WITH BNG

Application Fee $ 2488

City of Sherwood Oregon

Home of the Tualatin River National Wildlife Refuge

Case No. MLP 13-01
Fee _____
Receipt # _____
Date _____
TYPE _____

City of Sherwood
Application for Land Use Action

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

- ☐ Annexation
- ☐ Plan Amendment (Proposed Zone _____)
- ☐ Variance(list standard(s) to be varied in description
- ☐ Site Plan (Sq. footage of building and parking area)
- ☐ Planned Unit Development
- ☐ Conditional Use
- X☒ Partition (# of lots 3 Lot partition
- ☐ Subdivision (# of lots _____)
- ☐ Other: _____

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

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

Owner/Applicant Information:

Applicant: John Satterberg/Community Financial Phone: 503 636 4800
Applicant Address: PO Box 1969 Lake Oswego, Or 97035 Email: _____
Owner: John Satterberg/Community Financial Phone: _____
Owner Address: _____ Email: _____
Contact for Additional Information: Kirsten Vanloo - 503 956 4180
kirsten@emeriodesign.com

Property Information:

Street Location: Denali Lane and Ironwood Lane
Tax Lot and Map No: 2S1 33 CB TL 1000
Existing Structures/Use: Vacant
Existing Plan/Zone Designation: VLDR zoning
Size of Property(ies) 3.7 acres

Proposed Action:

Purpose and Description of Proposed Action: 3 lot partition of site into 40,000 sf lots

Proposed Use: Single Family detached homes

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

Continued on Reverse

LAND USE APPLICATION FORM

Authorizing Signatures:

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

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

Applicant's Signature — Date: 4-17-2013

Owner's Signature John Satterberg — Date: 3/29/13

The following materials must be submitted with your application or it will not be accepted at the counter. Once taken at the counter, the City has up to 30 days to review the materials submitted to determine if we have everything we need to complete the review.

- ☐ **3 * copies of Application Form** completely filled out and signed by the property owner (or person with authority to make decisions on the property.
- ☐ **Copy of Deed** to verify ownership, easements, etc.
- ☐ **At least 3 * folded** sets of plans
- ☐ **At least 3 * sets** of narrative addressing application criteria
- ☐ **Fee** (along with calculations utilized to determine fee if applicable)
- ☐ **Neighborhood Meeting Verification** including affidavit, sign-in sheet and meeting summary (required for Type III, IV and V projects) NA
- ☐ **Signed checklist** verifying submittal includes specific materials necessary for the application process

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

Project Overview and Area History

This property has been evaluated by several developers over the past 10-15 years as a potential site for a small high-quality subdivision development. The downturn in residential subdivision values several years ago forced the return of this parcel to the investor/financial organization.

The site has development potential, however it is fraught with challenges.

1. The land is sloped and connection of the stub street – Denali – to Ironwood Lane is a serious design challenge. Coupled with the engineering challenges, the adjacent neighborhood activists are seriously opposed to a public street connection between Ironwood Lane and Denali Street.

2. The underlying rock sub-stratum requires a storm water management design that reduces underground piping and uses surface flows and shallow piping to convey waters for treatment and redistribution to the natural system.

3. There is evidence of soil contamination from earlier rural farm operations that included application of tannery wastes for "soil amendments" between 1962 and 1971. A comprehensive report was produced addressing the contamination titled: PUBLIC HEALTH ASSESSMENT – KEN FOSTER FARM – SHERWOOD, OREGON.

4. The lengthy "pole" of land 25 feet wide, extending 700 feet+ out to Murdock, provides no benefit to the property for development purposes. However, city staff believes that because the property has "frontage" along Ironwood Lane, any development of the site requires improvements to this country lane.

5. A PUD design was developed for the property using the concept plans promulgated in the SE Sherwood Master Plan. All of the alternative concept plans in the Master Plan included 8 residential lots on the subject property. For this reason, the prior preliminary plan was designed for 8 lots with a minimum 10,000 square foot area. That proposal was denied, with a reduction to a maximum of 6 lots. The property owner performed an extensive construction cost analysis for the project as approved by the City Council and determined that the required infrastructure was prohibitively expensive for a resulting six lot project.

6. Subsequent efforts on the part of this property owner to work with the Planning Commission and the City Council to revise the Development Code to support the density concepts in the SESMP have to date been unsuccessful.

