

DEVELOPMENT REVIEW APPLICATION

For Office Use Only		
STAFF CONTACT <i>Jennifer Arnold</i>	PROJECT NO(S). <i>SUB-17-01 / WRG-17-01</i>	
NON-REFUNDABLE FEE(S)	REFUNDABLE DEPOSIT(S) <i>5400 / 1700</i>	TOTAL <i>7100</i>

Type of Review (Please check all that apply):

- | | | |
|--|--|---|
| <input type="checkbox"/> Annexation (ANX)
<input type="checkbox"/> Appeal and Review (AP) *
<input type="checkbox"/> Conditional Use (CUP)
<input type="checkbox"/> Design Review (DR)
<input type="checkbox"/> Easement Vacation
<input type="checkbox"/> Extraterritorial Ext. of Utilities
<input type="checkbox"/> Final Plat or Plan (FP)
<input type="checkbox"/> Flood Management Area
<input type="checkbox"/> Hillside Protection & Erosion Control | <input type="checkbox"/> Historic Review
<input type="checkbox"/> Legislative Plan or Change
<input type="checkbox"/> Lot Line Adjustment (LLA) */**
<input type="checkbox"/> Minor Partition (MIP) (Preliminary Plat or Plan)
<input type="checkbox"/> Non-Conforming Lots, Uses & Structures
<input type="checkbox"/> Planned Unit Development (PUD)
<input type="checkbox"/> Pre-Application Conference (PA) */**
<input type="checkbox"/> Street Vacation | <input checked="" type="checkbox"/> Subdivision (SUB)
<input type="checkbox"/> Temporary Uses *
<input type="checkbox"/> Time Extension *
<input type="checkbox"/> Variance (VAR)
<input type="checkbox"/> Water Resource Area Protection/Single Lot (WAP)
<input type="checkbox"/> Water Resource Area Protection/Wetland (WAP)
<input checked="" type="checkbox"/> Willamette & Tualatin River Greenway (WRG)
<input type="checkbox"/> Zone Change |
|--|--|---|

Home Occupation, Pre-Application, Sidewalk Use, Sign Review Permit, and Temporary Sign Permit applications require different or additional application forms, available on the City website or at City Hall.

Site Location/Address: 4096 Cornwall St. West Linn, OR	Assessor's Map No.: 21E36BA
	Tax Lot(s): 6300
	Total Land Area: 2.18 acres

Brief Description of Proposal:

Subdivision application to divide the subject property into six lots for construction of single-family detached homes.
Willamette & Tualatin River Greenway application to adjust HCA boundary.

Applicant Name: Icon Construction and Development, LLC <small>(please print)</small>	Phone: (503) 657-0406
Address: 1980 Willamette Falls Drive, Suite 200	Email: mark@iconconstruction.net
City State Zip: West Linn, OR 97068	
Owner Name (required): Same as applicant. <small>(please print)</small>	Phone:
Address:	Email:
City State Zip:	
Consultant Name: Rick Givens, Planning Consultant <small>(please print)</small>	Phone: 503-479-0097
Address: 18680 Sunblaze Dr.	Email: rickgivens@gmail.com
City State Zip: Oregon City, OR 97045	

1. All application fees are non-refundable (excluding deposit). **Any overruns to deposit will result in additional billing.**
2. The owner/applicant or their representative should be present at all public hearings.
3. A denial or approval may be reversed on appeal. No permit will be in effect until the appeal period has expired.
4. **Three (3) complete hard-copy sets (single sided) of application materials must be submitted with this application.**
One (1) complete set of digital application materials must also be submitted on CD in PDF format.
If large sets of plans are required in application please submit only two sets.

* No CD required / ** Only one hard-copy set needed

The undersigned property owner(s) hereby authorizes the filing of this application, and authorizes on site review by authorized staff. I hereby agree to comply with all code requirements applicable to my application. Acceptance of this application does not infer a complete submittal. All amendments to the Community Development Code and to other regulations adopted after the application is approved shall be enforced where applicable. Approved applications and subsequent development is not vested under the provisions in place at the time of the initial application.

<i>[Signature]</i>	Date FEB 21 2017	<i>[Signature]</i>	Date 2-21-17
<div style="border: 1px solid black; padding: 5px; display: inline-block;"> <p style="font-size: 2em; margin: 0;">RECEIVED</p> <p style="font-size: 1.2em; margin: 0;">2-21-17</p> <p style="font-size: 0.8em; margin: 0;">PLANNING & BUILDING CITY OF WEST LINN INT. _____ TIME _____</p> </div>			

WILLOW RIDGE

Six-Lot Subdivision Application

Icon Construction & Development, LLC

Proposal: This application requests approval of a 6-lot subdivision to be developed on property located at 4096 Cornwall St. in West Linn. The property is located on the west side of, and at the terminus of, the Cornwall Street right-of-way. Landis Street is stubbed to the west property line of the subject site.

The subject property is described as Tax Lot 6300 of Assessor's Map 21E36BA. The site is 2.18 acres (94,808 square feet) in area. It is presently developed with a single-family detached home. This home will be removed to allow for the construction of the extension of Landis Street to Cornwall Street. The subject property is zoned R-10.



Figure 1: Vicinity Map



Figure 2: Aerial Photograph

The proposed development conforms to the applicable provisions of the CDC as follows:

DIVISION 8. LAND DIVISION

Chapter 85 GENERAL PROVISIONS

85.200 APPROVAL CRITERIA

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

A. Streets.

Comment: The subject property fronts on Cornwall Street and Landis Street is stubbed to the west property line of the site. The development of the site will provide for the extension of Landis Street through the site to connect with Cornwall Street. Both Landis and Cornwall are local streets intended to serve the immediate neighborhood.

No reserve strips are warranted as there are no stub streets proposed. No stub streets are proposed as the properties to the south and west are already developed. The proposed alignment of Landis Street abuts the property to the north and would allow for a private street to be extended to serve the rear yard of that property. The unbuilt right-of-way of Cornwall Street that extends to the southerly border of the subject property is too steep to allow for construction and existing development precludes its extension to the west.

No cul-de-sac streets are proposed so the provisions of Section 85.200(A)11 are not applicable.

No new street names are proposed. The maximum street grade proposed is 15%, which is consistent with City standards. The minimum centerline curve radius proposed is 100 feet, which exceeds the minimum standard of 50 feet. No alleys are proposed. All proposed streets have sidewalks and planter strips, consistent with City standards. All proposed streets will be dedicated without any reservations or restrictions. All lots in the subdivision have access to a public street, as shown on the Tentative Plan. No gated streets or special entry designs are proposed.

B. Blocks and lots.

Comment: No new blocks having a length of more than 800 feet are proposed. The proposed street simply completes the connection of Landis through to Cornwall Street. Due to terrain and surrounding development patterns, it is not practicable to make blocks that are shorter. The proposed lot have property lines that are perpendicular to the street; contain sufficient area to meet the requirements of the R-10 zone, and provide for building envelopes that will meet required setbacks. The lots have buildable depths that do not exceed 2.5 times their width.

The development conforms to the provisions of Chapter 48, as discussed below in this report.

85.200(B) (5). No double frontage lots are proposed. The proposed lot lines within the development are approximately at right angles to the streets on which they front, as required by Section 85.200(B)(6). No flag lots are proposed. The proposed lots are not large enough to allow for future re-division under the provisions of the R-10 zone.

C. Pedestrian and bicycle trails.

Comment: No pedestrian or bicycle trails are proposed in this development. No bicycle improvements were listed on the Bicycle Master Plan.

D. Transit facilities.

Comment: Not applicable. No transit facilities are proposed or required as there is no TriMet service in this area.

E. Lot grading.

Comment: Grading of the proposed building site will conform to City standards. Preliminary grading plans for the street area is shown on the Preliminary Grading Plan submitted with this application. Compliance for individual homes will be reviewed at the time of building permit application.

F. Water.

Comment: City water is available in both Landis Street and Cornwall Street. The waterline in Cornwall Street, however, is substandard and will need to be upgraded in conjunction with the proposed development

G. Sewer.

Comment: As shown on the Preliminary Utility Plan, there is an existing public sewer line stubbed in Landis Street to the west boundary of the site. This sewer line will be extended through the property to Cornwall Street. Lots 5 through 6 will be served from the south via the extension of a sewer line from an existing sewer manhole located in an easement between Tax Lots 4700 and 4800.

H. Storm.

Comment: As shown on the Preliminary Utility Plan, storm sewer will be installed in the new street and piped to a detention and treatment facility to be developed in the City-owned tract on the north side of Fairhaven Street. Treated storm water will be discharged at pre-development levels, in accordance with City standards.

I. Utility easements. Utility easements are shown on the plans submitted with this application.

J. Supplemental provisions.

1. Wetland and natural drainageways. Comment: There are no wetlands or natural drainageways on or abutting the subject property.
2. Willamette and Tualatin Greenways. Comment: See discussion of Chapter 48, below
3. Street trees. Comment: Street trees will be provided as required, as shown on the Tentative Plan.
4. Lighting. Comment: Prior to final plat approval, an analysis of existing street lighting will be conducted and, if necessary, improvements made to comply with these standards. The preliminary design for streetlight placement within the subdivision is shown on the preliminary utility plan. To reduce ambient light and glare, high or low pressure sodium light bulbs will be provided for all streetlights within the subdivision. The lights will be shielded so that the light is directed downwards rather than omni-directional.
5. Dedications and exactions. Comment: No new dedications or exactions to service off-site properties are anticipated in conjunction with this application.
6. Underground utilities. Comment: All utilities within the development will be placed underground, as required by this section.
7. Density requirement. Comment: The density calculations submitted with this application demonstrate that the maximum density permitted on this site is 6 units. The proposed density of 6 units satisfies the minimum density standard.
8. Mix requirement. Comment: Not applicable. This requirement only applies in the R-2.1 and R-3 zones. The subject property is zoned R-10.
9. Heritage trees/significant tree and tree cluster protection. Comment: No heritage trees, as defined in the Municipal Code, are present on the site. Other existing trees are mapped on the Tree Plan, including those identified by the City Arborist as "significant". Please see discussion of Chapter 55, below.
10. Annexation and street lights. Comment: Not applicable. The subject property is within the city limits.

Chapter 48 - ACCESS, EGRESS AND CIRCULATION

48.025 ACCESS CONTROL

B. Access control standards.

1. Traffic impact analysis requirements. *The City or other agency with access jurisdiction may require a traffic study prepared by a qualified professional to*

determine access, circulation and other transportation requirements. (See also CDC 55.125, Traffic Impact Analysis.)

Comment: The trip generation rate for single-family homes is approximately 10 vehicle trips per day according to Institute of Transportation Engineers data. One of these trips will occur in the am peak hour and one will occur in the pm peak hour. The proposed subdivision will add five new dwellings (additionally, the existing home on the property will be replaced with a new dwelling, which will generate the same traffic as the existing home would). A total of 50 new trips per day would be expected from this development, with 5 occurring in the am peak hour and 5 occurring in the pm peak hour. Because of the small size and limited amount of traffic to be generated by this development, a Traffic Impact Analysis is not required for this project.

2. The City or other agency with access permit jurisdiction may require the closing or consolidation of existing curb cuts or other vehicle access points, recording of reciprocal access easements (i.e., for shared driveways), development of a frontage street, installation of traffic control devices, and/or other mitigation as a condition of granting an access permit, to ensure the safe and efficient operation of the street and highway system. Access to and from off-street parking areas shall not permit backing onto a public street.

Comment: Access to the site will be via extension of Landis Street to Cornwall Street. The driveway serving the existing home on the property will be removed when the home is demolished, and the new driveway will be reviewed at the time of building permit application.

3. Access options. When vehicle access is required for development (i.e., for off-street parking, delivery, service, drive-through facilities, etc.), access shall be provided by one of the following methods (planned access shall be consistent with adopted public works standards and TSP). These methods are "options" to the developer/subdivider.

a) Option 1. Access is from an existing or proposed alley or mid-block lane. If a property has access to an alley or lane, direct access to a public street is not permitted.

b) Option 2. Access is from a private street or driveway connected to an adjoining property that has direct access to a public street (i.e., "shared driveway"). A public access easement covering the driveway shall be recorded in this case to assure access to the closest public street for all users of the private street/drive.

c) Option 3. Access is from a public street adjacent to the development lot or parcel. If practicable, the owner/developer may be required to close or consolidate an existing access point as a condition of approving a new access. Street accesses shall comply with the access spacing standards in subsection (B)(6) of this section.

Comment: All lots will take access from Landis/Cornwall Streets system within the subdivision.

4. Subdivisions fronting onto an arterial street. *New residential land divisions fronting onto an arterial street shall be required to provide alleys or secondary (local or collector) streets for access to individual lots. When alleys or secondary streets cannot be constructed due to topographic or other physical constraints, access may be provided by consolidating driveways for clusters of two or more lots (e.g., includes flag lots and mid-block lanes).*

Comment: The site plan provides local street access for all lots. The site does not abut an arterial street.

5. Double-frontage lots. *When a lot or parcel has frontage onto two or more streets, access shall be provided first from the street with the lowest classification. For example, access shall be provided from a local street before a collector or arterial street. When a lot or parcel has frontage opposite that of the adjacent lots or parcels, access shall be provided from the street with the lowest classification.*

Comment: No double-frontage lots are proposed.

6. Access spacing.

a. *The access spacing standards found in Chapter 8 of the adopted Transportation System Plan (TSP) shall be applicable to all newly established public street intersections and non-traversable medians.*

b. *Private drives and other access ways are subject to the requirements of CDC 48.060.*

Comment: The intersection of Landis with Cornwall Street, both of which are local streets, complies with these standards. There are no other intersections near the subject property.

7. Number of access points. *For single-family (detached and attached), two-family, and duplex housing types, one street access point is permitted per lot or parcel, when alley access cannot otherwise be provided; except that two access points may be permitted corner lots (i.e., no more than one access per street), subject to the access spacing standards in subsection (B)(6) of this section. The number of street access points for multiple family, commercial, industrial, and public/institutional developments shall be minimized to protect the function, safety and operation of the street(s) and sidewalk(s) for all users. Shared access may be required, in conformance with subsection (B)(8) of this section, in order to maintain the required access spacing, and minimize the number of access points.*

Comment: Each proposed lot will have one access point, as specified in this section.

8. Shared driveways. *The number of driveway and private street intersections with public streets shall be minimized by the use of shared driveways with*

adjoining lots where feasible. The City shall require shared driveways as a condition of land division or site design review, as applicable, for traffic safety and access management purposes in accordance with the following standards:

Comment: Not applicable. No shared accesses are proposed.

C. Street connectivity and formation of blocks required. In order to promote efficient vehicular and pedestrian circulation throughout the City, land divisions and large site developments shall produce complete blocks bounded by a connecting network of public and/or private streets, in accordance with the following standards:

1. Block length and perimeter. The maximum block length shall not exceed 800 feet or 1,800 feet along an arterial.

Comment: No block lengths in excess of 800 feet are proposed. The proposed development simply completes the local street connection between Landis and Cornwall Streets.

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

Comment: Proposed streets will comply with the public street standards of Chapter 92 (see below).

3. Exception. Exceptions to the above standards may be granted when blocks are divided by one or more pathway(s), in conformance with the provisions of CDC 85.200(C), Pedestrian and Bicycle Trails, or cases where extreme topographic (e.g., slope, creek, wetlands, etc.) conditions or compelling functional limitations preclude implementation, not just inconveniences or design challenges. (Ord. 1635 § 25, 2014; Ord. 1636 § 33, 2014)

Comment: No exceptions to block length are necessary.

48.030 MINIMUM VEHICULAR REQUIREMENTS FOR RESIDENTIAL USES

A. Direct individual access from single-family dwellings and duplex lots to an arterial street, as designated in the transportation element of the Comprehensive Plan, is prohibited for lots or parcels created after the effective date of this code where an alternate access is either available or is expected to be available by imminent development application. Evidence of alternate or future access may include temporary cul-de-sacs, dedications or stubouts on adjacent lots or parcels, or tentative street layout plans submitted at one time by adjacent property owner/developer or by the owner/developer, or previous owner/developer, of the property in question.

Comment: All lots will take access from the internal local street system. No arterial streets are located in this area.

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

1. *One single-family residence, including residences with an accessory dwelling unit as defined in CDC 02.030, shall provide 10 feet of unobstructed horizontal clearance. Dual-track or other driveway designs that minimize the total area of impervious driveway surface are encouraged.*
2. *Two to four single-family residential homes equals a 14- to 20-foot-wide paved or all-weather surface. Width shall depend upon adequacy of line of sight and number of homes.*
3. *Maximum driveway grade shall be 15 percent. The 15 percent shall be measured along the centerline of the driveway only. Variations require approval of a Class II variance by the Planning Commission pursuant to Chapter 75 CDC. Regardless, the last 18 feet in front of the garage shall be under 12 percent grade as measured along the centerline of the driveway only. Grades elsewhere along the driveway shall not apply.*
4. *The driveway shall include a minimum of 20 feet in length between the garage door and the back of sidewalk, or, if no sidewalk is proposed, to the paved portion of the right-of-way.*

Comment: All lots will have individual driveways that conform to these standards. Driveways will be reviewed at the time of building permit application.

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

1. *A turnaround may be required as prescribed by the Fire Chief.*
2. *Minimum vertical clearance for the driveway shall be 13 feet, six inches.*
3. *A minimum centerline turning radius of 45 feet is required unless waived by the Fire Chief.*
4. *There shall be sufficient horizontal clearance on either side of the driveway so that the total horizontal clearance is 20 feet.*

Comment: No lots will have portions of the homes located more than 150 feet for the adjacent right-of-way.

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

Comment: All proposed streets will be built to full City standards for local streets.

E. Access and/or service drives for multi-family dwellings shall be fully improved with hard surface pavement:

Comment: Not applicable. No multi-family dwellings are proposed.

F. Where on-site maneuvering and/or access drives are necessary to accommodate required parking, in no case shall said maneuvering and/or access drives be less than that required in Chapters 46 and 48 CDC.

Comment: Not applicable. All lots are for single-family homes and all parking will be provided on the home's driveway.

G. The number of driveways or curb cuts shall be minimized on arterials or collectors. Consolidation or joint use of existing driveways shall be required when feasible.

Comment: No driveways onto arterial or collector streets are proposed.

H. In order to facilitate through traffic and improve neighborhood connections, it may be necessary to construct a public street through a multi-family site.

Comment: Not applicable. No multi-family development is proposed.

I. Gated accessways to residential development other than a single-family home are prohibited. (Ord. 1408, 1998; Ord. 1463, 2000; Ord. 1513, 2005; Ord. 1584, 2008; Ord. 1590 § 1, 2009; Ord. 1636 § 34, 2014)

Comment: Not applicable. No gated accesses are proposed.

Chapter 55 - DESIGN REVIEW

As required by this chapter, the applicant retained the services of an arborist (Multnomah Tree Experts) to identify the size, species, and condition of existing trees on the subject property. The trees were surveyed and mapped by Centerline Concepts, Inc., as shown on the Existing Conditions Map submitted with this application. Subsequently, the City Arborist visited the site and determined that 38 of these trees are significant trees. These trees are shown on the Tree Preservation Plan submitted with this application. The following provisions of Chapter 55 relating to tree preservation are applicable to this proposal:

B. Relationship to the natural and physical environment.

1. The buildings and other site elements shall be designed and located so that all heritage trees, as defined in the municipal code, shall be saved. Diseased heritage trees, as determined by the City Arborist, may be removed at his/her direction.

Comment: No heritage trees are located on the subject property.

2. All heritage trees, as defined in the municipal code, all trees and clusters of trees ("cluster" is defined as three or more trees with overlapping driplines; however, native oaks need not have an overlapping dripline) that are considered significant by the City Arborist, either individually or in consultation with certified arborists or similarly qualified professionals, based on accepted arboricultural standards including consideration of their size, type, location, health, long term survivability, and/or numbers, shall be protected pursuant to the criteria of

subsections (B)(2)(a) through (f) of this section. In cases where there is a difference of opinion on the significance of a tree or tree cluster, the City Arborist's findings shall prevail. It is important to acknowledge that all trees are not significant and, further, that this code section will not necessarily protect all trees deemed significant.

- a. Non-residential and residential projects on Type I and II lands shall protect all heritage trees and all significant trees and tree clusters by either the dedication of these areas or establishing tree conservation easements. Development of Type I and II lands shall require the careful layout of streets, driveways, building pads, lots, and utilities to avoid heritage trees and significant trees and tree clusters, and other natural resources pursuant to this code. The method for delineating the protected trees or tree clusters ("dripline + 10 feet") is explained in subsection (B)(2)(b) of this section. Exemptions of subsections (B)(2)(c), (e), and (f) of this section shall apply.*

Comment: Five of the significant trees identified by the City Arborist are located on Type I or II lands outside of the street right-of-way. These trees are all on Lots 3 and 4 and fall within the fill slope of grading associated with the extension of Landis Street and must be removed. See comment on subsection 55.B.2.f, below.

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

Comment: The Tentative Plan shows two areas being protected: the western portion of Lot 1 and the rear yard areas of 2 to 6. A total of 40 significant trees are located on the property. The plan would retain 13 of these trees, or 32.5% of the total significant trees on the site.

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

Comment: Landis Street is stubbed to the west property line of the subject property. This street must be extended through the site to connect with Cornwall Street in order to comply with the City's Transportation System Plan. This extension will result in the loss of 13 trees on the property that are located within the street right-of-way or in areas that will be filled to allow for the extension of the street.

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

Comment: The density calculations submitted with this application demonstrate that the project will achieve more than 70% of maximum density.

Density Calculations:	Area in Sq. Ft.
Gross Site Area	94,808
Land in a boundary street right-of-way, water course, or planned open space where density transfer is not requested	0
Area in street rights-of-way:	19,068
Net Site Area:	75,740
Type 1 & II Slopes Developed: 20,587 sq.ft. /10,000 x .5 =	1.03 Units
Water Resource Area:	None
Open space (Type III and IV lands)	None
Type III & IV lands developed: 55,153 sq. ft./10,000 =	5.51 Units
Total allowable base density:	6 Units

- e. *For arterial and collector street projects, including Oregon Department of Transportation street improvements, the roads and graded areas shall*

avoid tree clusters where possible. Significant trees, tree clusters, and heritage tree loss may occur, however, but shall be minimized.

Comment: Not applicable. The site does not abut an arterial or collector street.

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

Comment: Trees located in the protected portions of the site will not be impacted by site grading.

Chapter 92: REQUIRED IMPROVEMENTS

92.010 PUBLIC IMPROVEMENTS FOR ALL DEVELOPMENT

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

- A. Streets within subdivisions.
 - 1. All streets within a subdivision, including alleys, shall be graded for the full right-of-way width and improved to the City's permanent improvement standards and specifications which include sidewalks and bicycle lanes, unless the decision-making authority makes the following findings:**

Comment: As shown on the Tentative Plan, the developer proposes to construct Landis/Cornwall Streets to full City standards.

- 2. When the decision-making authority makes these findings, the decision-making authority may impose any of the following conditions of approval:*

Comment: Not applicable. This subsection applies only when an applicant is proposing to construct less than full standard streets.

- B. Extension of streets to subdivisions. The extension of subdivision streets to the intercepting paving line of existing streets with which subdivision streets intersect shall be graded for the full right-of-way width and improved to a minimum street structural section and width of 24 feet.*

Comment: As shown on the Grading Plan submitted with this requirement will be met.

- C. Local and minor collector streets within the rights-of-way abutting a subdivision shall be graded for the full right-of-way width and approved to the City's permanent improvement standards and specifications. The City Engineer shall review the need*

for street improvements and shall specify whether full street or partial street improvements shall be required. The City Engineer shall also specify the extent of storm drainage improvements required. The City Engineer shall be guided by the purpose of the City's systems development charge program in determining the extent of improvements which are the responsibility of the subdivider.

Comment: As shown on the Grading Plan submitted with this application, the proposed streets will be graded for the full right-of-way and improved to City standards.

D. Monuments. Upon completion of the first pavement lift of all street improvements, monuments shall be installed and/or reestablished at every street intersection and all points of curvature and points of tangency of street centerlines with an iron survey control rod. Elevation benchmarks shall be established at each street intersection monument with a cap (in a monument box) with elevations to a U.S. Geological Survey datum that exceeds a distance of 800 feet from an existing benchmark.

Comment: Monumentation will be installed and/or reestablished at street intersections in accordance with this subsection.

E. Surface drainage and storm sewer system. A registered civil engineer shall prepare a plan and statement which shall be supported by factual data that clearly shows that there will be no adverse impacts from increased intensity of runoff off site of a 100-year storm, or the plan and statement shall identify all off-site impacts and measures to mitigate those impacts commensurate to the particular land use application. Mitigation measures shall maintain pre-existing levels and meet buildout volumes, and meet planning and engineering requirements.

Comment: The project engineer has prepared a storm drainage plan, as shown on the Utility Plan, and a storm report for this project. Please refer to those documents.

F. Sanitary sewers. Sanitary sewers shall be installed to City standards to serve the subdivision and to connect the subdivision to existing mains.

- 1. If the area outside the subdivision to be directly served by the sewer line has reached a state of development to justify sewer installation at the time, the Planning Commission may recommend to the City Council construction as an assessment project with such arrangement with the subdivider as is desirable to assure financing his share of the construction.*
- 2. If the installation is not made as an assessment project, the City may reimburse the subdivider an amount estimated to be a proportionate share of the cost for each connection made to the sewer by property owners outside of the subdivision for a period of 10 years from the time of installation of the sewers. The actual amount shall be determined by the City Administrator considering current construction costs.*

Comment: Sanitary sewers are available to this project from an existing line in Landis Street. This sewer will be extended to service all lots within the development, as required by this subsection, and will be stubbed into the Cornwall Street right-of-way to provide for future service to other properties in this area.

