow Control and Treatment	Stormwater Planter - Filtration	Lined	192.5	150.0	0.5
Basin #3A - LIDA Planters	Flow Control and Treatment	Stormwater Planter - Filtration	Lined	770.0	600.0	1.0
Basin #4A - LIDA Planter	Flow Control and Treatment	Stormwater Planter -	Lined	192.5	150.0	0.5

		Filtration				
Basin #10A - LIDA Planters	FlowControlAndTreatment	Stormwater Planter - Filtration	Lined	577.5	450.0	0.9
Basin #1- Street LIDA	FlowControlAndTreatment	Vegetated Swale - Filtration	Lined	279.0	247.5	0.6
Basin #4 - Street LIDA	FlowControlAndTreatment	Vegetated Swale - Filtration	Lined	151.0	146.3	0.4
Basin #3 - Street LIDA	FlowControlAndTreatment	Vegetated Swale - Filtration	Lined	384.0	353.6	0.7
Basin #2 - Street LIDA	FlowControlAndTreatment	Vegetated Swale - Filtration	Lined	1,633.6	1,285.9	1.4
Basin #5 - Street LIDA	FlowControlAndTreatment	Vegetated Swale - Filtration	Lined	1,868.6	1,483.0	1.6
Basin #6 - Street LIDA	FlowControlAndTreatment	Vegetated Swale - Filtration	Lined	968.2	740.0	1.1
Basin #8 - Street LIDA	FlowControlAndTreatment	Vegetated Swale - Filtration	Lined	598.1	380.0	0.9
Basin #9 - Street LIDA	FlowControlAndTreatment	Vegetated Swale - Filtration	Lined	1,335.6	1,103.0	1.3
Basin #10 - Street LIDA	FlowControlAndTreatment	Vegetated Swale - Filtration	Lined	2,030.7	1,674.0	1.6
Basin #11 - Street LIDA	FlowControlAndTreatment	Vegetated Swale - Filtration	Lined	245.2	244.0	0.6

Pond Sizing Details

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only
2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).
3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.
4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

**APPENDIX 'C' – WES BMP SIZING REPORT
NORTH BASIN**

WES BMP Sizing Report

Project Information

Project Name	Morgan Farm - North Basin
Project Type	Subdivision
Location	7331 & 7447 SW Boeckman Road
Stormwater Management Area	207373
Project Applicant	Jim Wolfston
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
Basin #12: Steets & Sdwks	3,494	Grass	ConventionalConcrete	C	Basin #12-Street LIDA
Basin #13A: 2 Lots (2750 per lot)	5,500	Grass	Roofs	C	Basin #13A - LIDA Planters
Basin #13: Streets & Sdwks	14,646	Grass	ConventionalConcrete	C	Basin #13 - Street LIDA
Basin #13: 5 lots (2750 per lot)	13,750	Grass	Roofs	C	Basin #13 - Street LIDA
Basin #14: Streets & Sdwks	17,004	Grass	ConventionalConcrete	C	Basin #14 - Street LIDA
Basin #15: Streets & Sdwks	7,268	Grass	ConventionalConcrete	C	Basin #15 - Street LIDA
Basin #15: 2 Lots (2750 per lot)	5,500	Grass	Roofs	C	Basin #15 - Street LIDA
Basin #18: Streets & Sdwks	4,166	Grass	ConventionalConcrete	C	Basin #18 - Street LIDA
Basin #16: 12 Lots (2750 per lot)	33,000	Grass	Roofs	C	Basin #16 - LIDA Planters
Basin #17: Streets &	4,157	Grass	ConventionalConcrete	C	Basin #17 - Street LIDA

Sdwks					
Basin #17: 2 Lots (2750 per lot)	5,500	Grass	Roofs	C	Basin #17 - Street LIDA
Basin #18: 2 Lots (2750 per lot)	5,500	Grass	Roofs	C	Basin #18 - Street LIDA
Basin #19: 9 Lots (2750 per lot)	24,750	Grass	Roofs	C	Basin #19 - LIDA Planters
Basin #20: Streets & Sdwks	8,623	Grass	Conventional Concrete	C	Basin #20 - Street LIDA
Basin #20: 2 Lots (2750 per lot)	5,500	Grass	Roofs	C	Basin #20 - Street LIDA
Basin #21: Streets & Sdwks	9,332	Grass	Conventional Concrete	C	Basin #21 - Street LIDA
Basin #23: 7 Lots (2750 per lot)	19,250	Grass	Roofs	C	Basin #23 - LIDA Planters
Basin #22: Streets & Sdwks	8,582	Grass	Conventional Concrete	C	Basin #22 - Street LIDA

LID Facility Sizing Details

LID ID	Design Criteria	BMP Type	Facility Soil Type	Minimum Area (sq-ft)	Planned Areas (sq-ft)	Orifice Diameter (in)
Basin #16 - LIDA Planters	Flow Control and Treatment	Stormwater Planter - Filtration	Lined	2,310.0	1,800.0	1.7
Basin #19 - LIDA Planters	Flow Control and Treatment	Stormwater Planter - Filtration	Lined	1,732.5	1,350.0	1.5
Basin #23 - LIDA Planters	Flow Control and Treatment	Stormwater Planter - Filtration	Lined	1,347.5	1,050.0	1.3
Basin #13A - LIDA Planters	Flow Control and Treatment	Stormwater Planter - Filtration	Lined	385.0	300.0	0.7
Basin #12 - Street LIDA	Flow Control and Treatment	Vegetated Swale - Filtration	Lined	244.6	297.0	0.6
Basin #15 - Street LIDA	Flow Control and Treatment	Vegetated Swale - Filtration	Lined	893.8	892.0	1.1

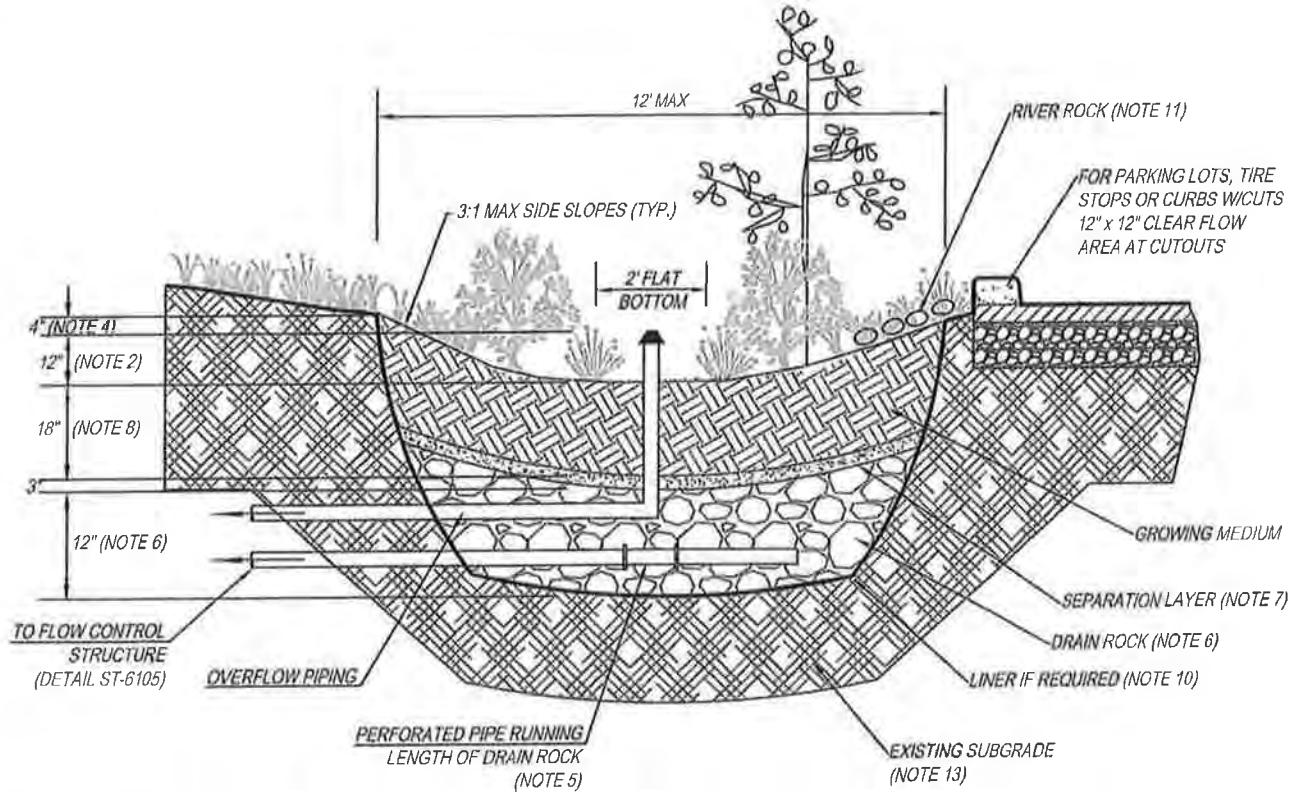
Basin #14 - Street LIDA	FlowControlAndTreatment	Vegetated Swale - Filtration	Lined	1,190.3	1,222.0	1.2
Basin #13 - Street LIDA	FlowControlAndTreatment	Vegetated Swale - Filtration	Lined	1,987.7	1,602.0	1.6
Basin #17 - Street LIDA	FlowControlAndTreatment	Vegetated Swale - Filtration	Lined	676.0	819.0	0.9
Basin #18 - Street LIDA	FlowControlAndTreatment	Vegetated Swale - Filtration	Lined	676.6	819.0	0.9
Basin #20 - Street LIDA	FlowControlAndTreatment	Vegetated Swale - Filtration	Lined	988.6	819.0	1.1
Basin #21 - Street LIDA	FlowControlAndTreatment	Vegetated Swale - Filtration	Lined	653.2	243.0	0.9
Basin #22 - Street LIDA	FlowControlAndTreatment	Vegetated Swale - Filtration	Lined	600.7	638.0	0.9

Pond Sizing Details

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only
2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).
3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.
4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

**APPENDIX 'D' – CITY OF WILSONVILLE
STORMWATER DETAILS**

This Detail Drawing may not be altered or changed in any manner except by the City Engineer. It is the responsibility of the user to acquire the most current version.



GENERAL NOTES:

1. **PROVIDE PROTECTION** FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED INFILTRATION AREAS PRIOR TO, DURING AND AFTER CONSTRUCTION. UNLESS REQUIRED BY SITE CONDITIONS, UNLINED SWALES ARE PREFERRED TO ALLOW MAXIMUM INFILTRATION.
2. **DIMENSIONS:**
 - DEPTH OF SWALE (FROM TOP OF GROWING MEDIUM TO OVERFLOW ELEVATION); 12"
 - LONGITUDINAL SLOPE OF SWALE: 6.0% OR LESS
 - FLAT BOTTOM WIDTH: 2' MINIMUM
 - SIDE SLOPES OF SWALE: 3:1 MAXIMUM
3. **LOCATION/SETBACKS:**
 - FILTRATION SWALES SHALL BE 10' FROM FOUNDATIONS AND 5' FROM PROPERTY LINES UNLESS APPROVED BY BUILDING OFFICIAL
4. **OVERFLOW:**
 - INLET ELEVATION SHALL ALLOW FOR 4" OF FREEBOARD, MINIMUM.
 - PROTECT FROM DEBRIS AND SEDIMENT WITH STRAINER OR GRATE.
5. **PIPING:**
 - PERFORATED UNDER-DRAIN PIPING: SHALL BE ABS SCH. 40, CAST IRON, OR PVC SCH.40. MINIMUM DIAMETER IS 6". PIPING SHALL HAVE 1% GRADE AND FOLLOW THE UNIFORM PLUMBING CODE. PVC NOT ALLOWED ABOVE GROUND. WRAP UNDER-DRAIN IN FILTER FABRIC TO REDUCE TRANSPORT OF FINES.
 - OVERFLOW PIPING: SHALL BE ABS SCH. 40, CAST IRON, OR PVC SCH. 40 AND SHALL NOT BE PERFORATED. MINIMUM DIAMETER IS 6". PIPING SHALL HAVE 1% GRADE AND FOLLOW THE UNIFORM PLUMBING CODE. PVC NOT ALLOWED ABOVE GROUND.
6. **DRAIN ROCK:**
 - SIZE: 1 1/2" - 3/4" WASHED
 - DEPTH: 12"
7. **SEPARATION BETWEEN DRAIN ROCK AND GROWING MEDIUM:** SHALL BE A 3" LAYER OF 3/4" - 1/4" OPEN GRADED AGGREGATE.
8. **GROWING MEDIUM:**
 - 18" MINIMUM
 - SEE APPENDIX C FOR SPECIFICATION OR USE SAND/LOAM/COMPOST 3-WAY MIX.
 - FACILITY SURFACE AREA MAY BE REDUCED BY 25% WHEN GROWING MEDIA DEPTH IS INCREASED TO 30" OR MORE.
9. **VEGETATION:** FOLLOW LANDSCAPE PLANS OR REFER TO PLANTING REQUIREMENTS IN APPENDIX A.
10. **WATERPROOF LINER (IF REQUIRED):** SHALL BE 30 MIL PVC OR EQUIVALENT.
11. **INSTALL RIVER ROCK SPLASH PAD OVER A NON WOVEN GEO TEXTILE FABRIC TO TRANSITION FROM INLETS TO GROWING MEDIUM.** SIZE OF ROCK SHALL BE 1" TO 3", 4 SQUARE FEET, 6" DEEP.
12. **CHECK DAMS:** SHALL BE PLACED ACCORDING TO FACILITY DESIGN. REFER TO DETAIL ST-6100 FOR PROFILE AND SPACING.
13. **SEASONAL HIGH GROUNDWATER SEPARATION:**
 - SEPARATION DISTANCE AS REQUIRED BY CITY.

Vegetated Swale - Filtration

DRAWING NUMBER: ST-6045	DRAWN BY: SR	SCALE: N.T.S.
FILE NAME: ST-6045.DWG	APPROVED BY: NK	DATE: 6/3/16

CITY OF WILSONVILLE



PUBLIC WORKS STANDARDS

This Detail Drawing may not be altered or changed in any manner except by the City Engineer. It is the responsibility of the user to acquire the most current version.

Vegetated Swales Operations & Maintenance Plan

What to Look For	What to Do
Structural Components , including inlets and outlets/overflows, shall freely convey stormwater.	
Clogged inlets or outlets	-Remove sediment and debris from catch basins, trench drains, curb inlets and pipes to maintain at least 50% conveyance capacity at all times.
Cracked Drain Pipes	-Replace/seal cracks. Replace when repair is insufficient.
Check Dams	-Maintain 4 - 10 inch deep rock check dams at design intervals.
Vegetation	
Dead or strained vegetation	-Replant per original planting plan, or substitute from Appendix A. -Irrigate as needed. Mulch banks annually. DO NOT apply fertilizers, herbicides, or pesticides.
Tall Grass and Vegetation	-Cut back to 4-6 inches, 1-2 times per year. Remove cuttings
Weeds	-Manually remove weeds. Remove all plant debris.
Growing/Filter Medium , including soil and gravels, shall sustain healthy plant cover and infiltrate within 72 hours.	
Gullies	-Fill, lightly compact, and plant vegetation to disperse flow.
Erosion	-Restore or create outfalls, checkdams, or splash blocks where necessary.
Slope Sippage	-Stabilize Slope.
Ponding	-Rake, till, or amend to restore infiltration rate.

Annual Maintenance Schedule:

Summer. Make any structural repairs. Improve filter medium as needed. Clear drain. Irrigate as needed.

Fall. Replant exposed soil and replace dead plants. Remove sediment and plant debris.

Winter. Monitor infiltration/flow-through rates. Clear inlets and outlets/overflows to maintain conveyance.

Spring. Remove sediment and plant debris. Replant exposed soil and replace dead plants. Mulch.

All seasons. Weed as necessary.

Maintenance Records: Record date, description, and contractor (if applicable) for all structural repairs, landscape maintenance, and facility cleanout activities. Keep work orders and invoices on file and make available upon request of the inspector.

Access: Maintain ingress/egress to design standards.

Infiltration/Flow Control: All facilities shall drain within 72 hours. Record time/date, weather, and site conditions when ponding occurs.

Pollution Prevention: All sites shall implement best management practices to prevent hazardous or solid wastes or excessive oil and sediment from contaminating stormwater. Contact _____ for immediate assistance responding to spills. Record time/date, weather, and site conditions if site activities contaminate stormwater.

Vectors (Mosquitoes & Rodents): Stormwater facilities shall not harbor mosquito larvae or rats that pose a threat to public health or that undermine the facility structure. Monitor standing water for small wiggling sticks perpendicular to the water's surface.

Note holes/burrows in and around facilities. Call Clackamas County Vector Control for immediate assistance to eradicate vectors. Record time/date, weather, and site conditions when vector activity observed.

Vegetated Swale O & M Plan

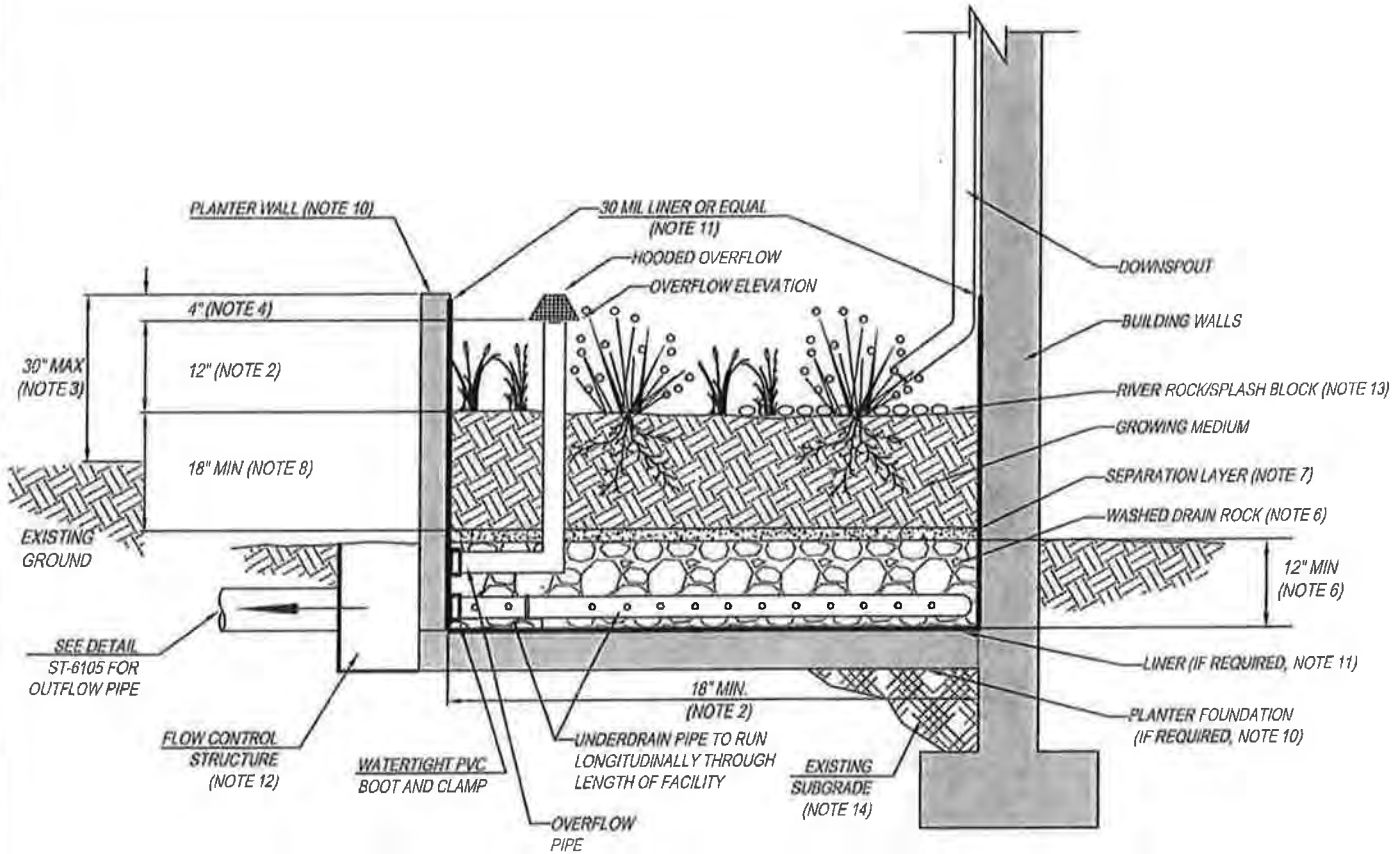
DRAWING NUMBER: ST-6055	DRAWN BY: SR	SCALE: N.T.S.
FILE NAME: ST-6055.DWG	APPROVED BY: NK	DATE: 10/8/14

CITY OF
WILSONVILLE



PUBLIC WORKS STANDARDS

This Detail Drawing may not be altered or changed in any manner except by the City Engineer. It is the responsibility of the user to acquire the most current version.