SE Sherwood Master Plan

The subject site is within the study area that was the focus of the SE Sherwood Master Plan community involvement process. The intent of the *plan* was to coordinate the separate land use actions and infrastructure investments of property owners, developers, and the City of Sherwood to create a cohesive, livable neighborhood. The goals of the study were to plan:

A. A pedestrian friendly transportation system that will link the site with nearby residential developments, parks, school, commercial sites and other destinations;
B. An increase in residential densities;
C. A land use plan that provides for a mix of housing types that is compatible with adjacent uses;
D. Conceptual plans for public facilities (roads, paths, water, sewer and storm drainage) needed to support the land use plan;
E. Implementing strategies including map and text amendments for the City to adopt (to be prepared by the City); and
F. A high level of neighborhood and citizen involvement.

Goals A, C, D, and E were never achieved. The plan was never adopted by the City Council and has no implementation methodology.

In light of the unsuccessful previous land development/text amendment actions by the property owner, this application is presented to the City of Sherwood for approval in order to position the property for sale to a qualified developer/builder. The proposal is for a three lot partition, with tracts set aside for *CWS easement-encumbered* vegetated corridors. Each lot is a minimum of 40,000 square feet as required by the development code. The termination of Denali will be accomplished with a private hammerhead street improvement protected with access easements.

Nominal street improvements along Ironwood Lane, as per the recent comments by the City Engineer **MAY BE** acceptable – only if other options, including **a waiver of remonstrance to future street improvements as provided by the Development Code** are vetoed by the City Engineer.

The VLDR zone provides a density of one unit/acre with a minimum lot size of 40,000 square feet.

City of Sherwood Zoning and Community Development Code

Chapter 16.12 VERY LOW DENSITY RESIDENTIAL (VLDR)*

16.12.010 Purpose
The VLDR zoning district provides for low density, larger lot single-family housing and other related uses in natural resource and environmentally sensitive areas warranting preservation, but otherwise deemed suitable for limited development, with a density of 0.7 to 1 dwelling unit per acre. ……. Minor land partitions shall be exempt from the minimum density requirement.

16.12.020 Permitted Uses
Response: The proposed project is a three lot partition with additional tracts to satisfy CWS vegetated corridors requirements. The proposed lots are a minimum of 40,000 sq. ft. each.

16.12.040 Dimensional Standards

A. Lot Dimensions.

Except as modified under Chapter 16.68 (Infill Development), Section 16.144.030 (Wetland, Habitat and Natural Areas), or as otherwise provided, required minimum lot areas and dimensions shall be:

1.	***Lot area (conventional):***	***40,000 square feet***

Response: As allowed all lots are a minimum of 40,000 square feet. Lot widths are greater than 25' at the front property line.

B. Setbacks.

Except as modified under Chapter 16.68 (Infill Development), Section 16.144.030 (Wetland, Habitat and Natural Areas), or as otherwise provided, required minimum setbacks shall be:

1.	*Front yard:*	*20 feet*
2.	*Side yard:*	
	a. Single-Family Detached:	*5 feet*
	b. Corner Lots (street side):	*20 feet*
	c. Single-Family Attached (one side):	*20 feet*
3.	*Rear yard:*	*20 feet*
4.	*Accessory buildings see Chapter 16.50 -- Accessory Uses*	

Response: All future development on the proposed lots will comply with the setback requirements.

C. Height

Except as otherwise provided for accessory structures, and for infill development under Chapter 16.68, the maximum height of structures shall be two (2) stories or thirty (30) feet.....

Response: All dwellings will be a maximum of 2 stories or 30 feet in height, whichever is less.

16.12.050 Community Design

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

Response: None of these standards apply to this application for a three lot partition.

16.12.060 Floodplain

Response: No floodplains exist on the site.

Chapter 16.94 Off-Street Parking and Loading*

16.94.020 Off-Street Parking Standards

Minimum and Maximum Parking Standards

	Minimum	*Maximum A*	*Maximum B*
*Single, two-family & Manufactured Home on lot**	*1 per du*	*None*	*None*
** An enclosed building or garage associated with any residential dwelling type cannot be counted towards the parking space requirement for that unit. Further, if the street on which the house has access is less than 28 feet wide, 2 off-street parking spaces are required per single-family residential unit (includes single-family detached or attached, two-family dwelling or a manufactured home on an individual lot). If the abutting street is 28-feet or wider, one standard (9 ft × 18 ft) parking space is required.*			

Response: Each proposed lot will have more than the minimum of 1 off-street parking space provided in the driveway of the home.