G. Water system. *Water lines with valves and fire hydrants providing service to each building site in the subdivision and connecting the subdivision to City mains shall be installed. Prior to starting building construction, the design shall take into account provisions for extension beyond the subdivision and to adequately grid the City system. Hydrant spacing is to be based on accessible area served according to the City Engineer's recommendations and City standards. If required water mains will directly serve property outside the subdivision, the City may reimburse the developer an amount estimated to be the proportionate share of the cost for each connection made to the water mains by property owners outside the subdivision for a period of 10 years from the time of installation of the mains. If oversizing of water mains is required to areas outside the subdivision as a general improvement, but to which no new connections can be identified, the City may reimburse the developer that proportionate share of the cost for oversizing. The actual amount and reimbursement method shall be as determined by the City Administrator considering current or actual construction costs.*

Comment: Water lines will be installed within the proposed development and will connect to existing lines in Landis St. and Cornwall St. Additionally; the developer will replace and upgrade the existing water line in Cornwall St. to City standards. Tying these lines together will improve the water system in this area by providing looping that will aid in maintaining appropriate flows and will avoid sedimentation associated with dead-end lines.

H. Sidewalks.

1. *Sidewalks shall be installed on both sides of a public street and in any special pedestrian way within the subdivision, except that in the case of primary or secondary arterials, or special type industrial districts, or special site conditions, the Planning Commission may approve a subdivision without sidewalks if alternate pedestrian routes are available. In the case of the double-frontage lots, provision of sidewalks along the frontage not used for access shall be the responsibility of the developer. Providing front and side yard sidewalks shall be the responsibility of the land owner at the time a request for a building permit is received. Additionally, deed restrictions and CC&Rs shall reflect that sidewalks are to be installed prior to occupancy and it is the responsibility of the lot or homeowner to provide the sidewalk, except as required above for double-frontage lots.*

Comment: As required by this subsection, sidewalks will be installed along all street frontages in this development.

2. *On local streets serving only single-family dwellings, sidewalks may be constructed during home construction, but a letter of credit shall be required from the developer to ensure construction of all missing sidewalk segments within four years of final plat approval pursuant to CDC 91.010(A)(2).*

Comment: Sidewalks will be constructed during home construction on each lot. The required letter of credit will be provided.

3. *The sidewalks shall measure at least six feet in width and be separated from the curb by a six-foot minimum width planter strip. Reductions in widths to preserve*

trees or other topographic features, inadequate right-of-way, or constraints, may be permitted if approved by the City Engineer in consultation with the Planning Director.

Comment: Sidewalks will be installed to City specifications.

4. *Sidewalks should be buffered from the roadway on high volume arterials or collectors by landscape strip or berm of three and one-half-foot minimum width.*

Comment: Not applicable. The site does not abut an arterial or collector street.

5. *The City Engineer may allow the installation of sidewalks on one side of any street only if the City Engineer finds that the presence of any of the factors listed below justifies such waiver:*
 - a. *The street has, or is projected to have, very low volume traffic density;*
 - b. *The street is a dead-end street;*
 - c. *The housing along the street is very low density; or*
 - d. *The street contains exceptional topographic conditions such as steep slopes, unstable soils, or other similar conditions making the location of a sidewalk undesirable.*

Comment: Sidewalks are proposed on both sides of all streets within this subdivision.

- I. *Bicycle routes. If appropriate to the extension of a system of bicycle routes, existing or planned, the Planning Commission may require the installation of separate bicycle lanes within streets and separate bicycle paths.*

Comment: No bicycle routes are called for on the local streets within this subdivision.

- J. *Street name signs. All street name signs and traffic control devices for the initial signing of the new development shall be installed by the City with sign and installation costs paid by the developer.*

Comment: The developer will provide all required signs, consistent with City standards.

- K. *Dead-end street signs. Signs indicating "future roadway" shall be installed at the end of all discontinued streets. Signs shall be installed by the City per City standards, with sign and installation costs paid by the developer.*

Comment: Not applicable. No dead-end streets are proposed.

- L. *Signs indicating future use shall be installed on land dedicated for public facilities (e.g., parks, water reservoir, fire halls, etc.). Sign and installation costs shall be paid by the developer.*

Comment: Not applicable. No public dedications are proposed.

- M. *Street lights. Street lights shall be installed and shall be served from an underground source of supply. The street lighting shall meet IES lighting standards. The street*

lights shall be the shoe-box style light (flat lens) with a 30-foot bronze pole in residential (non-intersection) areas. The street light shall be the cobra head style (drop lens) with an approximate 50-foot (sized for intersection width) bronze pole. The developer shall submit to the City Engineer for approval of any alternate residential, commercial, and industrial lighting, and alternate lighting fixture design. The developer and/or homeowners association is required to pay for all expenses related to street light energy and maintenance costs until annexed into the City.

Comment: Street lights will be installed by the developer, consistent with the requirements of this subsection.

N. Utilities. The developer shall make necessary arrangements with utility companies or other persons or corporations affected for the installation of underground lines and facilities. Electrical lines and other wires, including but not limited to communication, street lighting, and cable television, shall be placed underground.

Comment: The developer will coordinate with utility companies for the installation of underground facilities for electrical, cable, natural gas, telephone, and street lighting. As required by this section.

O. Curb cuts and driveways. Curb cuts and driveway installations are not required of the subdivider at the time of street construction, but, if installed, shall be according to City standards. Proper curb cuts and hard-surfaced driveways shall be required at the time buildings are constructed.

Comment: Curb cuts will be installed at the time of home construction and will be installed to City standards.

P. Street trees. Street trees shall be provided by the City Parks and Recreation Department in accordance with standards as adopted by the City in the Municipal Code. The fee charged the subdivider for providing and maintaining these trees shall be set by resolution of the City Council.

Comment: The developer will coordinate with the City Parks and Recreation Department regarding installation of street trees and will be responsible for paying the appropriate fee.

Q. Joint mailbox facilities shall be provided in all residential subdivisions, with each joint mailbox serving at least two, but no more than eight, dwelling units. Joint mailbox structures shall be placed in the street right-of-way adjacent to roadway curbs. Proposed locations of joint mailboxes shall be designated on a copy of the tentative plan of the subdivision, and shall be approved as part of the tentative plan approval. In addition, sketch plans for the joint mailbox structures to be used shall be submitted and approved by the City Engineer prior to final plat approval.

Comment: The developer will coordinate with the US Postal Service and the City Engineer regarding the location of joint mailbox clusters and will install them in accordance with this section.

CHAPTER 28 - WILLAMETTE AND TUALATIN RIVER PROTECTION

City Planning staff indicate that they have adopted a new policy determining that the provisions of Chapter 28 are applicable to developments containing Habitat Conservation Areas shown on City mapping. The applicant disagrees with this interpretation. These provisions have never been applied to other developments outside of the Willamette River and Tualatin River Greenways, and we believe that this interpretation is in direct conflict with the plain language of that section.

28.030 APPLICABILITY

A. *The Willamette and Tualatin River Protection Area is an overlay zone. The zone boundaries are identified on the City's zoning map, and include:*

1. *All land within the City of West Linn's Willamette River Greenway Area.*
2. *All land within 200 feet of the ordinary low water mark of the Tualatin River, and all land within the 100-year floodplain of the Tualatin River.*
3. *In addition to the Willamette Greenway and Tualatin River Protection Area boundaries, this chapter also relies on the HCA Map to delineate where development should or should not occur. Specifically, the intent is to keep out of, or minimize disturbance of, the habitat conservation areas (HCAs). Therefore, if all, or any part, of a lot or parcel is in the Willamette Greenway and Tualatin River Protection Area boundaries, and there are HCAs on the lot or parcel, a Willamette and Tualatin River Protection Area permit shall be required unless the development proposal is exempt per CDC 28.040.*

Comment: The subject property is not within the identified Willamette River Greenway or within 200 feet of the ordinary low water mark of the Tualatin River. The Planning staff interpretation is based upon subsection 28.030(A)3. The site contains a minor area of HCA outside of the Water Resource Area boundary and staff's opinion is that the language of this subsection makes these provisions applicable to this project. However, we note that the plain language states that "*if all, or any part, of a lot or parcel is in the Willamette Greenway and Tualatin River Protection Area boundaries, **and** there are HCAs on the lot or parcel, a Willamette and Tualatin River Protection Area permit shall be required*" (emphasis added). The property must be within one of the river areas and have an HCA before the provisions of subsection 28.030(A)3 apply. This has been the consistent policy of the City of West Linn for years since the adoption of this Chapter. The property is not in either river resource area and, therefore, this chapter is not applicable despite there being Habitat Conservation Area on the property.

28.040 EXEMPTIONS/USES PERMITTED OUTRIGHT

The use of Habitat Conservation Areas for residential purposes is not listed as a use that is exempt or permitted outright. However CDC 28.040AA does apply to this proposal:

AA. *Lands that are designated as an HCA only due to a forested canopy shall be exempted since trees are already protected in the municipal code and Chapters 55 and 85 CDC. Development of lands that are designated as HCA due to other variables such as wetlands, flood areas and steep slopes shall still be regulated by the provisions of this chapter and not exempted.*

Please see discussion of this provision under section 28.070, below.

28.050 PROHIBITED USES

The following are prohibited:

1. Residential floating structures, also known as floating homes or houseboats.
2. Permanent ski jumps.
3. More than one dock with or without a boat house per riverfront lot of record, except City-owned tax lots 100, 200, 300, 400, and 500 of Assessor's Map 21 East 24.
4. The location of any dock under any water condition that prevents what would otherwise be historic, safe, uninterrupted water passage.
5. Any new lawn area or garden area consisting primarily of non-native vegetation within HCA lands. A lawn area in the "Allowed Development" area is permitted.
6. Planting of any species identified as nuisance or prohibited plants on the Metro Native Plant List.
7. Non-permitted storage of hazardous materials as defined by the Oregon Department of Environmental Quality and dumping of any materials of any kind.
8. Excessive trimming or removal of existing native vegetation within the HCA unless it is to reestablish native vegetation in place of non-native or invasive vegetation. (Ord. 1576, 2008)

Comment: None of the uses listed in this section are proposed within the Habitat Conservation Area.

28.060 ADMINISTRATION AND APPROVAL PROCESS

An application for a protection area permit shall be processed pursuant to the provisions of Chapter 99 CDC, Procedures for Decision-Making: Quasi-Judicial.

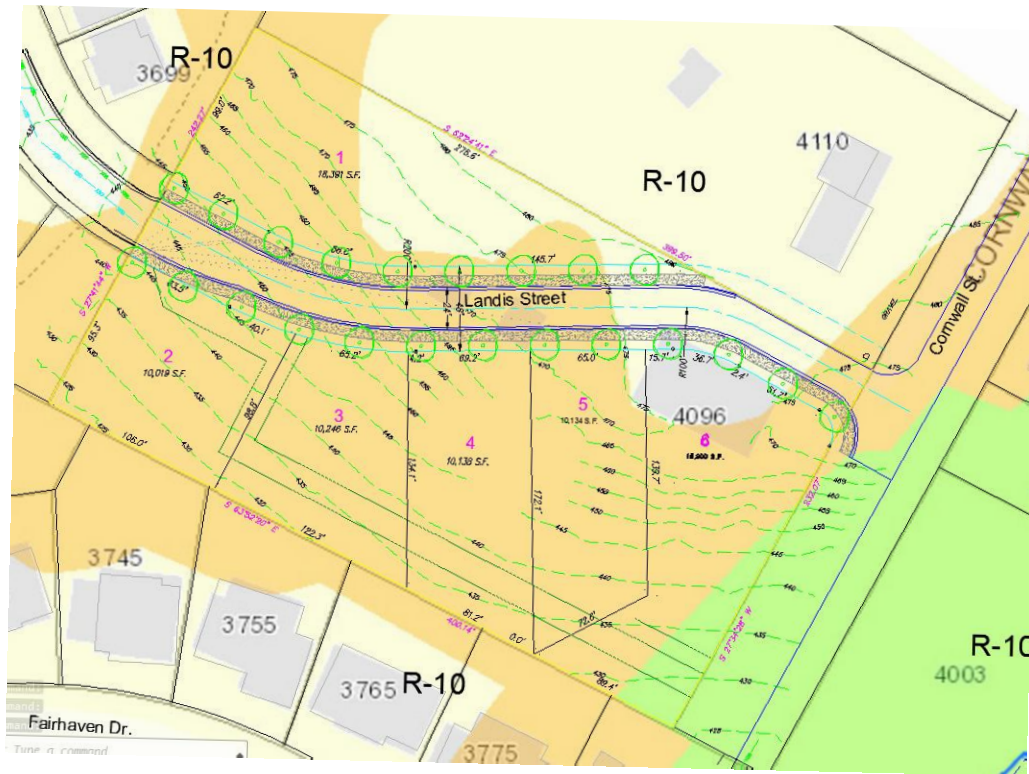
Comment: The application is being processed quasi-judicially, in accordance with the provisions of Chapter 99 of the CDC.

28.070 PLANNING DIRECTOR VERIFICATION OF METRO HABITAT PROTECTION MAP BOUNDARIES

A. *The HCA Map is the basis for identifying and designating the habitat conservation areas in the City. A copy of the latest, updated HCA Map is on file at the City and is adopted by reference for use with this chapter.*

It is inevitable, given the large area that Metro's HCA Map covers, that there may be some errors. In cases where, for example, three properties share the same contours and the same natural features but the map shows the middle lot with an HCA designation on it, it is reasonable to question the accuracy of that HCA designation. Using tree overstory as the sole basis for HCA designation will also allow a change in designation since trees are already protected in the municipal code and Chapters 55 and 85 CDC.

The map below shows the location of the HCA per the City of West Linn GIS mapping system.



The areas that are designated HCA due strictly to forested tree canopy are shown in tan. As noted in section 28.070(F) "Lands that are designated as an HCA only due to a forested overstory are exempt under CDC 28.040, Exemptions, since trees are already protected in the municipal code and Chapters 55 and 85 CDC." Therefore, the areas mapped in tan are not subject to the provisions of Chapter 28.

The HCA area mapped in green is a moderate value HCA associated with a seasonal drainageway on property to the east of Cornwall Street.

B. The Planning Director shall verify the appropriate HCA or non-HCA designation by site visits or consultations with Metro or by other means. Determination is based on whether the Metro criteria are met or whether the Metro designation was based solely on tree overstory in which case a redesignation is appropriate. In cases where the determination is that the map is incorrect, the Planning Director will make a written finding of this as well as the site conditions that led to that conclusion.

Comment: We do not believe that there are any HCA resources on the subject property and are submitting a letter from Schott and Associates confirming that this area should not be designated as HCA.

C. Class B public notice, per Chapter 99 CDC, shall be required prior to issuance of the redesignation decision if it involves redesignation of the HCA boundary to allow the construction of, or addition to, a house.

Comment: The required notice will be provided.

D. This determination and findings shall become part of the City record and part of the record for any associated land use application. The Planning Director shall also include in the record the revised map boundary. The Planning Director's determination and map revisions shall also be sent to Metro so that their map may be corrected as necessary.

Comment: If approved, this requirement will be met by the City.

E. The Planning Director determination is appealable to the City Council per Chapter 99 CDC.

Comment: The applicant recognizes that the determination is appealable.

F. Lands that are designated as an HCA only due to a forested overstory are exempt under CDC 28.040, Exemptions, since trees are already protected in the municipal code and Chapters 55 and 85 CDC. Similar exemptions apply to lands that exhibit no constraints. (Ord. 1576, 2008; Ord. 1604 §§ 25 – 28, 2011)

Comment: The areas shown in tan are exempt due to this provision as there are no habitat resources in those areas other than forested overstory.

28.110 APPROVAL CRITERIA

No application for development on property within the protection area shall be approved unless the decision-making authority finds that the following standards have been met or can be met by conditions of approval. The development shall comply with the following criteria as applicable:

Comment: Upon approval of the change in designation, these provisions will no longer apply.

Theta, llc

ENGINEERING - SURVEYING - PLANNING

4260 Country Woods Ct.
Lake Oswego, Oregon 97035

503/481-8822

e-mail: thetaeng@comcast.net

Memorandum

To: file
From: Bruce Goldson
Date: January 24, 2017
Subject: Neighborhood Meeting for Willow Ridge (Cornwall) 2014-129L

MEETING HIGHLIGHTS:

- Approximately 25 in attendance for the Sunset and Barrington groups
- Storm water, neighborhood flooding and springs in yards
 - Home owners on Fairhaven Drive with backyards have complaints about springs and surface water. All have collections systems in the backyards with connections to the storm sewer in the street
 - Has Icon conducted a geotechnical investigation? Unknown
 - Concerned about runoff from Cornwall. Even with getting a regional facility next to Fairhaven Drive
 - Some fear of settlement on houses on Fairhaven if underground flow is stopped.
 - Some feel that there is a wetlands on the property.
- Concerns about through traffic on Landis, would prefer cul-de-sacs
- Concerns about intersection at Cornwall and Sunset.
- Vote to have the City do a presentation about the possible stormwater facility.
- Handout from Barrington Neighborhood with concerns.

Sunset Neighborhood Association Quarterly Meeting
Sunset Primary, 2351 Oxford Street, West Linn, OR 97068
Tuesday, January 24, 2017
Agenda

1. Call to order
2. Approval of Minutes from September 2016
3. Old Business
 - a. Election of new Officers
 - b. Disaster Preparedness discussion
4. New Business
 - a. West Linn Refuse and Recycling PCD notice
 - b. Rick Givens to present about new neighborhood on Cornwall proposal
 - i. To give input on the application of the new neighborhood contact the City of West Linn
 - ii. City of West Linn, Planning Dept and/or City Council
22500 Salamo Road
West Linn, OR 97068
503-656-4211
 - c. David Dodds to present about Land Use Board Association (LUBA) decisions
 - i. to give input on the redrawing of the storm water plans contact City of West Linn Planning Dept and/or City Council
 - d. Carrie Hansen to speak about cost for Save Our Sunset specialist
 - i. <http://www.save-our-sunset.org/>
 - e. Doug Vokes to present about Disaster Preparedness for Sunset
 - i. [Map your neighborhood](http://westlinnoregon.gov/MapYourNeighborhood)
(<http://westlinnoregon.gov/MapYourNeighborhood>)
 - ii. [MYN Youtube educational videos](https://www.youtube.com/playlist?list=PLA218D92E24E04C53)
(<https://www.youtube.com/playlist?list=PLA218D92E24E04C53>)
5. Adjourn

www.facebook.com/sunsetneighborhoodwestlinn

<https://westlinnoregon.gov/sunset>

- Add Gmail, Outlook, AOL and more
- Inbox (9999+)**
- Drafts (235)
- Sent
- Archive
- Spam (37)**
- Trash (149)**
- Smart Views
 - Important
 - Unread
 - Starred
 - People
 - Social
 - Shopping
 - Travel
 - Finance
 - john virley
 - west linn refuse & recyc...
- Folders (825)
 - AIR Vallauris (2)**
 - Amazon Buys (24)**
 - Appointments (2)**
 - Art (17)**
 - Art Beat (2)**
 - ATTENTION ... (70)**
 - BILLS (2)**
 - Business (8)**
 - Carve Wright (19)**
 - commissions (20)**
 - CUSTOMER ... (12)**
 - Deleted Items
 - Donations
 - EVENTS (2)**
 - Failure Notice (150)**
 - Fairfield Life
 - Family Mail (3)**
 - Financial Cor... (102)**
 - Friends (2)**
 - Gallery Mail
 - Glowforge (6)**
 - Health (2)**
 - House (3)**
 - Jokes
 - Josie and All... (16)**
 - Justin Gaeta
 - Kaiser Perm... (3)**
 - Karen (1)**
 - matches (3)**
 - MONTHLY BILLS
 - My Computer (5)**
 - OPA (22)**
 - Political
 - Potential Commissions
 - Primrose Mail (1)**

Proposed development at 4096 Cornwall Street, West Linn, Oregon People

Robert Jester <jjtjester@comcast.net> Today at 4:40 PM
To rickgivens@gmail.com
CC Jere McLaurin, art2noe@yahoo.com

Dear mr Givens,

I appreciate your outreach regarding the above proposed 6 lot subdivision. I unfortunately will be unable the attend the Sunset Neighborhood Association meeting tonight as we also are scheduled for our annual homeowner association meeting at the same time. Therefore I am submitting our NA concerns in writing.

- We have concerns about the construction traffic using Barrington Heights as access to the development. Barrington Drive is a road in dire need of paving and we believe it will further deteriorate under the stress of construction trucks. To my knowledge, there is not a current plan to repave this road.
- We have experienced damage from trucks entering the neighborhood as the is no way into the neighborhood without an island to navigate around. The cost of repair to the islands owned by the HOA is our responsibility unless we "catch" a truck doing the damage.
- We have grave concerns about the unsafe condition at the intersection of Barrington Drive and Salamo Road. The speeding traffic going downhill has a blind spot prior to the intersection of Barrington Drive which makes turning left a heart pounding experience. The city has been made aware of our concerns but is yet to act.
- Salamo Road is a heavily traveled Road that cannot manage the amount of existing traffic. There seems to be no fix in sight from the city or ODOT to better manage this ever increasing safety issue.
- There are currently no through sidewalks connecting Salamo Rd. to 10th St./ Blankenship Rd. nor are there through sidewalks on Sunset from Willamette Falls Drive up the hill. Therefore foot traffic must walk in or on the edge of the roadways which is unsafe in both locations.
- We have had homeowners on Fairhaven Drive express concern about run off water as the property is sloping down hill behind their houses. This is currently mitigated to some extent by foliage and trees on the undeveloped portion of the property.

We thank you in advance for having these concerns addressed as part of the public input phase of this process.

Robert Jester
Barrington on NA Vice President

503-557-7575
3475 Riverknoll Way,
West Linn, Or. 97068

Sent from my iPad

Reply Reply to All Forward More

Click to Reply, Reply All or Forward

Send Attachments Text Bold Italic Link Lists Links Smiley Undo Delete

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Extra Services & Fees (check box, add fee as appropriate)	\$2.70
<input type="checkbox"/> Return Receipt (hardcopy)	\$0.00
<input type="checkbox"/> Return Receipt (electronic)	\$0.00
<input type="checkbox"/> Certified Mail Restricted Delivery	\$0.00
<input type="checkbox"/> Adult Signature Required	\$0.00
<input type="checkbox"/> Adult Signature Restricted Delivery	\$0.00

Postage \$0.47

Total Postage and Fees \$6.47



Sent To: Leslie Bowlin
 Street and Apt. No., or PO Box No. 4023 Sussex St.
 City, State, ZIP+4® West Linn, OR 97068

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

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Extra Services & Fees (check box, add fee as appropriate)	\$2.70
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<input type="checkbox"/> Return Receipt (electronic)	\$0.00
<input type="checkbox"/> Certified Mail Restricted Delivery	\$0.00
<input type="checkbox"/> Adult Signature Required	\$0.00
<input type="checkbox"/> Adult Signature Restricted Delivery	\$0.00

Postage \$0.47

Total Postage and Fees \$6.47



Sent To: Patrick Noe
 Street and Apt. No., or PO Box No. 4412 Simpson St
 City, State, ZIP+4® West Linn, OR 97068

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Extra Services & Fees (check box, add fee as appropriate)	\$2.70
<input type="checkbox"/> Return Receipt (hardcopy)	\$0.00
<input type="checkbox"/> Return Receipt (electronic)	\$0.00
<input type="checkbox"/> Certified Mail Restricted Delivery	\$0.00
<input type="checkbox"/> Adult Signature Required	\$0.00
<input type="checkbox"/> Adult Signature Restricted Delivery	\$0.00

Postage \$0.47

Total Postage and Fees \$6.47



Sent To: Robert Wester
 Street and Apt. No., or PO Box No. 3475 Riverknoll Way
 City, State, ZIP+4® West Linn, OR 97068

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Extra Services & Fees (check box, add fee as appropriate)	\$2.70
<input type="checkbox"/> Return Receipt (hardcopy)	\$0.00
<input type="checkbox"/> Return Receipt (electronic)	\$0.00
<input type="checkbox"/> Certified Mail Restricted Delivery	\$0.00
<input type="checkbox"/> Adult Signature Required	\$0.00
<input type="checkbox"/> Adult Signature Restricted Delivery	\$0.00

Postage \$0.47

Total Postage and Fees \$6.47



Sent To: Meredith Olmstead
 Street and Apt. No., or PO Box No. 3560 Riverknoll Way
 City, State, ZIP+4® West Linn, OR 97068

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Patrick Noe
 4412 Simpson St
 West Linn, OR 97068



9590 9402 2357 6249 7826 05

2. Article Number (Transfer from service label)

7016 0910 0000 7688 1891

PS Form 3811, July 2015 PSN 7530-02-000-9053

COMPLETE THIS SECTION ON DELIVERY

A. Signature

X *Noe* Agent
 Addressee

B. Received by (Printed Name)

C. Date of Delivery

D. Is delivery address different from item 1? Yes
 If YES, enter delivery address below: No

3. Service Type

- Adult Signature
- Adult Signature Restricted Delivery
- Certified Mail®
- Certified Mail Restricted Delivery
- Collect on Delivery
- Collect on Delivery Restricted Delivery
- Insured Mail
- Insured Mail Restricted Delivery (over \$500)
- Priority Mail Express®
- Registered Mail™
- Registered Mail Restricted Delivery
- Return Receipt for Merchandise
- Signature Confirmation™
- Signature Confirmation Restricted Delivery

Domestic Return Receipt

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1. Article Addressed to:

Robert Jester
 3475 Riverknoll Way
 West Linn, OR 97068



9590 9402 2357 6249 7925 29

2. Article Number (Transfer from service label)

7016 0910 0000 7688 1877

PS Form 3811, July 2015 PSN 7530-02-000-9053

COMPLETE THIS SECTION ON DELIVERY

A. Signature

X *Jan Jester* Agent
 Addressee

B. Received by (Printed Name)

C. Date of Delivery

D. Is delivery address different from item 1? Yes
 If YES, enter delivery address below: No

3. Service Type

- Adult Signature
- Adult Signature Restricted Delivery
- Certified Mail®
- Certified Mail Restricted Delivery
- Collect on Delivery
- Collect on Delivery Restricted Delivery
- Insured Mail
- Insured Mail Restricted Delivery (over \$500)
- Priority Mail Express®
- Registered Mail™
- Registered Mail Restricted Delivery
- Return Receipt for Merchandise
- Signature Confirmation™
- Signature Confirmation Restricted Delivery

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PLACE STICKER AT TOP OF ENVELOPE TO THE RIGHT OF THE RETURN ADDRESS, FOLD AT DOTTED LINE

SENDER: COMPLETE THIS SECTION

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- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Meredith Olmstead
 3560 Riverknoll Way
 West Linn, OR 97068



9590 9402 2357 6249 7925 12

2. Article Number (Transfer from service label)

7016 0910 0000 7688 1860

PS Form 3811, July 2015 PSN 7530-02-000-9053

COMPLETE THIS SECTION ON DELIVERY

A. Signature

X Agent
 Addressee

B. Received by (Printed Name)

C. Date of Delivery

D. Is delivery address different from item 1? Yes
 If YES, enter delivery address below: No

3. Service Type

- Adult Signature
- Adult Signature Restricted Delivery
- Certified Mail®
- Certified Mail Restricted Delivery
- Collect on Delivery
- Collect on Delivery Restricted Delivery
- Insured Mail
- Insured Mail Restricted Delivery (over \$500)
- Priority Mail Express®
- Registered Mail™
- Registered Mail Restricted Delivery
- Return Receipt for Merchandise
- Signature Confirmation™
- Signature Confirmation Restricted Delivery

Domestic Return Receipt

AFFIDAVIT OF NOTICE

STATE OF OREGON)
)
County of Clackamas)

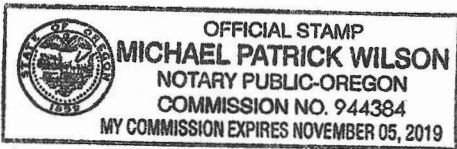
SS

I, Richard Givens, Planning Consultant for Icon Construction and Development, LLC, declare that on January 4, 2017 notice of a neighborhood meeting was provided, in the case of the Willow Ridge subdivision, pursuant to Chapter 99.083 of the West Linn Community Development Code. Notice was mailed to property owners within 500 feet of the project site, and to the Sunset and BHT neighborhood associations. This notice was for a 6-lot subdivision.