GENERAL NOTES:

1. **PROVIDE PROTECTION** FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED INFILTRATION AREAS PRIOR TO, DURING AND AFTER CONSTRUCTION. WRAP UNDER-DRAIN IN FILTER FABRIC TO REDUCE TRANSPORT OF FINES.
2. **DIMENSIONS:**
 - WIDTH: 18" MINIMUM
 - DEPTH OF PLANTER (FROM TOP OF GROWING MEDIUM TO OVERFLOW ELEVATION): 12"
 - SLOPE OF PLANTER: 0.5% OR LESS
3. **HEIGHT/SETBACK**
 - PLANTERS SHALL BE LESS THAN 30" IN HEIGHT ABOVE SURROUNDING AREA
 - PLANTERS SHALL BE MINIMUM OF 5 FEET FROM PROPERTY LINE
4. **OVERFLOW:**
 - INLET ELEVATION SHALL ALLOW FOR 4" OF FREEBOARD, MINIMUM
 - PROTECT FROM DEBRIS AND SEDIMENT WITH STRAINER OR GRATE
5. **PIPING:**
 - PERFORATED UNDER-DRAIN PIPING: SHALL RUN LONGITUDINALLY THROUGH LENGTH OF FACILITY, SHALL BE ABS SCH. 40, CAST IRON, OR PVC SCH.40, 6" MINIMUM DIAMETER. PIPING SHALL HAVE 1% GRADE AND FOLLOW THE UNIFORM PLUMBING CODE. PVC NOT ALLOWED ABOVE GROUND. WRAP UNDER-DRAIN IN FILTER FABRIC TO REDUCE TRANSPORT OF FINES.
 - OVERFLOW PIPING: SHALL BE ABS SCH.40, CAST IRON, OR PVC SCH.40 AND SHALL NOT BE PERFORATED. MINIMUM DIAMETER IS 6". PIPING SHALL HAVE 1% GRADE AND FOLLOW THE UNIFORM PLUMBING CODE. PVC NOT ALLOWED ABOVE GROUND.
6. **DRAIN ROCK:**
 - SIZE FOR FLOW-THROUGH PLANTER: 1 1/2" - 3/4" WASHED
 - DEPTH: 12" MINIMUM
7. **SEPARATION** BETWEEN DRAIN ROCK AND GROWING MEDIUM: SHALL BE A 3" LAYER OF 3/4" - 1/4" OPEN GRADED AGGREGATE.
8. **GROWING MEDIUM:**
 - DEPTH: 18" MINIMUM
 - SEE APPENDIX A FOR SPECIFICATION OR USE SAND/LOAM/COMPOST 3-WAY MIX.
 - FACILITY SURFACE AREA MAY BE REDUCED BY 25% WHEN GROWING MEDIA DEPTH IS INCREASED TO 30" OR MORE.
9. **VEGETATION:** FOLLOW LANDSCAPE PLANS OR REFER TO PLANTING REQUIREMENTS IN APPENDIX A.
10. **PLANTER FOUNDATION AND WALLS:**
 - MATERIALS SHALL BE 4" REINFORCED CONCRETE, STONE, BRICK, OR OTHER DURABLE MATERIAL.
 - CONCRETE, BRICK, OR STONE WALLS SHALL BE INCLUDED ON FOUNDATION PLANS.
 - INSTALL INVERTED CURB AS NEEDED BETWEEN PLANTER AND ROAD SUBGRADE.
 - SUBMIT RETAINING WALL DESIGN IN ACCORDANCE WITH APPLICABLE STRUCTURAL CODES FOR REVIEW AND APPROVAL.
11. **WATERPROOF LINER (IF REQUIRED):**
 - LINER SHALL BE 30 MIL PVC OR EQUIVALENT, FOR FLOW THROUGH FACILITIES.
 - A WATERPROOF LINER IS NOT REQUIRED IF THE FOUNDATION OR WALL MATERIAL IS WATERPROOF REINFORCED CONCRETE OR APPROVED EQUAL.
12. **FLOW CONTROL STRUCTURE.** SEE DETAIL ST-6105.
13. **INSTALL RIVER ROCK** SPLASH PAD OVER A NON WOVEN GEO TEXTILE FABRIC TO TRANSITION FROM INLETS TO GROWING MEDIUM. SIZE OF ROCK SHALL BE 1" - 3", 4 SQUARE FEET, 6" DEEP.
14. **SEASONAL HIGH GROUNDWATER SEPARATION:**
 - SEPARATION DISTANCE AS REQUIRED BY THE CITY.

Stormwater Planter - Filtration

CITY OF WILSONVILLE



DRAWING NUMBER: ST-6005

DRAWN BY: SR

SCALE: N.T.S.

FILE NAME: ST-6005.DWG

APPROVED BY: NK

DATE: 6/3/16

PUBLIC WORKS STANDARDS

Stormwater Planters Operations & Maintenance Plan

What to Look For	What to Do
Structural Components, including inlets and outlets/overflows, shall freely convey stormwater.	
Clogged inlets or outlets	-Remove sediment and debris from catch basins, trench drains and curb inlets and pipes to maintain at least 50% conveyance capacity at all times.
Cracked Drain Pipes	-Repair/seal cracks. Replace when repair is insufficient.
Check Dams	-Maintain 4 to 10 inch deep rock check dams at design intervals.
Vegetation	
Dead or strained vegetation	-Replant per original planting plan, or substitute from Appendix A. -Irrigate as needed. Mulch banks annually. DO NOT apply fertilizers, herbicides, or pesticides.
Tall Grass and Vegetation	-Cut back grass and prune overgrowth 1-2 times per year. Remove cuttings
Weeds	-Manually remove weeds. Remove all plant debris.
Growing/Filter Medium, including soil and gravels, shall sustain healthy plant cover and infiltrate within 72 hours.	
Gullies	-Fill, lightly compact, and plant vegetation to disperse flow.
Erosion	-Replace splash blocks or inlet gravel/rock.
Slope Slippage	-Stabilize 3:1 slopes/banks with plantings from Appendix A
Ponding	-Rake, till, or amend to restore infiltration rate.

Annual Maintenance Schedule:

Summer. Make any structural repairs. Improve filter medium as needed. Clear drain. Irrigate as needed.

Fall. Replant exposed soil and replace dead plants. Remove sediment and plant debris.

Winter. Monitor infiltration/flow-through rates. Clear inlets and outlets/overflows to maintain conveyance.

Spring. Remove sediment and plant debris. Replant exposed soil and replace dead plants. Mulch.

All seasons. Weed as necessary.

Maintenance Records: Record date, description, and contractor (if applicable) for all structural repairs, landscape maintenance, and facility cleanout activities. Keep work orders and invoices on file and make available upon request of the inspector.

Access: Maintain ingress/egress to design standards.

Infiltration/Flow Control: All facilities shall drain within 72 hours. Record time/date, weather, and site conditions when ponding occurs.

Pollution Prevention: All sites shall implement best management practices to prevent hazardous or solid wastes or excessive oil and sediment from contaminating stormwater. Contact _____ for immediate assistance responding to spills. Record time/date, weather, and site conditions if site activities contaminate stormwater.

Vectors (Mosquitoes & Rodents): Stormwater facilities shall not harbor mosquito larvae or rats that pose a threat to public health or that undermine the facility structure. Monitor standing water for small wiggling sticks perpendicular to the water's surface. Note holes/burrows in and around facilities. Call Clackamas County Vector Control for immediate assistance to eradicate vectors. Record time/date, weather, and site conditions when vector activity observed.

Stormwater Planter O & M Plan

DRAWING NUMBER: ST-6015

DRAWN BY: SR

SCALE: N.T.S.

FILE NAME: ST-6015.DWG

APPROVED BY: NK

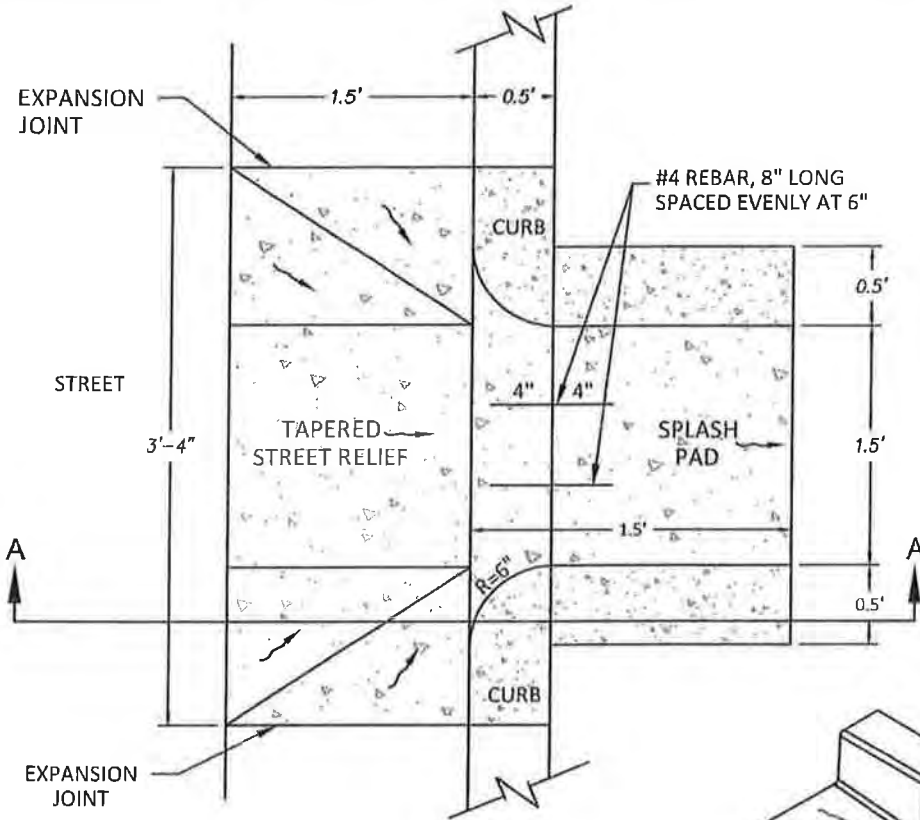
DATE: 10/8/14

CITY OF
WILSONVILLE



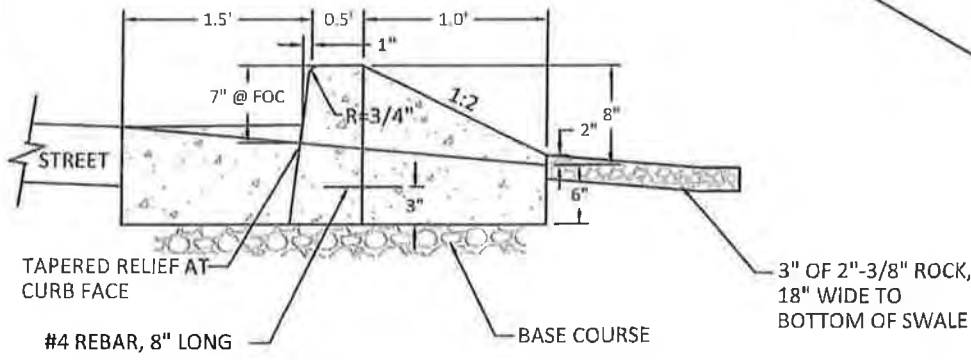
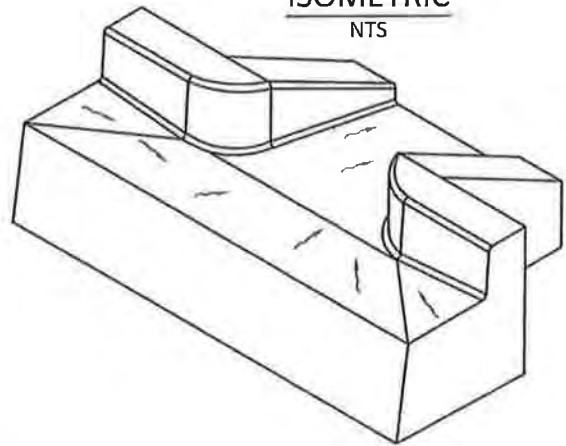
PUBLIC WORKS STANDARDS

This Detail Drawing may not be altered or changed in any manner except by the City Engineer. It is the responsibility of the user to acquire the most current version.



SWALE INLET
NTS

ISOMETRIC
NTS



SECTION A-A
NTS

Notes:

1. Concrete shall be commercial mix, minimum compressive strength of 3300 PSI at 28 days and incorporate micro-reinforcement "Fibermesh 300" or approved equal.
2. Base rock to be 3/4"-0 compacted to 95% of AASHTO T-180 and shall be to sub grade, street structure, or 4" in depth, whichever is greater.
3. Base course shall be thoroughly watered immediately prior to placement of concrete when the measured or forecasted ascending air temperature is 80 degrees or greater.

Swale Inlet

**CITY OF
WILSONVILLE**



PUBLIC WORKS STANDARDS

RAWING NUMBER: ST-6012

DRAWN BY: SR

SCALE: N.T.S.

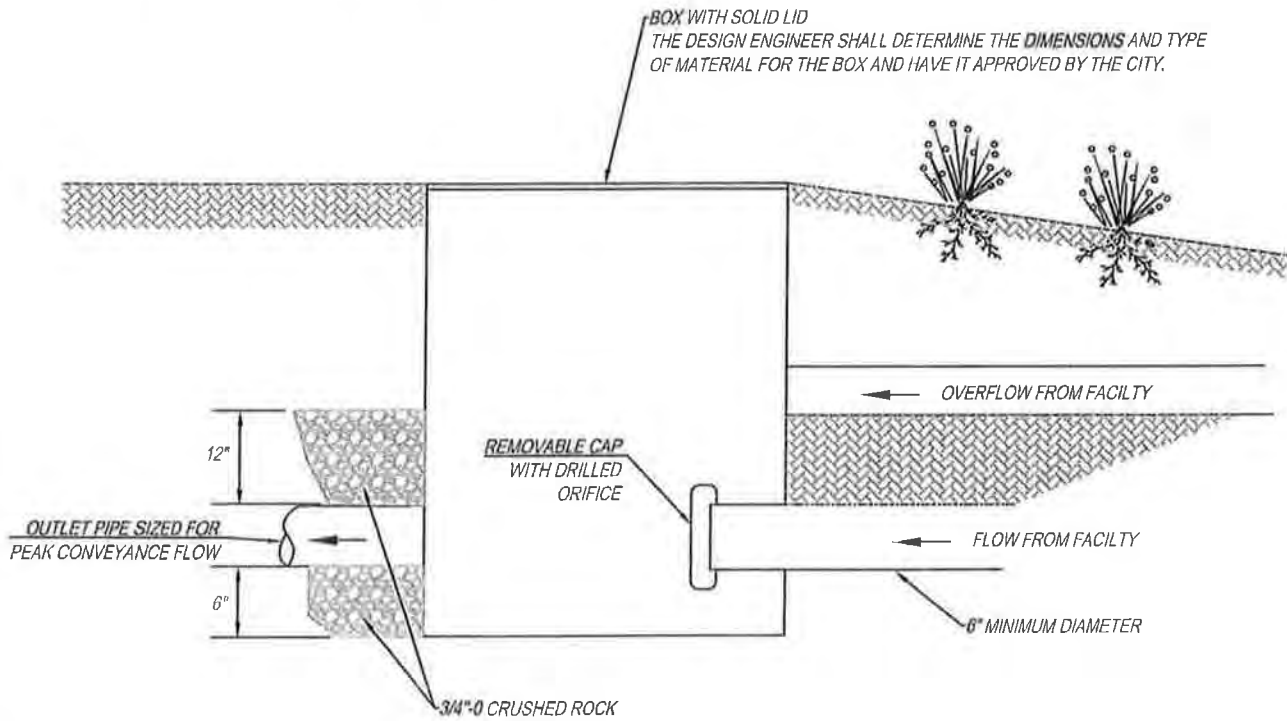
FILE NAME: ST-6012.dwg

APPROVED BY: NK

DATE: 09/28/15

This Detail Drawing may not be altered or changed in any manner except by the City Engineer. It is the responsibility of the user to acquire the most current version.

PLANTER, RAIN GARDEN, SWALE
FLOW CONTROL STRUCTURE



Planter, Rain Garden, Swale Flow Control Structure

DRAWING NUMBER: ST-6105

DRAWN BY: SR

SCALE: N.T.S.

FILE NAME: ST-6105.DWG

APPROVED BY: NK

DATE: 11/4/14

CITY OF
WILSONVILLE

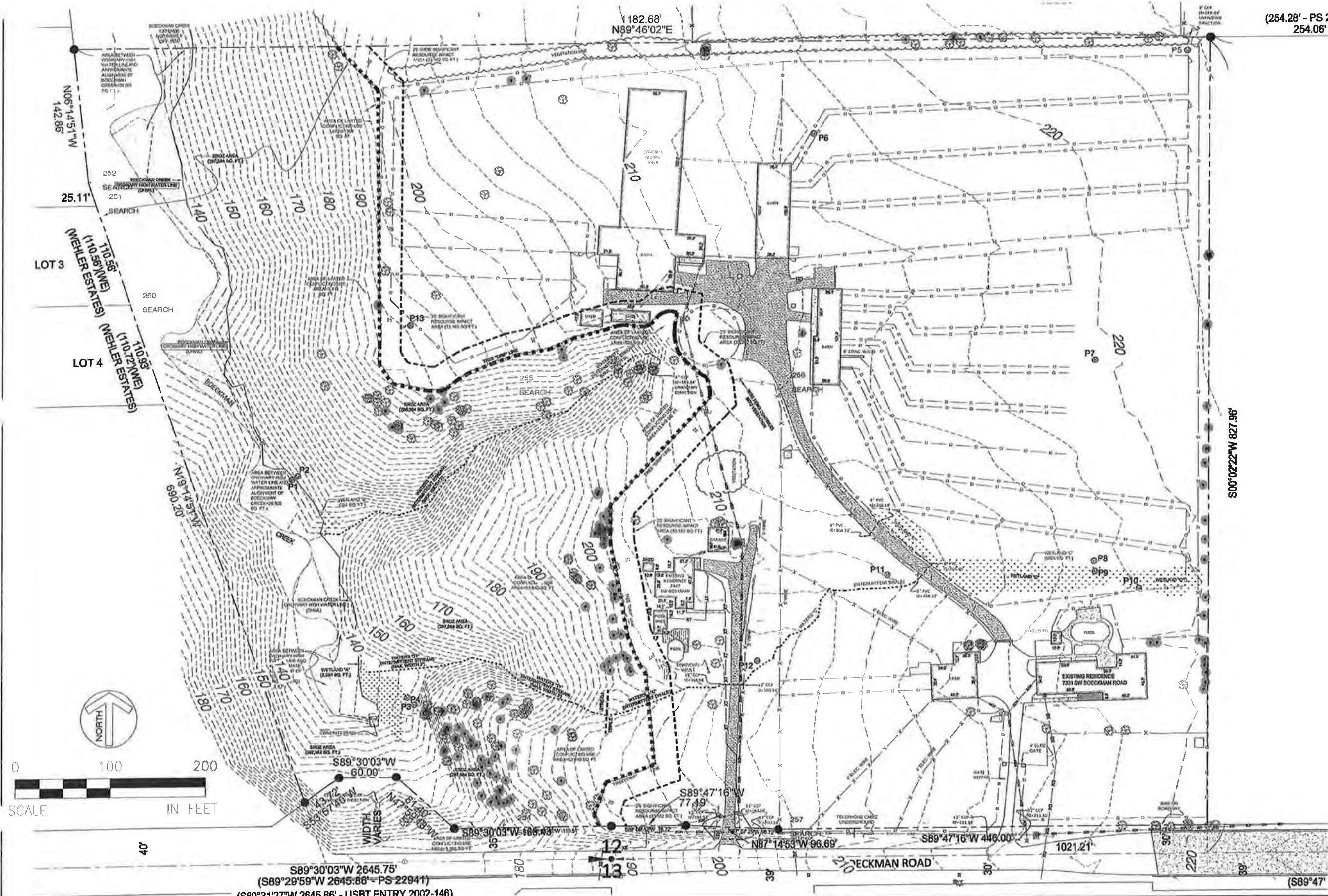


PUBLIC WORKS STANDARDS

B:\Land\cts 2004\338-001\hydro\Planning\3381_EXCN.dwg 2/2/04 8:33:10 AM

EXISTING CONDITIONS

MORGAN FARMS



(254.28' - PS 254.06'

S00°02'22\"/>

9020 SW WASHINGTON SQUARE RD.
SUITE 170
PORTLAND, OREGON 97223
p 503.643.8286
f 844.715.4743
www.pd-grp.com



PIONEER DESIGN GROUP, INC.

Designed by	TCC	Date	01/18
Drawn by	TCC	Date	01/18
Reviewed by	BEF	Date	01/18
Project No.	338-001	REF.	
Horiz. Scale:	1"=100'		
Vert. Scale:			

Project
MORGAN FARMS

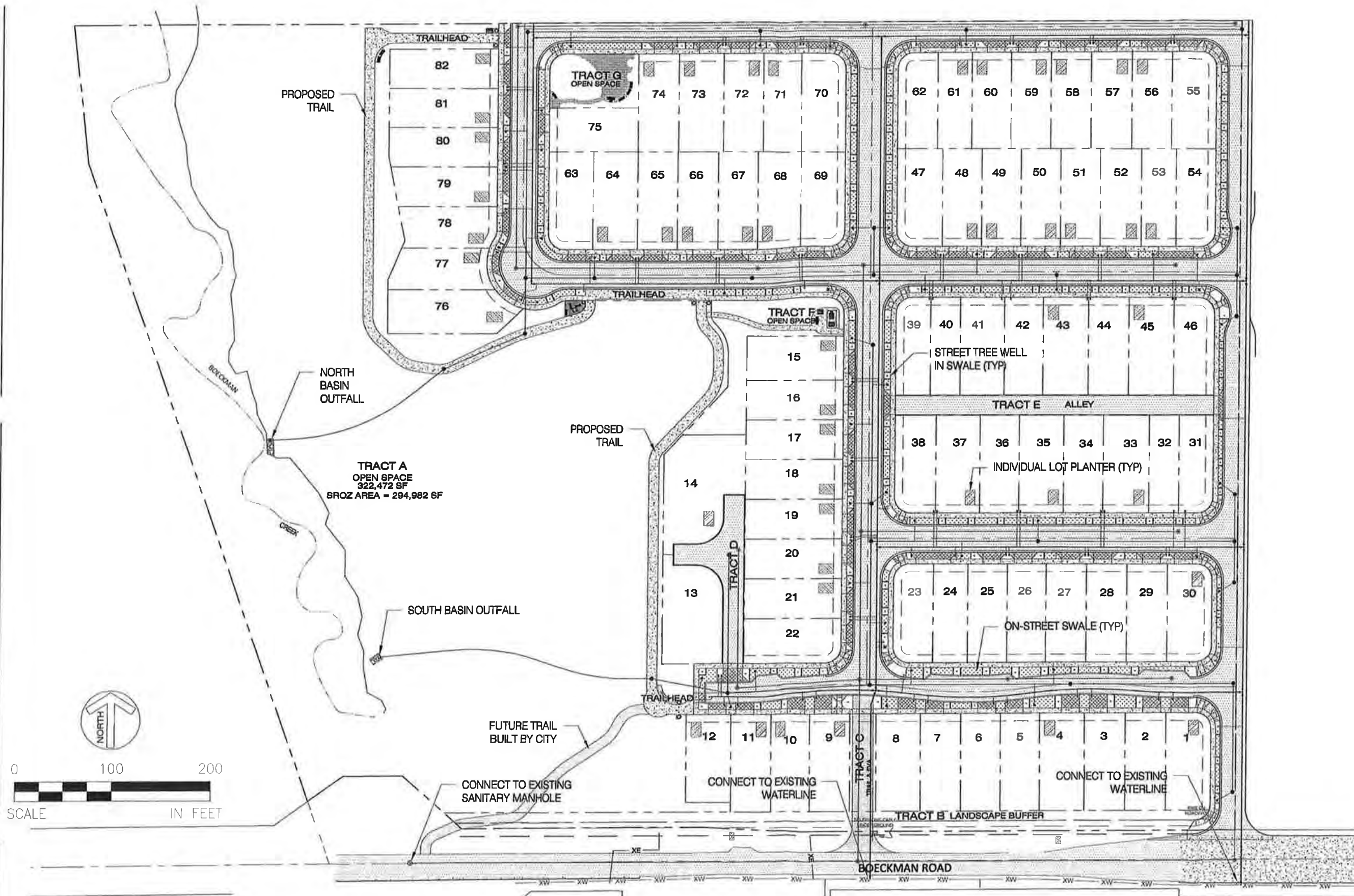
No.
338-001

Type
ENGINEERING

Sheet

COMPOSITE UTILITY PLAN

MORGAN FARMS



27/2018 10:18:20 AM

acts 2004\338-001\hydro\Planning\3381_COMP UTIL.dwg

B:\land

9020 SW WASHINGTON SQUARE RD.
SUITE 170
PORTLAND, OREGON 97223
p 503.643.8286
f 844.715.4743
www.pd-grp.com



PIONEER DESIGN GROUP, INC.