Transportation Facilities
16.106.020 Required Improvements

B Existing Streets

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

Response: The parcel under consideration has 700+ feet of "frontage" along the south side of the Ironwood Lane ROW. The parcel also has a local public street "stubbing" into the site on the south PL, that being the northern terminus of Denali Lane.

C. Proposed Streets

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

Response: The parcel under consideration has a local public street "stubbing" into the site on the south PL, that being the northern terminus of Denali Lane. While extension of this street is shown as a "conceptual local connection" on city transportation maps, it is not financially realistic to build this local street connection with the current zoning of VLDR on the subject property. At a density of one unit per 40,000 sq. ft. of net lot area, the site can only be developed with three lots. The dedication of public ROW of approximately 25,000 sq. ft. and the costs associated with construction of the potential street improvements are not proportional to the development impacts and thus findings cannot be made by the City that demonstrate fair proportionality between the <u>*desired street improvement of the extension of Denali Lane*</u> and the impacts of three large lots.

The approval of this application and the eventual platting of three lots will result in two additional single family lots accessing the existing termination of Denali Lane. That result will contribute approximately 20 ADT to the local street system in Sherwood View Estates, which has a total of less than 70 single family lots. The total ADT (>700) for the entire Sherwood View Estates development including the two proposed lots accessing the end of Denali Lane will be less than that typically acceptable for a local street. The street system in Sherwood View Estates is completely built with improvements that were conditioned and constructed at the time of the original development approvals. Based on the excerpts below, since there is no need for any additional street extensions/improvements related to Denali Lane, the City does not have the legal authority to "take"

the land for a new local street extension, nor can they require this development to "provide" any additional street improvements on the existing street system within Sherwood View Estates.

"roughly proportional" means "roughly equivalent." Thus, in order to be valid, the cost of an exaction must be roughly equivalent to the cost that a local government would incur to address (or "assuage") the impact attributable to a new development.

The U.S. Supreme Court agreed that proportionality "animates" the Takings Clause: "The Fifth Amendment's guarantee . . . was designed to bar the Government from forcing some people alone to bear public burdens which, in all fairness and justice, should be borne by the public as a whole."

D. Extent of Improvements

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

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

a. A partial improvement is not feasible due to the inability to achieve proper design standards;

b. A partial improvement may create a potential safety hazard to motorists or pedestrians.

c. Due to the nature of existing development on adjacent properties it is unlikely that street improvements would be extended in the foreseeable future and the improvement associated with the project under review does not, by itself, provide a significant improvement to street safety or capacity;

d. The improvement would be in conflict with an adopted capital improvement plan;

e. The improvement is associated with an approved land partition on property zoned residential use and the proposed land partition does not create any new streets; or

f. Additional planning work is required to define the appropriate design standards for the street and the application is for a project that would contribute only a minor portion of the anticipated future traffic on the street.

Response: The property under consideration has 700+ feet of "frontage" along the south side of the Ironwood Lane ROW. The proposed minor partition is designed to allow access to Ironwood Lane by only one future parcel/dwelling – Parcel 1. Based on a careful reading of the standards above, especially those highlighted, this partition application qualifies for a ***future improvements guarantee*** otherwise known as a "non-remonstrance agreement" or "L.I.D. waiver for future public street improvements".

The approval of this project and subsequent construction of one dwelling unit on proposed parcel 1 will contribute exactly the same impact to Ironwood Lane as the construction of ONLY one house on the total existing parcel, if that parcel were to take vehicular access to Ironwood Lane. That impact is 10 ADT. If a new house on a lot of record – impacting the public street with 10 ADT - cannot be required to provide any public street improvements (and it can't), then a new lot as part of a partition approval that allows only one house to take vehicular access to Ironwood Lane– impacting the public

street with 10 ADT – puts no greater "burden" or impact on the public street system and shouldn't be required to bear the cost of street improvements meant to benefit the general public.