Richard Givens
RICHARD GIVENS
PLANNING CONSULTANT

2/20/2017
DATE

SUBSCRIBED AND SWORN TO before me this 20th day of FEBRUARY, 2017,
by RICHARD GIVENS.



NOTARY PUBLIC FOR OREGON

My Commission Expires: NOVEMBER 5, 2019

AFFIDAVIT OF POSTING

STATE OF OREGON)
)
County of Clackamas) SS

I, Richard Givens, Planning Consultant for Icon Construction and Development, LLC, in the case of Willow Ridge subdivision, declare that on January 4, 2017, pursuant to Chapter 99.083 of the West Linn Community Development Code, Signs were posted providing notice of a neighborhood meeting to discuss the proposed 6 lot project. The signs met the required 11" x 17" standard and were posted on the subject property's frontage at 4096 Cornwall Street, as well as its frontage on Landis Street.

Richard Givens 2-20-2017
RICHARD GIVENS DATE
PLANNING CONSULTANT

SUBSCRIBED AND SWORN TO before me this 20th day of FEBRUARY, 2017,
by RICHARD GIVENS.



NOTARY PUBLIC FOR OREGON
My Commission Expires: NOVEMBER 5, 2019



Rick Givens
Planning Consultant
18680 Sunblaze Dr.
Oregon City, Oregon 97045

January 23, 2017

Mr. Patrick Noe, President
Sunset Neighborhood Association
4412 Simpson St.
West Linn, OR 97068

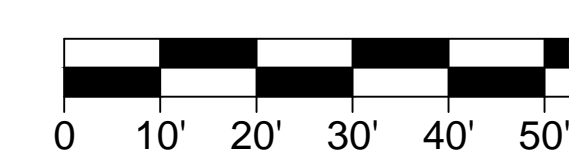
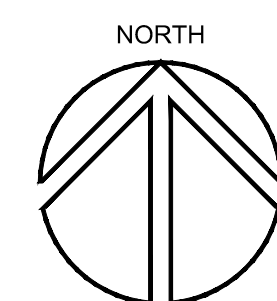
Dear Mr. Noe:

I'd like to thank you for your assistance in arranging a neighborhood meeting date for the proposed development of property located at 4096 Cornwall Street. Our correspondence to date has been via email, but this letter is being sent to you to fulfill the technical requirements of Section 99.038C of the West Linn Community Development Code that we contact you via certified mail to arrange the date for the meeting. Just to confirm, the date of the Sunset NA meeting is January 24, 2017 at the Sunset Primary School library at 7:00 pm and our proposal for a 6-lot subdivision will be on the agenda. We will be sending out the required neighborhood notice letters for that time and place.

Thanks again,

Rick Givens

cc: Leslie Bowlin, Secretary-Treasurer Sunset NA
Meredith Olmstead, President BHT NA
Robert Jester, Vice President



DESIGNED: REG			
DRAWN: REG			
SCALE: 1" = 20'			
DATE: Jan. 2017			
FILE: 15-ICN-112	DATE	NO.	REVISION

Richard E. Givens, Planning Consultant
 18680 Sunblaze Dr.
 Oregon City, OR 97045
 PH: (503) 479-0097

APPLICANT: Icon Construction & Development, LLC
 1980 Willamette Falls Drive, Suite 200
 West Linn, OR 97068
 PH: (503) 657-0406

Willow Ridge Site Plan

Notice of Neighborhood Meeting

Regarding A Proposed
6-Lot Subdivision for Property
Located at 4096 Cornwall Street

You are invited to attend a neighborhood meeting to discuss a proposed development on this property. The project will be presented at the Jan. 24, 2017 meeting of the Sunset Neighborhood Association. Other items may be on the agenda in addition to this one.

The applicant for this project is Icon Construction & Development, LLC. Additional information may be obtained by telephoning the project planning consultant, Rick Givens, at (503) 479-0097 or by email at rickgivens@gmail.com.

The meeting time and place are:

7:00 PM on Tuesday, January 24, 2017
Sunset Primary School library
2351 Oxford St.
West Linn, Oregon

Notice of Neighborhood Meeting Regarding
A Proposed 6-Lot Subdivision
Located at 4096 Cornwall Street

Hello,

You are invited to attend a neighborhood meeting to discuss a proposed development in your area. Icon Construction & Development, LLC is proposing to construct a 6 Lot subdivision on property located at 4096 Cornwall Street in West Linn.

As required by the West Linn Community Development Code, prior to the submittal of an application to the City of West Linn for preliminary approval of this project, a meeting with neighbors will be held to present the conceptual plan for the project, to answer questions and for the developer to receive feedback from those in attendance. This notice of the meeting is being mailed to owners of property located within 500 feet of the boundaries of the subject property. The notice is also being mailed to officers of the Sunset and BHT Neighborhood Associations. The property is located within the Sunset Neighborhood Association boundary and is within 500 feet of the BHT Neighborhood Association boundary.

The proposed development is scheduled to be presented at the January 24, 2017 meeting of the Sunset Neighborhood Association. There may be other items on the agenda in addition to this project. Meeting time and place are:

7:00 PM, Tuesday, January 24th, 2017
Sunset Primary School Library
2351 Oxford St.
West Linn, Oregon

We look forward to meeting with you. If you cannot attend in person but have questions regarding the project, please feel free to contact the project planning consultant, Rick Givens. You may phone him at (503) 479-0097 or contact him via email at rickgivens@gmail.com.

SNA Quarterly Meeting Sign In Sheet

Name	Street	Email
Doris Clark	Cornwall	✓
Doris Clark	TIGARD	
D. Dobson	Exeter	✓
Joslyn Smith	Sunset	
H Wingard	Cornwall	✓
FRED GROVES	OC BLVD	SEVORGERF@GMAIL.COM
Amanda Callahan	2380 Long St	✓
DOUG VOKOS	4972 PROSPECT	✓
Victoria Meier	4669 Exeter	meier235@gmail.com
Bill Dahl	OC Blvd.	dahlbu@hetnet.net
Pam & Mark Y.	Fairhaven Drive	pam@yokubaitis.com
Charlene Imhaet	Cornwall	
Dave Doherty		
Kam Jeffers	Oregon City Blvd	kmljepiane@comcast.net
Kent Carol Fuchs	FAIRHAVEN DR.	cvfuchs@gmail.com
Pia Snyder	Fairhaven Dr	piasnnyder@comcast.net
PAUL & ASHLEY BONNET	LANNIS PK	BEANETP@821@GMAIL.COM
JEANNIE LEE	Fairhaven Dr	JE
Shesman Paruly	"	shesmparuly@yahoo.com
Wayne Tilley	Oregon City Blvd	tilleybw@gmail.com

Preliminary storm drainage report for Willow Ridge

Site Conditions:

This parcel is a rectangular tract with one existing house with access of the end of Cornwall Street and containing approximately 2.18 acres. Landis Street dead ends at the westerly limit of the property. The property slopes, generally from north to south with a maximum slope of approximately 20+%. The Cornwall Street unimproved right-of-way is along the easterly boundary of the property. The preliminary plans sites six (6) single family residential lots and connects Landis with Cornwall.

There is a natural drainage way to the east and open space tract that connects to the Cornwall right-of-way. A detention pond with water quality is proposed in the open space tract.

Hydrologic Soils Group:

The Oregon Soil Survey was used to determine the soil type and Hydrologic Soil Group.

Map unit Symbol	Map unit name	Rating
76B	Saum silt loam	C
78D	Saum silt loam	C

Regulatory

West Linn Public Works Design Standards
2.0013 Minimum design criteria

Summary:

Willow Ridge			
Event	Pre-development	Post-development	Release rate
2-year	0.32 cfs	0.84cfs	0.31 cfs
5-year	0.50 cfs	1.10 cfs	0.35 cfs
10-year	0.62 cfs	1.31 cfs	0.65 cfs
25-year	0.97 cfs	1.58 cfs	0.97 cfs
100-year	N/A	1.91 cfs	1.91 cfs

Time of Concentration

$$T = 0.42(n L)^{-0.8} / (P_2)^{0.5} (S_0)^{0.4} \quad \& \quad T = L / 60k(s_0)^{0.5}$$

$$\text{Pre-Development: } (.42)[(0.24(280))^{0.8} / (2.6)^{0.5} (0.20)^{0.4}] = 14.4 \text{ min}$$

$$\text{Post-Development } (.42)[(0.15(109))^{0.8} / (2.6)^{0.5} (0.21)^{0.4}] = 4.5 \text{ min} + 278 / (60)(42)(0.018)^{-0.5} = 0.8 \text{ min} + 429 / (60)(42)(0.01)^{-0.5} = 1.7 = \text{total } 7.0 \text{ minutes}$$

HYDROGRAPH RESULTS

KING COUNTY DEPARTMENT OF PUBLIC WORKS

Surface Water Management Division

HYDROGRAPH PROGRAMS

Version 4.21B

1 - INFO ON THIS PROGRAM

2 - SBUHYD

3 - MODIFIELD SBUHYD

4 - ROUTE

5 - ROUTE2

6 - ADDHYD

7 - BASEFLOW

8 - PLOTHYD

9 - DTATA

10 - REFAC

11 - RETURN TO DOS

ENTER OPTION:

2

SBUN/SCS METHOD FOR COMPUTING RUNOFF HYDROGRAPH

STORM OPTIONS:

1 - S.C.S. TYPE-1A

2 - 7-DAY DESIGN STORM

3 - STORM DATA FILE

SPECIFY STORM OPTION:

1

S.C.S. TYPE - 1A RAINFALL DISTRIBUTION

ENTER; FREQ(YEAR), DURATION(HOUR), PRECIP(INCHES)

2,24,2.5

XXXXXXXXXXXXXXXXXXXXXXXXX S.C.S.TYPE-1A DISTRIBUTION XXX

XXXXXXXXXXXXX 2-YEAR 24-HOUR STORM XXXX 2.50 "TOTAL PRECIP XX/

ENTER: A(PERV),CN(PERV),A(IMPERV),CN(IMPERV),TC FOR BASIN NO. 1

2.09,78,0.09,98.14.4

DATA PRINT OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
2.2	2.1	78.0	.1	98.0	14.4

PEAK-Q(CFS) T-PEAK(HRS) VOL(CU-FT)
 .32 7.83 6701

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:

C:wr2

SPECIFY: C - CONTINUE, N - NEWSTORM, P - PRINT, S - STOP

C

ENTER: A(PERV),CN(PERV),A(IMPERV),CN(IMPERV),TC FOR BASIN NO. 1

1.55,86,0.62,98,7

DATA PRINT OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
2.2	1.5	86.0	.6	98.0	7.0

PEAK-Q(CFS) T-PEAK(HRS) VOL(CU-FT)
 .84 7.83 12105

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:

C:2wr

SPECIFY: C - CONTINUE, N - NEWSTORM, P - PRINT, S - STOP

N

STORM OPTIONS:

- 1 - S.C.S. TYPE-1A
- 2 - 7-DAY DESIGN STORM
- 3 - STORM DATA FILE

SPECIFY STORM OPTION:

1

S.C.S. TYPE - 1A RAINFALL DISTRIBUTION

ENTER; FREQ(YEAR), DURATION(HOUR), PRECIP(INCHES)

5,24,3.0

XXXXXXXXXXXXXXXXXXXXXXXXX S.C.S.TYPE-1A DISTRIBUTION XXX
 XXXXXXXXXXXXX 5-YEAR 24-HOUR STORM xxxx 3.00" TOTAL PRECIP XXX

ENTER: A(PERV),CN(PERV),A(IMPERV),CN(IMPERV),TC FOR BASIN NO. 1

2.09,78,0.09,98,14.4

DATA PRINT OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
2.2	2.1	78.0	.1	98.0	14.4

PEAK-Q(CFS) T-PEAK(HRS) VOL(CU-FT)
 .50 7.83 9445

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:

C:wr5

SPECIFY: C-CONTINUE, N-NEWSTORM,P-PRINT,S-STOP

C

ENTER: A(PERV),CN(PERV),A(IMPERV),CN(IMPERV),TC FOR BASIN NO. 1

1.55,86,0.62,98,7.0

DATA PRINT OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
2.2	2.1	78.0	.1	98.0	14.4

2.2 1.5 86.0 .6 98.0 7.0
PEAK-Q(CFS) T-PEAK(HRS) VOL(CU-FT)
1.10 7.83 15582

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:

C:5wr

SPECIFY: C – CONTINUE, N – NEWSTORM, P – PRINT, S – STOP

N

STORM OPTIONS:

- 1 – S.C.S. TYPE-1A
- 2 - 7-DAY DESIGN STORM
- 3 - STORM DATA FILE

SPECIFY STORM OPTION:

1

S.C.S. TYPE - 1A RAINFALL DISTRIBUTION

ENTER; FREQ(YEAR), DURATION(HOUR), PRECIP(INCHES)

10,24,3.4

XXXXXXXXXXXXXXXXXXXXXXXXX S.C.S.TYPE-1A DISTRIBUTION XXX

XXXXXXXXXXXX 10-YEAR 24-HOUR STORM xxxx 3.40" TOTAL PRECIP XXX

ENTER: A(PERV),CN(PERV),A(IMPERV),CN(IMPERV),TC FOR BASIN NO. 1

ENTER: A(PERV),CN(PERV),A(IMPERV),CN(IMPERV),TC FOR BASIN NO. 1

2.09,78,0.09,98,14.4

DATA PRINT OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
2.2	2.1	78.0	0.1	98.0	14.4
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
.66	7.83		11793		

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:

C:wr10

SPECIFY: C-CONTINUE, N-NEWSTORM,P-PRINT,S-STOP

C

ENTER: A(PERV),CN(PERV),A(IMPERV),CN(IMPERV),TC FOR BASIN NO. 1

1.55,86,0.62,98,7.0

DATA PRINT OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
2.2	1.5	86.0	.6	98.0	7.0
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
1.31	7.83		18435		

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:

C:10wr

SPECIFY: C – CONTINUE, N – NEWSTORM, P – PRINT, S – STOP

N

STORM OPTIONS:

- 1 - S.C.S. TYPE-1A
- 2 - 7-DAY DESIGN STORM
- 3 - STORM DATA FILE

SPECIFY STORM OPTION:

1

S.C.S. TYPE - 1A RAINFALL DISTRIBUTION

ENTER; FREQ(YEAR), DURATION(HOUR), PRECIP(INCHES)

25,24,3.9

XXXXXXXXXXXXXXXXXXXXXXXXX S.C.S.TYPE-1A DISTRIBUTION XXX

XXXXXXXXXXXXX 25-YEAR 24-HOUR STORM xxxx 3.90" TOTAL PRECIP XXX

ENTER: A(PERV),CN(PERV),A(IMPERV),CN(IMPERV),TC FOR BASIN NO. 1

2.09,78,0.09,98,14.4

DATA PRINT OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
2.2	2.1	78.0	.1	98.0	14.4
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
.97	7.83		14877		

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:

C:wr25

SPECIFY: C - CONTINUE, N - NEWSTORM, P -PRINT, S - STOP

C

ENTER: A(PERV),CN(PERV),A(IMPERV),CN(IMPERV),TC FOR BASIN NO. 1

1.55,86,0.62,98,7.0

DATA PRINT OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
2.2	1.5	86.0	.6	98	7.0
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
1.58	7.83		22065		

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:

C:25wr

SPECIFY: C - CONTINUE, N - NEWSTORM, P - PRINT, S - STOP

N

STORM OPTIONS:

1 - S.C.S. TYPE-1A

2 - 7-DAY DESIGN STORM

3 - STORM DATA FILE

SPECIFY STORM OPTION:

1

S.C.S. TYPE - 1A RAINFALL DISTRIBUTION

ENTER; FREQ(YEAR), DURATION(HOUR), PRECIP(INCHES)

100,24,4.5

XXXXXXXXXXXXXXXXXXXXXXXXX S.C.S.TYPE-1A DISTRIBUTION XXX

XXXXXXXXXXXXX 100-YEAR 24-HOUR STORM xxxx 4.50" TOTAL PRECIP XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ENTER: A(PERV),CN(PERV),A(IMPERV),CN(IMPERV),TC FOR BASIN NO. 1

1.55,86,0.62,98,7.0

DATA PRINT OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
2.2	1.5	86.0	.6	98	7.0

2.2	1.5	86.0	.6	98.0	7.0
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
1.91	7.83		26491		

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:

C:100wr

SPECIFY: C – CONTINUE, N – NEWSTORM, P – PRINT, S – STOP

S

1 - INFO ON THIS PROGRAM

2 - SBUHYD

3 - MODIFIELD SBUHYD

4 - ROUTE

5 - ROUTE2

6 - ADDHYD

7 - BASEFLOW

8 - PLOTHYD

9 - DTATA

10 - REFAC

11 - RETURN TO DOS

ENTER OPTION:

DETENTION SIZING

ENTER OPTION

10

R/D FACILITY DESIGN ROUTINE

SPEFICY TYPE OF R/D FACILTY

1 - POND 4 - INFILTRATION POND

2 - TANK 5 - INFILTRATION TANK

3 -VAULT 6 - GRAVEL TRENCH/BED

1

ENTER: POND SIDE SLOPE (HORIZ. COMPOENT)

4

ENTER: EFFECTIVE STORAGE DEPTH(ft) BEFORE OVERFLOW

3

ENTER [d:][path]filename[.ext] OF PRIMARY DESIGN INFLOW HYDROGRAPH:

C:25wr

PRELIMINARY DESIGN INFLOW PEAK = 1.68 CFS

ENTER PRIMARY DESIGN RELEASE RATE(cfs)

.97

ENTER NUMBER OF INFLOW HYDROGRAPHS TO BE TESTED FOR PERFORMANCE (5 MAXIMUM)

3

ENTER [d:][path]filename[ext] OF HYDROGRAPH 1:

C:10wr

ENTER TARGET RELEASE RATE(cfs)

.66

ENTER [d:][path]filename[ext] OF HYDROGRAPH 2:

```

C:5wr
ENTER TARGET RELEASE RATE(cfs)
.50
ENTER [d:][path]filename[ext] OF HYDROGRAPH 3:
C:2wr
ENTER TARGET RELEASE RATE(cfs)
0.32
ENTER: NUMBER OF ORIFICES, RISER-HEAD(ft), RISER-DIAMETER(in)
3,3,12
RISER OVERFLOW DEPTH FOR PRIMARY PEAK INFLOW= .30FT
SPECIFY ITERATION DISPLAY: Y -YES, N - NO
N
SPECIFY: R - REVIEW/REVISE INPUT, C - CONTINUE
C
INITIAL STORAGE VALUE FOR ITERATION PURPOSES: 6930 CU-FT
BOTTOM ORIFICE: ENTER Q-MAX(cfs)
0.38
DIA.= 2.84 INCHES
MIDDLE ORIFICE: ENTER Q-MAX(cfs), HEIGHT (ft)
0.49,2.7
DIA. = 5.74 INCHES
TOP ORIFICE: ENTER HEIGHT (ft)
2.8
DIA.= 5.87 INCHES
PERFORMANCE: INFLOW TARGET-OUTFLOW ACTUAL-OUTFLOW PK-STAGE STORAGE
DESIGN HYD: 1.58 .97 .97 3.00 2814
TEST HYD 1: 1.31 .66 .65 2.80 2470
TEST HYD 2: 1.10 .50 .35 2.58 2140
TEST HYD 3: .84 .32 .31 2.01 1380
SPECIFY: D - DOCUMENT, R -REVISE, A - ADJUST ORIF, E -ENLARGE, S -STOP

```

A proposed detention facility will be constructed within the existing open space track at the northerly side of Fairhaven. This will become a regional storm facility. The preliminary plan illustrates a facility with sufficient volume as indicated in the calculations. Water quality will be provided in the bottom on the pond. The 100-year event flow will be addressed in the final design.

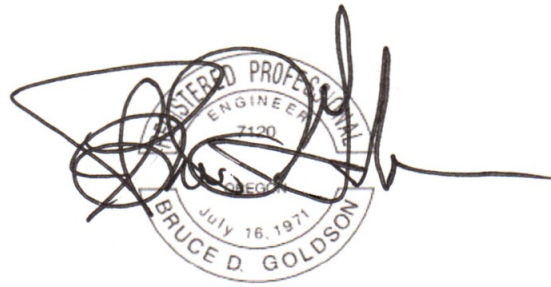
This preliminary analysis of the storm water collection and discharge for the Willow Ridge development demonstrates feasibility and to meet the minimum standards of the City of West Linn. Calculations and preliminary drawings show that the storm water can be collected and discharged per standard engineering practice and City standards for the 2, 5, 10, & 25 year storm events with detention facilities that control the flow to the pre-design rates. A final report will be prepared with the design phase that will provide necessary detail and final sizing.

Prepared By:

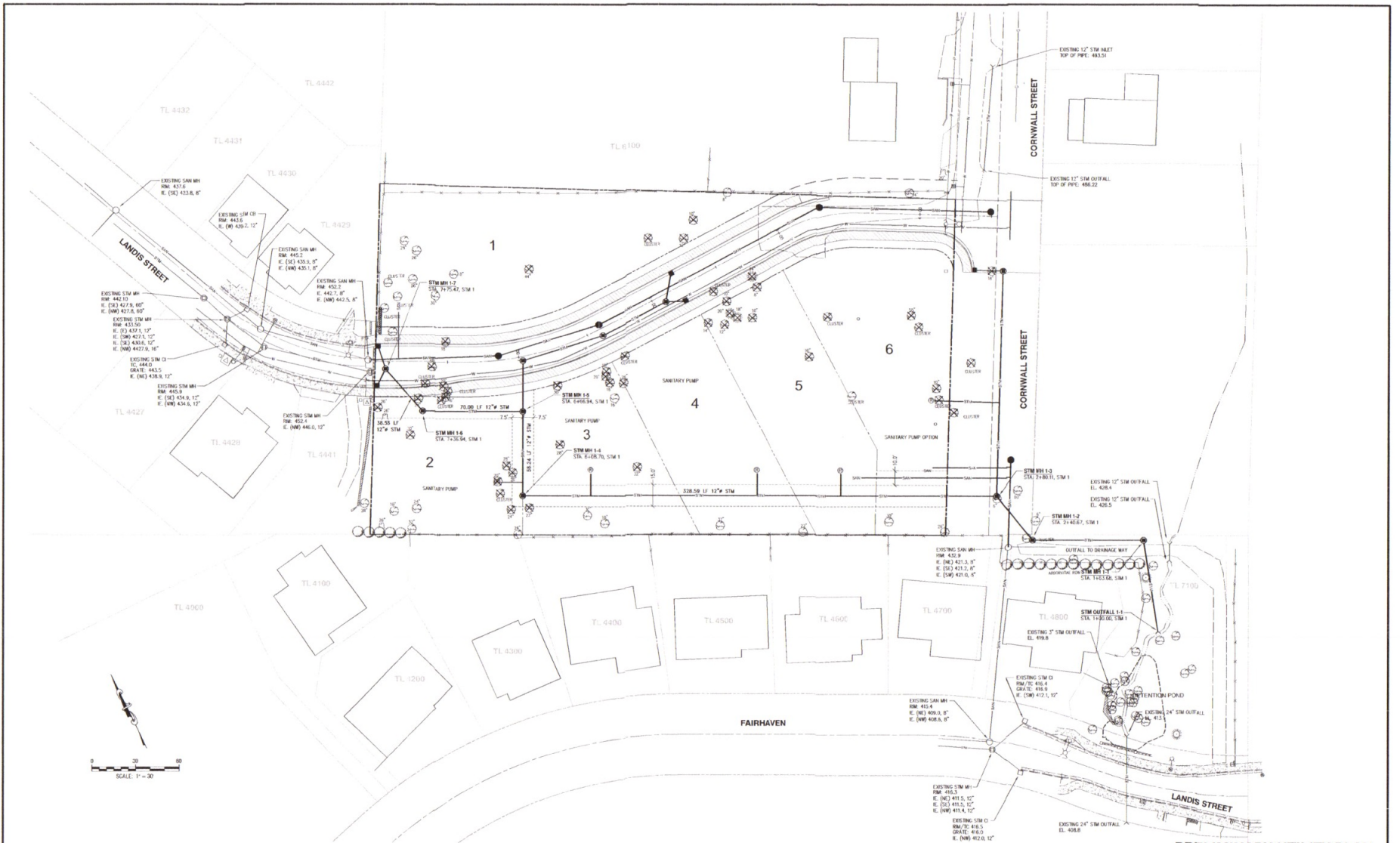
Bruce D. Goldson, PE

Theta

January 9, 2017



EXPIRES: 06/30/2017
SIGNATURE DATE: 2/19/17



PRELIMINARY UTILITY PLAN

2010-129L	DESIGNED: BIDG		
	DRAWN: EJS		
	SCALE: 1" = 30'		
	DATE: April, 2018		
FILE: Cornwall Street Problem	DATE	NO.	REVISION

Theta, LLC
 ENGINEERING - SURVEYING - PLANNING
 PO Box 1345
 Lake Oswego, Oregon 97035
 503-481-8822
 email: info@theta-llc.com

Icon Construction & Development, LLC
 1980 Willamette Falls Drive, Suite 200
 West Linn, Oregon 97068
 Phone: (503) 657-0405

**Willow Ridge
 West Linn, Oregon**

Table 4-3 MODIFIED CURVE NUMBERS					
SCS Western Washington Runoff Curve Numbers					
Runoff curve numbers for selected agricultural, suburban, and urban land use for Type 1A rainfall distribution, 24-hour storm duration. (Published by SCS in 1982)					
LAND USE DESCRIPTION		CURVE NUMBERS BY HYDROLOGIC SOIL GROUP			
		A	B	C	D
Cultivated land ¹	Winter Condition	86	91	94	95
Mountain Open Areas:	Low growing brush and grassland.	74	82	89	92
Meadow or pasture:		65	78	85	89
Wood or forest land:	Undisturbed	42	64	76	81
	Established second growth ²	48	68	78	83
	Young second growth or brush	55	72	81	86
Orchard:	With over crop	81	88	92	94
Open spaces, lawns, parks, golf courses, cemeteries, landscaping	Good Condition: Grass cover on > =75% of area	68	80	86	90
	Fair Condition: Grass cover on 50-75% of area	77	85	90	92
Gravel Roads and Parking Lots:		76	85	89	91
Dirt Roads and Parking Lots:		72	82	87	89
Impervious surfaces, pavement, roofs, etc.		98	98	98	98
Open water bodies: Lakes, wetlands, ponds, etc.		100	100	100	100
Single Family Residential ³ :		Select a separate curve number for pervious and impervious portions of the site or basin.			
<u>Dwelling unit/gross acre</u>	<u>% Impervious⁴</u>				
1.0 DU/GA	15				
1.5 DU/GA	20				
2.0 DU/GA	25				
2.5 DU/GA	30				
3.0 DU/GA	34				
3.5 DU/GA	38				
4.0 DU/GA	42				
4.5 DU/GA	46				
5.0 DU/GA	48				
5.5 DU/GA	50				
6.0 DU/GA	52				
6.5 DU/GA	54				
7.0 DU/GA	56				
Planned Unit Developments, condominiums, apartments, commercial businesses & industrial areas ³	% impervious ⁴ Must be computed	Select a separate curve number for pervious and impervious portions of the site or basin.			