Designed by	TCC	Date	01/18
Drawn by	TCC	Date	01/18
Reviewed by	BEF	Date	01/18
Project No.	338-001	REF.	
Horiz. Scale:	1"=100'		
Vert. Scale:			

Project
MORGAN FARMS

No.
338-001

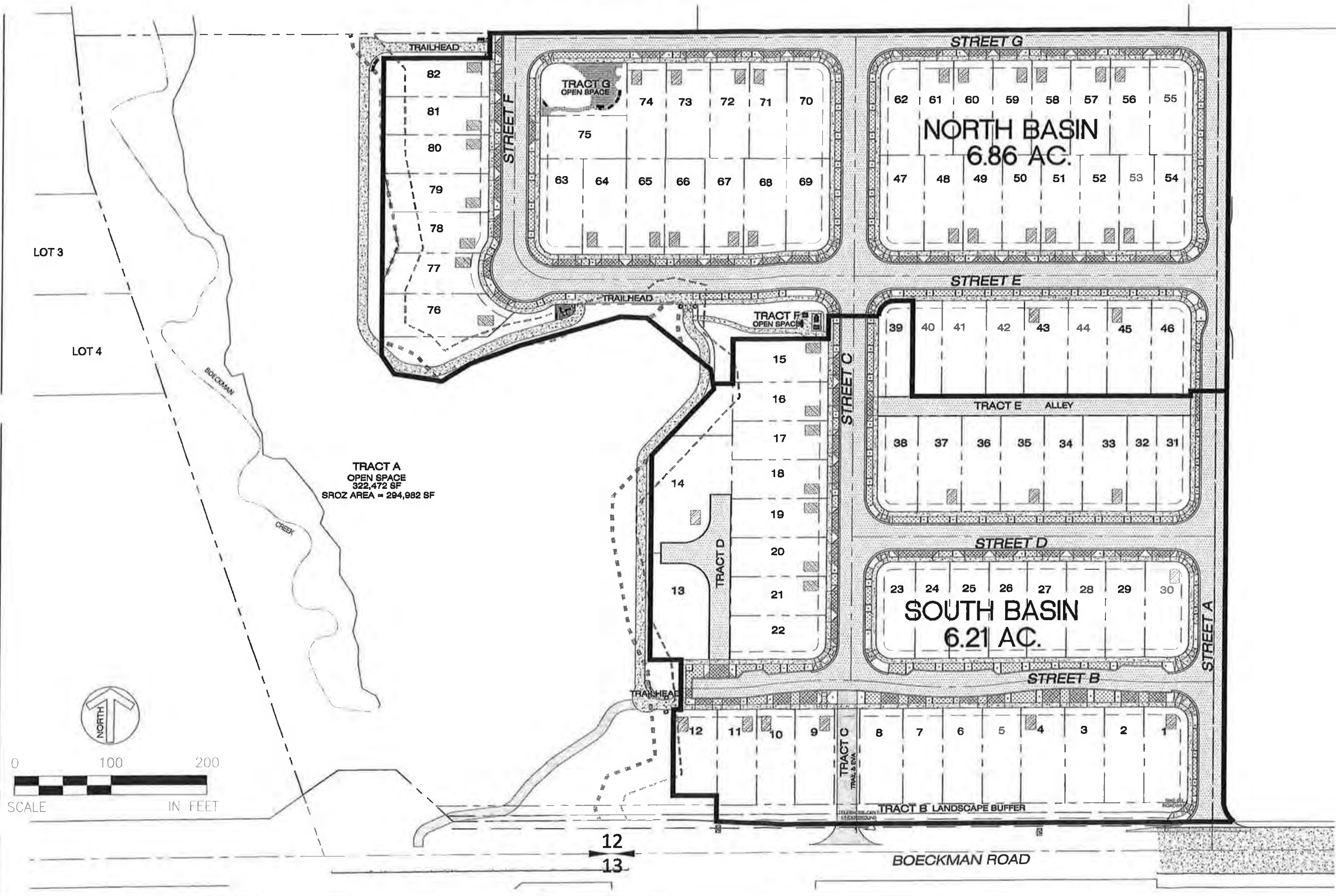
Type
ENGINEERING

Sheet

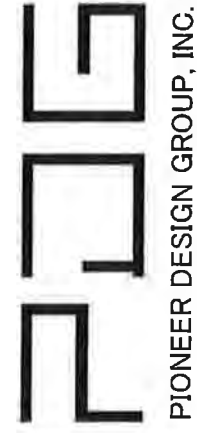
B:\Land F...cts 2004\338-001\hydro\Planning\3381_basin map.dwg 7/2018 10:07:29 AM

DRAINAGE BASIN EXHIBIT

MORGAN FARMS



9020 SW WASHINGTON SQUARE RD.
 SUITE 170
 PORTLAND, OREGON 97223
 p 503.643.8286
 f 844.715.4743
 www.pd-grp.com



PIONEER DESIGN GROUP, INC.

Designed by	TCC	Date	01/18
Drawn by	TCC	Date	01/18
Reviewed by	BEF	Date	01/18
Project No.	338-001	REF.	
Horiz. Scale: 1"=100'		Vert. Scale:	

Project
MORGAN FARMS

No.
338-001

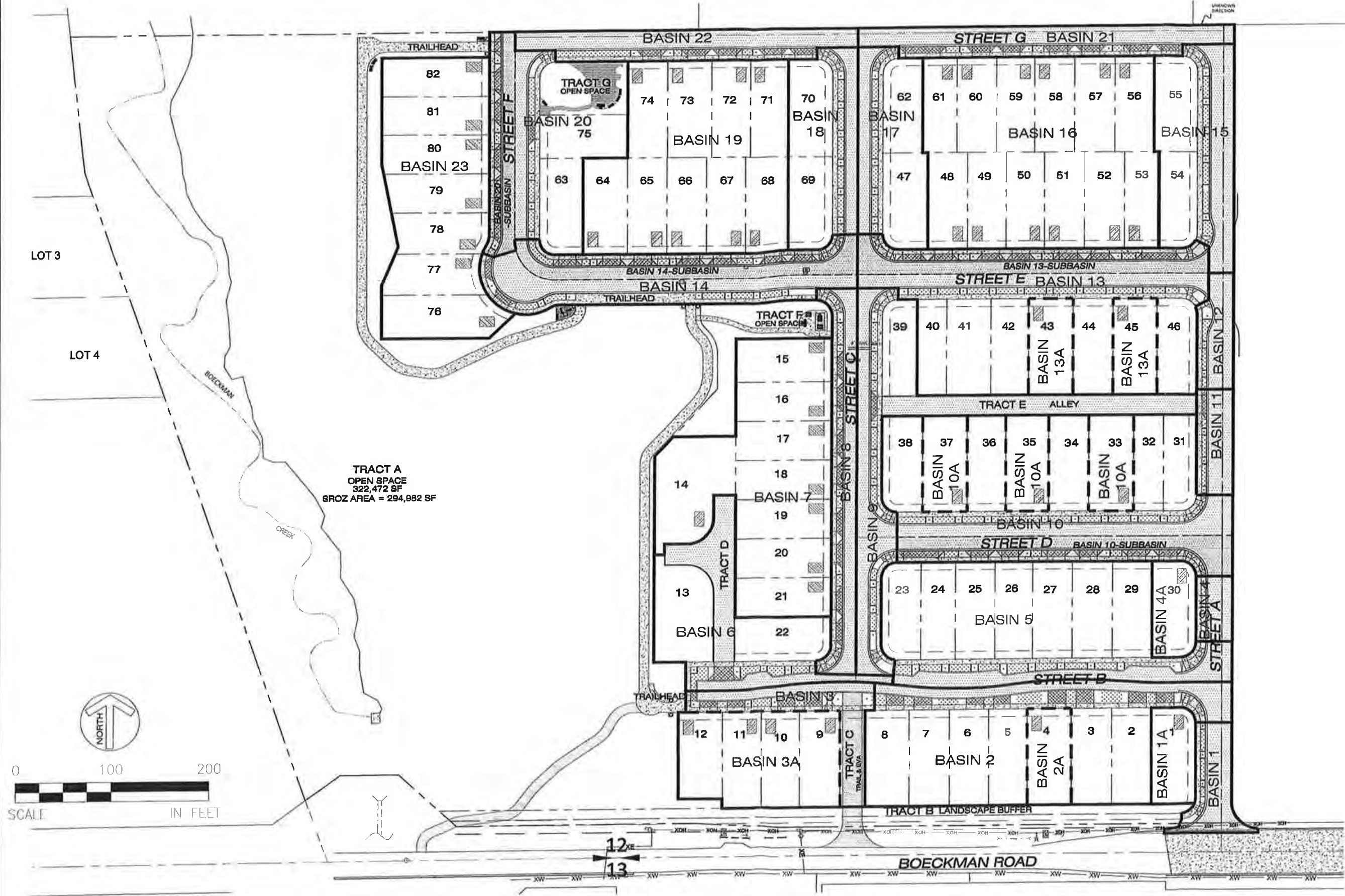
Type
ENGINEERING

Sheet

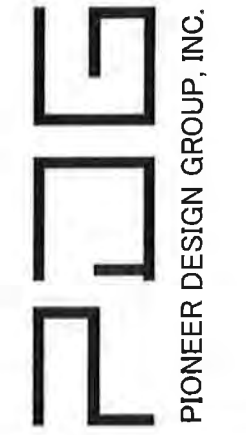
B:\Land . jts 2004\338-001\hydro\Planning\3381_LIDA BASIN MA. g 3/27/2018 12:43:05 PM

LIDA BASIN EXHIBIT

MORGAN FARMS



9020 SW WASHINGTON SQUARE RD.
 SUITE 170
 PORTLAND, OREGON 97223
 p 503.643.8286
 f 844.715.4743
 www.pd-grp.com



Designed by	TCC	Date	01/18
Drawn by	TCC	Date	01/18
Reviewed by	BEF	Date	01/18
Project No.	338-001	REF.	
Horiz. Scale: 1"=100'		Vert. Scale:	

Project
MORGAN FARMS

No.
338-001

Type
ENGINEERING

Sheet

Retaining Walls Details

Structural Calculations

for

Belz Place Phase 2: Allan Block Retaining Walls

Camas, Washington

Prepared for
Pahlisch Homes, Inc.

February 17, 2017

JOB NUMBER: MSP-246

Limitations

Engineer was retained in limited capacity for this project. Design is based upon information provided by the client, who is solely responsible for the accuracy of same. No responsibility and/or liability is assumed by, or is to be assigned to the engineer for items beyond that shown on these sheets.

37 sheets total including this cover sheet.

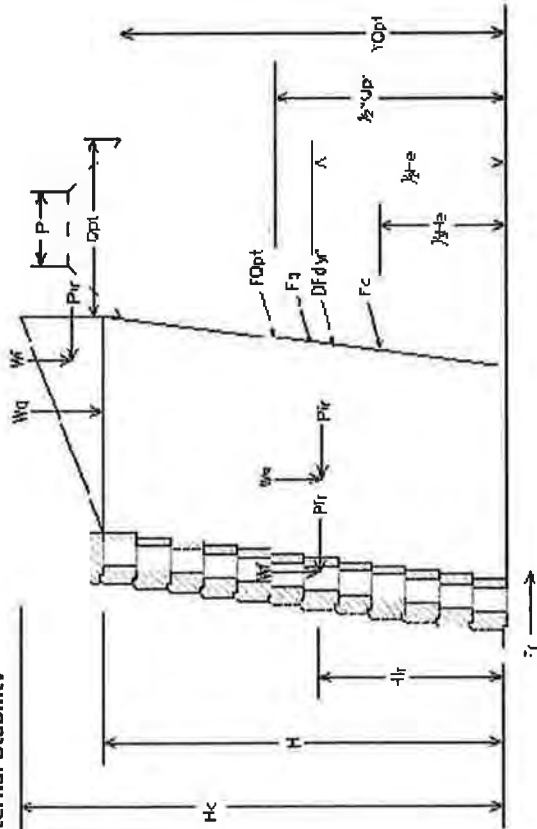


This Packet of Calculations is Null and Void if Signature above is not original



205 SE Spokane St. Suite 200 ♦ Portland, OR 97202 ♦ [P] 503.221.1131 ♦ [F] 503.221.1171
1104 Main St. Suite 100 ♦ Vancouver, WA 98660 ♦ [P] 360.450.1141 ♦ [F] 360.750.1141
1133 NW Wall St. Suite 201 ♦ Bend, OR 97701 ♦ [P] 541.318.1161 ♦ [F] 541.318.1141

External Stability



Unit Weight of Concrete = 135 pcf
 Unit Weight of Wall Rock = 120 pcf

- He = Effective Wall Height = 13.13 ft
- H = Total Panel Height = 13.13 ft
- Wi = Weight of the Backslope = 0 plf
- Wq = Infill Surcharge Dead Load = 0 plf
- Ws = Weight of the Allan Block Facing = 1675.64 plf
- Ws = Weight of the Geogrid Reinforced Soil Mass = 11264.63 plf
- Pir = Seismic Inertial Force for Each Gravity Force = 607.5 plf
- Hir = Resultant Vertical Location = 6.56 ft
- P = Point Load Surcharge = 0 psf
- Qpt = Translated Point Load = 0 plf
- DFdyn = Dynamic Earth Force = 374.66 plf
- Fg = Surcharge Force = 0 plf
- FQopt = Point Load Force = 0 plf
- YQopt = Translated Point Load Vertical Location = 0 plf
- Fa = Active Earth Force = 2864.78 plf

Bearing Capacity Calculations:

Bearing Pressure (s_max) = 2540.26 psf
 Ultimate Bearing Capacity (s_ult) = 5158.03 psf
 (Using Meyerhoff bearing capacity equation.)

I hereby certify that these calculations were prepared by me or under my direct supervision and that I am a duly licensed engineer certified and responsible for the content of these calculations.

Signature: _____
 Engineer: _____
 License Number: _____ Date: _____

W

Internal Stability:

Section: 0

Summary of Forces

Geogrid Number	Course Number	Geogrid Length ft	Active Earth Pressure pif	Dynamic Earth Pressure pif	Surcharge Force pif	Point Load Force pif	Seismic Internal Force pif	Static Tensile Force pif
10A	17	10	82.44	67.11	0	0	166.24	82.44
9A	16	10	53.84	19.18	0	0	77.78	53.84
8A	15	8	106	28.76	0	0	141.91	106
7A	13	8	188.44	38.35	0	0	236.33	188.44
6A	11	8	242.28	38.35	0	0	290.17	242.28
5A	9	8	296.12	38.35	0	0	344.01	296.12
4A	7	8	349.96	38.35	0	0	397.85	349.96
3A	5	8	403.8	38.35	0	0	451.69	403.8
2A	3	8	457.64	38.35	0	0	505.53	457.64
1A	1	8	511.48	38.35	0	0	559.37	511.48

I hereby certify that these calculations were prepared by me or under my direct supervision and that I am a duly licensed engineer certified and responsible for the content of these calculations.

Signature:

Engineer:

License Number:

Date:

Page #: 3

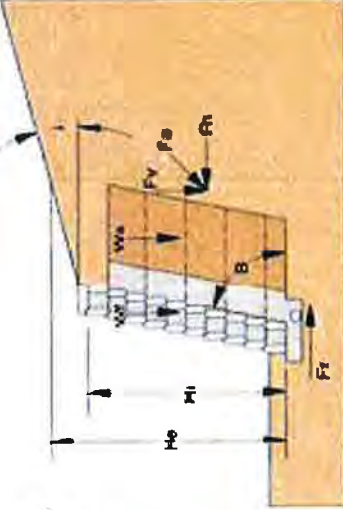
Project Name:
 Location:
 Wall Number:
 Project Number:
 Designer: JAS
 Date:

4

Wall Design Variables

K_{a1} = Active Earth Pressure Coefficient Infill = 0.277
 K_{a2} = Active Earth Pressure Coefficient Retained = 0.277
 H = Wall Height = 13.13 ft
 H_e = Effective Height = 13.13 ft
 $H_{e,i}$ = Effective Height = 13.13 ft
 i = Slope = 0 Deg.
 i_{int} = Effective Slope = 0 Deg.
 i_{ext} = Effective Slope = 0 Deg.

Setback = 90 - Beta Angle = 2.9 Deg.
 W_f = Weight of Facing = 1675.64 plf
 W_t = Total Weight = 12940.27 plf
 F_a = Active Force = 2864.78 plf
 F_{av} = Vertical Force = 979.81 plf
 F_{ah} = Horizontal Force = 2692.01 plf
 F_r = Resistance Force = 8036.77 plf



Internal Design Calculations (Static)

Section: 0

Geogrid Number	Geogrid Elevation ft	Geogrid Length ft	Tensile Force plf	Allowable Load plf	Factor Safety Overstress	Factor Safety Pullout Block	Factor Safety Pullout Soil	Efficiency
10A	11.16	10	82.44	1075.33	19.57	19.28	11.85	7.67
9A	10.5	10	53.84	1075.33	29.96	31.09	24.03	5.01
8A	9.84	8	106	1075.33	15.22	16.59	9.15	9.86
7A	8.53	8	188.44	1075.33	8.56	10.23	7.05	17.52
6A	7.22	8	242.28	1075.33	6.66	8.66	7.92	22.53
5A	5.91	8	296.12	1075.33	5.45	7.66	9.56	27.54
4A	4.59	8	349.96	1075.33	4.61	6.96	11.19	32.54
3A	3.28	8	403.8	1075.33	3.99	6.45	12.82	37.55
2A	1.97	8	457.64	1075.33	3.52	6.07	14.46	42.56
1A	0.66	8	511.48	1075.33	3.15	5.76	16.09	47.57

Geogrid Legend
 A - Strata SG 200
 B - Strata SG 350
 C - Strata SG 500
 Min. Length of Geogrid: 8 ft

I hereby certify that these calculations were prepared by me or under my direct supervision and that I am a duly licensed engineer certified and responsible for the content of these calculations.

Signature: _____
 Engineer: _____
 License Number: _____ Date: _____

Project Name: _____
 Location: _____
 Wall Number: _____
 Project Number: _____
 Designer: JAS
 Date: _____









Republic Services

Ben Altman

From: Lonergan, Frank <FLonergan@republicservices.com>
Sent: Friday, January 05, 2018 12:35 PM
To: Ben Altman
Subject: RE: Frog Pond Development Plan

Hey Ben, Happy New Year to you!

This development looks great. Yes typical 65 gallon roll carts for the most part with automated side load trucks servicing them. Should not be a problem getting around the streets.

Thanks for setting it up for easy service.

Frank Lonergan

Operations Manager

Wilsonville / Tualatin

Lake Oswego / Clackamas & Washington Counties

10295 SW Ridder Rd. Wilsonville OR 97070

e flonergan@republicservices.com

o 503-404-4176 c 503-209-5754

f 503-682-9004 w www.RepublicServices.com



We'll handle it from here."

[REDACTED]

From: Ben Altman [<mailto:BAltman@pd-grp.com>]
Sent: Friday, January 05, 2018 11:22 AM
To: Lonergan, Frank
Subject: Frog Pond Development Plan

Frank: HAPPY NEW YEAR!

I have attached the Preliminary Plat for a proposed development we are working on in the Frog Pond West Neighborhood.

Please review for garbage truck service.

I assume typical residential roll carts will be utilized, and placed at the curbs. The streets are layout to give you good circulation.

Please note, that Tract D, is design for flow-through circulation from Street B to C, rather than a typical dead-end hammerhead.

Ben Altman SENIOR PLANNER | PROJECT MANAGER | D 971.708.6258

PIONEER DESIGN GROUP, INC. CIVIL | LAND USE PLANNING | SURVEY

220 SW Washington Square Rd. Suite 170 Portland, OR 97223 P 503.643.8286 pd-grp.com

Disclaimer:

This e-mail may contain proprietary, confidential, and/or privileged information. If you are not the intended recipient (or have received this e-mail in error), please notify the sender immediately by email or telephone (503-643-8286) and delete this message along with any attachments without copying or disclosing the contents. Any unauthorized copying, disclosure or distribution of the material in this e-mail is strictly forbidden. Pioneer Design Group, Inc. (PDG) shall not be liable for any changes made to the electronic data transferred. Distribution of electronic data to others is prohibited without the express written consent of PDG.



Ben Altman

From: Lonergan, Frank <FLonergan@republicservices.com>
Sent: Friday, January 05, 2018 12:35 PM
To: Ben Altman
Subject: RE: Frog Pond Development Plan

Hey Ben, Happy New Year to you!

This development looks great. Yes typical 65 gallon roll carts for the most part with automated side load trucks servicing them. Should not be a problem getting around the streets.

Thanks for setting it up for easy service.

Frank Lonergan

Operations Manager

Wilsonville / Tualatin

Lake Oswego / Clackamas & Washington Counties

10295 SW Ridder Rd. Wilsonville OR 97070

e flonergan@republicservices.com

o 503-404-4176 c 503-209-5754

f 503-682-9004 w www.RepublicServices.com



We'll handle it from here.™

From: Ben Altman [<mailto:BAltman@pd-grp.com>]
Sent: Friday, January 05, 2018 11:22 AM
To: Lonergan, Frank
Subject: Frog Pond Development Plan

Frank: HAPPY NEW YEAR!

I have attached the Preliminary Plat for a proposed development we are working on in the Frog Pond West Neighborhood.

Please review for garbage truck service.

I assume typical residential roll carts will be utilized, and placed at the curbs. The streets are layout to give you good circulation.

Please note, that Tract D, is design for flow-through circulation from Street B to C, rather than a typical dead-end hammerhead.