To provide greater detail:

- Until the SESMP issues are resolved and the Plan is adopted, development is this area – accessing Ironwood Lane – will probably not materialize and the street will not extend. Further, the improvements associated with this application for a minor partition do not – by themselves – provide significant improvement to street safety or capacity, thus complying with criteria (c).
- The City-Engineer-requested street improvement is associated with a minor partition and no new public streets are proposed, thus complying with criteria (e).
- Significant additional planning work must be completed with the Southeast Sherwood Master Plan to define the design standards for Ironwood Lane and the remainder of the SESMP area and this application is for a project (one dwelling unit accessing Ironwood Lane) that contributes a VERY MINOR portion of the anticipated future traffic on Ironwood Lane, thus complying with criteria (f).

Included with this set of findings is an example document from the City of Tigard that can be used as a waiver of remonstrance or ***future improvements guarantee*** to be signed and executed by the developer/buyer/builder on proposed Lot 1.

16.106.030 - Location

A. Generally

The location, width and grade of streets shall be considered in their relation to existing and planned streets, topographical conditions, and proposed land uses. .....

B. Street Connectivity and Future Street Systems

.....

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

a. Physical or topographic conditions make a street or accessway connection impracticable. Such conditions include but are not limited to freeways, railroads, steep slopes, wetlands or other bodies of water where a connection could not reasonably be provided.

Response: The parcel under consideration has a local public street "stubbing" into the site on the south PL, that being the northern terminus of Denali Lane. While extension of this street is shown as a "conceptual local connection" on city transportation maps, it is not financially realistic to build this local street connection with the current zoning of VLDR on the subject property. A concept plan and profile was developed for the extension of Denali Lane as part of a prior submittal. The local street extension could only be achieved with modifications including - horizontal alignment, vertical alignment, and maximum grade - to the local public street standards. Additionally the Fire Marshal required any homes built along that proposed public street to have residential fire sprinkler systems installed because the street design did not comply with their standards.

At a density of one unit per 40,000 sq. ft. of net lot area, the site can only be developed with three lots. The dedication of public ROW of approximately 25,000 sq. ft. and the costs associated with construction of the potential street improvements are not proportional to the development impacts and thus findings cannot be made by the City that demonstrate fair proportionality between the *desired street improvement of the extension of Denali Lane* and the impacts of three large lots.

16.106.040 – Design

N. Private Streets

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

Response: The parcel under consideration has a local public street "stubbing" into the site on the south PL, that being the northern terminus of Denali Lane. Extending north from the terminus of the public street will be a shared driveway/emergency vehicle turn-around that will be constructed to meet the standards of TVF &R for accommodating emergency vehicles. This private driveway/emergency vehicle access will serve only the two new lots adjacent to the Denali Lane terminus. Access, maintenance, and restrictions will be addressed through final platting documents and necessary easements. The private driveway will be signed "Private" "No Outlet" as required by the City.

16.106.060 - Sidewalks

Response: The parcel under consideration will not be required to construct any sidewalks.

16.106.080 – Bike Paths

Response: The parcel under consideration will not be required to construct any bike paths.

Chapter 16.110 SANITARY SEWERS*

Response: The three proposed lots have direct access to existing sanitary sewer and laterals will be installed to serve each of the three homes.

Chapter 16.112 WATER SUPPLY*

Response: The three proposed lots have direct access to existing water service and laterals will be installed to serve each of the three homes.

Chapter 16.114 STORM WATER*

16.114.010 Required Improvements

Storm water facilities, including appropriate source control .....

16.114.020 Design Standards

A. Capacity

B. On-Site Source Control

C. Conveyance System

Response: The three proposed lots have sufficient land area to provide necessary infiltration of roof drains and impervious surface flow for each of the three homes. A geo-tech report is included with the application and an engineer's analysis of the on-site storm water management proposal is included as well.

Chapter 16.116 FIRE PROTECTION*

Response: The Fire Marshal **may** require residential fire sprinkler systems in each of the new homes in addition to the public hydrant system proposed with this preliminary engineering plan set.

Chapter 16.118 PUBLIC AND PRIVATE UTILITIES*

Response: Preliminary engineering details are included to demonstrate public utility easements and planned improvements to meet the design criteria.

Chapter 16.120 GENERAL PROVISIONS*

16.120.010 Purpose

Subdivision and land partitioning regulations are intended to promote the public health, safety and general welfare; .....