¹ For a more detailed description of agricultural land use curve numbers, refer to National Engineering Handbook, Sec. 4, Hydrology, Chapter 9, August 1972.

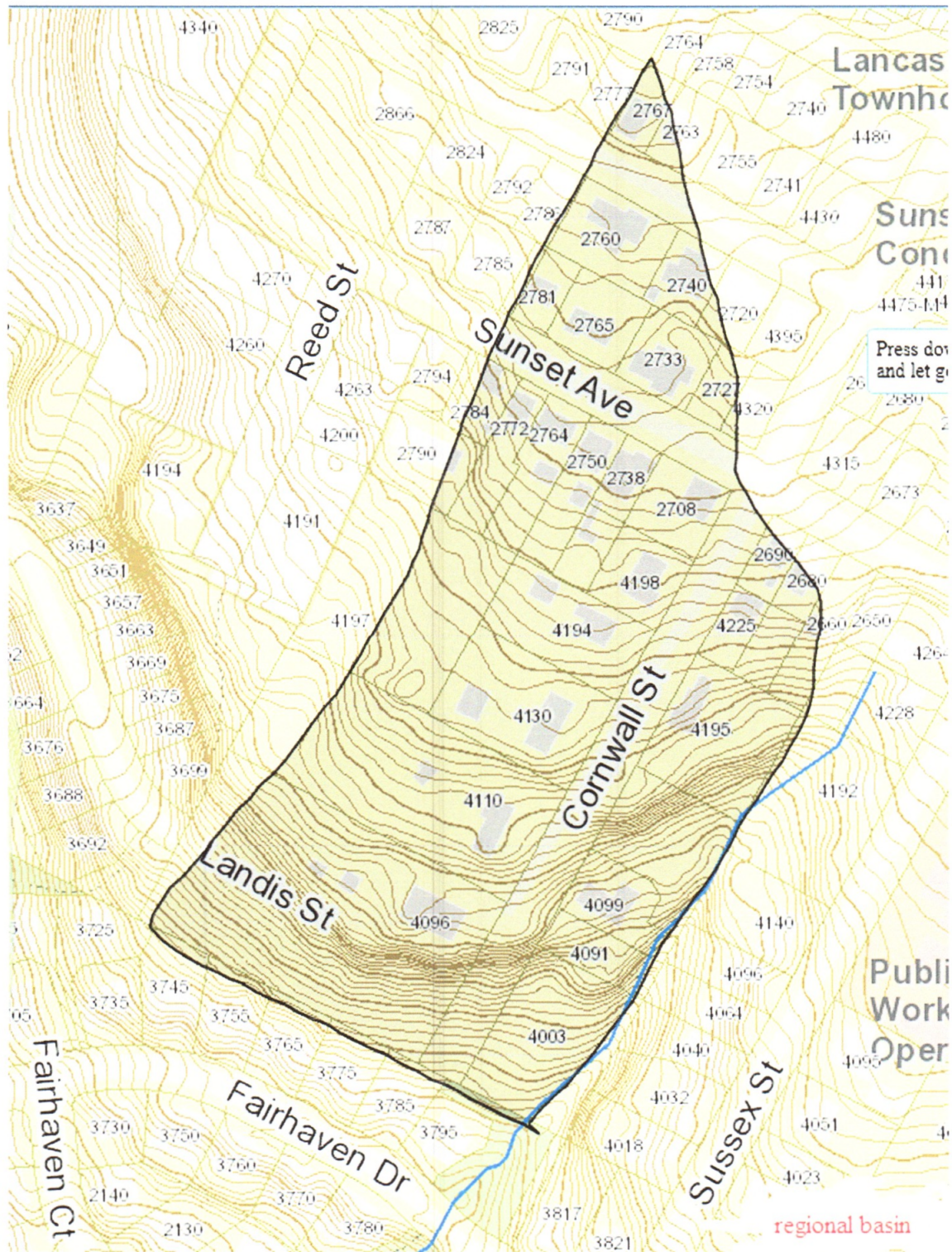
² Modified by KCFW, 1995.

³ Assumes roof and driveway runoff is directed into street/storm system.

⁴ The remaining pervious areas (lawn) are considered to be in good condition for these curve numbers.

Table 4-4 MANNING'S COEFFICIENTS/"K" FACTORS

"n" AND "k" Value Used in Time Calculations for Hydrographs		
"n _s " Sheet Flow Equation Manning's Values (for initial 300 ft. of travel)		n _s
Smooth surfaces (concrete, asphalt, gravel, or bare hand packed soil)		0.01
Fallow fields or loose soil surface (no residue)		0.05
Cultivated soil with residue cover (s # 0.20 ft/ft)		0.06
Cultivated soil with residue cover (s > 0.20 ft/ft)		0.17
Short prairie grass and lawns		0.15
Dense grasses		0.24
Bermuda grass		0.41
Range (natural)		0.13
Woods or forest with light underbrush		0.40
Woods or forest with dense underbrush		0.80
* Manning values for sheet flow only, from Overton and Meadows 1976 (See SCS's TR-55, 1986) "k" Values Used in Travel Time/Time of Concentration Calculations Shallow Concentrated Flow (After the initial 300 ft. of sheet flow, R = 0.1)		k _s
1.	Forest with heavy ground litter and meadows (n = 0.10)	3
2.	Brushy ground with some trees (n = 0.060)	5
3.	Fallow or minimum tillage cultivation (n=0.040)	8
4.	High grass (n=0.035)	9
5.	Short grass, pasture, and lawns (n=0.030)	11
6.	Nearly bare ground (n=0.025)	13
7.	Paved and gravel areas (n=0.012)	27
** Channel flow (intermittent) (At beginning of visible channels R=0.2)		k _c
1.	Forested swale with heavy ground litter (n=0.10)	5
2.	Forested drainage course/ravine with defined channel bed (n=0.050)	10
3.	Rock-lined waterway (n=0.035)	15
4.	Grassed waterway (n=0.030)	17
5.	Earth-lined waterway (n=0.025)	20
6.	CMP pipe (n=0.024)	21
7.	Concrete pipe (0.012)	42
8.	Other waterways and pipe 0.508/n	
Channel flow (Continuous stream, R=0.4)		k _c
9.	Meandering stream with some pools (n=0.040)	20
10.	Rock-lined stream (n=0.035)	23
11.	Grass-lined stream (n=0.030)	27
12.	Other streams, man-made channels and pipe 0.807/n **	
** See Table 6-3 for additional Mannings "n" values for open channels.		



EXISTING CONDITIONS MAP

TAX LOT 6300
 LOCATED IN THE N.W. 1/4 SECTION 36, T.25, R.1E, W.M.,
 CITY OF WEST LINN, CLACKAMAS COUNTY, OREGON
 DECEMBER 28, 2015 SCALE 1"=30'

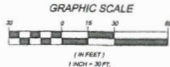
SURVEY NOTES:

THE DATA FOR THIS SURVEY IS BASED UPON A STATIC GPS OBSERVATION OF LOCAL CONTROL POINTS, PROCESSED THROUGH OPUS. DATUM IS NAD 83.
 A TRIMBLE 58-SERIES ROBOTIC INSTRUMENT WAS USED TO COMPLETE A CLOSED LOOP FIELD TRAVERSE.
 THE BASIS OF BEARINGS FOR THIS SURVEY IS PER MONUMENTS FOUND AND HELD FOR THE PLAT OF "TANNER CREEK ESTATES," RECORDS OF CLACKAMAS COUNTY.
 THE PURPOSE OF THIS SURVEY IS TO RESOLVE AND DETERMINE THE PERMETER BOUNDARY OF THE SUBJECT PROPERTY, TO SHOW ALL PERTINENT BOUNDARY ISSUES AND ENCUMBRANCES, NO PROPERTY CORNER HERE SET BY THIS SURVEY.
 NO WARRANTIES ARE MADE AS TO MATTERS OF UNWRITTEN FILE, SUCH AS ADVERSE POSSESSION, EJECTMENT, ADJUDICATION, ETC.
 FIDELITY NATIONAL TITLE COMPANY OF OREGON PRELIMINARY TITLE REPORT NUMBER 451454104, DATED DECEMBER 15, 2015 AS PROVIDED HAS BEEN USED AND REFERRED TO IN PREPARATION OF THIS MAP. PLEASE REFER TO THIS DOCUMENT FOR EXCEPTIONS TO TITLE INSURANCE.
 THE UNDERGROUND UTILITIES AS SHOWN ON THIS MAP HAVE BEEN LOCATED FROM FIELD SURVEY OF ABOVE GROUND STRUCTURES AND AS MARKED BY OTHERS. THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES ARE IN THE EXACT LOCATION INDICATED, ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES UNLESS INDICATED AND ENVIRONMENTAL CONDITIONS WERE NOT EXAMINED OR CONSIDERED AS A PART OF THIS SERVICE. NO ATTEMPT IS MADE CONCERNING THE SYSTEMS OF DISTRIBUTION OF OVERHEAD CONDUITS OR FACILITIES THAT MAY AFFECT THE USE OR DEVELOPMENT OF THIS TRACT. THIS SURVEY DOES NOT CONSTITUTE A REE SEARCH BY SURVEYOR.

LEGEND:

Some Symbols shown may not be used on map

- | | |
|------------------------------|-------------------------------------|
| ○ DECEADUOUS TREE | ○ UTILITY AND LIGHT POLE |
| ○ EMERGENCY TREE | ○ UTILITY POLE |
| ○ STORM SEWER MANHOLE | ○ LIGHT POLE |
| ○ CATION BASIN | ○ GUT PIPE |
| ○ SANITARY SEWER CLEANOUT | ○ ELECTRIC BOX |
| ○ SANITARY SEWER MANHOLE | ○ ELECTRIC METER |
| ○ WATER VALVE | ○ ELECTRICAL POWER PEDestal |
| ○ WATER METER | ○ ELECTRIC RISER |
| ○ FIRE HYDRANT | ○ HEAT PUMP |
| ○ GAS VALVE | ○ OVERHEAD LINE |
| ○ GAS METER | ○ GAS LINE |
| ○ BELLHOLE | ○ ELECTRICAL LINE |
| ○ SIDE | ○ COMMUNICATIONS LINE |
| ○ MALEBOX | ○ SANITARY SEWER LINE |
| ○ COMMUNICATIONS PEDestal | ○ STORM URNAN LINE |
| ○ COMMUNICATIONS MANHOLE | ○ WATER LINE |
| ○ COMMUNICATIONS BOX | ○ FENCELINE |
| ○ STORM OUTFALL | ○ UTILITY RISER |
| ○ FOUND MONUMENT | ○ DOWN SPOUT TO OPENLY DRAIN-GROUND |
| ○ DOWN SPOUT TO STORM SYSTEM | ○ ELECTRIC TRANSDUCER |
| ○ ELECTRIC VAULT | ○ SATELLITE DISH |
| ○ GAS STUB | ○ STUMP |
| ○ RADON VENT | |



BOND ON 05 JAN 15
 REGISTERED
 PROFESSIONAL
 LAND SURVEYOR
 OREGON
 TOBY S. BOLDEN
 503-650-1188
 REVISED: DECEMBER 31, 2017

CENTERLINE CONCEPTS
 LAND SURVEYING, INC.
 729 MOJALLA AVE., SUITE 1 & 2
 OREGON CITY, OREGON 97145
 PHONE 503.650.0188 FAX 503.650.0188
 Plotfile M:\PROJECTS\UCON-CORVALL 07-10981\cpl\ECM.dwg

RECEIVED
 FEB 21 2017
 CLACKAMAS COUNTY
 CLERK OF COUNTY



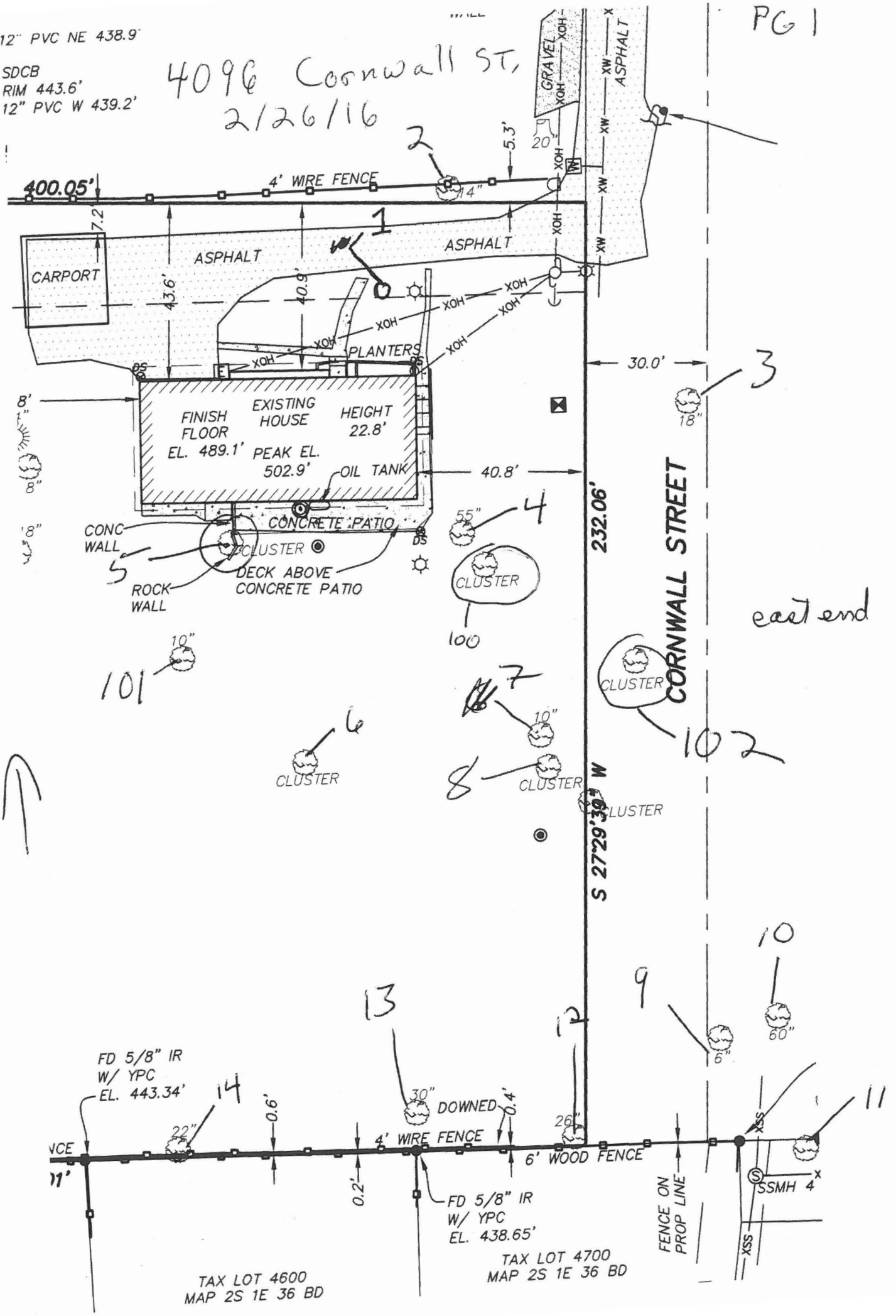
Tag	Species	Diameter	DBH	Rating	Condition
1	blue spruce	20	20	2	added
2	tree of heaven	14	14	2	average
3	bird cherry	18	18	2	offsite
4	Lombardy poplar	55	55	2	11' from existing house
5	plum	12	12	1	stump sprouts
6	weeping willow	0	0	0	fallen; on ground
7	elm	11	11	11	undersize
8	elm	9,5,3	9	1	undersize; listed
9	big leaf maple	7	7	2	undersize; offsite
10	Garry oak	55	55	3	offsite
11	Garry oak	43	43	2	offsite
12	Garry oak	26	26	2	barbed wire in trunk
13	Garry oak	32	32	2	average
14	Garry oak	20	20	2	barbed wire in trunk
15	Garry oak	34	34	2	average
16	Garry oak	38	38	3	excellent
17	Garry oak	19	19	2	average
18	Garry oak	31	31	3	excellent
19	Garry oak	23	23	2	average
20	Garry oak	25	25	2	average
21	Garry oak	24	24	2	average
22	Garry oak	10	10	1	basal decay; dead stem; broken top
23	Garry oak	20	20	2	average
24	Garry oak	28	28	2	average
25	Garry oak	26	26	2	average
26	Garry oak	42	42	2	co-dominate at 3'; added
27	Garry oak	28	28	1	basal decay; ivy
28	big leaf maple	30	30	2	average
29	big leaf maple	16	16	0	broken; snag
30	big leaf maple	16	16	2	ivy
31	big leaf maple	24	24	1	cavity in base
32	big leaf maple	18	18	2	broken stem for T34 hung up in canopy

Tag	Species	Diameter	DBH	Rating	Condition
33	big leaf maple	26	26	2	ivy
34	big leaf maple	52,16	60	0	basal decay; trunk decay; failed stem is hung up in T32
35	Portuguese laurel	12	12	2	average
36	Portuguese laurel	14	14	2	average
37	western red cedar	22	22	2	average
38	western red cedar	20	20	2	average
39	apple	18	18	1	trunk decay; topped; resprouted tops
40	apple	10	10	1	undersize
41	apple	10	10	1	resprouted tops
42	Pacific dogwood	8	8	2	average
43	Port-Orford cedar	16	16	2	average
44	plum	8	8	2	undersize
45	English walnut	10	10	2	undersize
46	English walnut	12	12	2	average
47	elderberry	6,5,5	11	2	undersize
48	big leaf maple	45	45	1	trunk decay; resprouted tops
49	big leaf maple	28	28	2	average
50	big leaf maple	26	26	2	average
51	plum	8	8	2	undersize
52	Garry oak	26	26	2	average
53	Garry oak	31	31	2	average
54	Garry oak	18	18	2	average
55	Garry oak	30	30	2	average
56	big leaf maple	20	20	1	basal decay; hollow; hazard
57	Garry oak	30	30	2	average
58	big leaf maple	20	20	1	decline
59	big leaf maple	26,16	34	1	basal decay; multiple cavities in trunk
60	Garry oak	38	38	2	co-dominate at 4'
61	Garry oak	26	26	2	average
62	big leaf maple	22	22	2	average
63	big leaf maple	36	36	1	trunk and stem decay; past failures; hazard
64	Garry oak	32	32	2	average

Tag	Species	Diameter	DBH	Rating	Condition
65	Garry oak	10	10	2	average
66	Garry oak	23	23	2	average
67	Garry oak	42	42	2	average
100	Lombardy poplar	8, 12	16	2	undersize; no tag
101	plum	10	10	1	undersize
102	elm	<12	<12	2	cluster; offsite
103	big leaf maple	<6	<6	0	undersize; stump sprouts; no tag

12" PVC NE 438.9'
SDCB
RIM 443.6'
12" PVC W 439.2'

4096 Cornwall St,
2/26/16



496 4096 Cornwall St.

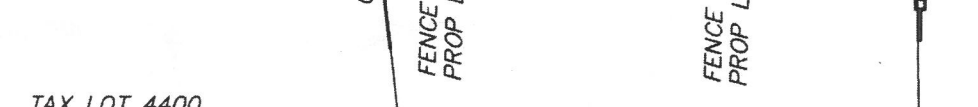
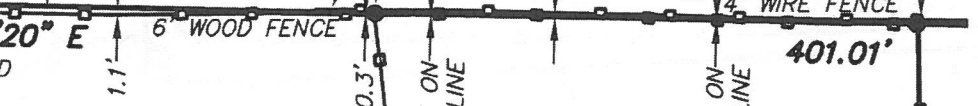
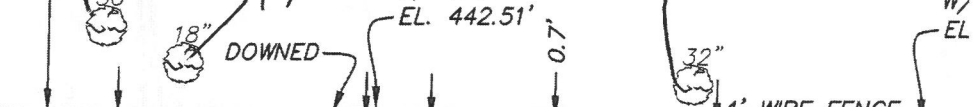
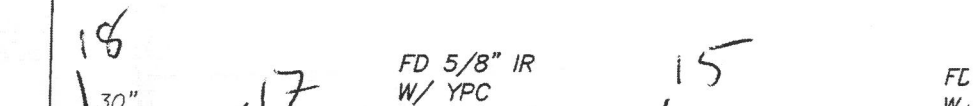
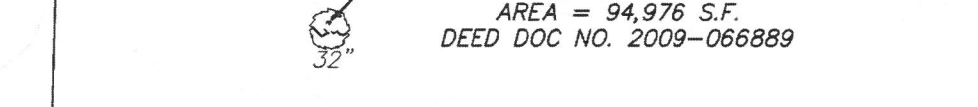
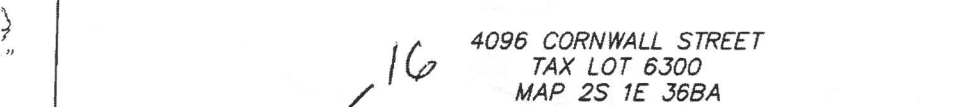
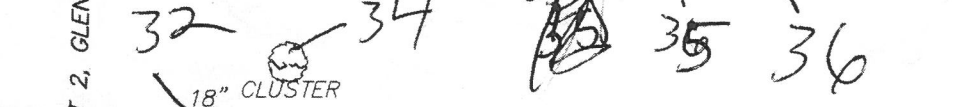
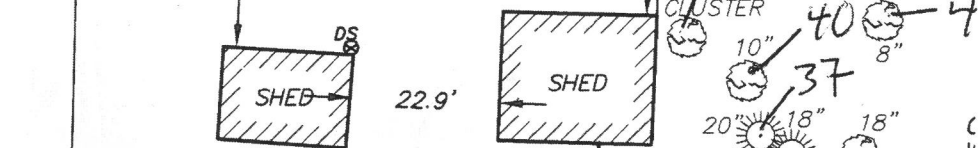
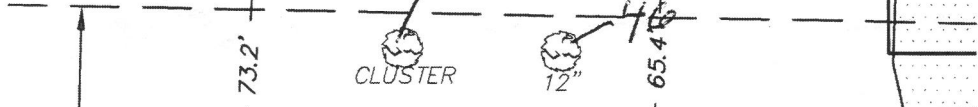
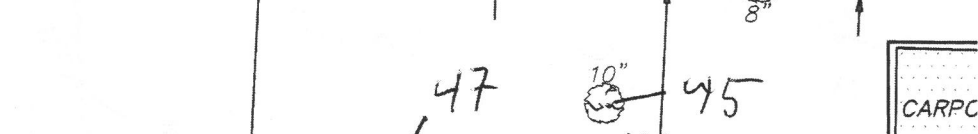
2/26/16

12" PVC

PG 2

SDCB
RIM 443.0
12" PVC

62°24'48" E



4096 CORNWALL STREET
TAX LOT 6300
MAP 2S 1E 36BA
AREA = 94,976 S.F.
DEED DOC NO. 2009-066889

TAX LOT 4400
MAP 2S 1E 36 BD

TAX LOT 4500
MAP 2S 1E 36 BD

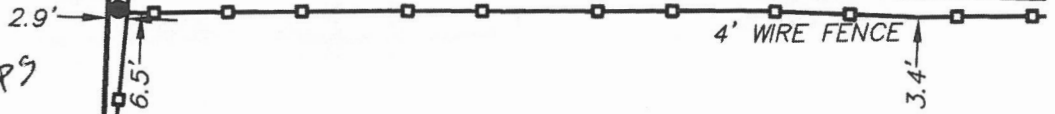
control



RIM 432.9
8" PVC NE 421.3'
8" PVC SE 421.2'
8" PVC SW 421.0'

4096
~~4906~~ Cornwall ST
2/26/16

FD 1-1/4" BOLT
EL. 484.23'



respouted
maple STAMPS
← C

(LOT 4429
2S 1E 36 BB

west end

242.27'

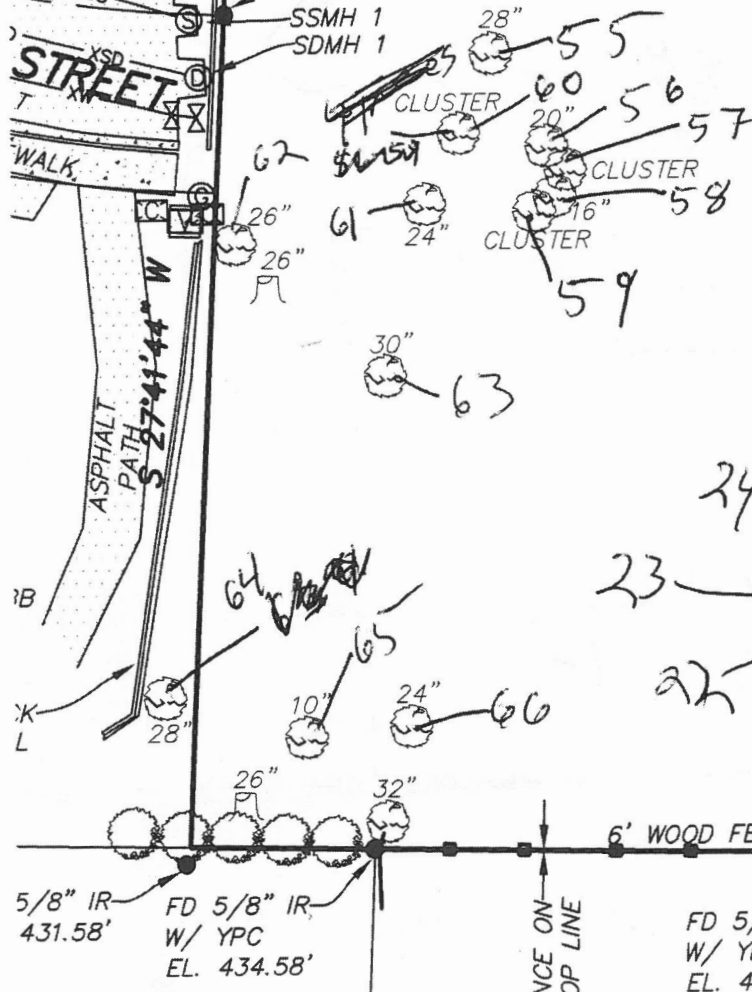
CYCLONE
VCE

WALK

STREET

ASPHALT
PATH
S 27° 41' 44" W

Lendis



TRACT 1
TRACT 2
"S'LY 210 FEET OF TRACT 2, GLENESK"

5/8" IR
FD 5/8" IR
W/ YPC
EL. 434.58'

FD 5/8" IR
W/ YPC
EL. 437.69'

S 63° 52' 20" E
DOWNED

Carlson Geotechnical

A Division of Carlson Testing, Inc.