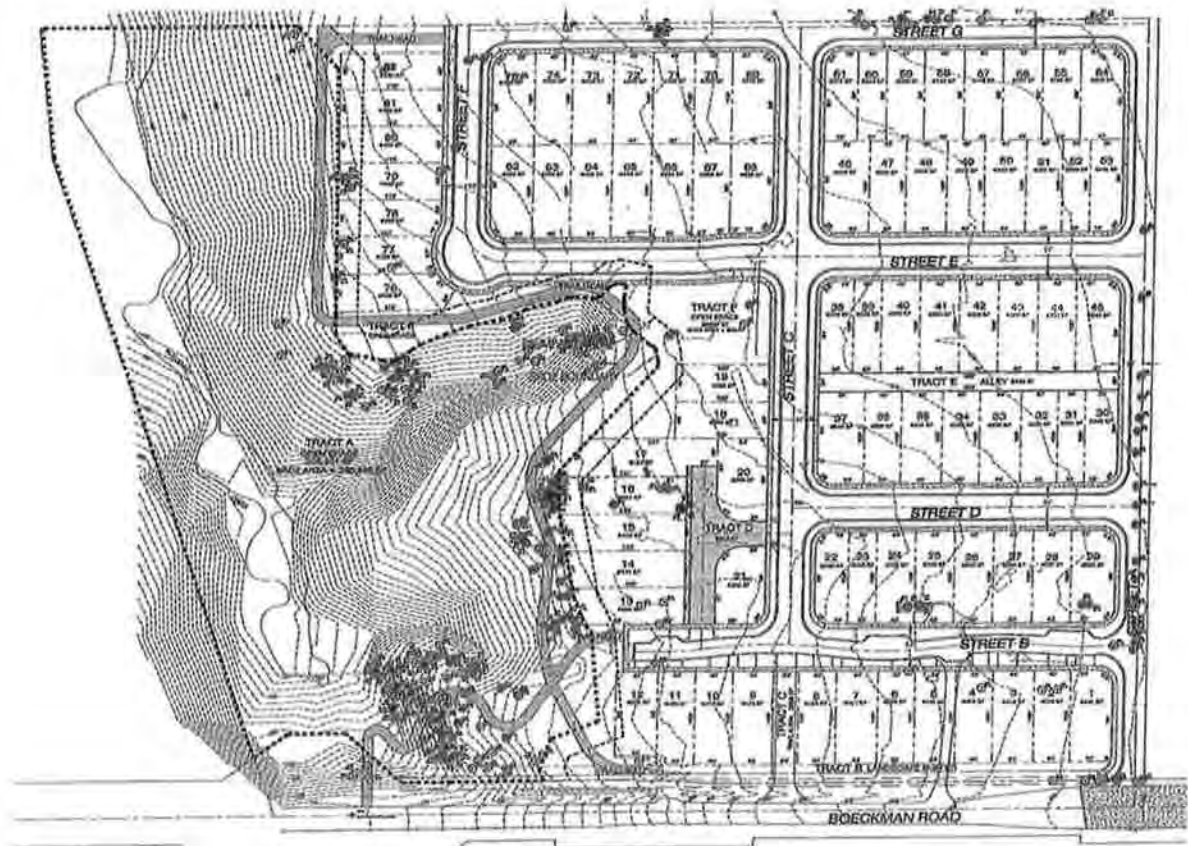
Ben Altman SENIOR PLANNER | PROJECT MANAGER | D 971.708.6258

PIONEER DESIGN GROUP, INC. CIVIL | LAND USE PLANNING | SURVEY

9020 SW Washington Square Rd. Suite 170 Portland, OR 97223 P 503.643.8286 pd-grp.com

Disclaimer:

This e-mail may contain proprietary, confidential, and/or privileged information. If you are not the intended recipient (or have received this e-mail in error), please notify the sender immediately by email or telephone (503-643-8286) and delete this message along with any attachments without copying or disclosing the contents. Any unauthorized copying, disclosure or distribution of the material in this e-mail is strictly forbidden. Pioneer Design Group, Inc. (PDG) shall not be liable for any changes made to the electronic data transferred. Distribution of electronic data to others is prohibited without the express written consent of PDG.



Parks Review Board

Parks and Recreation Advisory Board Meeting Action Minutes
February 8, 2018

Advisory Board members present included:

Steve Benson
Jim Barnes
David Davis (arrived at: 5:45pm)
Denise Downs
Kate Johnson
Ken Rice

Staff present included:

Tod Blankenship, Parks Supervisor
Mike McCarty, Parks and Recreation Director
Kim Rybold, Associate Planner
Brian Stevenson, Program Manager

AGENDA ITEM	ACTIONS
REGULAR MEETING	
<u>Public Comment</u>	None
<u>Agenda</u> A. Morgan Estates – Boeckman Creek Regional Trail and Trail Head Improvements B. FY 18/19 Proposed CIP Budget Items	A. Recommendation to DRB passes 5-0 as presented with the inclusion of center dividing line on trail for safety purposes. B. Motion supporting proposed CIP budget as presented by staff; recognizing that one of the Board's priorities (Community-scale skatepark) is included in funding request. Passes 4-0 (2 abstaining).
<u>Staff Reports</u> A. Admin/Parks and Rec Director B. Recreation C. Parks Maintenance	A. Comprehensive Parks and Rec Master Plan scheduled to go City Council and Planning Commission. Boones Ferry Park Master Plan on hold until landing point for Bike/Pedestrian determined. B. Community Garden sign up starts April 5. Park Rental season opens for residents on March 12. C. Community Garden/Dog Park parking lot expansion starting permitting progress. Town Center Park bandshell design process starting.
ADJOURN	6:30 p.m.

February 1, 2018

Wilsonville Parks & Recreation Advisory Board
City of Wilsonville
29799 SW Town Center Loop E.
Wilsonville, OR 97070

RE: Morgan Farms - Boeckman Creek Regional Trail and Trail Head Improvements
Pioneer Project No.: 338-001.

Board Members:

We appreciate this opportunity to review proposed Boeckman Creek Regional Trail and Trail Head improvements, associated with the proposed Morgan Farms Development with the Board.

Morgan Farms is an 82 Lot development proposed in the southwest corner of the Frog Pond West Neighborhood, within Sub-Area 1. This will be the first development within the Frog Pond master planned area. This development site consists of three tax lots totaling 21.13 acres, of which about 6.79 acres are within the Boeckman Creek corridor. The Boeckman Creek corridor will be zoned SROZ.

Morgan Farms

The plat name, Morgan Farms, was selected based on the history of the property. This property, including barns and stables, was originally developed for breeding horses. Bill and Helen Crawford of Boston Morgan Farm have been breeding and raising Morgan show horses for over 30 years. In 1973, they left their New England home and relocated to Wilsonville, OR. Then in late 2003, they made a big move to their present location in La Cresta in Murrieta, CA where they built a new farm. Besides operating their horse farm, the Crawfords were also active in Wilsonville schools and youth sports, until they moved to California.

The farm's celebrity in residence, of course, is *Tug Hill Whamuniton*. A WC Stallion in hand, six-time WC in the Park Saddle section and packing a total of 11 WC titles overall, this charismatic stallion is right at home and is enjoying welcoming visitors and charming the ladies of his court.



The Frog Pond West Master Plan identifies a regional trail system with the SROZ, see excerpt from Master Plan. Consistent with the Frog Pond West Master Plan, the Morgan Estates development will construct the initial trail section north of Boeckman Road, see Preliminary Trail Plan. The proposed trail alignment has been coordinated with City Staff.

Streets

The preliminary plat aligns the main entry street along the common property line with the school property. This primary local access (Street A) is designated P1, Primary Street, in the Frog Pond West Master Plan. This alignment frames the school with the street and provides for homes across the street to face the school site.

The local streets are laid out to provide a safe and efficient circulation pattern with 3 north/south and 4 east/west streets. All of the local streets will be designed consistent with the “Low Impact Green Street” design.

The street grid has been refined to provide compliance with the pedestrian access spacing of no greater than 330 feet. The north/south blocks range from 115 to 230 feet in length, with the east/west blocks spaced at 330 feet or less.

Streets B, E and G provide visual corridors from the school property, adjacent to the east of the development, to the SROZ. Streets B, C, E, F, and G all provide direct links to the SROZ or to trail heads. Tract ‘C’ provides a pedestrian link into the development and the trail system from Boeckman Road.

Open Space

The SROZ area is to be set aside in Tract ‘A’ and dedicated to the City. The SROZ boundary includes 295,855 square feet (6.79 acres), which equals 33.7% of the gross site area, accounting for smoothed edges. The pathway connections and trail heads extending from Streets B, E and G are included in Tract ‘A’, for dedication to the City. These trail heads provide an additional 10,496 square feet of open space, outside of the SROZ.

The proposed preliminary plat provides a total of 50,568 square feet of general open space, outside of the SROZ. This equals 14.5% of the net developable area.

The proposed “active use” area includes Tract ‘F,’ and portions of Tract ‘A,’ which are outside of the SROZ, plus trail segment within the SROZ, totaling 40,424 square feet, or 79.9% of the total general open space. Tract ‘G’ has been added to preserve a very large White Oak. Tract ‘G’ contains 4,941 square feet. Tract ‘F’ & ‘G’ are proposed to be owned and maintained by the Home Owners Association (HOA).

Table 3
Open Space Percent of Gross & Net Site Area

Tract	Square Footage	% Gross Site	% Net Site
'A' (SROZ)	295,855	33.7	
Tract 'A' Outside SROZ	16,569 "Active Space"		
'B' & 'C'	10,318		
Tract 'F' less 809 sf SROZ	23,855 "Active Space" Includes trail within SROZ		79.9 "Active Space" of General Open Space
'G' (White Oak)	4,941		
Total Open Space	50,568		14.5
Total SROZ & Open Space	351,538	40.1	
Gross Site	38.5%	876,700 sf	
Net Site			384,252 sf

NOTE: Tract F includes 809 square feet of SROZ, accounting for smoothed edges.

Regional Trail and Trail Heads

The Frog Pond West Master Plan identifies 3 planned trail heads associated with the subject property. These trail heads will provide local access to and from the planned regional trail system to be developed along Boeckman Creek corridor, See attached Figures 12, 31, 32, & 35 from the Frog Pond West Master Plan.

The trail will run along the top edge of the SROZ and the rear or side of lots adjacent to the SROZ. The grades are designed to meet ADA standards as 5% maximum. Where the slopes are the steepest, there will be retaining walls constructed to meet grade requirements and to stabilize the slopes, See attached Preliminary Trail Plans, L1 & L2.

Note: On the L1 & L2 Plans, the dotted black line is the 25 Foot Impact Area at the outer edge of the SROZ, and the dotted purple line is the Area of Limited Conflicting Use (ALCU). However, the proposed regional trail and trail heads are exempted from the SROZ regulations.

As shown on the Preliminary Plans, the trail heads are as follows:

1. Trail head #1 extends off the west end of Street G. This trail head provides for future extension of the trail to the north, as the adjacent property is developed.
2. Trail head #2 connects with the sidewalk along Street E. Along this section, the trail and sidewalk are combined. This section of the trail links with Tract 'F', which is being designed for "active open space" for the development.

3. Trail head #3 extends off the west end of Street B, and provides an overlook into the canyon. From this overlook, there is a planned future trail link, which is intended to extend down the slope to pass under the future bridge. This segment will connect with the trail planned south of the road.

However, this segment will exceed ADA slope standards. Therefore the City will be exploring alternative ADA alignments. This segment is shown as a future link to be constructed by the City.

To maintain grades for the trail, some sections will be elevated above the slope into the canyon, Retaining walls will be constructed along these sections, ranging from 4-8 feet in height. There will also be a retaining wall for the overlook at the south end. For the areas will retaining walls wrought iron railings will be installed, to maintain open views into the canyon, while ensuring public safety.

Tract 'C' provides a pedestrian connection from Boeckman Road to and from the development connecting with the intersection of Streets B & C. With the Tract 'C' connection, it has been determined that the trail link shown on the Master Plan directly from Boeckman Road, at the southwest corn of the site will not be necessary.

The developer will construct the trail extending through the development, and will provide basic improvements at the trail heads. The initial trail head improvements will include directional signage, together with some outdoor fitness/exercise stations. The city has agreed to provide the sign design. These exercise stations will be constructed of strong durable material, likely metal, not wood.

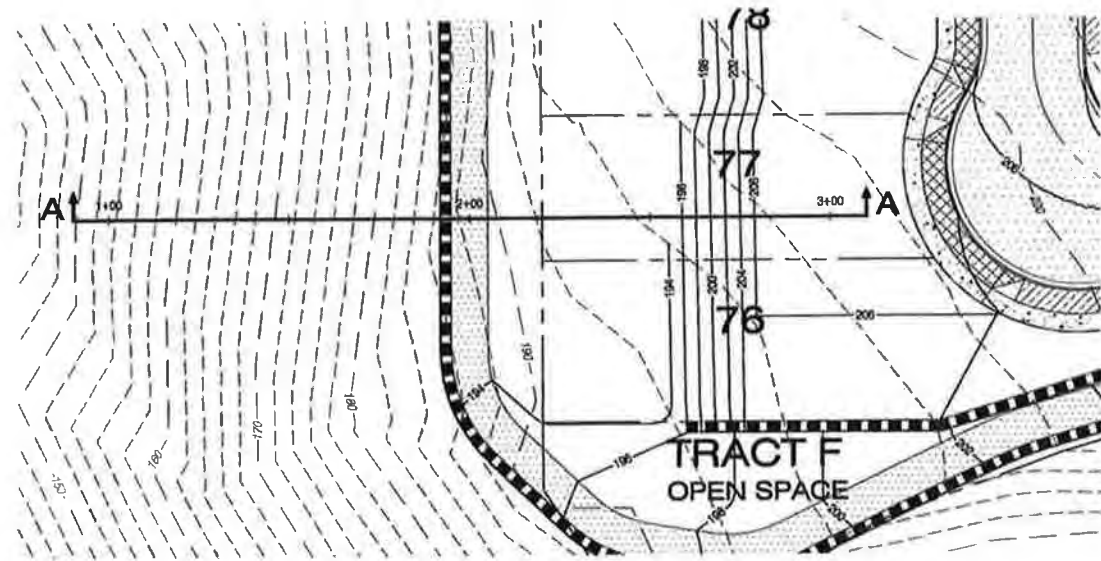
Beyond these initial improvements, we suggest that the City coordinate with the School District's Environmental Education program (CREST) to develop environmental educational signage, related to storm water management and the natural habitat of Boeckman Creek.

Thank you for your consideration of our input.

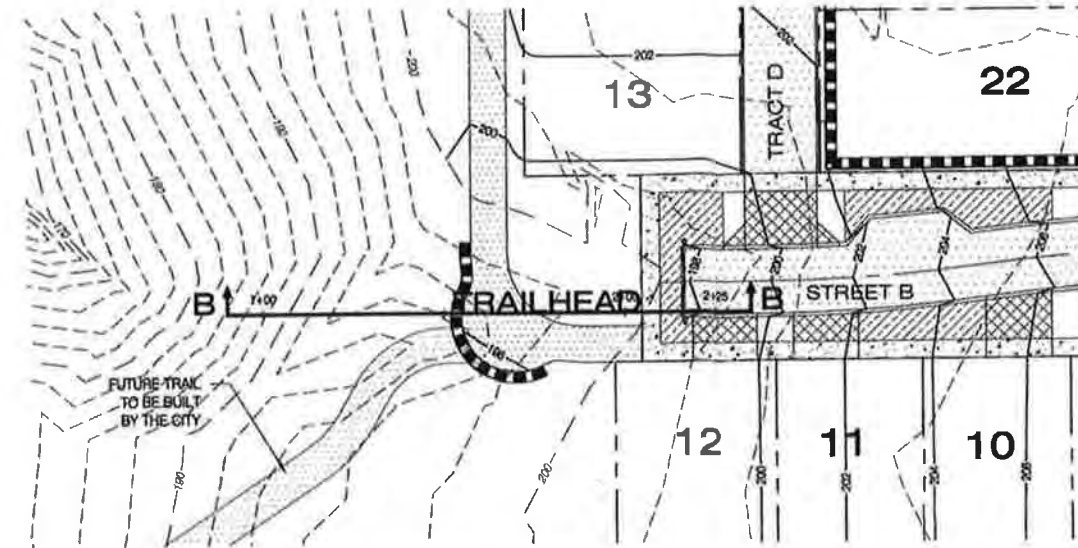
Sincerely,
Pioneer Design Group, Inc.

Ben Altman
Senior Planner/Project Manager

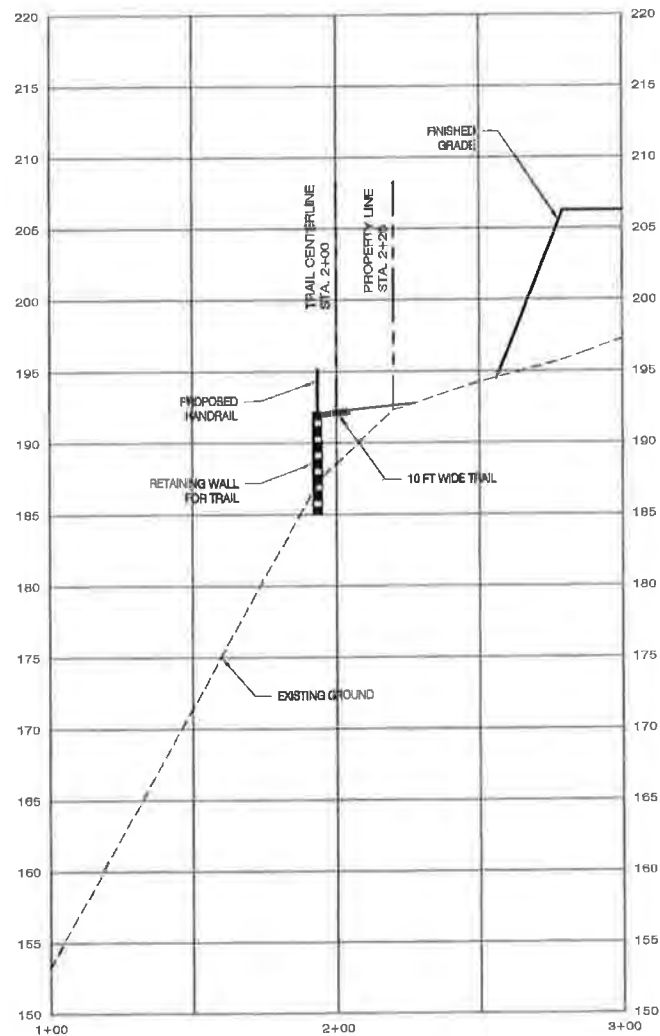
Cc: Jim Wolfston, Property Owner
Mike Morse, Pahlisch Homes



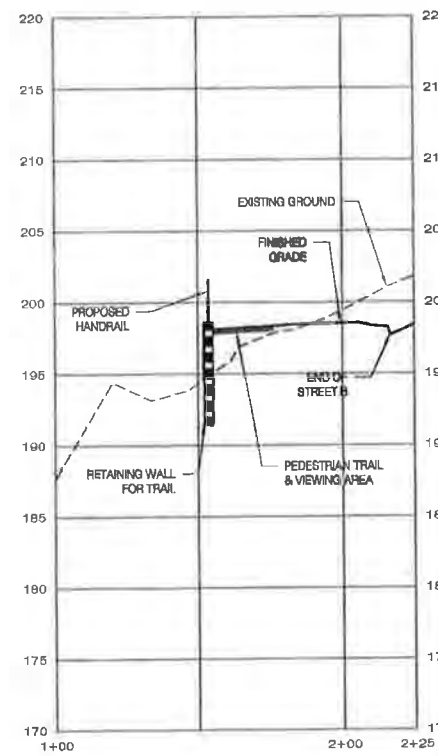
CROSS SECTION A-A PLAN
SCALE: 1"=30'



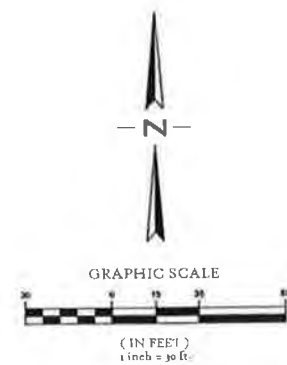
CROSS SECTION B-B PLAN
SCALE: 1"=30'



CROSS SECTION A-A PROFILE
SCALE: H:1"=30'; V:1"=6'



CROSS SECTION B-B PROFILE
SCALE: H:1"=30'; V:1"=6'



**TRAIL CROSS SECTIONS
PLAN AND PROFILES**

MORGAN FARMS
CITY OF WILSONVILLE, OREGON

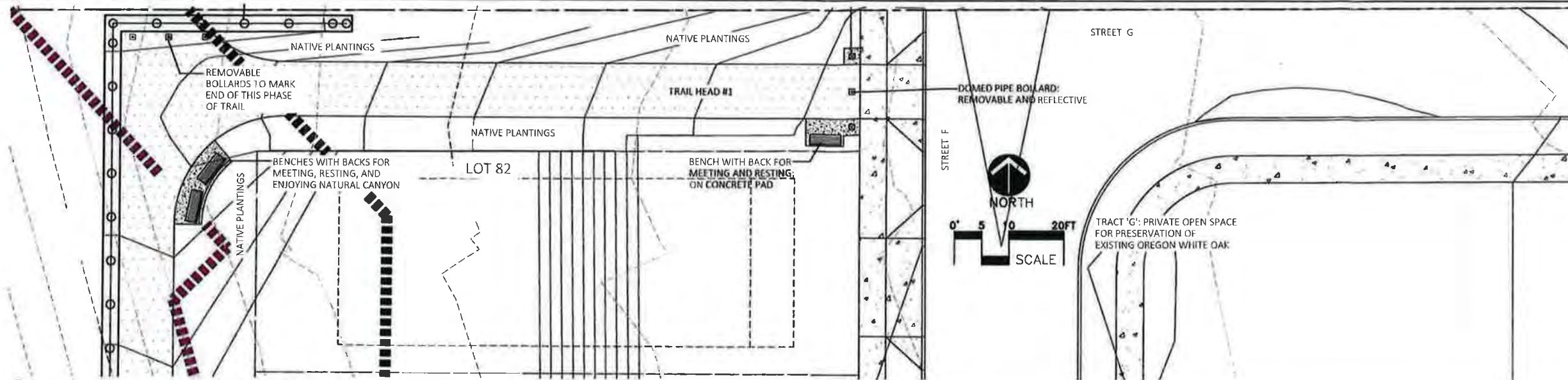
Designed by	Date	Checked by	Date	Reviewed by	Date	Project No.	Horizontal Scale	Vertical Scale
TTC	02/20/18	BA	02/20/18	REF.		338-001	1"=30'	1"=6'