16.120.020 Platting Authority

A. Approval Authority

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

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

B. Future Partitioning

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

C. Required Setbacks

All required building setback lines as established by this Code, shall be shown in the subdivision plat or included in the deed restrictions.

D. Property Sales

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

Response: The proposed preliminary partition complies with the standards set forth above.

Chapter 16.122 PRELIMINARY PLATS*

16.122.020 - Approval Criteria: Preliminary Plat

Partitions shall not be approved unless:

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

B. The partition dedicates to the public all required common improvements and areas including but not limited to streets, parks, floodplains, and sanitary sewer, storm water, and water supply systems.

C. Adequate water, sanitary sewer and other public facilities exist to support the proposed use of the partitioned land, as determined by the City and are in compliance with City standards. For the purposes of this section:

> *1. Connection to the City water supply system shall be deemed to be adequate water service.*
>
> *2. Connection to the City sewer system shall be deemed to be adequate sanitary sewer service if sewer lines are within three-hundred (300) feet of the partition or if the lots created are less than 15,000 square feet in area. Installation of private sewage disposal facilities shall be deemed adequate on lots of 15,000 square feet or more if the private system is permitted by County Health and City sewer lines are not within three-hundred (300) feet.*

3. The adequacy of other public facilities such as storm water and streets shall be determined by the City Manager or his/her designee based on applicable City policies, plans and standards for said facilities.

D. Adjoining land can be developed, or is provided access that will allow future development, in accordance with this Code.

E. Future Development Ability

In addition to the findings required by Section 16.122.010, the City Manager or his/her designee must find, for any partition creating lots averaging one (1) acre or more, that the lots may be re-partitioned or resubdivided in the future in full compliance with the standards of this Code. The City Manager or his/her designee may require the applicant to submit partition drawings or other data confirming that the property can be resubdivided. If re-partitioning or resubdividing in full compliance with this Code is determined not to be feasible, the City Manager or his/her designee shall either deny the proposed partition, require its redesign, or make a finding and condition of approval that no further partitioning or subdivision may occur, said condition to be recorded against the property.

Response: The proposed preliminary partition complies with the standards set forth above. The application will be reviewed by the appropriate review authority and conditions may be applied to the decision to ensure compliance with all of the development code requirements. The proposed lots are less than one acre in size so no "shadow" plat design is necessary.

16.126.020 Easements

A. Utilities

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

Response: The proposed preliminary partition plat complies with the standards set forth above.

16.128.010 Blocks

Response: The parcel under consideration will not have any blocks or be part of a development that has blocks..

16.128.030 Pedestrian and Bicycle Ways

Response: The parcel under consideration will not be required to construct any bike paths.

16.128.030 Lots

A. Size and Shape

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

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

B. Access

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

C. Double Frontage

Double frontage and reversed frontage lots are prohibited except where essential to provide separation of residential development from railroads, traffic arteries, adjacent nonresidential uses, or

to overcome specific topographical or orientation problems. A five (5) foot wide or greater easement for planting and screening may be required.

D. Side Lot Lines

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

E. Grading

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

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

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

Response: The proposed preliminary partition complies with the standards set forth above.

RETURN RECORDED DOCUMENT TO:
CITY HALL RECORDS DEPARTMENT,
CITY OF TIGARD
13125 SW Hall Blvd.
Tigard, OR 97223

INDIVIDUAL

File No._____

WAIVER

(NON-REMONSTRANCE AGREEMENT)

STREET IMPROVEMENT

Space above reserved for Washington County Recording Information

The undersigned owners (including purchasers) of the real property described below do hereby record their consent to the formation of a local improvement district by the City of Tigard for the purposes of improving the public streets upon which the described property abuts. The undersigned expressly waive all present and future rights to oppose or remonstrate against the formation of a local improvement district for the improvement of the abutting street or streets, reserving only the right to contest the inclusion of particular cost items in the improvement district proceeding and any right they may have under the laws of the State of Oregon to contest the proposed assessment formula.

The real property that is the subject of this consent covenant is described on Exhibit A.

IN WITNESS WHEREOF, I hereunto set my hand on this _____ day of _____, 20____.