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Salem Office (503) 589-1252
Tigard Office (503) 684-3460



**Report of
Geotechnical Investigation
Cornwall Street Subdivision
4096 Cornwall Street
West Linn, Oregon**

CGT Project Number G1504283

Prepared for

Mr. Darren Gusdorf
ICON Construction & Development
1980 Willamette Falls Drive, Suite 200
West Linn, Oregon 97068

January 7, 2016

Carlson Geotechnical

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January 7, 2016

Mr. Darren Gusdorf
ICON Construction & Development
1980 Willamette Falls Drive, Suite 200
West Linn, Oregon 97068

**Report of
Geotechnical Investigation
Cornwall Street Subdivision
4096 Cornwall Street
West Linn, Oregon**

CGT Project Number G1504283

Dear Mr. Gusdorf:

Carlson Geotechnical (CGT), a division of Carlson Testing, Inc. (CTI), is pleased to submit this report summarizing our Geotechnical Investigation for the proposed Cornwall Street Subdivision project. The site is located at 4096 Cornwall Street in West Linn, Oregon. We performed our work in general accordance with CGT Proposal GP6901, dated December 3, 2015. Written authorization for our services was provided on December 3, 2015.

We appreciate the opportunity to work with you on this project. Please contact us at 503.601.8250 if you have any questions regarding this report.

Respectfully Submitted,
CARLSON GEOTECHNICAL

A handwritten signature in black ink, appearing to read "Kyle Smetana".

Kyle Smetana, EIT
Geotechnical Project Manager
ksmetana@carlsontesting.com



EXPIRES: 6.30.2016

William M. Weyrauch, P.E., G.E.
Senior Geotechnical Engineer
bweyrauch@carlsontesting.com

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 USCS Figure 4
 ODOT Rock Classification Figure 5
 Exploration Logs Figures 5 through 12
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1.0 INTRODUCTION

Carlson Geotechnical (CGT), a division of Carlson Testing, Inc. (CTI), is pleased to submit this report summarizing our Geotechnical Investigation for the proposed Cornwall Street Subdivision. The site is located at 4096 Cornwall Street in West Linn, Oregon, as shown on the attached Site Location, Figure 1.

1.1 Project Description

CGT developed an understanding of the proposed project based on our correspondence with ICON Construction & Development and a preliminary site plan prepared by Richard E. Givens, Planning Consultant, dated March 2015. Based on our review, we understand the project will include:

- Demolition and removal of the existing single-family residence and accessory structures.
- Partitioning the site into seven residential lots.
- Development within each lot will include construction of a single-family residence with appurtenant driveways and underground utilities. Although no lot-specific plans have been provided, we have assumed each structure will be two stories in height, wood-framed, and include daylight basements/garages. We anticipate the living space of the structures will incorporate post-and-beam floors (crawlspaces), while basements/garages will incorporate a slab-on-grade floor.
- Construction of extensions to Landis Street and Cornwall Street to provide vehicular access to the residential lots.
- Although no grading plans have been provided, we anticipate permanent grade changes at the site will include cuts and fills on the order of up to 5 feet within the new roadway.
- We understand infiltration testing is not needed as part of this assignment.

1.2 Scope of Work

The purpose of our work was to explore shallow subsurface conditions at the site in order to provide geotechnical recommendations for design and construction of the proposed development. Our scope of work included the following:

- Contact the Oregon Utilities Notification Center and subcontract a private utility locator to mark the locations of public utilities within a 20-foot radius of our explorations at the site.
- Explore subsurface conditions at the site by observing the excavation of seven test pits to depths of about 6 to 10 feet below ground surface (bgs).
- Classify the materials encountered in the explorations in accordance with American Society for Testing and Materials (ASTM) Soil Classification Method D2488 (visual-manual procedure).
- Collect representative soil samples from within the explorations in order to perform laboratory testing and to confirm our field classifications.
- Perform laboratory testing on selected samples collected during our subsurface exploration.
- Provide a technical narrative describing surface and subsurface deposits, and local geology of the site, based on the results of our explorations and published geologic mapping.
- Provide a site vicinity map and a site plan showing the locations of the explorations relative to existing site features.
- Provide logs of the explorations, including results of laboratory testing on selected soil samples.
- Provide preliminary geotechnical recommendations for site preparation and earthwork.
- Provide preliminary geotechnical engineering recommendations for design and construction of shallow spread foundations, retaining walls, floor slabs, and flexible pavements.

- Provide recommendations for the Seismic Site Class, mapped maximum considered earthquake spectral response accelerations, and site seismic coefficients.
- Provide a qualitative evaluation of seismic hazards at the site, including liquefaction potential, earthquake-induced settlement and landsliding, and surface rupture due to faulting or lateral spread.
- Provide this written report summarizing the results of our Geotechnical Investigation and preliminary recommendations for the project. This report is considered preliminary, as we have not reviewed final grading plans, finished floor elevations, and/or detailed structural information for the development. An addendum indicating that this report is final, and including supplemental recommendations, if warranted, can be issued after we have reviewed those items.

2.0 SITE INVESTIGATION

2.1 Site Geology

The site is located at the southeast end of the Tualatin Mountains. The Tualatin Mountains separate the Tualatin Valley to the west, the Portland Basin to the northeast, and the Willamette Valley to the southwest. Based on available geologic mapping of the area, the site is underlain by Columbia River Basalt. The Columbia River Basalt consists of numerous fine-grained lava flows that primarily erupted from fissures in present day eastern Washington and Oregon and western Idaho during the Miocene (23.8 to 5.3 million years ago). A thick, clay-rich residual soil often forms on the upper portion of the Columbia River Basalt from the in-place weathering of the rock. The Columbia River Basalt is several thousand feet thick in the vicinity of the site.

2.2 Site Surface Conditions

The site consists of one tax lot totaling approximately 2 acres. A single-family residence and accessory structures were located within the northeast portion of the site. The site was bordered by residential development on all sides. Landis Street and Cornwall Street terminate at the site boundaries. Vegetation on the northeastern portion of the site consists of grasses and scattered deciduous trees. The site generally descended to the south at maximum gradients up to about 2½ horizontal to 1 vertical (2½H:1V).

2.3 Field Investigation

2.3.1 Test Pits

CGT observed the excavation of seven test pits (TP-1 through TP-7) at the site on December 10, 2015, to depths of up to about 10 feet bgs. The test pits were excavated using a John Deere 50G, tracked excavator provided and operated by ICON Construction. The approximate test pit locations are shown on the attached Site Plan, Figure 2. The test pits were located in the field using approximate measurements from existing site features shown on the Site Plan. Upon completion of logging, the test pits were loosely backfilled by ICON Construction with the excavated materials.

Pocket penetrometer readings were taken within the upper 4 feet of selected test pits, where fine-grained soils were present. The pocket penetrometer is a hand-held instrument that provides an approximation of the unconfined compressive strength of cohesive, fine-grained soils. The correlation between pocket penetrometer readings and the consistency of cohesive, fine-grained soils is provided on the attached Figure 3.

2.3.2 Soil Classification & Sampling

Members of CGT's staff logged the soils observed within the explorations in general accordance with the Unified Soil Classification System (USCS) and collected representative samples of the materials encountered. An explanation of the USCS is presented on the attached Soil Classification Criteria and Terminology, Figure 4. Rock encountered within the test pits was logged in accordance with the Oregon Department of Transportation (ODOT) Soil and Rock Classification Manual¹. An explanation of the rock classification is shown on the attached ODOT Rock Classification Criteria and Terminology, Figure 5. The soil samples were stored in sealable plastic bags and transported to our laboratory for further examination and testing. Our staff visually examined all samples returned to our laboratory in order to refine the field classifications. Logs of the explorations are presented on the attached Exploration Logs, Figures 6 through 12. Surface elevations indicated on the logs and shown on the attached Figure 2 were estimated based on the topographic contours from the MetroMap web application. Elevations shown on the logs should be considered approximate.

2.4 **Laboratory Testing**

Laboratory testing was performed on samples collected in the field to refine our initial field classifications and determine in-situ parameters. Results of the laboratory tests are shown on the attached Exploration Logs, Figures 6 through 12. Laboratory testing included:

- Seven moisture content determinations (ASTM D2216)
- One Atterberg limits (plasticity index) test (ASTM D4318)

2.5 **Subsurface Materials**

The following paragraphs provide a description of each of the subsurface materials encountered at the site.

2.5.1 Silty Sand Fill (SM FILL)

Silty sand fill was encountered at the surface of TP-1 and TP-2. This material extended to depths of about 2 feet bgs. The silty sand fill was generally brown, moist, fine- to medium-grained, contained roots (less than 3-inch diameter), and contained fine to coarse angular gravel (up to 4-inch diameter).

2.5.2 Sandy Silt Fill (SM FILL)

Sandy silt fill was encountered beneath the silty sand fill within TP-1 and extended to a depth of about 4½ feet bgs. This material was generally gray, moist, exhibited low plasticity, contained fine to coarse angular gravel, and contained brick and asphalt debris (up to 2-inch diameter).

2.5.3 Native Silty Sand (SM)

Native silty sand was encountered beneath the sandy silt fill within TP-1 and at the surface of TP-3 and TP-4. This material extended to depths up to about 8½ feet bgs. The silty sand was generally medium dense, gray to brown, damp to moist, fine- to medium-grained, and contained gravel and boulders (up to 20-inch diameter).

¹ Oregon Department of Transportation, 1987. Soil and Rock Classification Manual.

2.5.4 Native Sandy Silt (ML)

Native sandy silt was encountered at the surface of TP-5 through TP-7 and extended to depths up to about 2 feet bgs. This material was generally medium stiff to stiff, gray to brown, moist, exhibited low plasticity, contained roots (up to 3-inch diameter), and contained gravel and cobbles (up to 10-inch diameter).

2.5.5 Native Lean Clay (CL)

Native lean clay was encountered beneath the silty sand fill within TP-2, beneath the native silty sand within TP-4, and beneath the sandy silt within TP-5 through TP-7. The lean clay extended to depths up to about 5 feet bgs within TP-2 and TP-4 through TP-7. The lean clay was generally medium stiff to very stiff, gray-brown, moist, exhibited medium plasticity, and contained sand, gravel, and cobbles (up to 9 inches in diameter).

2.5.6 Predominantly Weathered Basalt

Predominantly weathered basalt was encountered beneath the silty sand within TP-1 and TP-3, and beneath the lean clay within TP-2 and TP-4 through TP-7. The predominantly weathered basalt extended to the full depths explored within these test pits, up to about 10 feet bgs. The weathered basalt was generally very soft (R1), red, gray, brown, tan, and moist.

2.6 **Groundwater**

Groundwater was not encountered within depths explored on December 10, 2015. Based on our review of available groundwater mapping provided by the United States Geological Survey² (USGS), groundwater in the immediate vicinity of the site is estimated to be at a depth in excess of 200 feet bgs. We anticipate groundwater levels will fluctuate due to seasonal and annual variations in precipitation, changes in site utilization, or other factors. In addition, the native sandy silt (ML), native lean clay (CL), and weathered basalt are conducive to the formation of perched water tables.

3.0 **SEISMIC CONSIDERATIONS**

3.1 **Seismic Design**

Section 1613.3.2 of the 2014 Oregon Structural Specialty Code (2014 OSSC) requires that the determination of the seismic site class be based on subsurface data in accordance with Chapter 20 of the American Society of Civil Engineers Minimum Design Loads for Buildings and Other Structures (ASCE 7). Based on the results of the explorations and review of geologic mapping, we have assigned the site as Site Class D for the subsurface conditions encountered. Earthquake ground motion parameters for the site were obtained based on the United States Geological Survey (USGS) Seismic Design Values for Buildings - Ground Motion Parameter Web Application³. The site Latitude 45.356965° North and Longitude 122.633618° West were input as the site location. The following table shows the recommended seismic design parameters for the site.

² "USGS: Estimated Depth to Ground Water and Configuration of the Water Table in the Portland, Oregon Area" http://or.water.usgs.gov/projs_dir/puz/

³ United States Geological Survey, 2015. Seismic Design Parameters determined using: "U.S. Seismic Design Maps Web Application - Version 3.1.0," from the USGS website <http://geohazards.usgs.gov/designmaps/us/application.php>.

Table 1 Seismic Ground Motion Values (Section 1613.5 of 2014 OSSC)

	Parameter	Value
Mapped Acceleration Parameters	Spectral Acceleration, 0.2 second (S_s)	0.944g
	Spectral Acceleration, 1.0 second (S_1)	0.407g
Coefficients (Site Class D)	Site Coefficient, 0.2 sec. (F_A)	1.122
	Site Coefficient, 1.0 sec. (F_V)	1.593
Adjusted MCE Spectral Response Parameters	MCE Spectral Acceleration, 0.2 sec. (S_{MS})	1.060g
	MCE Spectral Acceleration, 1.0 sec. (S_{M1})	0.648g
Design Spectral Response Accelerations	Design Spectral Acceleration, 0.2 seconds (S_{DS})	0.706g
	Design Spectral Acceleration, 1.0 second (S_{D1})	0.432g
Seismic Design Category		D

3.2 Seismic Hazards

3.2.1 Liquefaction

In general, liquefaction occurs when deposits of loose/soft, saturated, cohesionless soils, generally sands and silts, are subjected to strong earthquake shaking. If these deposits cannot drain quickly enough, pore water pressures can increase, approaching the value of the overburden pressure. The shear strength of a cohesionless soil is directly proportional to the effective stress, which is equal to the difference between the overburden pressure and the pore water pressure. When the pore water pressure increases to the value of the overburden pressure, the shear strength of the soil approaches zero, and the soil can liquefy. The liquefied soils can undergo rapid consolidation or, if unconfined, can flow as a liquid. Structures supported by the liquefied soils can experience rapid, excessive settlement, shearing, or even catastrophic failure.

For fine-grained soils, susceptibility to liquefaction is evaluated based on penetration resistance and plasticity, among other characteristics. Criteria for identifying non-liquefiable, fine-grained soils are constantly evolving. Current practice⁴ to identify non-liquefiable, fine-grained soils is based on plasticity characteristics of the soils, as follows: (1) liquid limit greater than 47 percent, (2) plasticity index greater than 20 percent, and (3) moisture content less than 85 percent of the liquid limit. The susceptibility of sands, gravels, and sand-gravel mixtures to liquefaction is typically assessed based on penetration resistance, as measured using SPTs, CPTs, or Becker Hammer Penetration tests (BPTs).

Based on the shallow depth to weathered basalt, the relative plasticity of the clay soils and the estimated depth to groundwater, the soils encountered at the site are considered non-liquefiable within the depths explored.

3.2.2 Slope Instability

Due to the relatively minimal planned changes in site grade and the generally gently-sloping topography, we conclude the risk of seismically-induced slope instability at the site is low.

⁴ Seed, R.B. et al., 2003. Recent Advances in Soil Liquefaction Engineering: A Unified and Consistent Framework. Earthquake Engineering Research Center Report No. EERC 2003-06.

3.2.3 Surface Rupture

3.2.3.1 Faulting

Although the site is situated in a region of the country with known active faults and historic seismic activity, no known faults exist on or immediately adjacent to the site. Therefore, the risk of surface rupture at the site due to faulting is considered low.

3.2.3.2 Lateral Spread

Surface rupture due to lateral spread can occur on sites underlain by liquefiable soils that are located on or immediately adjacent to slopes steeper than about 3 degrees (20H:1V), and/or adjacent to a free face, such as a stream bank or the shore of an open body of water. During lateral spread, the materials overlying the liquefied soils are subject to lateral movement downslope or toward the free face. Given the lack of liquefiable soils at the site and the absence of a free face, the risk of surface rupture due to lateral spread is considered negligible.

4.0 CONCLUSIONS

Based on the results of our field explorations and analyses, the site may be developed as described in Section 1.1 of this report, provided the recommendations presented in this report are incorporated into the design and development. The primary geotechnical considerations for this project include:

- Cobbles and Boulders at Foundation/Floor Slab/Pavement Subgrade: Based on our explorations, cobbles and boulders may be encountered at design subgrade elevations for shallow foundations, floor slabs, or pavements. Structural elements placed directly on boulders and cobbles can result in uneven ground response. To minimize this potential, CGT recommends:
 - Boulders encountered during foundation, floor slab, and pavement subgrade preparation be removed in their entirety and replaced with granular structural fill.
 - Foundation subgrades should be covered with a minimum of 6 inches of angular structural fill compacted to a well-keyed condition.
- Existing Structures: Existing structures should be removed prior to redevelopment of the site.
- Moisture Sensitive Soils: The near-surface, native, silty sand (SM), native sandy silt (ML), and native lean clay (CL) are sensitive to small changes in moisture content, and can pose challenges for earthwork performed during wet weather.

5.0 PRELIMINARY RECOMMENDATIONS

The following paragraphs present specific geotechnical recommendations for design and construction of the proposed residential structures at the site. The recommendations presented in this report are based on the information provided to us, results of the field investigation, laboratory data, and professional judgment. CGT has observed only a small portion of the pertinent subsurface conditions. The recommendations are based on the assumption that the subsurface conditions do not deviate appreciably from those found during the field investigation. CGT should be consulted for further recommendations if variations and/or undesirable geotechnical conditions are encountered at the site.

This report is considered preliminary, as we have not reviewed final grading plans, finished floor elevations, and detailed structural information for the development. An addendum indicating that this report is final, and including supplemental recommendations, if warranted, can be issued after we have reviewed those items.

5.1 Site Preparation

5.1.1 Site Stripping

Existing vegetation, topsoil, and fill (SM FILL and ML FILL) should be removed from within, and for a minimum 5-foot margin around, proposed building pad and pavement areas. Based on the results of our field explorations, stripping depths at the site are anticipated to be about 2 to 4½ foot bgs where fill is present and about ½ to 1 foot bgs where fill is not present. These materials may be deeper or shallower at locations away from the completed explorations. A geotechnical representative from CGT should provide recommendations for actual stripping depths based on observations during site stripping. Stripped surface vegetation and rooted soils should be transported off-site for disposal or stockpiled for later use in landscaped areas. Stripped pavements and demolition debris should be transported off site for disposal.

5.1.2 Grubbing

Grubbing of trees should include the removal of the root mass and roots greater than ½-inch in diameter. Grubbed materials should be transported off-site for disposal. Root masses from larger trees may extend greater than 3 feet bgs. Where root masses are removed, the resulting excavation should be properly backfilled with structural fill in conformance with Section 5.4 of this report.

5.1.3 Existing Utilities & Below-Grade Structures

All existing utilities at the site should be identified prior to excavation. Abandoned utility lines beneath new residential structures, pavements, and hardscaping should be completely removed or grouted full. Soft, loose, or otherwise unsuitable soils encountered in utility trench excavations should be removed and replaced with structural fill as described in Section 5.4 of this report. No below-grade structures were encountered in our explorations. If encountered during site preparation, buried structures (i.e. footings, foundation walls, slabs-on-grade, tanks, etc.) should be completely removed and disposed of off-site except for concrete which may, alternatively, be processed for re-use as described in Section 5.4.1.1. Resulting excavations should be backfilled with structural fill as described in Section 5.4 of this report, as needed to achieve design grades.

5.1.4 Erosion Control

Erosion and sedimentation control measures should be employed in accordance with applicable City, County and State regulations regarding erosion control.

5.2 Temporary Excavations

5.2.1 Overview

Conventional earthmoving equipment in proper working condition should be capable of making necessary excavations into the on-site soils. Excavations into the basalt, if needed, may require the use of special excavation methods and/or equipment. Please contact the geotechnical engineer for further evaluation if excavation into the basalt is anticipated based on final plans.

All excavations should be in accordance with applicable OSHA and state regulations. It is the contractor's responsibility to select the excavation methods, to monitor site excavations for safety, and to provide any shoring required to protect personnel and adjacent improvements. A "competent person", as defined by OR-OSHA, should be on site during construction in accordance with regulations presented by OR-OSHA. CGT's current role on the project does not include review or oversight of excavation safety.

5.2.2 OSHA Soil Class

For use in the planning and construction of temporary excavations up to 8 feet in depth at the site, an OSHA soil type "C" should be used for the native, silty sand (SM), native sandy silt (ML), and native lean clay (CL). Special consideration may be required where boulders are encountered during excavation or are present within excavation sidewalls.

5.2.3 Utility Trenches

Temporary trench cuts in native soils described earlier should stand near vertical to depths of approximately 4 feet. Caving should be expected where the native soils contain boulders. Some instability may occur if groundwater seepage is encountered. If seepage undermines the stability of the trench, or if caving of the sidewalls is observed during excavation, the sidewalls should be flattened or shored. Depending on the time of year trench excavations occur, trench dewatering may be required in order to maintain dry working conditions, particularly if the invert elevations of the proposed utilities are below the groundwater level. Pumping from sumps located within the trench will likely be effective in removing water resulting from seepage. If groundwater is present at the base of utility excavations, we recommend placing trench stabilization material at the base of the excavations. Trench stabilization material should be in conformance with Section 5.4.4 of this report.

5.2.4 Excavations Near Existing Foundations

Temporary excavations near existing footings should not extend within a 1½H:1V (horizontal to vertical) plane projected out and down from the outside, bottom edge of the footings. In the event that excavation needs to extend below the referenced plane, temporary shoring of the excavation and/or underpinning of the footing may be required. The geotechnical engineer should be consulted to review proposed excavation plans for this design case to provide specific recommendations.

5.3 Wet Weather Considerations

For planning purposes, the wet season should be considered to extend from late September to late June. It is our experience that dry weather working conditions should prevail between early July and the middle of September. Notwithstanding the above, soil conditions should be evaluated in the field by the geotechnical engineer or his representative at the initial stage of site preparation to determine whether the recommendations within this section should be incorporated into construction.

5.3.1 General Considerations

The near-surface, native, silty sand (SM), native sandy silt (ML), and native lean clay (CL) encountered within our explorations are susceptible to disturbance during wet weather. Trafficability of these soils may be difficult, and significant damage to subgrade soils will likely occur, if earthwork is undertaken without proper precautions at times when the exposed soils are more than a few percentage points above optimum moisture content. For construction that occurs during the wet season, methods to limit soil disturbance should be employed. Site preparation activities may need to be accomplished using track-mounted equipment, loading removed material onto trucks supported on granular haul roads. Soils that have been disturbed during site preparation activities should be over-excavated to firm, stable subgrade, and replaced with imported granular structural fill.

5.3.2 Geotextile Separation Fabric

We recommend placing geotextile separation fabric to serve as a barrier between the fine-grained subgrade and imported fill in areas of repeated or heavy construction traffic. The geotextile fabric should be in conformance with Section 02320 of the current Oregon Department of Transportation (ODOT) Standard Specification for Construction. Please refer to Table 02320-4 of the 2015 ODOT specifications for specific requirements.