No.	Date	Revision

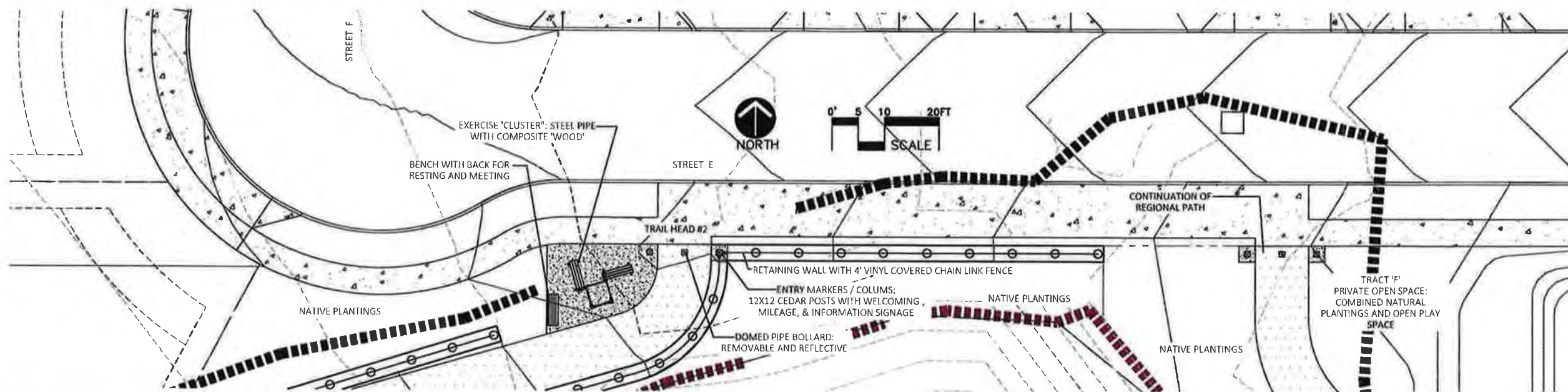
Project: MORGAN FARMS
No.: 338-001
Type: PLANNING
Sheet:

B:\Land Projects\2004\338-001\dwg\planning\Exhibits\3381_mal_cross_section.dwg 2/1/2018 5:42:18 AM

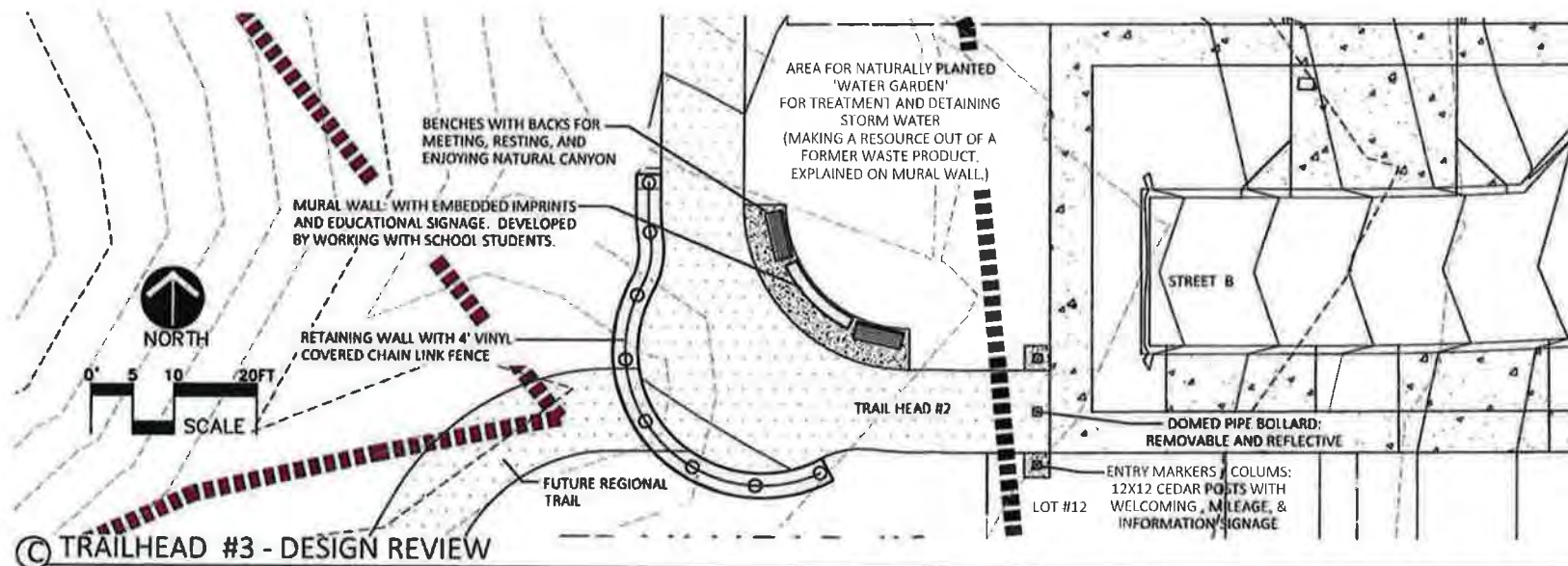




A TRAILHEAD #1 - DESIGN REVIEW



B TRAILHEAD #2 - DESIGN REVIEW



C TRAILHEAD #3 - DESIGN REVIEW

NOTE:
THE DETAIL AND SIZE OF THE TRAILHEAD BENCHES, SIGNS, AND "MARKERS / COLUMNS" WILL BE COORDINATED AND DEVELOPED WITH INPUT AND REVIEW BY THE CITY. THESE IMPROVEMENTS ARE TO BE CONSISTENT AND IN COMPLIANCE WITH THE DETAILS FOR THIS REGIONAL TRAIL SYSTEM.

PERCIVAL
LANDSCAPE
ARCHITECTURE
P.O. BOX 14876
PORTLAND,
OREGON
97293
perlandscape@gmail.com
503-939-3547



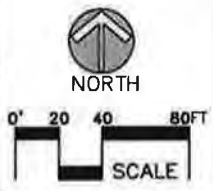
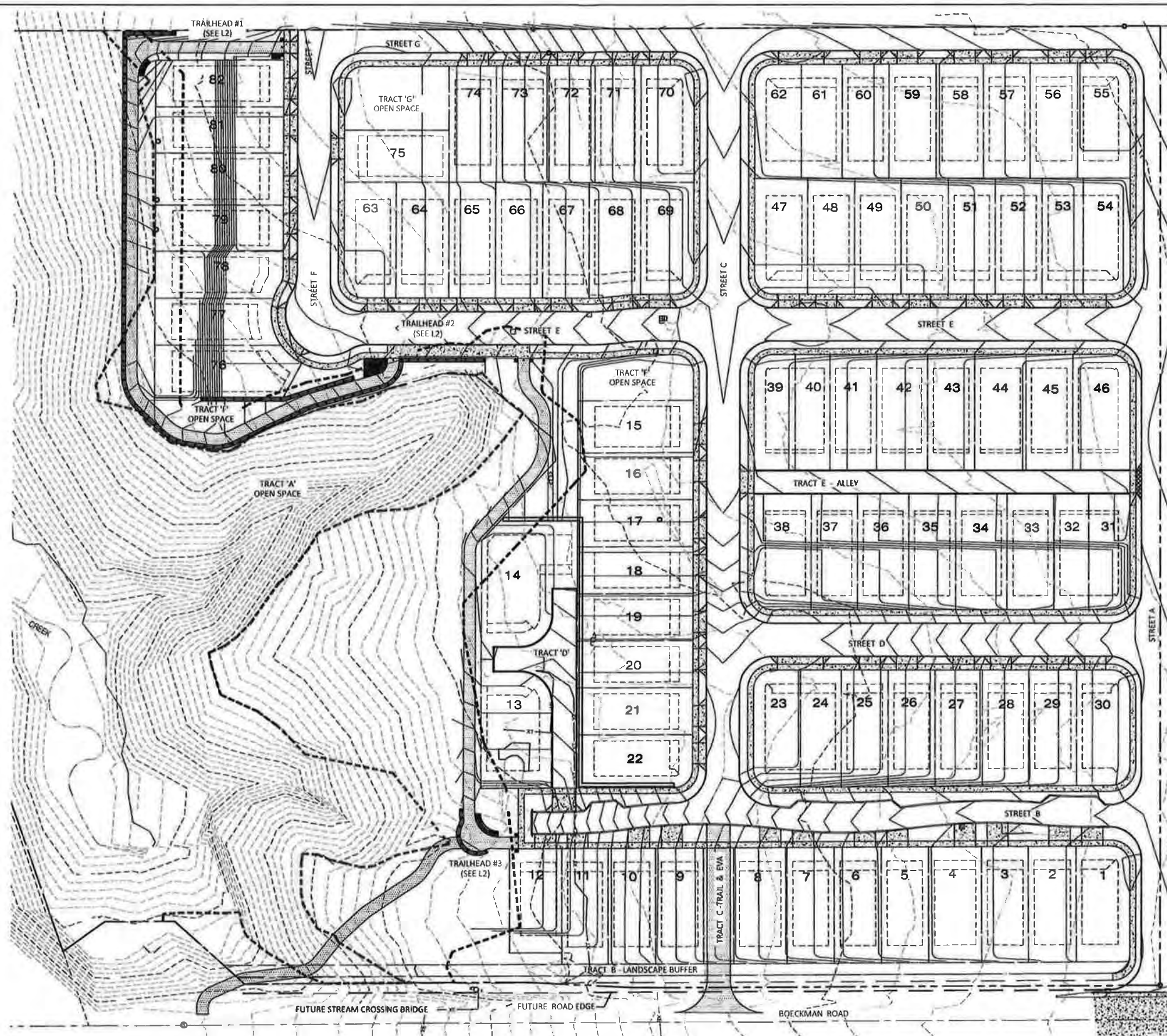
TRAILHEAD - COMPOSITION DESIGN REVIEW PLAN
LANDSCAPE

MORGAN FARMS
CITY OF WILSONVILLE, OREGON

Designed by	JDP	Date	1/31/18
Drawn by	JDP	Date	1/31/18
Reviewed by	JDP	Date	2/1/18

No.	Date	Revision	By
1	2/7/18	CITY DESIGN REVIEW	JDP

Project
MORGAN FARMS
No. 1715
Type D.R. PLAN
Sheet



(A) TRAILHEAD CONTEXT / KEY PLAN

PERCIVAL
LANDSCAPE
ARCHITECTURE
P.O. BOX 14676
PORTLAND,
OREGON
97293
perlandscape@gmail.com
503-939-3547



TRAILHEAD - CONTEXT / KEY DESIGN REVIEW PLAN
LANDSCAPE

MORGAN FARMS
CITY OF WILSONVILLE, OREGON

Designed by	JDP	Date	1/31/18
Drawn by	JDP	Date	1/31/18
Reviewed by	JDP	Date	2/1/18

By	JDP
Revision	
Date	
No.	1
Date	2/7/18
CITY DESIGN REVIEW	

Project
MORGAN FARMS
No. 1715
Type D.R. PLAN
Sheet L1

School District Dedication Legal Description

After recording, return to:
City of Wilsonville
Attn: Legal Department
29799 SW Town Center Loop East
Wilsonville OR 97070

Return tax statements to:
No change

STREET DEDICATION DEED

KNOW ALL BY THESE PRESENTS, that West Linn-Wilsonville School District, an educational district of the State of Oregon, County of Clackamas (hereinafter referred to as "Grantor"), as legal owner of that certain real property legally described below ("Property"), does hereby dedicate, grant, transfer, and convey to the **City of Wilsonville**, a municipal corporation of the State of Oregon, and its assigns (hereinafter referred to as "Grantee"), for the use of the public as public way, street, and road ("Street Dedication"), effective the ____ day of December, 2017, certain real property legally described as follows:

See **Exhibit A**, Legal Description, and **Exhibit B**, Locational Map, attached hereto, and incorporated by reference as if fully set forth herein.

TO HAVE AND TO HOLD the above-described Street Dedication unto Grantee for the public uses and purposes hereinabove mentioned; provided, however, in the event said Property is not used or ceases to be used for a public purpose, the Street Dedication may be vacated.

The true and actual consideration paid for this transfer, stated in terms of dollars, is Zero Dollars but consists of or includes other property or value given or promised, which is agreed by Grantor to be the whole and adequate consideration.

This Street Dedication Deed shall be subject to and construed pursuant to the laws of the State of Oregon, and venue shall be in the County of Clackamas.

No modifications may be made to this Dedication, except in writing, signed by both parties.

BEFORE SIGNING OR ACCEPTING THIS INSTRUMENT, THE PERSON TRANSFERRING FEE TITLE SHOULD INQUIRE ABOUT THE PERSON'S RIGHTS, IF ANY, UNDER ORS 195.300, 195.301 AND 195.305 TO 195.336 AND SECTIONS 5 TO 11, CHAPTER 424, OREGON LAWS 2007, SECTIONS 2 TO 9 AND 17, CHAPTER 855, OREGON LAWS 2009, AND SECTIONS 2 TO 7, CHAPTER 8, OREGON LAWS 2010. THIS INSTRUMENT DOES NOT ALLOW USE OF THE PROPERTY DESCRIBED IN THIS INSTRUMENT IN VIOLATION OF APPLICABLE LAND USE LAWS AND REGULATIONS. BEFORE SIGNING OR ACCEPTING THIS INSTRUMENT, THE PERSON ACQUIRING FEE TITLE TO THE PROPERTY SHOULD CHECK WITH THE APPROPRIATE CITY OR COUNTY PLANNING DEPARTMENT TO VERIFY THAT THE UNIT OF LAND BEING TRANSFERRED IS A LAWFULLY ESTABLISHED LOT OR PARCEL, AS DEFINED IN ORS 92.010 OR 215.010, TO VERIFY THE

GRANTEE:

ACCEPTED on behalf of the public and Grantee by the City of Wilsonville, Oregon:

Bryan Cosgrove, City Manager

STATE OF OREGON)
) ss.
County of Clackamas)

This instrument was acknowledged before me on _____, 20____,
by Bryan Cosgrove, as City Manager of the City of Wilsonville.

Notary Public – State of Oregon

APPROVED AS TO FORM:

Barbara A. Jacobson, City Attorney

APPROVED AS TO LEGAL DESCRIPTION:

Nancy J.T. Kraushaar, P.E., City Engineer

I:\prop acq\frog pond\doc\deed street dedic--sd to city templ (bjc).doc

**RIGHT-OF-WAY DEDICATION LEGAL DESCRIPTION
PORTION OF "PARCEL I", DEED DOCUMENT NO. 99-052398
(TAX LOT 2300, TAX MAP 3 1W 12D)
CLACKAMAS COUNTY, OREGON**

A STRIP OF LAND BEING THE WESTERLY 28.00 FEET OF "PARCEL I" DESCRIBED IN DEED DOCUMENT NO. 99-052398 (CLACKAMAS COUNTY DEED RECORDS), LOCATED IN THE NORTHEAST QUARTER OF SECTION 12, TOWNSHIP 3 SOUTH, RANGE 1 WEST OF THE WILLAMETTE MERIDIAN, CLACKAMAS COUNTY, OREGON, AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT A 1/2" IRON ROD MARKING THE SOUTHWEST CORNER OF SAID "PARCEL I", SAID CORNER LOCATED ON THE NORTH RIGHT-OF-WAY LINE OF BOECKMAN ROAD; THENCE NORTH 00°02'22" EAST ALONG THE WEST LINE OF SAID "PARCEL I", 827.96 FEET TO THE NORTHWEST CORNER THEREOF; THENCE NORTH 89°46'02" EAST ALONG THE NORTH LINE OF SAID "PARCEL I", 28.00 FEET; THENCE LEAVING SAID NORTH LINE, SOUTH 00°02'22" WEST, 827.97 FEET TO SAID NORTH RIGHT-OF-WAY LINE OF BOECKMAN ROAD; THENCE SOUTH 89°47'16" WEST, 28.00 FEET ALONG SAID RIGHT-OF-WAY LINE TO SAID SOUTHWEST CORNER OF "PARCEL I" AND THE POINT OF BEGINNING.

CONTAINING APPROXIMATELY 23,183 SQUARE FEET.



VALID UNTIL 6-30-19

DEED DOCUMENT
NO. 2003-083133

DEED DOCUMENT
NO. 2015-009641
"PARCEL II"

DEED DOCUMENT
NO. 91-36369

N89°46'02"E
28.00'



DEED DOCUMENT
NO. 2010-042556
"PARCEL I"

DEED DOCUMENT
NO. 99-052398
"PARCEL I"

N00°02'22"E 827.96'

S00°02'22"W 827.97'

28.00'

POINT OF BEGINNING - LEGAL DESCRIPTION
1/2" IR AT SOUTHWEST CORNER OF "PARCEL I" OF
DOCUMENT NO. 99-052398

30'

28.00'

S89°47'16"W

39'

BOECKMAN ROAD

"ARBOR CROSSING"

SW LAUREL
GLEN STREET

PDG JOB NO:
338-001

DATE:
01/16/18

SCALE:
NTS

EXHIBIT TO ACCOMPANY LEGAL DESCRIPTION



PIONEER DESIGN GROUP, INC.

9020 SW WASHINGTON SQUARE RD
SUITE 170
PORTLAND, OREGON 97223
p 503.841.8311
f 844.715.4743
www.pdg-grp.com

28.00' WIDE RIGHT-OF-WAY DEDICATION

A PORTION OF "PARCEL I", DEED DOCUMENT NO. 99-052398
AND LOCATED IN THE SOUTHEAST QUARTER OF SECTION 12,
TOWNSHIP 3 SOUTH, RANGE 1 WEST OF THE WILLAMETTE MERIDIAN,
CLACKAMAS COUNTY, OREGON



THIS REPORT IS ISSUED BY THE ABOVE-NAMED COMPANY ("THE COMPANY") FOR THE EXCLUSIVE USE OF THE FOLLOWING CUSTOMER:

Fidelity National Title Company of Oregon
Phone No.: (503)233-8338

Date Prepared: March 22, 2018
Effective Date: March 14, 2018 / 08:00 AM
Charge: \$350.00
Order No.: 45141805315
Reference: Boeckman Road

The information contained in this report is furnished to the Customer by Fidelity National Title Company of Oregon (the "Company") as an information service based on the records and indices maintained by the Company for the county identified below. This report is not title insurance, is not a preliminary title report for title insurance, and is not a commitment for title insurance. No examination has been made of the Company's records, other than as specifically set forth in this report ("the Report"). Liability for any loss arising from errors and/or omissions is limited to the lesser of the fee paid or the actual loss to the Customer, and the Company will have no greater liability by reason of this report. This report is subject to the Definitions, Conditions and Stipulations contained in it.

REPORT

- A. The Land referred to in this report is located in the County of Clackamas, State of Oregon, and is described as follows:
As fully set forth on Exhibit "A" attached hereto and by this reference made a part hereof.
- B. As of the Effective Date, the tax account and map references pertinent to the Land are as follows:
As fully set forth on Exhibit "B" attached hereto and by this reference made a part hereof.
- C. As of the Effective Date and according to the Public Records, we find title to the land apparently vested in:
As fully set forth on Exhibit "C" attached hereto and by this reference made a part hereof.
- D. As of the Effective Date and according to the Public Records, the Land is subject to the following liens and encumbrances, which are not necessarily shown in the order of priority:
As fully set forth on Exhibit "D" attached hereto and by this reference made a part hereof.

Fidelity National Title Company of Oregon
Public Record Report for New Subdivision or Land Partition
Order No. 45141805315

EXHIBIT "A"
(Land Description)

A tract of land situated in the Southeast one-quarter of Section 12, Township 3 South, Range 1 West of the Willamette Meridian, in the County of Clackamas and State of Oregon, more particularly described as follows:

Commencing at a stone in a monument box at the Southeast corner of said Section 12; thence tracing the South line of said Section 12 and the centerline of Boeckman Road South 89°46'58" West 1,519.10 feet; thence North 0°02'40" East 30.00 feet to a 5/8" iron rod on the North right-of-way line of Boeckman Road and the true point of beginning of this description; thence continuing North 0°02'40" East 828.00 feet to a 5/8" iron rod; thence South 89°46'58" West 511.16 feet; thence South 0°02'40" West 828.00 feet to the North right-of-way line of said Boeckman Road; thence along said North right-of-way line North 89°46'58" East 511.16 feet to the true point of beginning.

Fidelity National Title Company of Oregon
Public Record Report for New Subdivision or Land Partition
Order No. 45141805315

EXHIBIT "B"
(Tax Account and Map)

APN/Parcel ID(s) 00806006 as well as Tax/Map ID(s) 31W12D 02300

Fidelity National Title Company of Oregon
Public Record Report for New Subdivision or Land Partition
Order No. 45141805315

EXHIBIT "C"
(Vesting)

Clackamas County School District 3, West Linn-Wilsonville School District 3JT, an Oregon non profit public benefit corporation

EXHIBIT "D"
(Liens and Encumbrances)

1. The subject property is under public, charitable, fraternal, or religious organization ownership and is exempt from ad valorem taxation. Any change in ownership prior to delivery of the assessment roll may result in tax liability.

Tax Account No.: 00806006
Map No.: 31W12D 02300

2. Easement(s) for the purpose(s) shown below and rights incidental thereto, as granted in a document:

Granted to: Portland Railway, Light and Power Company
Purpose: Tree trimming and removal
Recording Date: July 8, 1907
Recording No: Book 99, Page 520
Affects: Southerly portion

3. Easement(s) for the purpose(s) shown below and rights incidental thereto, as granted in a document:

Granted to: The Pacific Telephone and Telegraph Company
Purpose: Poles and wires
Recording Date: October 1, 1913
Recording No: Miscellaneous Records Book 5, Page 455
Affects: Document currently unavailable. A copy will be provided upon receipt

The Company reserves the right to add additional items/exceptions or make further requirements after review of the above document.

4. Easement(s) for the purpose(s) shown below and rights incidental thereto, as granted in a document:

Granted to: Portland General Electric Company
Purpose: Install, maintain, extend and locate anchors, guy stub and guy wires
Recording Date: October 29, 2002
Recording No: 2002-104477
Affects: A strip running North from the South line - Reference is hereby made to said document for location

NOTE: The Land lies within the City of Wilsonville Urban Renewal Area and is subject to the terms and provisions thereof.