_____	_____
Print Name	Print Name
_____	_____
Signature	Signature
_____	_____
Address	Address
_____	_____

STATE OF OREGON)
) ss.
County of Washington)

This instrument was acknowledged before me on _____ (date) by: _____
_____(name of person(s)).

_____
Notary's Signature
My Commission Expires: _____

Accepted on behalf of the City of Tigard this _____ day of _____, 20____.

_____
City Engineer

NO CHANGE IN TAX STATEMENT

Washington County, Oregon 2010-032286
04/29/2010 02:05:49 PM
D-DLF Cnt=1 Stn=8 C MCKINNEY
$15.00 $5.00 $11.00 $15.00 $20.00 - Total = $66.00
01476915201000322860030034
I, Richard Hobernicht, Director of Assessment and Taxation and Ex-Officio County Clerk for Washington County, Oregon, do hereby certify that the within instrument of writing was received and recorded in the book of records of said county.
Richard Hobernicht, Director of Assessment and Taxation, Ex-Officio County Clerk

AFTER RECORDING RETURN TO:
Jordan Schrader Ramis PC
Two Centerpointe Dr Ste 600
Lake Oswego OR 97035
(46593-38159 – CLK)

UNTIL A CHANGE IS REQUESTED
SEND TAX STATEMENTS TO:
Community Financial Corporation
Attn: John Satterberg
412 A St Ste 150
Lake Oswego OR 97034

This space is reserved for recorder's use.

25-2010-5610

Recorded By Fidelity National Title
Courtesy Only. Not Examined

NON-MERGER DEED IN LIEU OF FORECLOSURE BARGAIN AND SALE DEED

J.C. REEVES CORPORATION, an Oregon corporation ("Grantor"), hereby conveys to COMMUNITY FINANCIAL CORPORATION, an Oregon corporation ("Grantee"), the following real property located in Washington County, Oregon:

> Parcel 2, PARTITION PLAT NO. 1991-078, in the City of Sherwood, County of Washington and State of Oregon.

(herein the "Denali Property" or the "Property"), together with any interest therein which Grantor may hereafter acquire.

This Deed is absolute in effect and conveys fee simple title to the Property to Grantee and does not operate as a mortgage, trust conveyance, or security of any kind. Grantee shall not be deemed to have accepted this Deed until and unless Grantee causes this Deed to be recorded. Grantee shall be entitled to immediate possession of the Property.

This Deed does not constitute a merger of the fee simple title and the lien of that certain Deed of Trust dated August 25, 2008 and recorded August 27, 2008, as Document No. 2008-073891 in the Records of Washington County, Oregon ("Deed of Trust"). The fee title and the lien of the Deed of Trust shall hereafter remain separate and distinct until Grantee and the beneficiary of the Deed of Trust ("Beneficiary") merge those interests with a separate instrument. Grantee does not assume any prior liens or obligations secured