5.3.3 Granular Working Surfaces (Haul Roads & Staging Areas)

Haul roads subjected to repeated heavy, tire-mounted, construction traffic (e.g. dump trucks, concrete trucks, etc.) will require a minimum of 18 inches of imported granular material. The prepared subgrade should be covered with geotextile fabric prior to placement of the imported granular material. The imported granular material should be placed in a single lift (up to 24 inches deep) and compacted using a smooth-drum, non-vibratory roller until well-keyed.

For light staging areas, 12 inches of imported granular material should be sufficient. Additional granular material or geo-grid reinforcement may be recommended based on site conditions and/or loading at the time of construction. The imported granular material should be in conformance with Section 5.4.2 of this report and have less than 5 percent material passing the U.S. Standard No. 200 Sieve.

5.3.4 Footing Subgrade Protection

A minimum of 3 inches of imported granular material is recommended to protect fine-grained, footing subgrades from foot traffic during inclement weather. The imported granular material should be in conformance with Section 5.4.2 of this report. The maximum particle size should be limited to 1 inch. The imported granular material should be placed in one lift over the prepared, undisturbed subgrade, and compacted using non-vibratory equipment until well keyed.

5.4 **Structural Fill**

The geotechnical engineer should be provided the opportunity to review all materials considered for use as structural fill a minimum of five business days prior to placement. If the gradation and proctor test results are not available or are more than three months old, samples of the proposed structural fill materials should be submitted to the geotechnical engineer for testing a minimum of five business day prior to use on site.

The geotechnical engineer or his representative should be contacted to evaluate compaction of structural fill as the material is being placed. Evaluation of compaction may take the form of in-place density tests and/or proof-roll tests with suitable equipment. Compaction of structural fill should be evaluated at intervals not exceeding every 2 vertical feet as the fill is being placed.

5.4.1 On-Site Soils (General Use)

5.4.1.1 Concrete Debris

Concrete debris resulting from the demolition of existing structures (foundations, floor slabs, etc.) can be re-used as structural fill if processed/crushed into material that is fairly well graded between coarse and fine particle sizes. The processed/crushed concrete should contain no organic matter, debris, or particles larger than 4 inches in diameter. Moisture conditioning (wetting) should be expected in order to achieve adequate compaction. When used as structural fill, this material should be placed and compacted in general accordance with Section 5.4.2 of this report. Such materials should be "capped" with a minimum of 12 inches

of ¾ -inch-minus (or finer) granular fill under all structural elements (footings, and, pavements, etc.). The capping material below slabs-on-grade (base rock) should consist of material as described in Section 5.4.3.

5.4.1.2 Silty sand (SM), Sandy Silt (ML) and Lean Clay (CL)

Re-use of on-site soils with fines contents over about 5 percent as structural fill may be difficult because these soils are sensitive to small changes in moisture content and are difficult, if not impossible, to adequately compact during wet weather. We anticipate the moisture content of these soils will be higher than the optimum moisture content for satisfactory compaction. Therefore, moisture conditioning (drying) should be expected in order to achieve adequate compaction. If used as structural fill, these soils should be free of organic matter, debris, and particles larger than 4 inches. Processing of the clay should include removal of boulders in excess of 4 inches in diameter. When used as structural fill, these soils should be placed in lifts with a maximum loose thickness of about 8 inches at moisture contents within -1 and +3 percent of optimum, and compacted to not less than 93 percent of the material's maximum dry density, as determined in general accordance with ASTM D1557 (Modified Proctor). If these soils cannot be properly moisture-conditioned and processed, we recommend using imported granular material for structural fill.

5.4.2 Imported Granular Structural Fill (General Use)

Imported granular structural fill should consist of angular pit or quarry run rock, crushed rock, or crushed gravel that is fairly well graded between coarse and fine particle sizes. The granular fill should contain no organic matter, debris, or particles larger than 1½ inches, and have less than 5 percent material passing the U.S. Standard No. 200 Sieve. The percentage of fines can be increased to 12 percent of the material passing the U.S. Standard No. 200 Sieve if placed during dry weather, and provided the fill material is moisture-conditioned, as necessary, for proper compaction. Granular fill material should be placed in lifts with a maximum loose thickness of about 12 inches, and compacted to not less than 93 percent of the material's maximum dry density, as determined in general accordance with ASTM D1557 (Modified Proctor). Proper moisture conditioning and the use of vibratory equipment will facilitate compaction of these materials.

Compaction of granular fill materials with high percentages of particle sizes in excess of 1½ inches should be evaluated by periodic proof-roll observation or continuous observation by the CGT geotechnical representative during fill placement, since it cannot be tested conventionally using a nuclear densometer. Such materials should be "capped" with a minimum of 12 inches of ¾-inch-minus (or finer) granular fill under all structural elements (footings, concrete slabs, pavements, etc.).

5.4.3 Floor Slab Base Rock

Floor slab base rock should consist of well-graded granular material (crushed rock) containing no organic matter or debris, have a maximum particle size of ¾-inch, and have less than 5 percent material passing the U.S. Standard No. 200 Sieve. Floor slab base rock should be placed in one lift and compacted to not less than 90 percent of the material's maximum dry density as determined in general accordance with ASTM D1557 (Modified Proctor).

5.4.4 Trench Base Stabilization Material

If groundwater is present at the base of utility excavations, stabilization material should be placed to help stabilize the base of the trench. Trench base stabilization material should consist of at least 1 foot of well-graded granular material with a maximum particle size of 4 inches and less than 5 percent material passing the U.S. Standard No. 4 Sieve. The material should be free of organic matter and other deleterious material, placed in one lift, and compacted until well-keyed.

5.4.5 Trench Backfill Material

Trench backfill for the utility pipe base and pipe zone should consist of granular material as recommended by the utility pipe manufacturer. Trench backfill above the pipe zone should consist of well-graded granular material containing no organic matter or debris, have a maximum particle size of ¾ inch, and have less than 8 percent material passing the U.S. Standard No. 200 Sieve. As a guideline, trench backfill should be placed in maximum 12-inch thick lifts. The earthwork contractor may elect to use alternative lift thicknesses based on their experience with specific equipment and fill material conditions during construction in order to achieve the required compaction. The following table presents recommended relative compaction percentages for utility trench backfill.

Table 2 Utility Trench Backfill Compaction Recommendations

Backfill Zone	Recommended <u>Minimum</u> Relative Compaction	
	Structural Areas ¹	Landscaping Areas
Pipe Base and Within Pipe Zone	90% ASTM D1557 or pipe manufacturer's recommendation	85% ASTM D1557 or pipe manufacturer's recommendation
Above Pipe Zone	92% ASTM D1557	88% ASTM D1557
Within 3 Feet of Design Subgrade	93% ASTM D1557	88% ASTM D1557
¹ Includes proposed residential structures, driveways, hardscaping, roadways, etc.		

5.5 Permanent Slopes

5.5.1 Overview

Permanent cut or fill slopes constructed at the site should be graded at 2H:1V or flatter. Constructed slopes should be overbuilt by a few feet depending on their size and gradient so that they can be properly compacted prior to being cut to final grade. The surface of all slopes should be protected from erosion by seeding, sodding, or other acceptable means. Adjacent on-site and off-site structures should be located at least 5 feet from the top of slopes.

5.5.2 Placement of Fill on Slopes

New fill should be placed and compacted against horizontal surfaces. Where fill is placed on existing slopes which exceed 5H:1V (horizontal to vertical), the existing slopes should be keyed and benched prior to structural fill placement in general accordance with the attached Fill Slope Detail, Figure 13. If subdrains are needed on benches, subject to the review of the CGT geotechnical representative, they should be placed as shown on the attached Fill Slope Detail, Figure 13. In order to achieve well-compacted slope faces, slopes should be overbuilt by a few feet and then trimmed back to proposed final grades. A representative from CGT should observe the benches, keyways, and associated subdrains, if needed, prior to placement of structural fill.

5.6 Shallow Spread Foundations

5.6.1 Subgrade Preparation

Satisfactory subgrade support for shallow foundations associated with the planned building addition can be obtained from the native medium dense to better, silty sand (SM), the native, medium stiff to better, sandy silt (ML), and native, medium stiff to better, lean clay (CL), or on structural fill that is properly placed and

compacted on this material during construction. These materials were encountered at depths of about 0 to 4½ feet bgs in the explorations.

Boulders encountered during foundation excavation should be removed and replaced with granular structural fill. The geotechnical engineer or his representative should be contacted to observe subgrade conditions prior to placement of forms, reinforcement steel, or granular backfill (if required). If soft, loose, or otherwise unsuitable soils are encountered, they should be over-excavated as recommended by the geotechnical representative at the time of construction. The resulting over-excavation should be brought back to grade with imported granular structural fill in conformance with Section 5.4.2 of this report. The maximum particle size of over-excavation backfill should be limited to 1½ inches and ¾ inch within 12 inches of the bottom of new structural elements, (footings, concrete slabs, pavements, etc.). All granular pads for footings should be constructed a minimum of 6 inches wider on each side of the footing for every vertical foot of over-excavation.

5.6.2 Minimum Footing Width & Embedment

Minimum footing widths should be in conformance with the most recent, Oregon Structural Specialty Code (OSSC). As a guideline, CGT recommends individual spread footings should have a minimum width of 24 inches. Similarly, for one-story, light-framed structures, we recommend continuous wall footings have a minimum width of 12 inches. For two-, three-, and four-story, light-framed structures, we recommend continuous wall footings have a minimum width of 15, 18, and 24 inches, respectively. All footings should be founded at least 18 inches below the lowest, permanent adjacent grade.

5.6.3 Bearing Pressure & Settlement

The minimum footing dimensions described above will likely govern footing sizes. Nonetheless, footings founded as recommended above, should be proportioned for a maximum allowable soil bearing pressure of 1,500 pounds per square foot (psf). This bearing pressure is a net bearing pressure, applies to the total of dead and long-term live loads, and may be increased by one-third when considering seismic or wind loads. For the recommended design bearing pressure, total settlement of footings is anticipated to be less than 1 inch. Differential settlements between adjacent columns and/or bearing walls should not exceed ½-inch. Based on the soils encountered in the explorations and soils encountered during excavation, limited (less than 1-foot) over-excavation/backfill should be anticipated in some areas in order to achieve the indicated allowable soil bearing pressure.

5.6.4 Lateral Capacity

A maximum passive (equivalent-fluid) earth pressure of 150 pounds per cubic foot (pcf) is recommended for design for footings confined by the native soils described earlier or imported granular structural fill that is properly placed and compacted during construction. The recommended earth pressure was developed using a factor of safety of 1½, which is appropriate due to the amount of movement required to develop full passive resistance. In order to develop the above capacity, the following should be understood:

1. Concrete must be poured neat in the excavation or the perimeter of the foundation must be backfilled with imported granular structural fill,
2. The adjacent grade must be level or rising away from the footing,
3. The static ground water level must remain below the base of the foundation throughout the year, and
4. Adjacent development (e.g. slabs, pavements, etc.) and/or the upper 12 inches of adjacent unpaved, structural fill areas should not be considered when calculating passive resistance.

An ultimate coefficient of friction equal to 0.45 may be used when calculating resistance to sliding for footings founded on a minimum of 6 inches of imported granular structural fill (crushed rock) that is properly placed and compacted during construction.

5.6.5 Subsurface Drainage

Recognizing the fine-grained soils encountered at this site, placement of foundation drains is recommended at the outside base elevations of perimeter continuous wall footings. Foundation drains should consist of a minimum 4-inch diameter, perforated, PVC drainpipe wrapped with a non-woven geotextile filter fabric. The drains should be backfilled with a minimum of 2 cubic feet of open graded drain rock per lineal foot of pipe. The drain rock should also be encased in a geotextile fabric in order to provide separation from the surrounding clayey soils. Foundation drains should be positively sloped and should outlet to a suitable discharge point. The geotechnical engineer or his representative should observe the drains prior to backfilling. Roof drains should not be tied into foundation drains.

5.7 **Floor Slabs**

5.7.1 Subgrade Preparation

Satisfactory subgrade support for floor slabs constructed on grade, supporting up to 150 psf area loading, can be obtained from native medium dense to better, silty sand (SM), the native, medium stiff to better, sandy silt (ML), and native, medium stiff to better, lean clay (CL), or on structural fill that is properly placed and compacted on this material during construction. Boulders encountered during floor slab excavation should be removed and replaced with granular structural fill. The geotechnical engineer or his representative should observe floor slab subgrade soils to evaluate surface consistencies. If soft, loose, or otherwise unsuitable soils are encountered, they should be over-excavated as recommended by the CGT geotechnical representative at the time of construction. The resulting over-excavation should be brought back to grade with imported granular structural fill as described in Section 5.4.2 of this report.

5.7.2 Crushed Rock Base

Concrete floor slabs should be supported on a minimum 6-inch thick layer of crushed rock base in conformance with Section 5.4.3 of this report. We recommend "choking" the surface of the base rock with sand just prior to concrete placement. Choking means the voids between the largest aggregate particles are filled with sand, but does not provide a layer of sand above the base rock. Choking the base rock surface reduces the lateral restraint on the bottom of the concrete during curing. Choking the base rock also reduces punctures in overlying vapor retarding membranes due to foot traffic where such membranes are used.

5.7.3 Design Considerations

For floor slabs constructed as recommended, an equivalent modulus of subgrade reaction of 75 pounds per cubic inch (pci) is recommended for the design of the floor slab. If a higher equivalent modulus of subgrade reaction value is required, this can be achieved with a thicker base rock section below the slab. For example, on this project, the use of a 12-inch thick base rock section below the slab would allow the use of an equivalent modulus of subgrade reaction value of 100 pci. Please consult the geotechnical engineer if alternative values are needed. Floor slabs constructed as recommended will likely settle less than ½-inch. For general floor slab construction, slabs should be jointed around columns and walls to permit slabs and foundations to settle differentially.

5.7.4 Subgrade Moisture Considerations

Liquid moisture and moisture vapor should be expected at the subgrade surface. The crushed rock base recommended above typically serves as a capillary break and provides protection against liquid moisture. Where moisture vapor emission through the slab must be minimized, e.g. impervious floor coverings, storage of moisture sensitive materials directly on the slab surface, etc., a vapor retarding membrane or vapor barrier below the slab should be considered. Factors such as cost, special considerations for construction, floor coverings, and end use suggest that the decision regarding a vapor retarding membrane or vapor barrier be made by the architect and owner.

If a vapor retarder or vapor barrier is placed below the slab, its location should be based on current American Concrete Institute (ACI) guidelines, ACI 302 Guide for Concrete Floor and Slab Construction. In some cases, this indicates placement of concrete directly on the vapor retarder or barrier. Please note that the placement of concrete directly on impervious membranes increases the risk of plastic shrinkage cracking and slab curling in the concrete. Construction practices to reduce or eliminate such risk, as described in ACI 302, should be employed during concrete placement.

5.8 Pavements

5.8.1 Subgrade Preparation

In general, the subgrade soils encountered should be suitable for pavement support. However, depending on final subgrade elevations, weather conditions and soils encountered at the time of construction, a contingency for limited over-excavation and replaced with imported granular structural fill in conformance with Section 5.4.2 of this report, and the use of geotextile fabric should be planned. When evaluating its suitability as a pavement subgrade, the presence of stress concentrators (large cobbles and boulders) within 12 inches of the design pavement section should also be precluded whenever possible.

Additional subgrade improvement may be required based on the subgrade conditions encountered during construction. Where silt or clay soils are exposed at the subgrade surface, geotextile fabric should be placed at the subgrade surface prior to placing the base rock section.

5.8.1.1 Dry Weather Construction

After site preparation as recommended above, but prior to placement of fill and/or base rock, the geotechnical engineer or his representative should observe a proof roll test of the exposed subgrade soils in order to identify areas of excessive yielding. Proof rolling of subgrade soils is typically conducted during dry weather conditions using a fully-loaded, 10- to 12-cubic-yard, tire-mounted, tandem-axle dump truck or equivalent weighted water truck. Areas that appear too soft and wet to support proof rolling equipment should be prepared in general accordance with the recommendations for wet weather construction presented in Section 5.3 of this report. If areas of soft soil or excessive yielding are identified, the affected material should be over-excavated to firm, stable subgrade, and replaced with imported granular structural fill in conformance with Section 5.4.2 of this report.

5.8.1.2 Wet Weather Construction

Preparation of pavement subgrade soils during wet weather should be in conformance with Section 5.3 of this report. As indicated therein, increased base rock sections and a geotextile separation fabric may be required in wet conditions.

5.8.2 Input Parameters

Design of the flexible pavement sections presented below was based on the parameters presented in the following table, procedures in the American Association of State Highway and Transportation Officials (AASHTO) 1993 “Design of Pavement Structures” manual, ODOT Pavement Design Guide 2011, and the Asphalt Pavement Association of Oregon Asphalt Pavement Design Guide. If any of the items listed need revised, please contact us and we will reassess the provided design sections.

Table 3 Input Parameters Assigned for Pavement Design

Input Parameter	Design Value ¹	Input Parameter	Design Value ¹
Pavement Design Life	20 years	Resilient Modulus ⁴	Suitable Silt, Silty Sand, Lean Clay Subgrade 5,000 psi
Annual Percent Growth	0 percent		Crushed Aggregate Base 22,500 psi
Serviceability	4.2 initial, 2.5 terminal	Structural Coefficient ²	Crushed Aggregate Base 0.08
Reliability ²	75 percent		Asphalt 0.42
Standard Deviation ²	0.49	Vehicle Traffic ⁵	APAO Level I “Residential Driveways” Less than 10,000 ESAL
Drainage Factor ³	1.0		APAO Level II “Residential Streets” Less than 50,000 ESAL

¹ If any of the above parameters are incorrect, please contact us so that we may revise our recommendations, if warranted.
² Value based on guidelines presented in Section 5.3 of the 2011 ODOT Pavement Design Manual for flexible pavements, local streets.
³ Assumes good drainage away from pavement, base, and subgrade is achieved by proper crowning of subgrades.
⁴ Values based on experience with similar soils prepared as recommended in this report.
⁵ ESAL = Total 18-Kip equivalent single axle load. Traffic levels taken from Table 3.1 of APAO manual. If an increased traffic load is estimated, please contact us so that we may refine the traffic loading and revise our recommendations, if warranted.
⁶ Suitability of subgrade at the time of construction and may require limited over-excavation as described in Section 5.8.1 of this report. A contingency for such over-excavation is recommended. Evaluation of actual requirements should be made at the time of construction based on actual subgrade soils encountered.

5.8.3 Recommended Minimum Sections

The following table presents the minimum recommended flexible pavement sections for the traffic levels indicated in the preceding table, based on the referenced AASHTO procedures.

Table 4 Recommended Minimum Pavement Sections

Material	Minimum Thickness (inches) ¹	
	APAO Level I (Residential Driveways)	APAO Level II (Residential Streets)
Asphalt Pavement (inches)	3	4
Crushed Aggregate Base (inches) ²	12	12
Subgrade Soils	Prepared in accordance with Section 5.8.1 of this report. Silt or clay subgrade soils should be covered with geotextile fabric prior to placing base rock materials.	

¹ Subject to review of Clackamas County standard structural sections and functional classification of subject roadway.
² Thickness shown assumes dry weather construction. Geotextile separation fabric required regardless of weather conditions. Additional granular over-excavation/backfill (sub-base) section may be required in wet weather or otherwise unsuitable subgrade conditions. Refer to Section 5.3 and for additional discussion.

5.8.4 Asphalt & Base Course Materials

Asphalt pavement and base course material should conform to the most recent State of Oregon Standard Specifications for Highway Construction. Place aggregate base in one lift, and compact to not less than 95 percent of the material's maximum dry density, as determined in general accordance with ASTM D1557 (Modified Proctor). Asphalt pavement should be compacted to at least 91 percent of the material's theoretical maximum density, as determined in general accordance with ASTM D2041 (Rice Specific Gravity).

5.8.5 Rigid Retaining Walls

At this time, we are not aware of final grading plans and the presence or absence of retaining walls within the overall development except those that might be related to basement walls. The following preliminary recommendations are provided for preliminary design purposes and are based on the assumption that silt or clay soils will be the predominant soil retained by the basement walls.

5.8.5.1 Footings

Retaining wall footings should be designed and constructed in conformance with the recommendations presented in Section 8.5 of this report, as applicable.

5.8.5.2 Wall Drains

We recommend retaining wall drains consist of a minimum 4-inch diameter, perforated, HDPE (High Density Poly-Ethylene) drainpipe wrapped with a non-woven geotextile filter fabric. The drains should be backfilled with a minimum of 2 cubic feet of open graded drain rock per lineal foot of pipe. The drain rock should be encased in a geotextile fabric in order to provide separation from the surrounding soils. Retaining wall drains should be positively sloped and should outlet to a suitable discharge point. The geotechnical engineer or his representative should be contacted to observe the drains prior to backfilling.

5.8.5.3 Backfill

Retaining walls should be backfilled with imported granular structural fill in conformance with Section **Error! Reference source not found.** of this report and contain less than 5 percent passing the U.S. Standard No. 200 Sieve. The backfill should be compacted to a minimum of 90 percent of the material's maximum dry density as determined in general accordance with ASTM D1557 (Modified Proctor). When placing fill behind walls, care must be taken to minimize undue lateral loads on the walls. Heavy compaction equipment should be kept at least "H" feet from the back of the walls, where "H" is the height of the wall. Light mechanical or hand tamping equipment should be used for compaction of backfill materials within "H" feet of the back of the walls.

5.8.5.4 Design Considerations

For rigid retaining walls founded, backfilled, and drained as recommended above, the following table presents parameters recommended for design.

Table 5 Design Parameters for Rigid Retaining Walls

Retaining Wall Condition	Modeled Backfill Condition	Static Equivalent Fluid Pressure (S _A)	Additional Seismic Equivalent Fluid Pressure (S _{AE})	Surcharge from Uniform Load, q, Acting on Backfill Behind Retaining Wall
Not Restrained from Rotation	Level (i = 0)	34 pcf	12 pcf	0.30*q
Restrained from Rotation	Level (i = 0)	58 pcf	6 pcf	0.50*q
<p><u>Note 1.</u> Refer to the attached Figure 14 for a graphical representation of static and seismic loading conditions. Seismic component of active thrust acts at 0.6H above the base of the wall.</p> <p><u>Note 2.</u> Seismic (dynamic) lateral loads were computed using the Mononobe-Okabe Equation as presented in the 1997 Federal Highway Administration (FHWA) design manual.</p>				

The above design recommendations are based on the assumptions that:

- (1) the walls consist of concrete cantilevered retaining walls ($\beta = 0$ and $\delta = 24$ degrees, see Figure 14).
- (2) the walls are 10 feet or less in height.
- (3) the backfill is drained and consists of imported granular structural fill ($\phi = 38$ degrees).
- (4) no line load, point, or area load surcharges are imposed behind the walls.
- (5) the grade behind the wall is level, or sloping down and away from the wall, for a distance of 10 feet or more from the wall.
- (6) the grade in front of the walls is level or sloping up for a distance of at least 5 feet from the wall.

Re-evaluation of our recommendations will be required if the retaining wall design criteria for the project vary from these assumptions.

5.9 Additional Considerations

5.9.1 Drainage

Subsurface drains should be connected to the nearest storm drain, on-site infiltration system (if selected and designed by others), or other suitable discharge point. Paved surfaces and ground near or adjacent to the buildings should be sloped to drain away from the buildings. Surface water from paved surfaces and open spaces should be collected and routed to a suitable discharge point. Surface water should not be directed into foundation drains or onto site slopes.

5.9.1 Expansive Potential

The near surface native soils consisted of silty sand (SM), sandy silt (ML), and lean clay (CL), with boulders noted in some areas. Based on experience with similar soils in the area of the site, these soils are considered to have a low susceptibility to volume change due to changes in moisture content.

6.0 RECOMMENDED ADDITIONAL SERVICES

Satisfactory earthwork, foundation, floor slab, and pavement performance depends to a large degree on the quality of construction. Sufficient observation of the contractor's activities is a key part of determining that the work is completed in accordance with the construction drawings and specifications. Subsurface conditions observed during construction should be compared with those encountered during subsurface explorations, and recognition of changed conditions often requires experience. We recommend that qualified

personnel visit the site with sufficient frequency to detect whether subsurface conditions change significantly from those observed to date and anticipated in this report.

The project geotechnical engineer or their representative should provide observations and/or testing of at least the following earthwork elements during construction:

- Site Stripping & Grubbing
- Subgrade Preparation for Structural Fills, Shallow Foundations, Floor Slabs, and Pavements
- Compaction of Structural Fill and Utility Trench Backfill
- Compaction of Base Rock for Floor Slabs and Pavements

It is imperative that the owner and/or contractor request earthwork observations and testing at a frequency sufficient to allow the geotechnical engineer to provide a final letter of compliance for the earthwork activities.

7.0 LIMITATIONS

We have prepared this report for use by the owner/developer and other members of the design and construction team for the proposed development. The opinions and recommendations contained within this report are not intended to be, nor should they be construed as a warranty of subsurface conditions, but are forwarded to assist in the planning and design process.

We have made observations based on our explorations that indicate the soil conditions at only those specific locations and only to the depths penetrated. These observations do not necessarily reflect soil types, strata thickness, or water level variations that may exist between or away from our explorations. If subsurface conditions vary from those encountered in our site explorations, CGT should be alerted to the change in conditions so that we may provide additional geotechnical recommendations, if necessary. Observation by experienced geotechnical personnel should be considered an integral part of the construction process.