BOUNDARY DOCUMENTS:

BOUNDARY - 91-036369
BOUNDARY - 99-052396
BOUNDARY - 2010-042556
BOUNDARY - 2015-009641

DEFINITIONS, CONDITIONS AND STIPULATIONS

1. **Definitions.** The following terms have the stated meaning when used in this report:
 - (a) "Customer": The person or persons named or shown as the addressee of this report.
 - (b) "Effective Date": The effective date stated in this report.
 - (c) "Land": The land specifically described in this report and improvements affixed thereto which by law constitute real property.
 - (d) "Public Records": Those records which by the laws of the state of Oregon impart constructive notice of matters relating to the Land.
2. **Liability of Company.**
 - (a) This is not a commitment to issue title insurance and does not constitute a policy of title insurance.
 - (b) The liability of the Company for errors or omissions in this public record report is limited to the amount of the charge paid by the Customer, provided, however, that the Company has no liability in the event of no actual loss to the Customer.
 - (c) No costs (including without limitation attorney fees and other expenses) of defense, or prosecution of any action, is afforded to the Customer.
 - (d) In any event, the Company assumes no liability for loss or damage by reason of the following:
 - (1) Taxes or assessments which are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the Public Records.
 - (2) Any facts, rights, interests or claims which are not shown by the Public Records but which could be ascertained by an inspection of the land or by making inquiry of persons in possession thereof.
 - (3) Easements, liens or encumbrances, or claims thereof, which are not shown by the Public Records.
 - (4) Discrepancies, encroachments, shortage in area, conflicts in boundary lines or any other facts which a survey would disclose.
 - (5) (i) Unpatented mining claims; (ii) reservations or exceptions in patents or in Acts authorizing the issuance thereof; (iii) water rights or claims or title to water.
 - (6) Any right, title, interest, estate or easement in land beyond the lines of the area specifically described or referred to in this report, or in abutting streets, roads, avenues, alleys, lanes, ways or waterways.
 - (7) Any law, ordinance or governmental regulation (including but not limited to building and zoning laws, ordinances or regulations) restricting, regulating, prohibiting or relating to (i) the occupancy, use or enjoyment of the land; (ii) the character, dimensions or location of any improvement now or hereafter erected on the land; (iii) a separation in ownership or a change in the dimensions or area of the land or any parcel of which the land is or was a part; or (iv) environmental protection, or the effect of any violation of these laws, ordinances or governmental regulations, except to the extent that a notice of the enforcement thereof or a notice of a defect, lien or encumbrance resulting from a violation or alleged violation affecting the land has been recorded in the Public Records at the effective date hereof.
 - (8) Any governmental police power not excluded by 2(d)(7) above, except to the extent that notice of the exercise thereof or a notice of a defect, lien or encumbrance resulting from a violation or alleged violation affecting the land has been recorded in the Public Records at the effective date hereof.
 - (9) Defects, liens, encumbrances, adverse claims or other matters created, suffered, assumed, agreed to or actually known by the Customer.
3. **Report Entire Contract.** Any right or action or right of action that the Customer may have or may bring against the Company arising out of the subject matter of this report must be based on the provisions of this report. No provision or condition of this report can be waived or changed except by a writing signed by an authorized officer of the Company. By accepting this form report, the Customer acknowledges and agrees that the Customer has elected to utilize this form of public record report and accepts the limitation of liability of the Company as set forth herein.
4. **Charge.** The charge for this report does not include supplemental reports, updates or other additional services of the Company.

LIMITATIONS OF LIABILITY

"CUSTOMER" REFERS TO THE RECIPIENT OF THIS REPORT.

CUSTOMER EXPRESSLY AGREES AND ACKNOWLEDGES THAT IT IS EXTREMELY DIFFICULT, IF NOT IMPOSSIBLE, TO DETERMINE THE EXTENT OF LOSS WHICH COULD ARISE FROM ERRORS OR OMISSIONS IN, OR THE COMPANY'S NEGLIGENCE IN PRODUCING, THE REQUESTED REPORT, HEREIN "THE REPORT." CUSTOMER RECOGNIZES THAT THE FEE CHARGED IS NOMINAL IN RELATION TO THE POTENTIAL LIABILITY WHICH COULD ARISE FROM SUCH ERRORS OR OMISSIONS OR NEGLIGENCE. THEREFORE, CUSTOMER UNDERSTANDS THAT THE COMPANY IS NOT WILLING TO PROCEED IN THE PREPARATION AND ISSUANCE OF THE REPORT UNLESS THE COMPANY'S LIABILITY IS STRICTLY LIMITED. CUSTOMER AGREES WITH THE PROPRIETY OF SUCH LIMITATION AND AGREES TO BE BOUND BY ITS TERMS

THE LIMITATIONS ARE AS FOLLOWS AND THE LIMITATIONS WILL SURVIVE THE CONTRACT:

ONLY MATTERS IDENTIFIED IN THIS REPORT AS THE SUBJECT OF THE REPORT ARE WITHIN ITS SCOPE. ALL OTHER MATTERS ARE OUTSIDE THE SCOPE OF THE REPORT.

CUSTOMER AGREES, AS PART OF THE CONSIDERATION FOR THE ISSUANCE OF THE REPORT AND TO THE FULLEST EXTENT PERMITTED BY LAW, TO LIMIT THE LIABILITY OF THE COMPANY, ITS LICENSORS, AGENTS, SUPPLIERS, RESELLERS, SERVICE PROVIDERS, CONTENT PROVIDERS AND ALL OTHER SUBSCRIBERS OR SUPPLIERS, SUBSIDIARIES, AFFILIATES, EMPLOYEES, AND SUBCONTRACTORS FOR ANY AND ALL CLAIMS, LIABILITIES, CAUSES OF ACTION, LOSSES, COSTS, DAMAGES AND EXPENSES OF ANY NATURE WHATSOEVER, INCLUDING ATTORNEY'S FEES, HOWEVER ALLEGED OR ARISING, INCLUDING BUT NOT LIMITED TO THOSE ARISING FROM BREACH OF CONTRACT, NEGLIGENCE, THE COMPANY'S OWN FAULT AND/OR NEGLIGENCE, ERRORS, OMISSIONS, STRICT LIABILITY, BREACH OF WARRANTY, EQUITY, THE COMMON LAW, STATUTE OR ANY OTHER THEORY OF RECOVERY, OR FROM ANY PERSON'S USE, MISUSE, OR INABILITY TO USE THE REPORT OR ANY OF THE MATERIALS CONTAINED THEREIN OR PRODUCED, **SO THAT THE TOTAL AGGREGATE LIABILITY OF THE COMPANY AND ITS AGENTS, SUBSIDIARIES, AFFILIATES, EMPLOYEES, AND SUBCONTRACTORS SHALL NOT IN ANY EVENT EXCEED THE COMPANY'S TOTAL FEE FOR THE REPORT.**

CUSTOMER AGREES THAT THE FOREGOING LIMITATION ON LIABILITY IS A TERM MATERIAL TO THE PRICE THE CUSTOMER IS PAYING, WHICH PRICE IS LOWER THAN WOULD OTHERWISE BE OFFERED TO THE CUSTOMER WITHOUT SAID TERM. CUSTOMER RECOGNIZES THAT THE COMPANY WOULD NOT ISSUE THE REPORT BUT FOR THIS CUSTOMER AGREEMENT, AS PART OF THE CONSIDERATION GIVEN FOR THE REPORT, TO THE FOREGOING LIMITATION OF LIABILITY AND THAT ANY SUCH LIABILITY IS CONDITIONED AND PREDICATED UPON THE FULL AND TIMELY PAYMENT OF THE COMPANY'S INVOICE FOR THE REPORT.

THE REPORT IS LIMITED IN SCOPE AND IS NOT AN ABSTRACT OF TITLE, TITLE OPINION, PRELIMINARY TITLE REPORT, TITLE REPORT, COMMITMENT TO ISSUE TITLE INSURANCE, OR A TITLE POLICY, AND SHOULD NOT BE RELIED UPON AS SUCH. THE REPORT DOES NOT PROVIDE OR OFFER ANY TITLE INSURANCE, LIABILITY COVERAGE OR ERRORS AND OMISSIONS COVERAGE. THE REPORT IS NOT TO BE RELIED UPON AS A REPRESENTATION OF THE STATUS OF TITLE TO THE PROPERTY. THE COMPANY MAKES NO REPRESENTATIONS AS TO THE REPORT'S ACCURACY, DISCLAIMS ANY WARRANTY AS TO THE REPORT, ASSUMES NO DUTIES TO CUSTOMER, DOES NOT INTEND FOR CUSTOMER TO RELY ON THE REPORT, AND ASSUMES NO LIABILITY FOR ANY LOSS OCCURRING BY REASON OF RELIANCE ON THE REPORT OR OTHERWISE.

IF CUSTOMER (A) HAS OR WILL HAVE AN INSURABLE INTEREST IN THE SUBJECT REAL PROPERTY, (B) DOES NOT WISH TO LIMIT LIABILITY AS STATED HEREIN AND (C) DESIRES THAT ADDITIONAL LIABILITY BE ASSUMED BY THE COMPANY, THEN CUSTOMER MAY REQUEST AND PURCHASE A POLICY OF TITLE INSURANCE, A BINDER, OR A COMMITMENT TO ISSUE A POLICY OF TITLE INSURANCE. NO ASSURANCE IS GIVEN AS TO THE INSURABILITY OF THE TITLE OR STATUS OF TITLE. CUSTOMER EXPRESSLY AGREES AND ACKNOWLEDGES IT HAS AN INDEPENDENT DUTY TO ENSURE AND/OR RESEARCH THE ACCURACY OF ANY INFORMATION OBTAINED FROM THE COMPANY OR ANY PRODUCT OR SERVICE PURCHASED.

NO THIRD PARTY IS PERMITTED TO USE OR RELY UPON THE INFORMATION SET FORTH IN THE REPORT, AND NO LIABILITY TO ANY THIRD PARTY IS UNDERTAKEN BY THE COMPANY.

CUSTOMER AGREES THAT, TO THE FULLEST EXTENT PERMITTED BY LAW, IN NO EVENT WILL THE COMPANY, ITS LICENSORS, AGENTS, SUPPLIERS, RESELLERS, SERVICE PROVIDERS, CONTENT PROVIDERS, AND ALL OTHER SUBSCRIBERS OR SUPPLIERS, SUBSIDIARIES, AFFILIATES, EMPLOYEES AND SUBCONTRACTORS BE LIABLE FOR CONSEQUENTIAL, INCIDENTAL, INDIRECT, PUNITIVE, EXEMPLARY, OR SPECIAL DAMAGES, OR LOSS OF PROFITS, REVENUE, INCOME, SAVINGS, DATA, BUSINESS, OPPORTUNITY, OR GOODWILL, PAIN AND SUFFERING, EMOTIONAL DISTRESS, NON-OPERATION OR INCREASED EXPENSE OF OPERATION, BUSINESS INTERRUPTION OR DELAY, COST OF CAPITAL, OR COST OF REPLACEMENT PRODUCTS OR SERVICES, REGARDLESS OF WHETHER SUCH LIABILITY IS BASED ON BREACH OF CONTRACT, TORT, NEGLIGENCE, THE COMPANY'S OWN FAULT AND/OR NEGLIGENCE, STRICT LIABILITY, BREACH OF WARRANTIES, FAILURE OF ESSENTIAL PURPOSE, OR OTHERWISE AND WHETHER CAUSED BY NEGLIGENCE, ERRORS, OMISSIONS, STRICT LIABILITY, BREACH OF CONTRACT, BREACH OF WARRANTY, THE COMPANY'S OWN FAULT AND/OR NEGLIGENCE OR ANY OTHER CAUSE WHATSOEVER, AND EVEN IF THE COMPANY HAS BEEN ADVISED OF THE LIKELIHOOD OF SUCH DAMAGES OR KNEW OR SHOULD HAVE KNOWN OF THE POSSIBILITY FOR SUCH DAMAGES.

END OF THE LIMITATIONS OF LIABILITY

136

AFTER RECORDING RETURN TO:
West Linn/Wilsonville Sch. Dist

PO Box 35

West Linn OR 97068

Until a change is requested all tax statements shall be sent to the following address:

PO Box 35

West Linn OR 97068

Escrow No: 4200-27182-SB
Order No: 201430

WARRANTY DEED - STATUTORY FORM
(INDIVIDUAL or CORPORATION)

201430

THOMAS C. SCOTT and CHARLOTTE F. SCOTT, Trustees, Thomas C. Scott Trust u/a/d February 11, 1994, an one-half undivided interest; and CHARLOTTE F. SCOTT and THOMAS C. SCOTT, Trustees, Charlotte F. Scott Trust u/a/d February 11, 1994 an one-half undivided interest, as tenants in common

Grantor, conveys and warrants to Clackamas County School District 3, West Linn-Wilsonville School District 3JT

Grantee, the following described real property free of encumbrances except as specifically set forth herein:

(Continued)

This instrument will not allow use of the property described in this instrument in violation of applicable land use laws and regulations. Before signing or accepting this instrument, the person acquiring fee title to the property should check with the appropriate city or county planning department to verify approved uses and to determine any limits on lawsuits against farming or forest practices as defined in ORS 30.930.

ENCUMBRANCES:

Rights of the public and of governmental bodies in and to that portion of the premises herein described lying below the high water mark of an unnamed creek.

(Affects Parcel II)

(Continued)

The true consideration for this conveyance is \$1,225,000.00 a portion of which will be paid to an accommodator as part of a 1031 tax deferred exchange.

Dated May 20, 1999; if a corporate grantor, it has caused its name to be signed by order of its board of directors.

<u>Thomas C. Scott, Trustee</u>	<u>Charlotte F. Scott, Trustee</u>
Thomas C. Scott, Trustee of the Thomas C. Scott Trust	Charlotte F. Scott, Trustee of the Thomas C. Scott Trust
<u>Charlotte F. Scott, Trustee</u>	<u>Thomas C. Scott, Trustee</u>
Charlotte F. Scott, Trustee of the Charlotte F. Scott Trust	Thomas C. Scott, Trustee of the Charlotte F. Scott Trust

99-052398

STATE OF OREGON, County of Clackamas) ss.
 This instrument was acknowledged before me on May 20, 1999, 19 99
 by Thomas C. & Charlotte F. Scott, Trustees
 This instrument was acknowledged before me on May 20, 1999, 19 99
 by Thomas C. & Charlotte F. Scott, Trustees
 of _____ as _____

Notary Public for Oregon
My commission expires: Nov. 6, 1999



CHICAGO TITLE INSURANCE COMPANY

LEGAL DESCRIPTION

PARCEL I:

A tract of land situated in the Southeast one-quarter of Section 12, Township 3 South, Range 1 West of the Willamette Meridian, in the County of Clackamas and State of Oregon, more particularly described as follows:

Commencing at a stone in a monument box at the Southeast corner of said Section 12; thence tracing the South line of said Section 12 and the centerline of Boeckman Road South 89°46'58" West 1,519.10 feet; thence North 0°02'40" East 30.00 feet to a 5/8" iron rod on the North right-of-way line of Boeckman Road and the true point of beginning of this description; thence continuing North 0°02'40" East 828.00 feet to a 5/8" iron rod; thence South 89°46'58" West 511.16 feet; thence South 0°02'40" West 828.00 feet to the North right-of-way line of said Boeckman Road; thence along said North right-of-way line North 89°46'58" East 511.16 feet to the true point of beginning.

Bearings in this description are based on 'LP 064' (Clackamas County Restoration Survey).

PARCEL II:

A tract of land situated in the Southeast one-quarter of Section 12, Township 3 South, Range 1 West of the Willamette Meridian, in the County of Clackamas and State of Oregon, described as follows:

BEGINNING at stone in monument box at the Southeast corner of said Section 12; thence tracing the South line of said Section 12 and the center line of Boeckman Road South 89°46'58" West 925.63 feet to the Southwest corner of a tract of land conveyed by Theodore C. Hopper to Walter O. and Doris A. Wehler recorded as Recorder's Fee No. 73-35929, Clackamas County Records (found 5/8-inch iron rod bears North 00°02'40" East 30.21 feet); thence continuing South 89°46'58" West 33.00 feet; thence North 00°02'40" East (parallel to the East line of the Southeast one-quarter of said Section 12) 30.00 feet to a point on the North right-of-way line of Boeckman Road (5/8-inch iron rod set by L. S. 475 bears South 63° East 0.13 feet); thence continuing North 00°02'40" East along the West line of a tract of land described in Warranty Deed from James A. Hathaway to Dale I. Kreilkamp, recorded as Recorder's Fee No. 86-01354, Clackamas County Records, North 00°02'40" East 422.00 feet to the true point of beginning of this description; thence South 89°46'58" West 540.47 feet; thence South 00°20'40" West 422.00 feet to a point on the North right-of-way line of said Boeckman Road (30.00 feet North of center line); thence tracing said North line South 89°46'58" West 20.00 feet; thence North 00°02'40" East 828.00 feet to a point on the South line of a tract of land described in Warranty Deed from Hubert Hutchcroft and Gladys B. Hutchcroft to Robert Coats, recorded in Book 641, Page 199, June 9, 1964, Clackamas County Deed Records; thence along said South line and also the South line of a tract of land conveyed by Berry K. Fuller and Stanley Kruse, co-executors of the estate of Mary W. Kruse to Ernest R. and Pauline V. Russel, recorded as Recorder's Fee No. 74-5153, Clackamas County Records, North 89°46'58" East 560.47 feet to the Northwest corner of the Kreilkamp Tract described in said Recorder's Fee No. 86-01354, Clackamas County Records; thence along the West line of said Kreilkamp Tract South 00°02'40" West 406.00 feet to the true point of beginning of this description. Bearings in this description are based on 'LP 064' (Clackamas County Restoration Survey).

EXCEPTING THEREFROM that portion thereof contained in Deed to Louis M. Pike, et ux, recorded February 9, 1989, Recorder's Fee No. 89 06039, Clackamas County Records.

Encumbrances, continued

An easement created by instrument, including terms and provisions thereof;

Dated: July 6, 1907
Recorded: July 8, 1907
Book: 99
Page: 520
In Favor Of: Portland Railway, Light and Power Company
For: Transmission lines
Affects: The Southerly portion

An easement created by instrument, including terms and provisions thereof;

Dated: July 6, 1907
Recorded: July 8, 1907
Book: 99
Page: 520
In Favor Of: Portland Railway, Light and Power Company
For: Tree trimming and removal
Affects: The Southerly portion

An easement created by instrument, including terms and provisions thereof;

Dated: July 23, 1913
Recorded: October 1, 1913
Book: 5
Page: 455, Miscellaneous Records
In Favor Of: The Pacific Telephone and Telegraph Company
For: Poles and wires
Affects: Exact location not disclosed

3

STATE OF OREGON 88-052388
CLACKANAS COUNTY
Received and placed in the public
records of Clackamas County
RECEIPT# AND FEE: 52878 005.00
DATE AND TIME: 05/24/99 01:52 PM
JOHN KAUFFMAN, COUNTY CLERK



THIS MAP IS MADE SOLELY FOR THE PURPOSE OF ASSISTING IN LOCATING SAID PREMISES, AND THE COMPANY ASSUMES NO LIABILITY FOR VARIATIONS, IF ANY, IN DIMENSIONS, AREAS, AND LOCATIONS ASCERTAINED BY ACTUAL SURVEY.



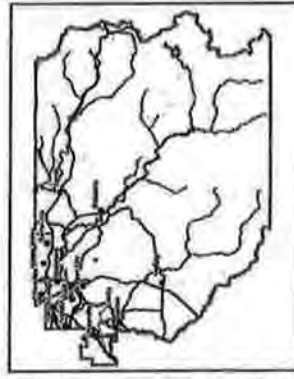
Title Report
Tax Map

1 W 12D
 -SONVILLE
 S.E.1/4 SEC.12 T.3S. R.1W. W.M.
 CLACKAMAS COUNTY
 1" = 200'

Cancelled Tracts

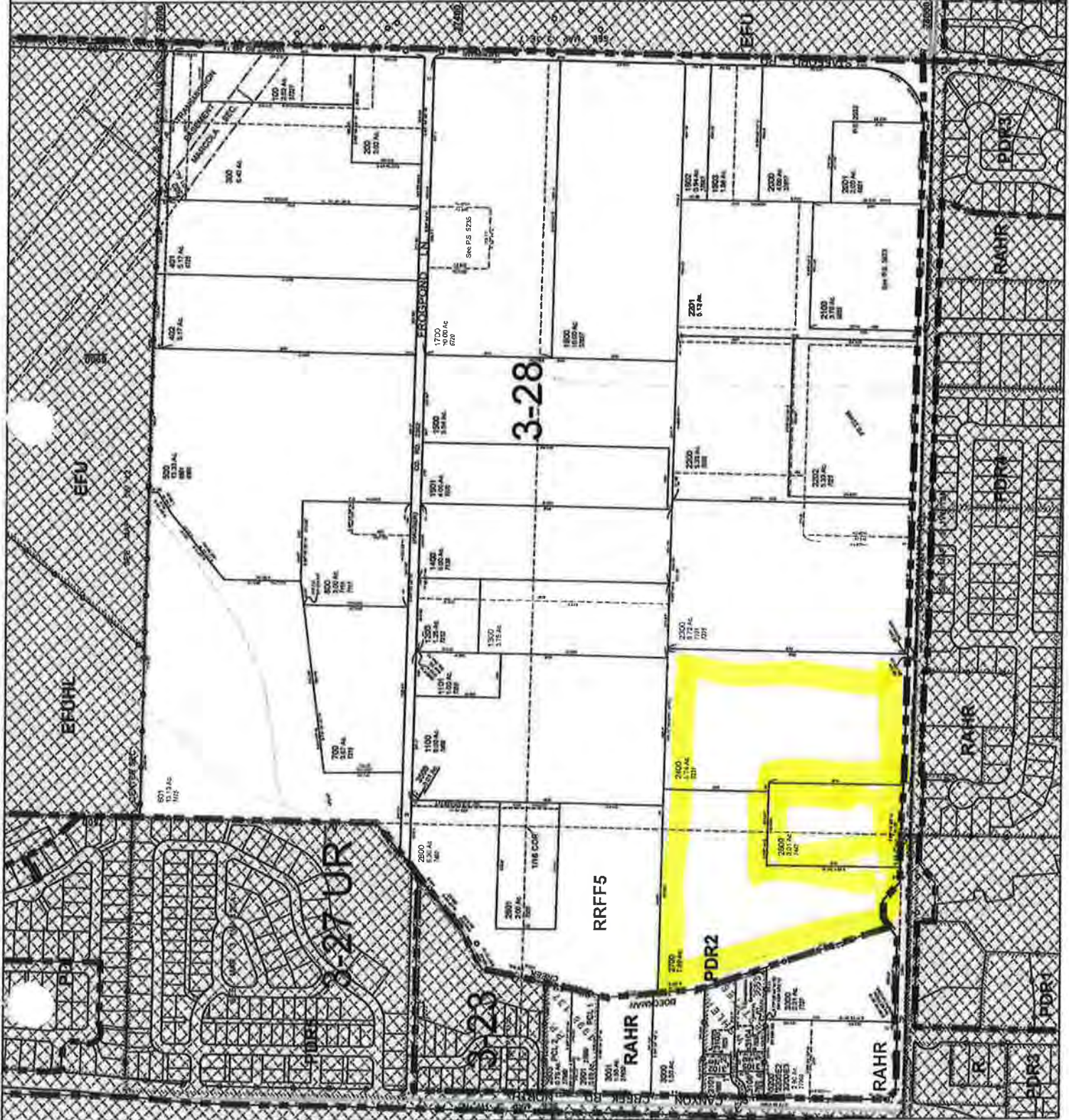
- 371
- 490
- 622
- 683
- 685
- 900
- 1000
- 1300
- 1900
- 2000E1
- 2000E2
- 2000E3
- 2000E4
- 2000E5
- 2000E6
- 2000E7
- 2000E8
- 2000E9
- 2000E10
- 2000E11
- 2000E12
- 2000E13
- 2000E14
- 2000E15
- 2000E16
- 2000E17
- 2000E18
- 2000E19
- 2000E20
- 2000E21
- 2000E22
- 2000E23
- 2000E24
- 2000E25
- 2000E26
- 2000E27
- 2000E28
- 2000E29
- 2000E30
- 2000E31
- 2000E32
- 2000E33
- 2000E34
- 2000E35
- 2000E36
- 2000E37
- 2000E38
- 2000E39
- 2000E40
- 2000E41
- 2000E42
- 2000E43
- 2000E44
- 2000E45
- 2000E46
- 2000E47
- 2000E48
- 2000E49
- 2000E50
- 2000E51
- 2000E52
- 2000E53
- 2000E54
- 2000E55
- 2000E56
- 2000E57
- 2000E58
- 2000E59
- 2000E60
- 2000E61
- 2000E62
- 2000E63
- 2000E64
- 2000E65
- 2000E66
- 2000E67
- 2000E68
- 2000E69
- 2000E70
- 2000E71
- 2000E72
- 2000E73
- 2000E74
- 2000E75
- 2000E76
- 2000E77
- 2000E78
- 2000E79
- 2000E80
- 2000E81
- 2000E82
- 2000E83
- 2000E84
- 2000E85
- 2000E86
- 2000E87
- 2000E88
- 2000E89
- 2000E90
- 2000E91
- 2000E92
- 2000E93
- 2000E94
- 2000E95
- 2000E96
- 2000E97
- 2000E98
- 2000E99
- 2000E100

- Parcel Boundary
- Private Road ROW
- Historical Boundary
- Railroad Centerline
- Tax Code Lines
- Map Index
- Water Lines
- Land Use Zoning
- Plats
- Water
- Corner
- Section Corners
- 1/16th Line
- Govt Lot Line
- DLC Line
- Meander Line
- PLSS Section Line
- Historic Corridor 40'
- Historic Corridor 20'



THIS MAP IS FOR ASSESSMENT
 PURPOSES ONLY

3 1 W 12D
 WILSONVILLE





THIS REPORT IS ISSUED BY THE ABOVE-NAMED COMPANY ("THE COMPANY") FOR THE EXCLUSIVE USE OF THE FOLLOWING CUSTOMER:

Fidelity National Title Company of Oregon
Phone No.: (503)223-8338

Date Prepared: December 21, 2017
Effective Date: November 14, 2014 / 08:00 AM
Charge: \$0.00
Order No.: 45141725134
Reference: SW BOECKMAN

The information contained in this report is furnished to the Customer by Fidelity National Title Company of Oregon (the "Company") as an information service based on the records and indices maintained by the Company for the county identified below. This report is not title insurance, is not a preliminary title report for title insurance, and is not a commitment for title insurance. No examination has been made of the Company's records, other than as specifically set forth in this report ("the Report"). Liability for any loss arising from errors and/or omissions is limited to the lesser of the fee paid or the actual loss to the Customer, and the Company will have no greater liability by reason of this report. This report is subject to the Definitions, Conditions and Stipulations contained in it.

REPORT

- A. The Land referred to in this report is located in the County of Clackamas, State of Oregon, and is described as follows:
As fully set forth on Exhibit "A" attached hereto and by this reference made a part hereof.
- B. As of the Effective Date, the tax account and map references pertinent to the Land are as follows:
As fully set forth on Exhibit "B" attached hereto and by this reference made a part hereof.
- C. As of the Effective Date and according to the Public Records, we find title to the land apparently vested in:
As fully set forth on Exhibit "C" attached hereto and by this reference made a part hereof.
- D. As of the Effective Date and according to the Public Records, the Land is subject to the following liens and encumbrances, which are not necessarily shown in the order of priority:
As fully set forth on Exhibit "D" attached hereto and by this reference made a part hereof.

EXHIBIT "A"
(Land Description)

PARCEL I:

A tract of land situated in Section 12, Township 3 South, Range 1 West, of the Willamette Meridian, in the City of Wilsonville, County of Clackamas, State of Oregon, more particularly described as follows:

Beginning at the one-quarter corner between Sections 12 and 13, in said Township and Range; thence North 89° 44' East along the South boundary of said Section 12, a distance of 173.11 feet to an iron rod set at the Southeast corner of a tract described in deed to Kenneth C. Miller, et ux in Book 611, Page 172; Records of Clackamas County, said point being the true point of beginning of the tract herein to be described; thence continuing North 89° 44' East along the South boundary of said Section 12, a distance of 405.59 feet to the Southwest corner of the tract described in deed to Sophie G. Hathaway and Clifford A. Hathaway as "Parcel I", in Book 661, Page 620, Records of Clackamas County; thence North along the West boundary of said Hathaway tract, 858.0 feet to a one-half inch iron rod set at the Northwest corner thereof; thence South 89° 44' West, parallel with the South boundary of said Section 12, a distance of 435.77 feet to the Northeast corner of a tract described in deed to Harold L. Lariviere, et ux in Book 643, Page 525, Records of Clackamas County; thence South 0° 01' 30" East along the East boundary of said Lariviere tract, 362.00 feet to a point in the North boundary of the said Kenneth C. Miller tract; thence North 89° 44' East, along the North boundary of said Miller tract, 30 feet to the Northeast corner thereof; thence South 0° 01' 30" along the East boundary of said Miller tract 496.0 feet to the true point of beginning;

EXCEPT THEREFROM that portion lying within the boundaries of public road and highways.

PARCEL II:

A tract of land situated in Section 12, Township 3 South, Range 1 West, of the Willamette Meridian, in the City of Wilsonville, County of Clackamas and State of Oregon, more particularly described as:

Beginning at the one-quarter corner between Sections 12 and 13, said Township and Range, from said point of beginning; thence South 89° 44' West along the South boundary of said Section 12, a distance of 110.74 feet to the true point of beginning; from said true point of beginning, leaving said South boundary of said Section 12, North 0° 01' 30" West, 496.00 feet to an iron rod; thence North 89° 44' East, 253.65 feet; thence North 0° 01' 30" West, 362.00 feet; thence South 89° 44' West, 701.96 feet to an iron rod set in the Westerly boundary of that certain tract of land described in Book 101, Page 392, Records of Clackamas County; thence South 6° 00' East along said Westerly boundary 141.12 feet; thence South 19° 00' East along said Westerly boundary 759.00 feet to the South line of said Section 12; thence North 89° 44' East along the South line of said Section 12, a distance of 186.26 feet to an iron rod and the true point of beginning.

EXCEPT THEREFROM that portion lying within the boundaries of public road and highways.

PARCEL III:

A tract of land situated in Section 12, Township 3 South, Range 1 West, of the Willamette Meridian, in the City of Wilsonville, County of Clackamas and State of Oregon, being more particularly described as follows:

Beginning at the one-quarter corner between sections 12 and 13, Township 3 South, Range 1 West, of the Willamette Meridian, from said place of beginning; thence North 89°44' East along the South boundary of said

Fidelity National Title Company of Oregon
Public Record Report for New Subdivision or Land Partition
Order No. 45141725134

EXHIBIT "A"
(Land Description)
(continued)

Section 12, a distance of 173.11 feet to an iron rod; thence leaving said South boundary of Section 12, North 0°01'30" West 496 feet; thence South 89°44' West parallel with said South boundary of Section 12, a distance of 283.85 feet; thence South 0°01'30" East 496 feet to an iron rod; thence North 89°44' East, 110.74 feet to the place of beginning.

Fidelity National Title Company of Oregon
Public Record Report for New Subdivision or Land Partition
Order No. 45141725134

EXHIBIT "B"
(Tax Account and Map)

APN/Parcel ID(s) 00806015, 00806033, 00806024, 00806024 and 00806033 as well as Tax/Map ID(s) 31W12D
02400, 31W12D 02700 and 31W12D 02600

Fidelity National Title Company of Oregon
Public Record Report for New Subdivision or Land Partition
Order No. 45141725134

EXHIBIT "C"
(Vesting)

James H. Wolfston, Jr., as to Parcels I and II, and Greg McKillip, as to Parcel III

EXHIBIT "D"
(Liens and Encumbrances)

SPECIFIC ITEMS AND EXCEPTIONS:

Note: Property taxes for the fiscal year shown below are paid in full.

Fiscal Year: 2017-2018
Amount: \$11,010.56
Levy Code: 003-028
Account No.: 00806015
Map No.: 31W12D 02400
Affects: Parcel I

Prior to close of escrow, please contact the Tax Collector's Office to confirm all amounts owing, including current fiscal year taxes, supplemental taxes, escaped assessments and any delinquencies.

Note: Property taxes for the fiscal year shown below are paid in full.

Fiscal Year: 2017-2018
Amount: \$6,845.42
Levy Code: 003-028
Account No.: 00806033
Map No.: 31W12D 02700
Affects: Parcel II

Prior to close of escrow, please contact the Tax Collector's Office to confirm all amounts owing, including current fiscal year taxes, supplemental taxes, escaped assessments and any delinquencies.

1. Unpaid Property Taxes are as follows:

Fiscal Year: 2017-2018
Amount: \$4,745.85, plus interest, if any
Levy Code: 003-028
Account No.: 00806024
Map No.: 31W12D-02600
Affects: Parcel III

Prior to close of escrow, please contact the Tax Collector's Office to confirm all amounts owing, including current fiscal year taxes, supplemental taxes, escaped assessments and any delinquencies.

2. As disclosed by the assessment and tax roll, the premises herein were once specially assessed for farmland, forestland or other special assessment status and later disqualified. Per ORS 308A.700 to 308A.733, additional taxes were imposed and remain as potential additional tax liability for the property. A check with the Assessor's office will be necessary to determine the effect and continuation of the additional tax liability.

Additional Tax Liability Amount: \$20,718.98
Affects Tax Lot 2400/Tax Account Number 00806015
Parcel I

EXHIBIT "D"
(Liens and Encumbrances)
(continued)

3. As disclosed by the assessment and tax roll, the premises herein were once specially assessed for farmland, forestland or other special assessment status and later disqualified. Per ORS 308A.700 to 308A.733, additional taxes were imposed and remain as potential additional tax liability for the property. A check with the Assessor's office will be necessary to determine the effect and continuation of the additional tax liability.

Additional Tax Liability Amount: \$19,146.36
Affects Tax Lot 2700/Tax Account Number 00806033
Parcel II

4. City Liens, if any, in favor of the City of Wilsonville.

5. Any adverse claim based upon the assertion that:

- A) Some portion of said land has been brought within the boundaries thereof by an avulsive movement of the Boeckman Creek or has been formed by accretion or reliction to any such portion.
B) Some portion of said property has been created by deposit of artificial fill.
And Excepting;
C) The rights of the public and governmental bodies for fishing, navigation and commerce in and to any portion of the premises herein described, lying below the high water line of the Boeckman Creek.
D) The right, title and interest of the State of Oregon in and to any portion lying below the high water line of Boeckman Creek.

6. An easement disclosed by instrument,

In favor of : The City of Wilsonville, a municipal corporation
For : Slope and utilities
Recorded : May 1, 1990
Recording No.: 90019680
Affects: Southerly portion; Parcel II

7. An easement disclosed by instrument,

In favor of : City of Wilsonville, a municipal corporation
For : Inundation - adjacent to Boeckman Creek
Recorded : August 9, 1996
Recording No. : 96058454
Affects: Westerly portion

EXHIBIT "D"
(Liens and Encumbrances)
(continued)

8. A deed of trust to secure an indebtedness in the amount shown below,

Amount: \$1,200,000.00
Dated: October 22, 2014
Trustor/Grantor: James H. Wolfston, Jr.
Trustee: Fidelity National Title Company of Oregon
Beneficiary: Mortgage Electronic Registration Systems, Inc., acting solely as nominee for Umpqua Bank
Loan No.: 8501207870/MIN#1000458-1000068972-6
Recording Date: October 28, 2014
Recording No.: 2014-055459
Affects: Parcels I & II

NOTE: Based on recitals in the trust deed or an assignment of the trust deed, it appeared that Umpqua Bank was the then owner of the indebtedness secured by the trust deed. It may be possible, for a MERS trust deed, to obtain information regarding the current owner of the indebtedness and the servicer, if any, by contacting MERS at 888-679-6377 or through the MERS website.

9. A line of credit deed of trust to secure an indebtedness in the amount shown below,

Amount: \$250,000.00
Dated: September 7, 2016
Trustor/Grantor: James H. Wolfston, Jr.
Trustee: Brad Williams
Beneficiary: Umpqua Bank
Loan No.: Not shown
Recording Date: September 12, 2016
Recording No.: 2016-062080
Affects: Parcels I & II

The Deed of Trust set forth above is purported to be a "Credit Line" Deed of Trust. It is a requirement that the Trustor/Grantor of said Deed of Trust provide written authorization to close said credit line account to the Lender when the Deed of Trust is being paid off through the Company or other Settlement/Escrow Agent or provide a satisfactory subordination of this Deed of Trust to the proposed Deed of Trust to be recorded at closing.

10. An option to purchase said Land with certain terms, covenants, conditions and provisions as set forth therein.

Optionor: Greg M. McKillip
Optionee: James Wolfson
Disclosed by: Memorandum
Recording Date: July 10, 2017
Recording No.: 2017-046627
Affects: Parcel III

EXHIBIT "D"
(Liens and Encumbrances)
(continued)

11. A judgment for installment payments of spousal and/or child support, to be made by:

Amount: \$404.00 per month Child Support; \$6025.00 per month Spousal Support
Debtor: James H. Wolfston, Jr.
Creditor: Katherine A. Ridley
Date entered: 12/11/2008
County: Clackamas
Court: Circuit
Case No.: DR08110238

BOUNDARY DOCUMENTS:

BOUNDARY - 99-018383
BOUNDARY - 99-052396
BOUNDARY - 2003-083133
BOUNDARY - 2006-011023
BOUNDARY - 2015-009641
BOUNDARY - 2016-066617
BOUNDARY - WEHLER ESTATES

DEFINITIONS, CONDITIONS AND STIPULATIONS

1. **Definitions.** The following terms have the stated meaning when used in this report:
 - (a) "Customer": The person or persons named or shown as the addressee of this report.
 - (b) "Effective Date": The effective date stated in this report.
 - (c) "Land": The land specifically described in this report and improvements affixed thereto which by law constitute real property.
 - (d) "Public Records": Those records which by the laws of the state of Oregon impart constructive notice of matters relating to the Land.
2. **Liability of Company.**
 - (a) This is not a commitment to issue title insurance and does not constitute a policy of title insurance.
 - (b) The liability of the Company for errors or omissions in this public record report is limited to the amount of the charge paid by the Customer, provided, however, that the Company has no liability in the event of no actual loss to the Customer.
 - (c) No costs (including without limitation attorney fees and other expenses) of defense, or prosecution of any action, is afforded to the Customer.
 - (d) In any event, the Company assumes no liability for loss or damage by reason of the following:
 - (1) Taxes or assessments which are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the Public Records.
 - (2) Any facts, rights, interests or claims which are not shown by the Public Records but which could be ascertained by an inspection of the land or by making inquiry of persons in possession thereof.
 - (3) Easements, liens or encumbrances, or claims thereof, which are not shown by the Public Records.
 - (4) Discrepancies, encroachments, shortage in area, conflicts in boundary lines or any other facts which a survey would disclose.
 - (5) (i) Unpatented mining claims; (ii) reservations or exceptions in patents or in Acts authorizing the issuance thereof; (iii) water rights or claims or title to water.
 - (6) Any right, title, interest, estate or easement in land beyond the lines of the area specifically described or referred to in this report, or in abutting streets, roads, avenues, alleys, lanes, ways or waterways.
 - (7) Any law, ordinance or governmental regulation (including but not limited to building and zoning laws, ordinances or regulations) restricting, regulating, prohibiting or relating to (i) the occupancy, use or enjoyment of the land; (ii) the character, dimensions or location of any improvement now or hereafter erected on the land; (iii) a separation in ownership or a change in the dimensions or area of the land or any parcel of which the land is or was a part; or (iv) environmental protection, or the effect of any violation of these laws, ordinances or governmental regulations, except to the extent that a notice of the enforcement thereof or a notice of a defect, lien or encumbrance resulting from a violation or alleged violation affecting the land has been recorded in the Public Records at the effective date hereof.
 - (8) Any governmental police power not excluded by 2(d)(7) above, except to the extent that notice of the exercise thereof or a notice of a defect, lien or encumbrance resulting from a violation or alleged violation affecting the land has been recorded in the Public Records at the effective date hereof.
 - (9) Defects, liens, encumbrances, adverse claims or other matters created, suffered, assumed, agreed to or actually known by the Customer.
3. **Report Entire Contract.** Any right or action or right of action that the Customer may have or may bring against the Company arising out of the subject matter of this report must be based on the provisions of this report. No provision or condition of this report can be waived or changed except by a writing signed by an authorized officer of the Company. By accepting this form report, the Customer acknowledges and agrees that the Customer has elected to utilize this form of public record report and accepts the limitation of liability of the Company as set forth herein.
4. **Charge.** The charge for this report does not include supplemental reports, updates or other additional services of the Company.

LIMITATIONS OF LIABILITY

"CUSTOMER" REFERS TO THE RECIPIENT OF THIS REPORT.

CUSTOMER EXPRESSLY AGREES AND ACKNOWLEDGES THAT IT IS EXTREMELY DIFFICULT, IF NOT IMPOSSIBLE, TO DETERMINE THE EXTENT OF LOSS WHICH COULD ARISE FROM ERRORS OR OMISSIONS IN, OR THE COMPANY'S NEGLIGENCE IN PRODUCING, THE REQUESTED REPORT, HEREIN "THE REPORT." CUSTOMER RECOGNIZES THAT THE FEE CHARGED IS NOMINAL IN RELATION TO THE POTENTIAL LIABILITY WHICH COULD ARISE FROM SUCH ERRORS OR OMISSIONS OR NEGLIGENCE. THEREFORE, CUSTOMER UNDERSTANDS THAT THE COMPANY IS NOT WILLING TO PROCEED IN THE PREPARATION AND ISSUANCE OF THE REPORT UNLESS THE COMPANY'S LIABILITY IS STRICTLY LIMITED. CUSTOMER AGREES WITH THE PROPRIETY OF SUCH LIMITATION AND AGREES TO BE BOUND BY ITS TERMS

THE LIMITATIONS ARE AS FOLLOWS AND THE LIMITATIONS WILL SURVIVE THE CONTRACT:

ONLY MATTERS IDENTIFIED IN THIS REPORT AS THE SUBJECT OF THE REPORT ARE WITHIN ITS SCOPE. ALL OTHER MATTERS ARE OUTSIDE THE SCOPE OF THE REPORT.

CUSTOMER AGREES, AS PART OF THE CONSIDERATION FOR THE ISSUANCE OF THE REPORT AND TO THE FULLEST EXTENT PERMITTED BY LAW, TO LIMIT THE LIABILITY OF THE COMPANY, ITS LICENSORS, AGENTS, SUPPLIERS, RESELLERS, SERVICE PROVIDERS, CONTENT PROVIDERS AND ALL OTHER SUBSCRIBERS OR SUPPLIERS, SUBSIDIARIES, AFFILIATES, EMPLOYEES, AND SUBCONTRACTORS FOR ANY AND ALL CLAIMS, LIABILITIES, CAUSES OF ACTION, LOSSES, COSTS, DAMAGES AND EXPENSES OF ANY NATURE WHATSOEVER, INCLUDING ATTORNEY'S FEES, HOWEVER ALLEGED OR ARISING, INCLUDING BUT NOT LIMITED TO THOSE ARISING FROM BREACH OF CONTRACT, NEGLIGENCE, THE COMPANY'S OWN FAULT AND/OR NEGLIGENCE, ERRORS, OMISSIONS, STRICT LIABILITY, BREACH OF WARRANTY, EQUITY, THE COMMON LAW, STATUTE OR ANY OTHER THEORY OF RECOVERY, OR FROM ANY PERSON'S USE, MISUSE, OR INABILITY TO USE THE REPORT OR ANY OF THE MATERIALS CONTAINED THEREIN OR PRODUCED, SO THAT THE TOTAL AGGREGATE LIABILITY OF THE COMPANY AND ITS AGENTS, SUBSIDIARIES, AFFILIATES, EMPLOYEES, AND SUBCONTRACTORS SHALL NOT IN ANY EVENT EXCEED THE COMPANY'S TOTAL FEE FOR THE REPORT.

CUSTOMER AGREES THAT THE FOREGOING LIMITATION ON LIABILITY IS A TERM MATERIAL TO THE PRICE THE CUSTOMER IS PAYING, WHICH PRICE IS LOWER THAN WOULD OTHERWISE BE OFFERED TO THE CUSTOMER WITHOUT SAID TERM. CUSTOMER RECOGNIZES THAT THE COMPANY WOULD NOT ISSUE THE REPORT BUT FOR THIS CUSTOMER AGREEMENT, AS PART OF THE CONSIDERATION GIVEN FOR THE REPORT, TO THE FOREGOING LIMITATION OF LIABILITY AND THAT ANY SUCH LIABILITY IS CONDITIONED AND PREDICATED UPON THE FULL AND TIMELY PAYMENT OF THE COMPANY'S INVOICE FOR THE REPORT.