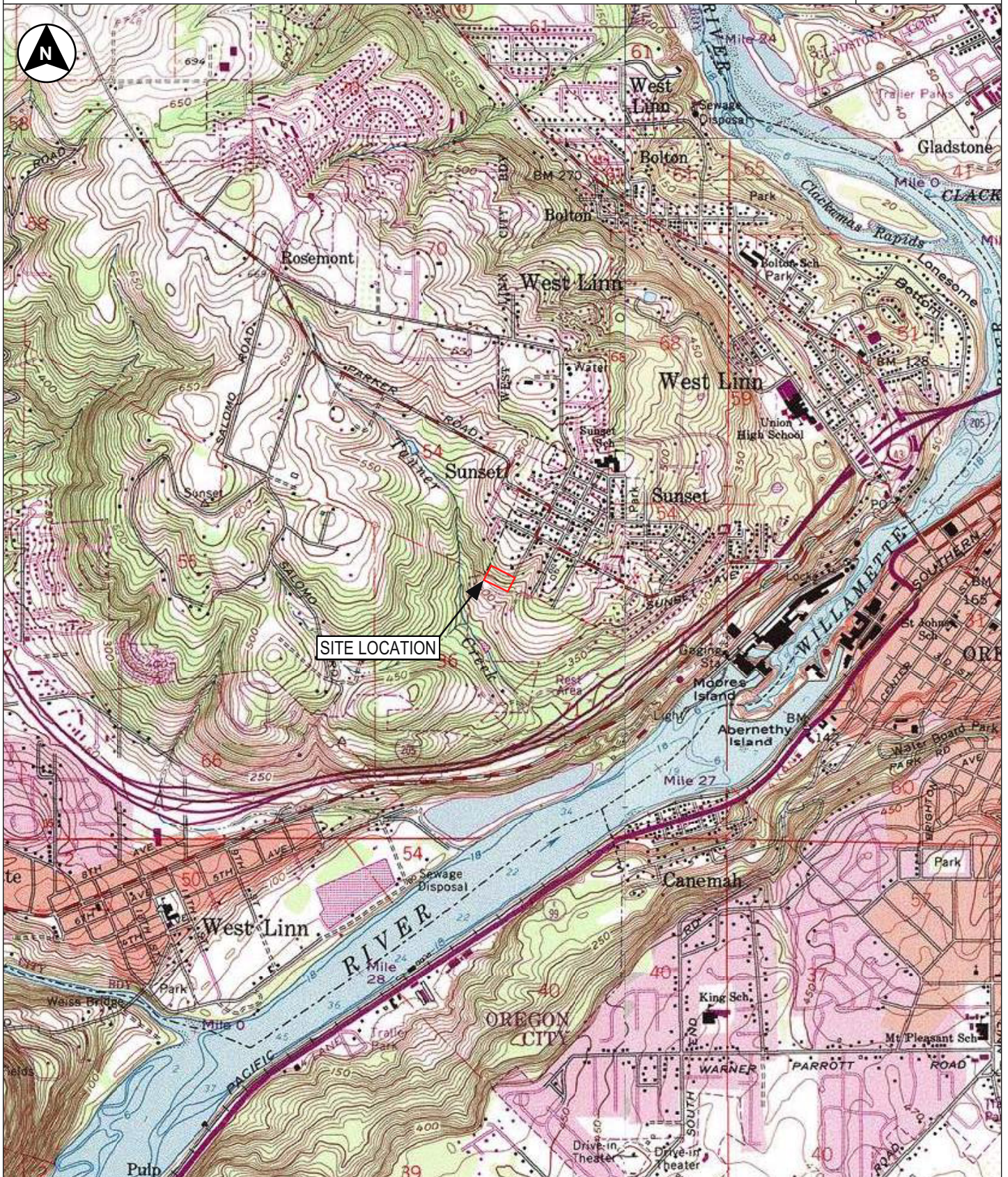
The owner/developer is responsible for ensuring that the project designers and contractors implement our recommendations. When the design has been finalized, prior to releasing bid packets to contractors, we recommend that the design drawings and specifications be reviewed by our firm to see that our recommendations have been interpreted and implemented as intended. If design changes are made, we request that we be retained to review our conclusions and recommendations and to provide a written modification or verification. Design review and construction phase testing and observation services are beyond the scope of our current assignment, but will be provided for an additional fee.

The scope of our services does not include services related to construction safety precautions, and our recommendations are not intended to direct the contractor's methods, techniques, sequences, or procedures, except as specifically described in our report for consideration in design.

Geotechnical engineering and the geologic sciences are characterized by a degree of uncertainty. Professional judgments presented in this report are based on our understanding of the proposed construction, familiarity with similar projects in the area, and on general experience. Within the limitations of scope, schedule, and budget, our services have been executed in accordance with the generally accepted practices in this area at the time this report was prepared; no warranty, expressed or implied, is made. This report is subject to review and should not be relied upon after a period of three years.

CORNWALL STREET SUBDIVISION - WEST LINN, OREGON
 Project Number G1504283

FIGURE 1
 Site Location



Map created with TOPO!™, © 2006 National Geographic Holdings
 USGS 7.5 Minute Topographic Map Series, Canby, Oregon Quadrangle.

Township 2 South, Range 1 East, Section 36 Willamette Meridian

Latitude: 45.356965
 Longitude: -122.633618

1 Inch = 2,000 feet




CORNWALL STREET SUBDIVISION - WEST LINN, OREGON
 Project Number G1504283

FIGURE 2
 Site Plan



LEGEND

TP-1  Test pit

 Orientation of site photographs shown on Figure 3

1 Inch = 100 Feet



NOTES: Drawing based on observations made while on site and site plans provided by client. All exploration locations should be considered approximate.





Photograph 1: Looking southwest towards the south margin of the site from just south of the existing residence.



Photograph 2: Looking south from the southeast towards the southeast corner of the site from just south of the existing residence.



Photograph 3: Looking northwest along the south margin of the site from within Lot 7.



Photograph 4: Looking north-northwest towards the northwest margin of the site from the proposed alignment of Landis Street.



See Figure 2 for approximate photograph locations and directions. Photographs were taken at the time of our fieldwork.

CORNWALL STREET SUBDIVISION - WEST LINN, OREGON
Project Number G1504283

FIGURE 4

USCS

Classification of Terms and Content	USCS Grain Size		
NAME: MINOR Constituents (12-50%); MAJOR Constituents (>50%); Slightly (5-12%) Relative Density or Consistency Color Moisture Content Plasticity Trace Constituents (0-5%) Other: Grain Shape, Approximate Gradation, Organics, Cement, Structure, Odor... Geologic Name or Formation: Fill, Willamette Silt, Till, Alluvium, etc.	Fines	<#200 (.075 mm)	
	Sand	Fine	#200 - #40 (.425 mm)
		Medium	#40 - #10 (2 mm)
		Coarse	#10 - #4 (4.75)
	Gravel	Fine	#4 - 0.75 inch
		Coarse	0.75 inch - 3 inches
Cobbles	3 to 12 inches; scattered <15% est. numerous >15% est.		
Boulders	> 12 inches		

Relative Density or Consistency						
Granular Material		Fine-Grained (cohesive) Materials				
SPT N-Value	Density	SPT N-Value	Torvane tsf Shear Strength	Pocket Pen tsf Unconfined	Consistency	Manual Penetration Test
		<2	<0.13	<0.25	Very Soft	Thumb penetrates more than 1 inch
0 - 4	Very Loose	2 - 4	0.13 - 0.25	0.25 - 0.50	Soft	Thumb penetrates about 1 inch
4 - 10	Loose	4 - 8	0.25 - 0.50	0.50 - 1.00	Medium Stiff	Thumb penetrates about ¼ inch
10 - 30	Medium Dense	8 - 15	0.50 - 1.00	1.00 - 2.00	Stiff	Thumb penetrates less than ¼ inch
30 - 50	Dense	15 - 30	1.00 - 2.00	2.00 - 4.00	Very Stiff	Readily indented by thumbnail
>50	Very Dense	>30	>2.00	>4.00	Hard	Difficult to indent by thumbnail

Moisture Content				Structure			
Dry: Absence of moisture, dusty, dry to the touch Damp: Some moisture but leaves no moisture on hand Moist: Leaves moisture on hand Wet: Visible free water, likely from below water table				Stratified: Alternating layers of material or color >6 mm thick Laminated: Alternating layers < 6 mm thick Fissured: Breaks along definite fracture planes Slickensided: Striated, polished, or glossy fracture planes Blocky: Cohesive soil that can be broken down into small angular lumps which resist further breakdown Lenses: Has small pockets of different soils, note thickness Homogeneous: Same color and appearance throughout			
Plasticity	Dry Strength	Dilatancy	Toughness				
ML CL MH CH	Non to Low Low to Medium Medium to High Medium to High	Non to Low Medium to High Low to Medium High to Very High	Slow to Rapid None to Slow None to Slow None	Low, can't roll Medium Low to Medium High			

Unified Soil Classification Chart (Visual-Manual Procedure) (Similar to ASTM Designation D-2487)							
Major Divisions			Group Symbols	Typical Names			
Coarse Grained Soils: More than 50% retained on No. 200 sieve	Gravels: 50% or more retained on the No. 4 sieve	Clean Gravels	GW	Well-graded gravels and gravel/sand mixtures, little or no fines			
		Gravels with Fines	GP	Poorly-graded gravels and gravel/sand mixtures, little or no fines			
			GM	Silty gravels, gravel/sand/silt mixtures			
		Sands: More than 50% passing the No. 4 sieve	Sands with Fines	GC	Clayey gravels, gravel/sand/clay mixtures		
	Clean Sands			SW	Well-graded sands and gravelly sands, little or no fines		
	Fine-Grained Soils: 50% or more Passes No. 200 Sieve	Silt and Clays Low Plasticity Fines		SP	Poorly-graded sands and gravelly sands, little or no fines		
SM				Silty sands, sand/silt mixtures			
SC				Clayey sands, sand/clay mixtures			
Silt and Clays High Plasticity Fines				ML	Inorganic silts, rock flour, clayey silts		
				CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, lean clays		
				OL	Organic silt and organic silty clays of low plasticity		
				MH	Inorganic silts, clayey silts		
Highly Organic Soils			CH	Inorganic clays of high plasticity, fat clays			
			OH	Organic clays of medium to high plasticity			
			PT	Peat, muck, and other highly organic soils			



Additional References:
ASTM D2487 Standard Practice for Classification of Soils for Engineering Purposes and
ASTM D2488 Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)

Table 22: Scale of Relative Rock Weathering

Designation	Field Identification
Fresh	Crystals are bright. Discontinuities may show some minor surface staining. No discoloration in rock fabric.
Slightly Weathered	Rock mass is generally fresh. Discontinuities are stained and may contain clay. Some discoloration in rock fabric. Decomposition extends up to 1-inch into rock.
Moderately Weathered	Rock mass is decomposed 50% or less. Significant portions of rock show discoloration and weathering effects. Crystals are dull and show visible chemical alteration. Discontinuities are stained and may contain secondary mineral deposits.
Predominantly Weathered	Rock mass is more than 50% decomposed. Rock can be excavated with geologist's pick. All discontinuities exhibit secondary mineralization. Complete discoloration of rock fabric. Surface of core is friable and usually pitted due to washing out of highly altered minerals by drilling water.
Decomposed	Rock mass is completely decomposed. Original rock fabric may be evident. May be reduced to soil with hand pressure.

Table 23: Scale of Relative Rock Hardness

Term	Hardness Designation	Field Identification	Approximate Unconfined Compressive Strength
Extremely Soft	R0	Can be indented with difficulty by thumbnail. May be moldable or friable with finger pressure.	<100 psi
Very Soft	R1	Crumbles under firm blows with point of geology pick. Can be peeled by pocket knife. Scratched with finger nail.	100-1000 psi
Soft	R2	Can be peeled by pocket knife with difficulty. Cannot be scratched with finger nail. Shallow indentation made by firm blow of geology pick.	1000-4000 psi
Medium Hard	R3	Can be scratched by knife or pick. specimen can be fractured with a single firm blow of hammer/geology pick.	4000-8000 psi
Hard	R4	Can be scratched with knife or pick only with difficulty. Several hard blows required to fracture specimen.	8000-16000 psi
Very Hard	R5	Cannot be scratched by knife or sharp pick. Specimen requires many blows of hammer to fracture or chip. Hammer rebounds after impact.	>16000 psi

Table 24: Stratification Terms

Term	Characteristics
Laminations	Thin beds (<1cm).
Fissile	Tendency to break along laminations.
Parting	Tendency to break parallel to bedding, any scale.
Foliation	Non-depositional, e.g., segregation and layering of minerals in metamorphic rock.



Tables adapted from the 1987 Soil and Rock Classification Manual, Oregon Department of Transportation.



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FIGURE 6

Test Pit TP-1

CLIENT Icon Construction - Darren Gusdorf	PROJECT NAME Cornwall Street Subdivision
PROJECT NUMBER G1504283	PROJECT LOCATION 4096 Cornwall Street, West Linn, Oregon
DATE STARTED 12/10/15 GROUND ELEVATION 486 ft	ELEVATION DATUM See Figure 2
EXCAVATION CONTRACTOR Icon Construction	LOGGED BY BLN REVIEWED BY KJS
EQUIPMENT John Deere 50G	SEEPAGE ---
EXCAVATION METHOD Excavator	GROUNDWATER AT END ---
NOTES	GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	U.S.C.S.	MATERIAL DESCRIPTION	GROUNDWATER DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N ₆₀ VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N ₆₀ VALUE ▲	
										PL	LL
484	[Cross-hatched pattern]	SM FILL	SILTY SAND FILL with gravel: Brown, moist, with roots (less than ¼-inch diameter), and with fine to coarse angular gravel (up to 1-inch diameter).	0	GRAB TP1-1			0.5			
482	[Cross-hatched pattern]	ML FILL	SANDY SILT FILL: Gray, moist, exhibited low plasticity, and with fine to coarse angular gravel, brick and asphalt debris (up to 2-inch diameter), and roots (up to 1-inch diameter).	2	GRAB TP1-2			1			
480	[Dotted pattern]	SM	SILTY SAND: Medium dense, red-brown, damp to moist, fine- to medium-grained, with roots, and with gravel and boulders (up to 20 inch-diameter).	4				1.5			
478	[Dotted pattern]	SM		6	GRAB TP1-3			2			20
476	[Hexagonal pattern]		PREDOMINANTLY WEATHERED BASALT: Very soft (R1), red and black, moist.	8	GRAB TP1-4			2.5			36
				10							

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- Test pit terminated at about 10 feet bgs.
- No groundwater or caving observed within the depth explored.
- Test pit loosely backfilled by Icon Construction with cuttings upon completion.



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FIGURE 7

Test Pit TP-2

CLIENT Icon Construction - Darren Gusdorf	PROJECT NAME Cornwall Street Subdivision
PROJECT NUMBER G1504283	PROJECT LOCATION 4096 Cornwall Street, West Linn, Oregon
DATE STARTED 12/10/15 GROUND ELEVATION 486 ft	ELEVATION DATUM See Figure 2
EXCAVATION CONTRACTOR Icon Construction	LOGGED BY BLN REVIEWED BY KJS
EQUIPMENT John Deere 50G	SEEPAGE ---
EXCAVATION METHOD Excavator	GROUNDWATER AT END ---
NOTES	GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	U.S.C.S.	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N ₆₀ VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N ₆₀ VALUE ▲	
											PL	LL
											<input type="checkbox"/> FINES CONTENT (%) <input type="checkbox"/> 0 20 40 60 80 100	
484		SM FILL	SILTY SAND FILL with gravel: Brown, moist, with roots (less than 3-inch diameter), and with fine to coarse angular gravel (up to 4-inch diameter).		0				0.5			
482		CL	LEAN CLAY with gravel: Medium stiff to very stiff, gray-brown, exhibited medium plasticity, with roots (less than 1/4-inch diameter), and with fine to coarse gravel (up to 2-inch diameter).		2				1.5			
					4	GRAB TP2-1			4		35	
480			PREDOMINANTLY WEATHERED BASALT: Very soft (R1), red, black, gray and tan, and moist.		6	GRAB TP2-2					43	
478	<ul style="list-style-type: none"> • Test pit terminated at about 7½ feet bgs due to practical refusal on a boulder. • No groundwater or caving observed within the depth explored. • Test pit loosely backfilled by Icon Construction with cuttings upon completion. 											
476												

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FIGURE 8

Test Pit TP-3

CLIENT Icon Construction - Darren Gusdorf **PROJECT NAME** Cornwall Street Subdivision
PROJECT NUMBER G1504283 **PROJECT LOCATION** 4096 Cornwall Street, West Linn, Oregon
DATE STARTED 12/10/15 **GROUND ELEVATION** 486 ft **ELEVATION DATUM** See Figure 2
EXCAVATION CONTRACTOR Icon Construction **LOGGED BY** BLN **REVIEWED BY** KJS
EQUIPMENT John Deere 50G **SEEPAGE** ---
EXCAVATION METHOD Excavator **GROUNDWATER AT END** ---
NOTES _____ **GROUNDWATER AFTER EXCAVATION** ---

ELEVATION (ft)	GRAPHIC LOG	U.S.C.S.	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N ₆₀ VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N ₆₀ VALUE ▲					
											PL	LL				
											MC					
□ FINES CONTENT (%) □																
					0						0	20	40	60	80	100
484		SM	SILTY SAND: Medium dense, gray-brown, damp to moist, fine- to medium-grained, with roots (less than, and with cobbles (up to 8-inch diameter).		1				1							
					1.5											
					2											
					2.5											
					2											
					2.5											
482			PREDOMINANTLY WEATHERED BASALT: Very soft (R1), moist, gray, red, brown, and tan		3.5											
					4											
					4											
					4											
					4											
480					6											
					6											
					6											
478					8											
					8											

- Test pit terminated at about 8 feet bgs due to practical refusal on basalt.
- No groundwater or caving observed within the depth explored.
- Test pit loosely backfilled with cuttings upon completion.

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FIGURE 9

Test Pit TP-4

CLIENT Icon Construction - Darren Gusdorf	PROJECT NAME Cornwall Street Subdivision
PROJECT NUMBER G1504283	PROJECT LOCATION 4096 Cornwall Street, West Linn, Oregon
DATE STARTED 12/10/15 GROUND ELEVATION 468 ft	ELEVATION DATUM See Figure 2
EXCAVATION CONTRACTOR Icon Construction	LOGGED BY BLN REVIEWED BY KJS
EQUIPMENT John Deere 50G	SEEPAGE ---
EXCAVATION METHOD Excavator	GROUNDWATER AT END ---
NOTES	GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	U.S.C.S.	MATERIAL DESCRIPTION	GROUNDWATER DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N ₆₀ VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N ₆₀ VALUE ▲					
										PL	LL				
										MC					
										□ FINES CONTENT (%) □					
										0	20	40	60	80	100
466		SM	SILTY SAND: Medium dense, gray-brown, damp to moist, fine- to medium-grained, with roots (less than, and with gravel and boulders (up to 20-inch diameter).	0				0.5							
				1				1							
				2				1.5							
		CL	LEAN CLAY with gravel: Medium stiff to very stiff, gray-brown, exhibited medium plasticity, and with cobbles (up to 9-inch diameter). Light to moderate groundwater seepage observed at about 3 feet bgs.		GRAB TP4-1			1.5			22, 31, 45				
464			PREDOMINANTLY WEATHERED BASALT: Very soft (R1), moist, gray, red, brown, and tan	4				2.5							
				6				3.5							
462								4							
460			<ul style="list-style-type: none"> • Test pit terminated at about 7 feet bgs due to practical refusal on a boulder. • No caving observed within the depth explored. • Test pit loosely backfilled with cuttings upon completion. 												
458															

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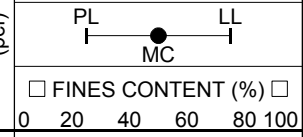
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FIGURE 10

Test Pit TP-5

CLIENT Icon Construction - Darren Gusdorf	PROJECT NAME Cornwall Street Subdivision
PROJECT NUMBER G1504283	PROJECT LOCATION 4096 Cornwall Street, West Linn, Oregon
DATE STARTED 12/10/15 GROUND ELEVATION 446 ft	ELEVATION DATUM See Figure 2
EXCAVATION CONTRACTOR Icon Construction	LOGGED BY BLN REVIEWED BY KJS
EQUIPMENT John Deere 50G	SEEPAGE ---
EXCAVATION METHOD Excavator	GROUNDWATER AT END ---
NOTES	GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	U.S.C.S.	MATERIAL DESCRIPTION	GROUNDWATER DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N ₆₀ VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N ₆₀ VALUE ▲	
										PL	LL
444		ML	SANDY SILT: Medium stiff to stiff, gray to brown, moist, exhibited low plasticity, with fine to coarse gravel and cobbles (up to 10-inch diameter), and with roots (up to 3-inch diameter).	0				0.5			
								0.5			
								1			
								2			
		CL	LEAN CLAY with gravel: Medium stiff to very stiff, gray-brown, exhibited medium plasticity, and with cobbles (up to 9-inch diameter).	2				2.5			
								3.5			
442			PREDOMINANTLY WEATHERED BASALT: Very soft (R1), moist, gray, red, brown, and tan	4				4			
			Moderate groundwater seepage observed at about 4 feet bgs.	4				4			
440				6							
438				8							



- Test pit terminated at about 8 feet bgs.
- No caving observed within the depth explored.
- Test pit loosely backfilled with cuttings upon completion.

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FIGURE 11

Test Pit TP-6

CLIENT Icon Construction - Darren Gusdorf	PROJECT NAME Cornwall Street Subdivision
PROJECT NUMBER G1504283	PROJECT LOCATION 4096 Cornwall Street, West Linn, Oregon
DATE STARTED 12/10/15 GROUND ELEVATION 450 ft	ELEVATION DATUM See Figure 2
EXCAVATION CONTRACTOR Icon Construction	LOGGED BY BLN REVIEWED BY KJS
EQUIPMENT John Deere 50G	SEEPAGE ---
EXCAVATION METHOD Excavator	GROUNDWATER AT END ---
NOTES	GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	U.S.C.S.	MATERIAL DESCRIPTION	GROUNDWATER DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N ₆₀ VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N ₆₀ VALUE ▲					
										PL	LL				
										MC					
										□ FINES CONTENT (%) □					
										0	20	40	60	80	100
		ML	SANDY SILT: Medium stiff to stiff, gray to brown, moist, exhibited low plasticity, with fine to coarse gravel, and with roots (up to 2-inch diameter).					0.5							
448		CL	LEAN CLAY with gravel: Medium stiff to very stiff, gray-brown, exhibited medium plasticity, and with cobbles (up to 9-inch diameter).	2	GRAB TP6-1			0.5							
								1.5							
								1.5							33
								2.5							
446			PREDOMINANTLY WEATHERED BASALT: Very soft (R1), moist, gray, red, brown, and tan	4				3							
			Moderate groundwater seepage observed at about 4 feet bgs.					4							
444				6											30

- Test pit terminated at about 7 feet bgs.
- No groundwater or caving observed within the depth explored.
- Test pit loosely backfilled with cuttings upon completion.

GGT EXPLORATION WITH WDCP G1504283.GPJ GINT US.GDT 1/7/16

442

440



Carlson Geotechnical
 7185 SW Sandburg Street
 Tigard, OT 97281
 Telephone: 503-601-8250
 Fax: 503-601-8254

FIGURE 12

Test Pit TP-7

CLIENT Icon Construction - Darren Gusdorf **PROJECT NAME** Cornwall Street Subdivision
PROJECT NUMBER G1504283 **PROJECT LOCATION** 4096 Cornwall Street, West Linn, Oregon
DATE STARTED 12/10/15 **GROUND ELEVATION** 460 ft **ELEVATION DATUM** See Figure 2
EXCAVATION CONTRACTOR Icon Construction **LOGGED BY** BLN **REVIEWED BY** KJS
EQUIPMENT John Deere 50G **SEEPAGE** ---
EXCAVATION METHOD Excavator **GROUNDWATER AT END** ---
NOTES _____ **GROUNDWATER AFTER EXCAVATION** ---

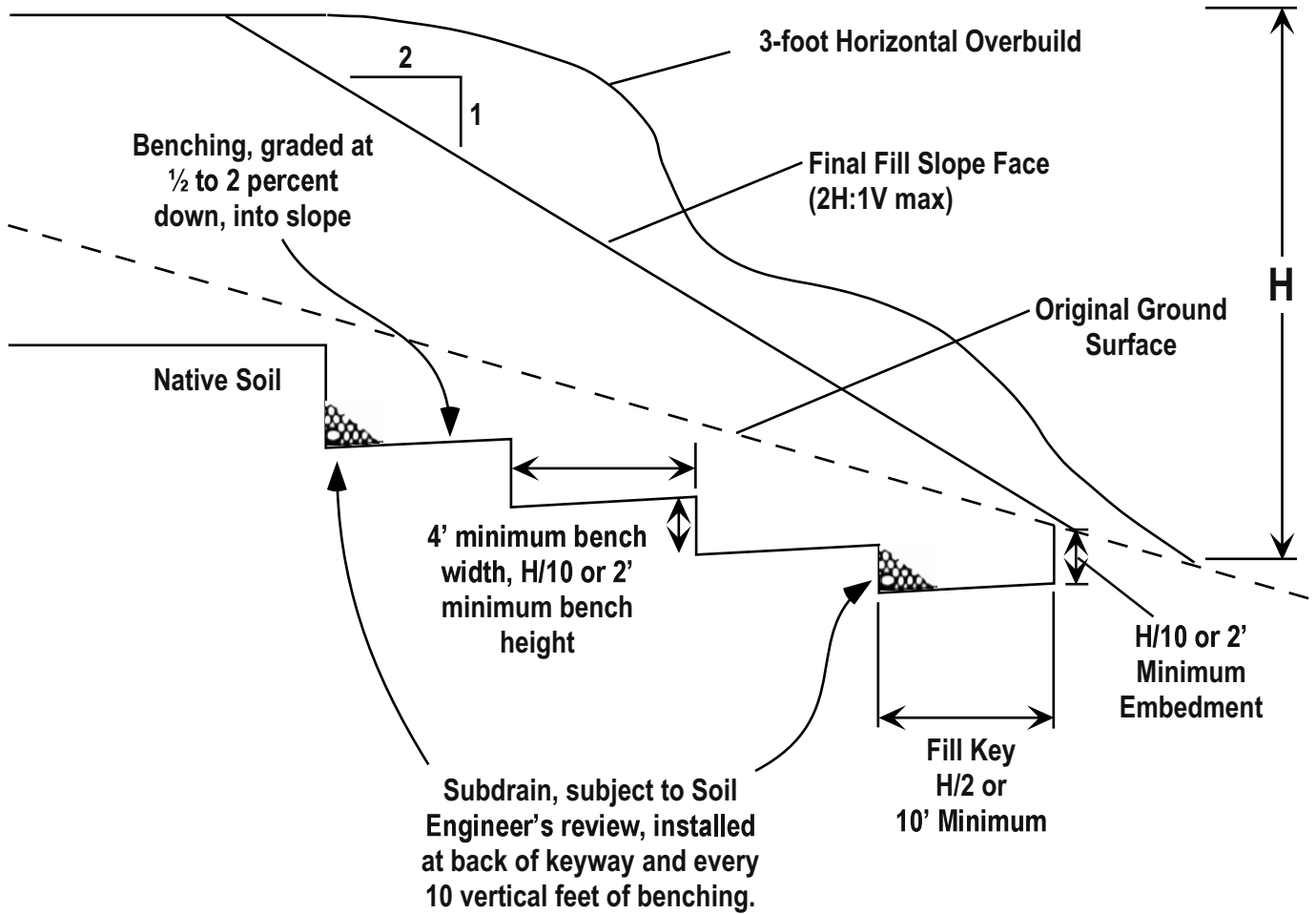
ELEVATION (ft)	GRAPHIC LOG	U.S.C.S.	MATERIAL DESCRIPTION	GROUNDWATER DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N ₆₀ VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N ₆₀ VALUE ▲	
										PL	LL
				0							MC
											0 20 40 60 80 100
		ML	SANDY SILT: Medium stiff to stiff, gray to brown, moist, exhibited low plasticity, with fine to coarse gravel, and with roots (up to 2-inch diameter).					0.5			
458		CL	LEAN CLAY with gravel: Medium stiff to very stiff, gray-brown, exhibited medium plasticity, and with cobbles (up to 9-inch diameter).	2				1			
456			PREDOMINANTLY WEATHERED BASALT: Very soft (R1), moist, gray, red, brown, and tan	4				4			
454				6							

- Test pit terminated at about 6 feet bgs.
- No groundwater or caving observed within the depth explored.
- Test pit loosely backfilled with cuttings upon completion.

CGT EXPLORATION WITH WDCP G1504283.GPJ GINT US.GDT 1/7/16

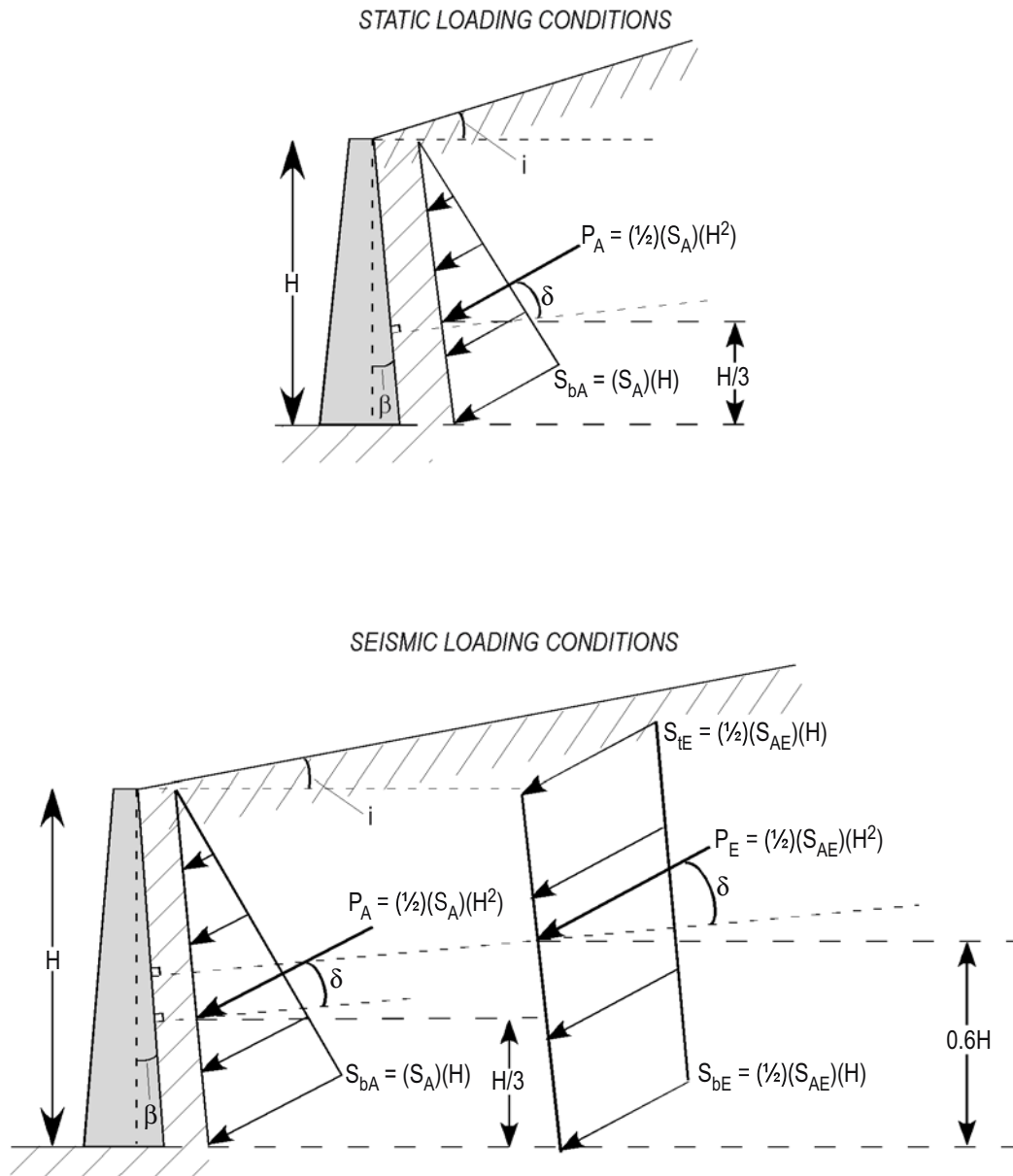
452

450



NOTE: Surfaces to receive fill with slopes steeper than 5H:1V (horizontal:vertical) should be benched and keyed as shown.

ACTIVE LATERAL PRESSURE DISTRIBUTION



LEGEND

P_A = Static active thrust force acting at a triangular distribution on wall (lb/ft³)
 P_E = Dynamic component of active thrust force acting at a uniform distribution on wall (lb/ft)
 i = Slope of backfill (degrees)**
 S_A = Active (static) component of equivalent fluid pressure (lb/ft³)*
 S_{tE} = Active earth pressure (dynamic) at the top of the wall (lb/ft³)
 S_{bA} = Active earth pressure (static) at the bottom of the wall (lb/ft³)

ϕ = Internal angle of friction for backfill (degrees)**
 δ = Angle from normal of back of wall (degrees). Based on friction developing between wall and backfill**
 β = Slope of back of wall (degrees)**
 S_{AE} = Dynamic component of equivalent fluid pressure (lb/ft³)*
 S_{bE} = Active earth pressure (dynamic) at bottom of the wall (lb/ft³)*

*Refer to report text for calculated values **Refer to report text for modeled/assumed values

Notes

1. Uniform pressure distribution of seismic loading is based on empirical evaluations [Sherif et al, 1982 and Whitman, 1990].
2. Placement of seismic resultant force at 0.6H is based on wall behavior and model test results [Whitman, 1990].



SIGNED ON: 20 FEB 17

REGISTERED
PROFESSIONAL
LAND SURVEYOR

OREGON
JULY 13, 2004
TOBY G. GOLDEN
60377LS

RENEWS: DECEMBER 31, 2017

Design by: Richard E. Givens, Planning Consultant
Survey Work by: Centerline Concepts, Inc.

Applicant/Owner:
Icon Construction & Development, LLC
1980 Willamette Falls Drive, Suite 200
West Linn, OR 97068
PH: (503) 657-0406

Legal: 2-1E-36BA TL 6300

Water: City of West Linn

Sewer: City of West Linn

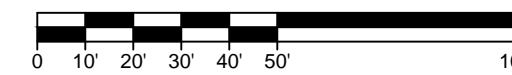
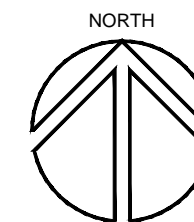
Contours: Centerline Concepts, Inc.

Site Area: 2.176 Acres

Engineer:
Theta Engineering, Inc.
PO Box 1345
Lake Oswego, OR 97035
PH: (503) 481-8822

Surveyor:
Centerline Concepts, Inc.
700 Molalla Ave.
Oregon City, OR 97045
PH: (503) 650-0188

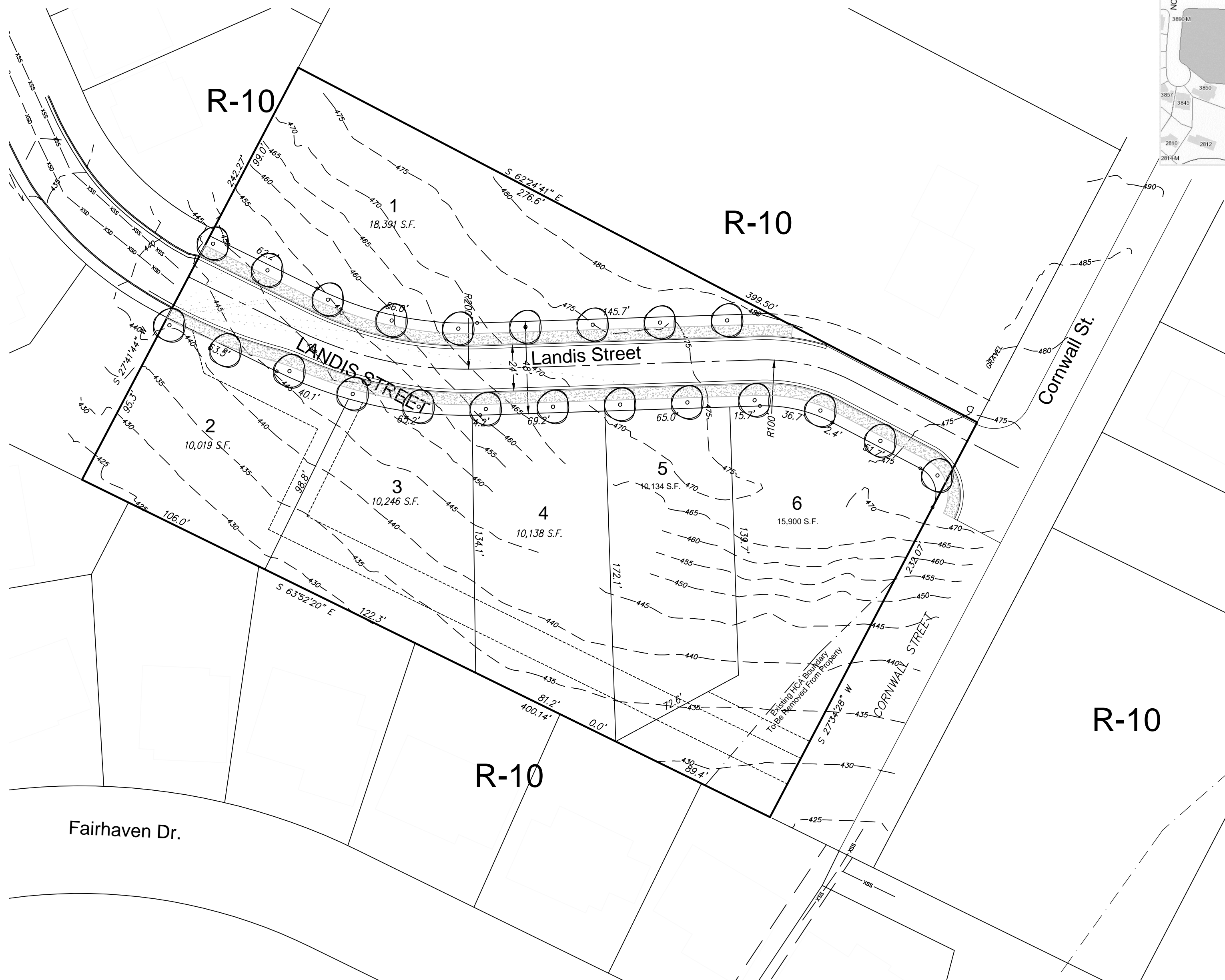
Zoning: R-10



Scale: 1" = 40'



Vicinity Map



Density Calculations			
	Area (sq. ft.)	Allowable Density	Units @ 1 per 10,000 sq.ft.
Gross Site Area	94,808		
Land in a boundary street right-of-way, water course, or planned open space where density transfer is not requested:	0		
Area in street right-of-way:	19,068		
Net Site Area:	75,740		
Area within Type I or II slopes where Developed:	20,587	50%	1.03
Area within Type I or II slopes where Density Will be Transferred:	0	75%	0
Area within Water Resource Area-all development transferred.	0	50%	0
Open Space (Type III and IV Lands)	0	100%	0.00
Type III & IV Land Developed:	55,153	100%	5.5
Base Density Allowed:			6
TOTAL ALLOWED DENSITY:			6 UNITS

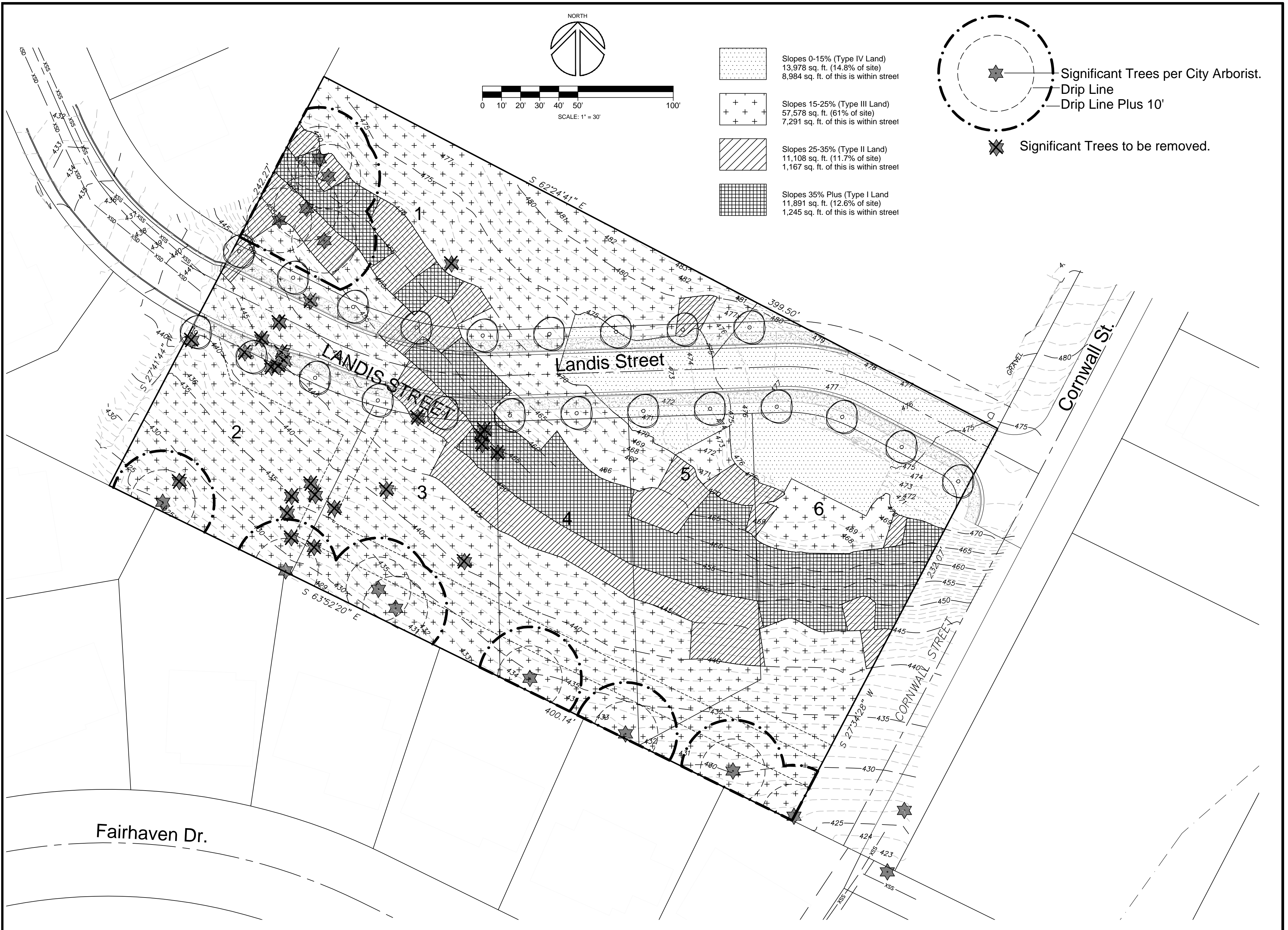
DESIGNED: REG			
DRAWN: REG			
SCALE: 1" = 30'			
DATE: Oct. 2017			
FILE: 15-ICN-112	DATE	NO.	REVISION

Richard E. Givens, Planning Consultant
18680 Sunblaze Dr.
Oregon City, OR 97045
PH: (503) 479-0097

APPLICANT: Icon Construction & Development, LLC
1980 Willamette Falls Drive, Suite 200
West Linn, OR 97068
PH: (503) 657-0406

Willow Ridge
Tentative Plan

SHEET:
1/2



DESIGNED: REG			
DRAWN: REG			
SCALE: 1" = 30'			
DATE: January 2017			
FILE: 15-ICN-112	DATE	NO.	REVISION

Richard E. Givens, Planning Consultant
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 Oregon City, OR 97045
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APPLICANT: Icon Construction & Development, LLC
 1980 Willamette Falls Drive, Suite 200
 West Linn, OR 97068
 PH: (503) 657-0406

Willow Ridge Trees & Slope Analysis Plan



EXISTING CONDITIONS

2010-129L

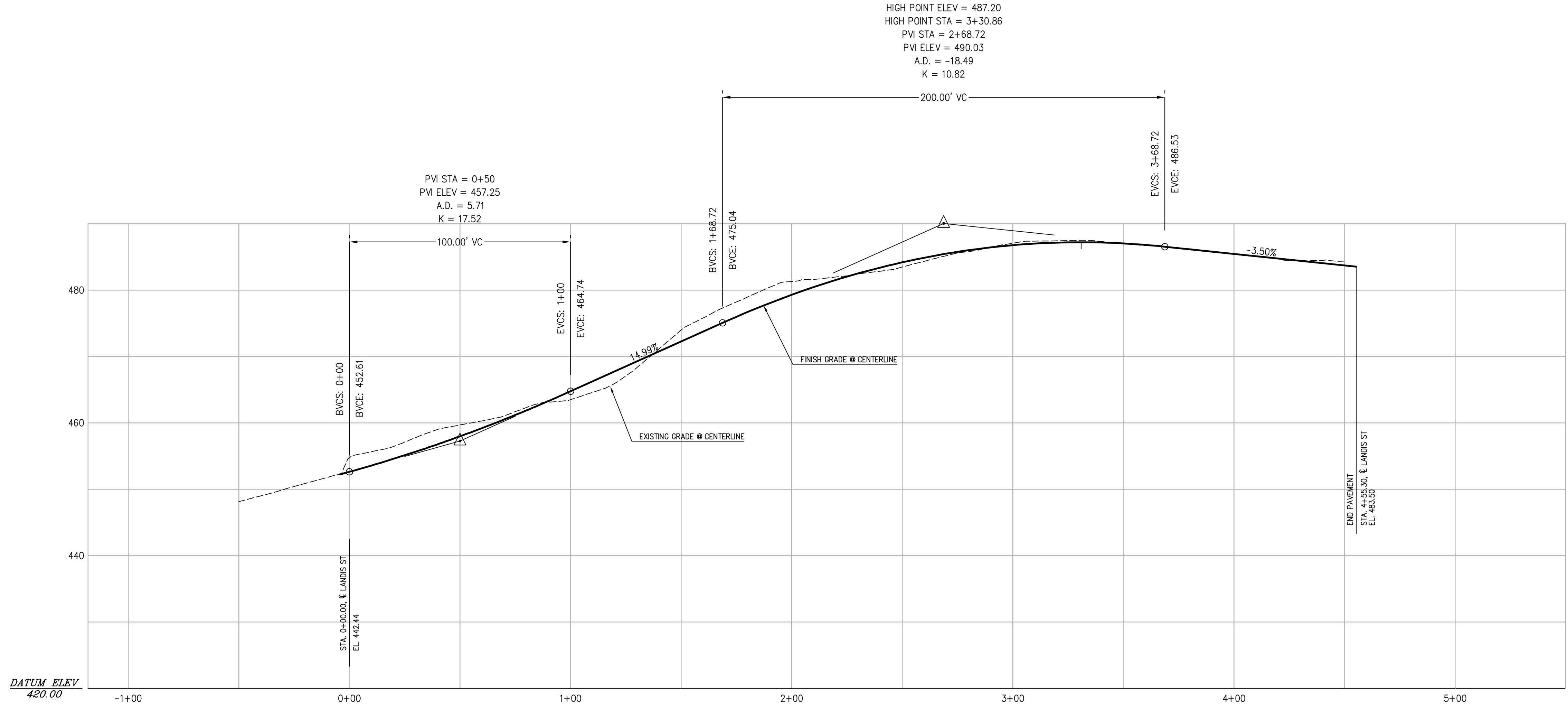
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DRAWN:	BJS			
SCALE:	1" = 30'			
DATE:	April, 2016			
FILE:	Corwall Street Prelim3	DATE	NO.	REVISION

Theta, llc
 ENGINEERING - SURVEYING - PLANNING
 PO Box 1345 503/481-8822
 Lake Oswego, Oregon 97035 email: thetaeng@comcast.net

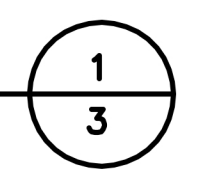
Icon Construction & Development, LLC
 1980 Willamette Falls Drive, Suite 200
 West Linn, Oregon 97068
 Phone: (503) 657-0406

Willow Ridge
 West Linn, Oregon

SHEET:
 1/4



**LANDIS STREET
CENTERLINE PROFILE**
SCALE: 1" = 30' HORIZONTAL
1" = 10' VERTICAL



2010-129L

PRELIMINARY STREET PROFILE

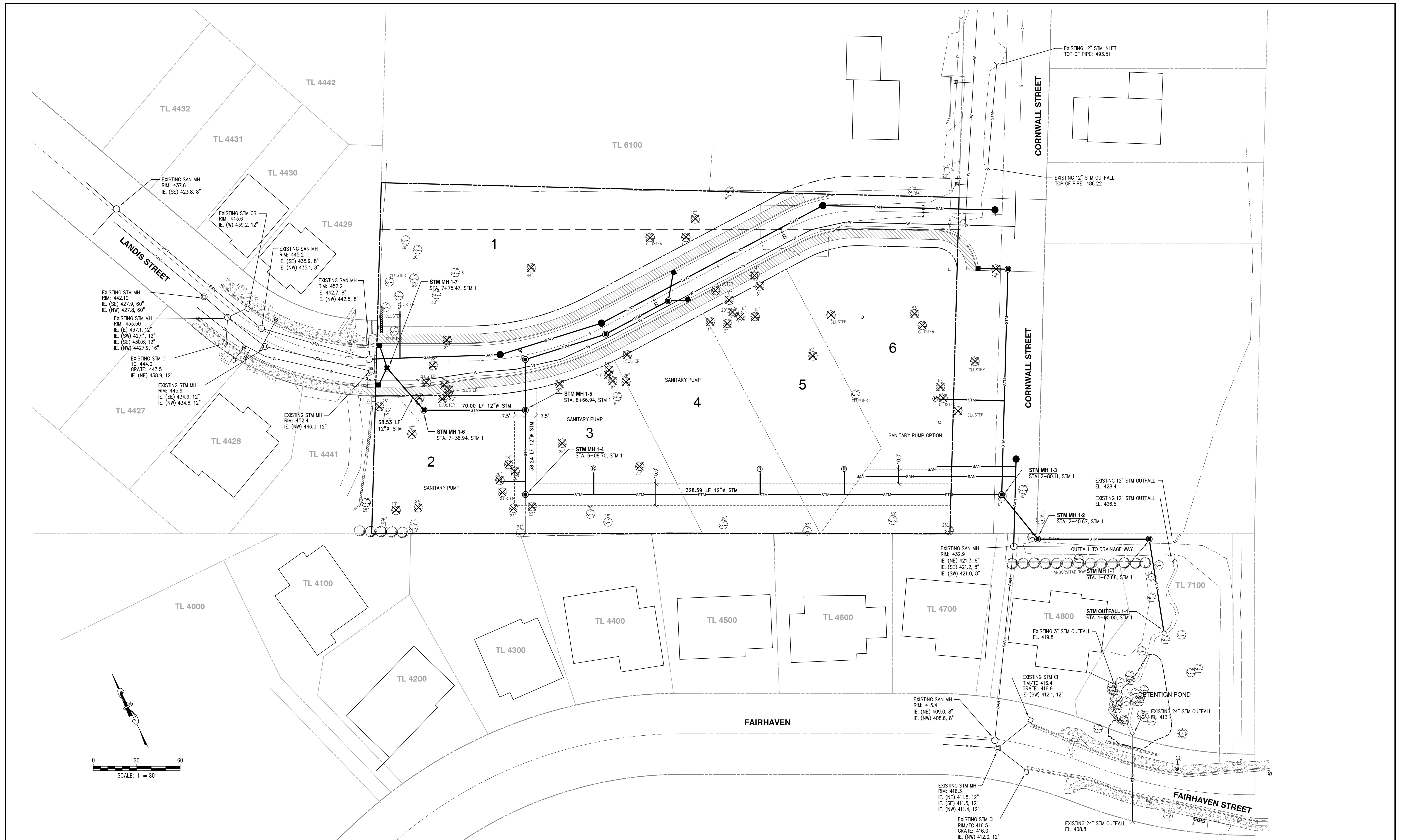
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DATE:	April, 2016			
FILE:	Cornwall Street Prelim3	DATE	NO.	REVISION

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Willow Ridge
 West Linn, Oregon

SHEET:
 3/4

PRELIMINARY UTILITY PLAN



PRELIMINARY GRADING PLAN

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DRAWN:	BJS			
SCALE:	1" = 30'			
DATE:	April, 2016			
FILE:	Cornwall Street Prelim3	DATE	NO.	REVISION

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