THE REPORT IS LIMITED IN SCOPE AND IS NOT AN ABSTRACT OF TITLE, TITLE OPINION, PRELIMINARY TITLE REPORT, TITLE REPORT, COMMITMENT TO ISSUE TITLE INSURANCE, OR A TITLE POLICY, AND SHOULD NOT BE RELIED UPON AS SUCH. THE REPORT DOES NOT PROVIDE OR OFFER ANY TITLE INSURANCE, LIABILITY COVERAGE OR ERRORS AND OMISSIONS COVERAGE. THE REPORT IS NOT TO BE RELIED UPON AS A REPRESENTATION OF THE STATUS OF TITLE TO THE PROPERTY. THE COMPANY MAKES NO REPRESENTATIONS AS TO THE REPORT'S ACCURACY, DISCLAIMS ANY WARRANTY AS TO THE REPORT, ASSUMES NO DUTIES TO CUSTOMER, DOES NOT INTEND FOR CUSTOMER TO RELY ON THE REPORT, AND ASSUMES NO LIABILITY FOR ANY LOSS OCCURRING BY REASON OF RELIANCE ON THE REPORT OR OTHERWISE.

Fidelity National Title Company of Oregon
Public Record Report for New Subdivision or Land Partition
Order No. 45141725134

IF CUSTOMER (A) HAS OR WILL HAVE AN INSURABLE INTEREST IN THE SUBJECT REAL PROPERTY, (B) DOES NOT WISH TO LIMIT LIABILITY AS STATED HEREIN AND (C) DESIRES THAT ADDITIONAL LIABILITY BE ASSUMED BY THE COMPANY, THEN CUSTOMER MAY REQUEST AND PURCHASE A POLICY OF TITLE INSURANCE, A BINDER, OR A COMMITMENT TO ISSUE A POLICY OF TITLE INSURANCE. NO ASSURANCE IS GIVEN AS TO THE INSURABILITY OF THE TITLE OR STATUS OF TITLE. CUSTOMER EXPRESSLY AGREES AND ACKNOWLEDGES IT HAS AN INDEPENDENT DUTY TO ENSURE AND/OR RESEARCH THE ACCURACY OF ANY INFORMATION OBTAINED FROM THE COMPANY OR ANY PRODUCT OR SERVICE PURCHASED.

NO THIRD PARTY IS PERMITTED TO USE OR RELY UPON THE INFORMATION SET FORTH IN THE REPORT, AND NO LIABILITY TO ANY THIRD PARTY IS UNDERTAKEN BY THE COMPANY.

CUSTOMER AGREES THAT, TO THE FULLEST EXTENT PERMITTED BY LAW, IN NO EVENT WILL THE COMPANY, ITS LICENSORS, AGENTS, SUPPLIERS, RESELLERS, SERVICE PROVIDERS, CONTENT PROVIDERS, AND ALL OTHER SUBSCRIBERS OR SUPPLIERS, SUBSIDIARIES, AFFILIATES, EMPLOYEES AND SUBCONTRACTORS BE LIABLE FOR CONSEQUENTIAL, INCIDENTAL, INDIRECT, PUNITIVE, EXEMPLARY, OR SPECIAL DAMAGES, OR LOSS OF PROFITS, REVENUE, INCOME, SAVINGS, DATA, BUSINESS, OPPORTUNITY, OR GOODWILL, PAIN AND SUFFERING, EMOTIONAL DISTRESS, NON-OPERATION OR INCREASED EXPENSE OF OPERATION, BUSINESS INTERRUPTION OR DELAY, COST OF CAPITAL, OR COST OF REPLACEMENT PRODUCTS OR SERVICES, REGARDLESS OF WHETHER SUCH LIABILITY IS BASED ON BREACH OF CONTRACT, TORT, NEGLIGENCE, THE COMPANY'S OWN FAULT AND/OR NEGLIGENCE, STRICT LIABILITY, BREACH OF WARRANTIES, FAILURE OF ESSENTIAL PURPOSE, OR OTHERWISE AND WHETHER CAUSED BY NEGLIGENCE, ERRORS, OMISSIONS, STRICT LIABILITY, BREACH OF CONTRACT, BREACH OF WARRANTY, THE COMPANY'S OWN FAULT AND/OR NEGLIGENCE OR ANY OTHER CAUSE WHATSOEVER, AND EVEN IF THE COMPANY HAS BEEN ADVISED OF THE LIKELIHOOD OF SUCH DAMAGES OR KNEW OR SHOULD HAVE KNOWN OF THE POSSIBILITY FOR SUCH DAMAGES.

END OF THE LIMITATIONS OF LIABILITY

RECORDING REQUESTED BY:
Fidelity National Title
Company of Oregon

900 SW 6th Avenue
Portland, OR 97204
GRANTOR'S NAME:
Greg McKillip
GRANTEE'S NAME:
James H. Wolfston, Jr.
AFTER RECORDING RETURN TO:
Order No.: 45141727447-SG
James H. Wolfston, Jr.
805 SW Broadway, Suite 1800
Portland, OR 97205
SEND TAX STATEMENTS TO:
James H. Wolfston, Jr.
805 SW Broadway, Suite 1800
Portland, OR 97205

Clackamas County Official Records **2017-086968**
Sherry Hall, County Clerk 12/28/2017 09:51:00 AM
D-D Cnt=1 Str=75 CONNIE \$58.00
\$10.00 \$16.00 \$10.00 \$22.00

SPACE ABOVE THIS LINE FOR RECORDER'S USE

STATUTORY WARRANTY DEED

FIDELITY NATIONAL TITLE 45141727447.01

Greg McKillip, Grantor, conveys and warrants to James H. Wolfston, Jr., Grantee, the following described real property, free and clear of encumbrances except as specifically set forth below, situated in the County of Clackamas, State of Oregon:

A Tract of land situated in Section 12, Township 3 South, Range 1 West, of the Willamette Meridian, in the County of Clackamas and State of Oregon, being more particularly described as follows:

Beginning at the one-quarter corner between Sections 12 and 13, Township 3 South, Range 1 West, of the Willamette Meridian, from said place of beginning; thence North 89°44' East along the South Boundary of said section 12, a distance of 173.11 feet to an Iron rod; thence leaving said South Boundary of section 12, North 0°01'30" West 496 feet; thence South 89°44' West parallel with said South Boundary of section 12, a distance of 283.85 feet; thence South 0°01'30" East 496 feet; thence North 89°44' East, 110.74 feet to the place of beginning.

THE TRUE AND ACTUAL CONSIDERATION FOR THIS CONVEYANCE IS FIVE HUNDRED FIFTY THOUSAND AND NO/100 DOLLARS (\$550,000.00). (See ORS 93.030). This Deed fulfills and releases the Memorandum of Option Agreement for Purchase and Sale recorded as Fee No. 2017-046827.

Subject to and excepting:

Any adverse claim based upon the assertion that:

- A) Some portion of said land has been brought within the boundaries thereof by an avulsive movement of the Boeckman Creek or has been formed by accretion or reliction to any such portion.
- B) Some portion of said property has been created by deposit of artificial fill.

And Excepting:

- C) The rights of the public and governmental bodies for fishing, navigation and commerce in and to any portion of the premises herein described, lying below the high water line of the Boeckman Creek.
- D) The right, title and interest of the State of Oregon in and to any portion lying below the high water line of Boeckman Creek.

Easement(s) for the purpose(s) shown below and rights incidental thereto, as granted in a document:

In favor of : City of Wilsonville, a municipal corporation
For : Inundation - adjacent to Boeckman Creek
Recorded : August 9, 1996
Recording No. : 96058454
Affects: Westerly portion

BEFORE SIGNING OR ACCEPTING THIS INSTRUMENT, THE PERSON TRANSFERRING FEE TITLE SHOULD INQUIRE ABOUT THE PERSON'S RIGHTS, IF ANY, UNDER ORS 195.300, 195.301 AND 195.305 TO 195.336 AND SECTIONS 5 TO 11, CHAPTER 424, OREGON LAWS 2007, SECTIONS 2 TO 9 AND 17, CHAPTER 855, OREGON LAWS 2009, AND SECTIONS 2 TO 7, CHAPTER 8, OREGON LAWS 2010. THIS INSTRUMENT DOES NOT ALLOW USE OF THE PROPERTY DESCRIBED IN THIS INSTRUMENT IN VIOLATION OF APPLICABLE LAND USE LAWS AND REGULATIONS. BEFORE SIGNING OR ACCEPTING THIS INSTRUMENT, THE PERSON ACQUIRING FEE TITLE TO THE PROPERTY SHOULD CHECK WITH THE APPROPRIATE CITY OR COUNTY PLANNING DEPARTMENT TO VERIFY THAT THE UNIT OF LAND BEING TRANSFERRED IS A LAWFULLY ESTABLISHED LOT OR PARCEL, AS DEFINED IN ORS 92.010 OR 215.010, TO VERIFY THE APPROVED USES OF THE LOT OR PARCEL, TO DETERMINE ANY LIMITS ON LAWSUITS AGAINST FARMING OR FOREST PRACTICES, AS DEFINED IN ORS 30.930, AND TO INQUIRE ABOUT THE RIGHTS OF NEIGHBORING PROPERTY OWNERS, IF ANY, UNDER ORS 195.300, 195.301 AND 195.305 TO 195.336 AND SECTIONS 5 TO 11, CHAPTER 424, OREGON LAWS 2007, SECTIONS 2 TO 9 AND 17, CHAPTER 855, OREGON LAWS 2009, AND SECTIONS 2 TO 7, CHAPTER 8, OREGON LAWS 2010.



THIS REPORT IS ISSUED BY THE ABOVE-NAMED COMPANY ("THE COMPANY") FOR THE EXCLUSIVE USE OF THE FOLLOWING CUSTOMER:

Fidelity National Title Company of Oregon
Phone No.: (503)223-8338

Date Prepared: November 22, 2017
Effective Date: November 14, 2014 / 08:00 AM
Charge: \$0.00
Order No.: 45141725134
Reference: SW BOECKMAN

The information contained in this report is furnished to the Customer by Fidelity National Title Company of Oregon (the "Company") as an information service based on the records and indices maintained by the Company for the county identified below. This report is not title insurance, is not a preliminary title report for title insurance, and is not a commitment for title insurance. No examination has been made of the Company's records, other than as specifically set forth in this report ("the Report"). Liability for any loss arising from errors and/or omissions is limited to the lesser of the fee paid or the actual loss to the Customer, and the Company will have no greater liability by reason of this report. This report is subject to the Definitions, Conditions and Stipulations contained in it.

REPORT

- A. The Land referred to in this report is located in the County of Clackamas, State of Oregon, and is described as follows:
As fully set forth on Exhibit "A" attached hereto and by this reference made a part hereof.
- B. As of the Effective Date, the tax account and map references pertinent to the Land are as follows:
As fully set forth on Exhibit "B" attached hereto and by this reference made a part hereof.
- C. As of the Effective Date and according to the Public Records, we find title to the land apparently vested in:
As fully set forth on Exhibit "C" attached hereto and by this reference made a part hereof.
- D. As of the Effective Date and according to the Public Records, the Land is subject to the following liens and encumbrances, which are not necessarily shown in the order of priority:
As fully set forth on Exhibit "D" attached hereto and by this reference made a part hereof.

EXHIBIT "A"
(Land Description)

PARCEL I:

A tract of land situated in Section 12, Township 3 South, Range 1 West, of the Willamette Meridian, in the City of Wilsonville, County of Clackamas, State of Oregon, more particularly described as follows:

Beginning at the one-quarter corner between Sections 12 and 13, in said Township and Range; thence North 89° 44' East along the South boundary of said Section 12, a distance of 173.11 feet to an iron rod set at the Southeast corner of a tract described in deed to Kenneth C. Miller, et ux in Book 611, Page 172; Records of Clackamas County, said point being the true point of beginning of the tract herein to be described; thence continuing North 89° 44' East along the South boundary of said Section 12, a distance of 405.59 feet to the Southwest corner of the tract described in deed to Sophie G. Hathaway and Clifford A. Hathaway as "Parcel I", in Book 661, Page 620, Records of Clackamas County; thence North along the West boundary of said Hathaway tract, 858.0 feet to a one-half inch iron rod set at the Northwest corner thereof; thence South 89° 44' West, parallel with the South boundary of said Section 12, a distance of 435.77 feet to the Northeast corner of a tract described in deed to Harold L. Lariviere, et ux in Book 643, Page 525, Records of Clackamas County; thence South 0° 01' 30" East along the East boundary of said Lariviere tract, 362.00 feet to a point in the North boundary of the said Kenneth C. Miller tract; thence North 89° 44' East, along the North boundary of said Miller tract, 30 feet to the Northeast corner thereof; thence South 0° 01' 30" along the East boundary of said Miller tract 496.0 feet to the true point of beginning;

EXCEPT THEREFROM that portion lying within the boundaries of public road and highways.

PARCEL II:

A tract of land situated in Section 12, Township 3 South, Range 1 West, of the Willamette Meridian, in the City of Wilsonville, County of Clackamas and State of Oregon, more particularly described as:

Beginning at the one-quarter corner between Sections 12 and 13, said Township and Range, from said point of beginning; thence South 89° 44' West along the South boundary of said Section 12, a distance of 110.74 feet to the true point of beginning; from said true point of beginning, leaving said South boundary of said Section 12, North 0° 01' 30" West, 496.00 feet to an iron rod; thence North 89° 44' East, 253.65 feet; thence North 0° 01' 30" West, 362.00 feet; thence South 89° 44' West, 701.96 feet to an iron rod set in the Westerly boundary of that certain tract of land described in Book 101, Page 392, Records of Clackamas County; thence South 6° 00' East along said Westerly boundary 141.12 feet; thence South 19° 00' East along said Westerly boundary 759.00 feet to the South line of said Section 12; thence North 89° 44' East along the South line of said Section 12, a distance of 186.26 feet to an iron rod and the true point of beginning.

EXCEPT THEREFROM that portion lying within the boundaries of public road and highways.

PARCEL III:

A tract of land situated in Section 12, Township 3 South, Range 1 West, of the Willamette Meridian, in the City of Wilsonville, County of Clackamas and State of Oregon, being more particularly described as follows:

Beginning at the one-quarter corner between sections 12 and 13, Township 3 South, Range 1 West, of the Willamette Meridian, from said place of beginning; thence North 89°44' East along the South boundary of said

Fidelity National Title Company of Oregon
Public Record Report for New Subdivision or Land Partition
Order No. 45141725134

EXHIBIT "A"
(Land Description)
(continued)

Section 12, a distance of 173.11 feet to an iron rod; thence leaving said South boundary of Section 12, North 0°01'30" West 496 feet; thence South 89°44' West parallel with said South boundary of Section 12, a distance of 283.85 feet; thence South 0°01'30" East 496 feet; thence South 0°01'30" East 496 feet to an iron rod; thence North 89°44' East, 110.74 feet to the place of beginning.

Fidelity National Title Company of Oregon
Public Record Report for New Subdivision or Land Partition
Order No. 45141725134

EXHIBIT "B"
(Tax Account and Map)

APN/Parcel ID(s) 00806015, 00806033, 00806024, 00806024 and 00806033 as well as Tax/Map ID(s) 31W12D
02400, 31W12D 02700 and 31W12D 02600

Fidelity National Title Company of Oregon
Public Record Report for New Subdivision or Land Partition
Order No. 45141725134

EXHIBIT "C"
(Vesting)

James H. Wolfston, Jr., as to Parcels I and II, and Greg McKillip, as to Parcel III

EXHIBIT "D"
(Liens and Encumbrances)

SPECIFIC ITEMS AND EXCEPTIONS:

Note: Property taxes for the fiscal year shown below are paid in full.

Fiscal Year: 2017-2018
Amount: \$11,010.56
Levy Code: 003-028
Account No.: 00806015
Map No.: 31W12D 02400
Affects: Parcel I

Prior to close of escrow, please contact the Tax Collector's Office to confirm all amounts owing, including current fiscal year taxes, supplemental taxes, escaped assessments and any delinquencies.

Note: Property taxes for the fiscal year shown below are paid in full.

Fiscal Year: 2017-2018
Amount: \$6,845.42
Levy Code: 003-028
Account No.: 00806033
Map No.: 31W12D 02700
Affects: Parcel II

Prior to close of escrow, please contact the Tax Collector's Office to confirm all amounts owing, including current fiscal year taxes, supplemental taxes, escaped assessments and any delinquencies.

1. Unpaid Property Taxes are as follows:

Fiscal Year: 2017-2018
Amount: \$4,745.85, plus interest, if any
Levy Code: 003-028
Account No.: 00806024
Map No.: 31W12D-02600
Affects: Parcel III

Prior to close of escrow, please contact the Tax Collector's Office to confirm all amounts owing, including current fiscal year taxes, supplemental taxes, escaped assessments and any delinquencies.

2. As disclosed by the assessment and tax roll, the premises herein were once specially assessed for farmland, forestland or other special assessment status and later disqualified. Per ORS 308A.700 to 308A.733, additional taxes were imposed and remain as potential additional tax liability for the property. A check with the Assessor's office will be necessary to determine the effect and continuation of the additional tax liability.

Additional Tax Liability Amount: \$20,718.98
Affects Tax Lot 2400/Tax Account Number 00806015
Parcel I

EXHIBIT "D"
(Liens and Encumbrances)
(continued)

3. As disclosed by the assessment and tax roll, the premises herein were once specially assessed for farmland, forestland or other special assessment status and later disqualified. Per ORS 308A.700 to 308A.733, additional taxes were imposed and remain as potential additional tax liability for the property. A check with the Assessor's office will be necessary to determine the effect and continuation of the additional tax liability.

Additional Tax Liability Amount: \$19,146.36
Affects Tax Lot 2700/Tax Account Number 00806033
Parcel II

4. City Liens, if any, in favor of the City of Wilsonville.

5. Any adverse claim based upon the assertion that:

A) Some portion of said land has been brought within the boundaries thereof by an avulsive movement of the Boeckman Creek or has been formed by accretion or reliction to any such portion.

B) Some portion of said property has been created by deposit of artificial fill.

And Excepting;

C) The rights of the public and governmental bodies for fishing, navigation and commerce in and to any portion of the premises herein described, lying below the high water line of the Boeckman Creek.

D) The right, title and interest of the State of Oregon in and to any portion lying below the high water line of Boeckman Creek.

6. An easement disclosed by instrument,

In favor of : The City of Wilsonville, a municipal corporation

For : Slope and utilities

Recorded : May 1, 1990

Recording No.: 90019680

Affects: Southerly portion; Parcel II

7. An easement disclosed by instrument,

In favor of : City of Wilsonville, a municipal corporation

For : Inundation - adjacent to Boeckman Creek

Recorded : August 9, 1996

Recording No. : 96058454

Affects: Westerly portion

EXHIBIT "D"
(Liens and Encumbrances)
(continued)

8. A deed of trust to secure an indebtedness in the amount shown below,

Amount: \$1,200,000.00
Dated: October 22, 2014
Trustor/Grantor: James H. Wolfston, Jr.
Trustee: Fidelity National Title Company of Oregon
Beneficiary: Mortgage Electronic Registration Systems, Inc., acting solely as nominee for Umpqua Bank
Loan No.: 8501207870/MIN#1000458-1000068972-6
Recording Date: October 28, 2014
Recording No.: 2014-055459
Affects: Parcels I & II

NOTE: Based on recitals in the trust deed or an assignment of the trust deed, it appeared that Umpqua Bank was the then owner of the indebtedness secured by the trust deed. It may be possible, for a MERS trust deed, to obtain information regarding the current owner of the indebtedness and the servicer, if any, by contacting MERS at 888-679-6377 or through the MERS website.

9. A line of credit deed of trust to secure an indebtedness in the amount shown below,

Amount: \$250,000.00
Dated: September 7, 2016
Trustor/Grantor: James H. Wolfston, Jr.
Trustee: Brad Williams
Beneficiary: Umpqua Bank
Loan No.: Not shown
Recording Date: September 12, 2016
Recording No.: 2016-062080
Affects: Parcels I & II

The Deed of Trust set forth above is purported to be a "Credit Line" Deed of Trust. It is a requirement that the Trustor/Grantor of said Deed of Trust provide written authorization to close said credit line account to the Lender when the Deed of Trust is being paid off through the Company or other Settlement/Escrow Agent or provide a satisfactory subordination of this Deed of Trust to the proposed Deed of Trust to be recorded at closing.

10. An option to purchase said Land with certain terms, covenants, conditions and provisions as set forth therein.

Optionor: Greg M. McKillip
Optionee: James Wolfson
Disclosed by: Memorandum
Recording Date: July 10, 2017
Recording No.: 2017-046627
Affects: Parcel III

EXHIBIT "D"
(Liens and Encumbrances)
(continued)

11. A judgment for installment payments of spousal and/or child support, to be made by:

Amount: \$404.00 per month Child Support; \$6025.00 per month Spousal Support
Debtor: James H. Wolfston, Jr.
Creditor: Katherine A. Ridley
Date entered: 12/11/2008
County: Clackamas
Court: Circuit
Case No.: DR08110238

BOUNDARY DOCUMENTS:

BOUNDARY - 99-018383
BOUNDARY - 99-052396
BOUNDARY - 2003-083133
BOUNDARY - 2006-011023
BOUNDARY - 2015-009641
BOUNDARY - 2016-066617
BOUNDARY - WEHLER ESTATES

Subdivision Name Request

REQUEST TO RESERVE SUBDIVISION / CONDOMINIUM NAME

Clackamas County Surveyor's Office
150 Beaver Creek Road, #325
Oregon City, OR 97045
(503) 742-4475
E-mail address: surveyor@clackamas.us

PLAT NAME REQUESTED: <i>Morgan Farm</i>

Location of Plat	TWP/RANGE: <i>T3S/R1W</i>	SECTION#: <i>12D</i>	TAX LOT#(s): <i>2400, 2600 & 2700</i>
-------------------------	-------------------------------------	--------------------------------	---

I understand that if the above name plat is not pending or recorded within two years, the name will be removed from the reserved list.

RESERVED BY: *Mike Harris*

DATE: <i>2-21-18</i>	TELEPHONE: <i>() - 971-708-6271</i>	FAX: <i>() -</i>
--------------------------------	--	-----------------------------

EMAIL ADDRESS: *mharris@pd-grp.com*

PLAT SURVEYOR: #
57863

NAME OF DEVELOPER:
Pahlisch Homes, Inc.

ADDRESS:
15333 SW Sequoia Parkway Suite 190, P.Hd. OR 97224

TELEPHONE: <i>() - 503-317-6500 - Mike Morse</i>	FAX: <i>() -</i>
---	-----------------------------

EMAIL ADDRESS: *mikem@pahlischhomes.com*

APPROVED BY: <i>Deborah S. Jule</i>	APPROVAL DATE: <i>2/21/2018</i>
---	---