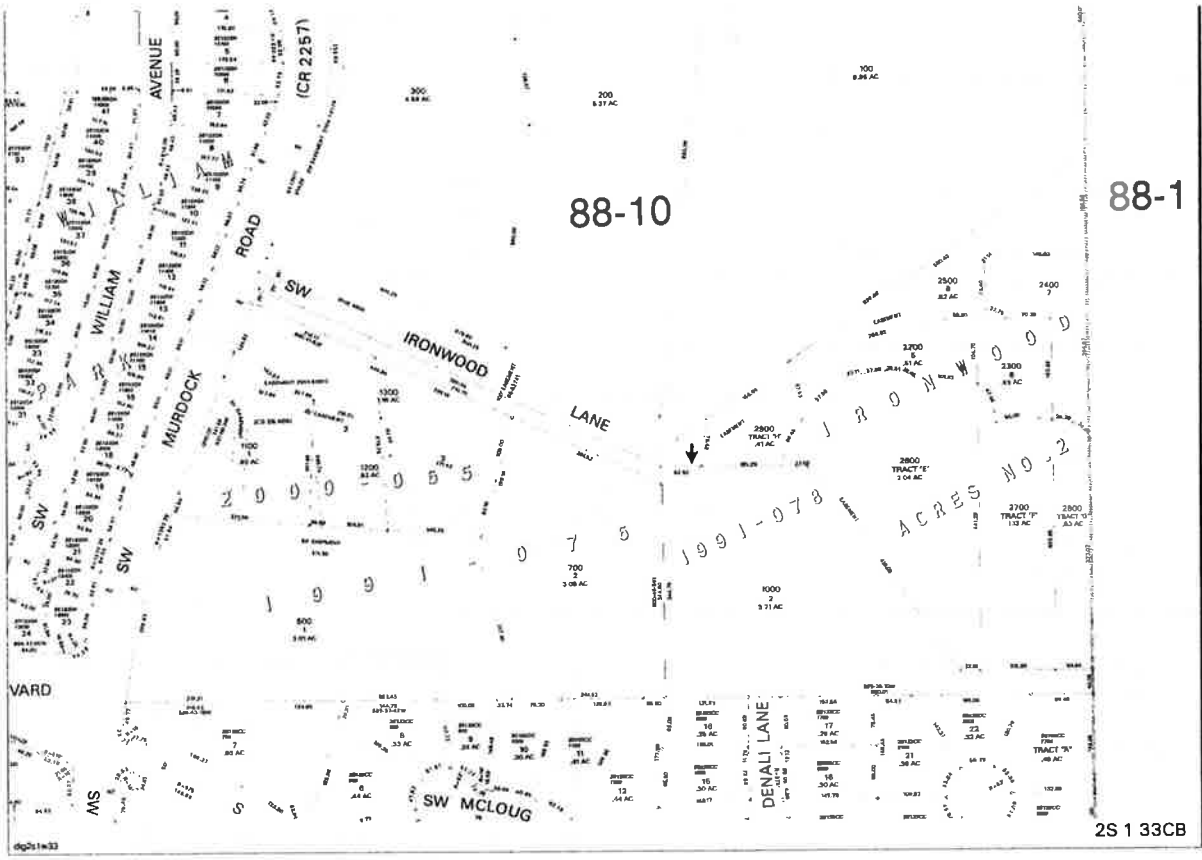
Title Data, Inc. FI POR10569 WN 2010032286.001

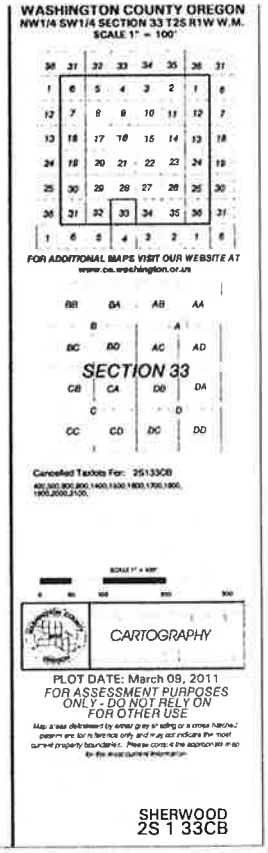
Fidelity National Title

Company Of Oregon

900 SW 5th Ave., Mezzanine Level Portland, Oregon 97204
Phone: (503) 227-LIST (5478) E-mail: csrequest@fnf.com

Parcel # : R2017553 **Ref Parcel Number : 2S133CB 01000**





The map is copied from the public records and is provided solely for the purpose of assisting in locating the premises. Fidelity National Title assumes no liability for variations, if any, in dimensions, area or location of the premises or the location of improvements ascertained by actual survey.

Fidelity National Title

Company Of Oregon

Prepared By:
Date: 4/30/2013

900 SW 5th Ave., Mezzanine Level Portland, Oregon 97204
Phone: (503) 227-LIST (5478) E-mail: csrequest@fnf.com

OWNERSHIP INFORMATION

Owner	: **Community Financial Corp**	Bldg #	Of
CoOwner	:	Ref Parcel Number	: 2S133CB 01000
Site Address	: *no Site Address* Sherwood 97140	T: 02S R: 01W S: 33 Q: SW QQ: NW	
Mail Address	: 412 A Ave #150 Lake Oswego Or 97034	Parcel Number	: R2017553
Telephone	:	County	: **Washington (OR)**

SALES INFORMATION

Transfer Date	: 04/29/2010	Document #	: 32286
Sale Price	:	Deed Type	: In Lieu of Forc
% Owned	: 100	Vesting Type	: Corporation
Prior Transfer Date	: 07/11/1996	Prior Document #	: 62248
Prior Sales Price	: $122,500		

PROPERTY DESCRIPTION

Map Page Grid	:
Census Tract	: 330.00 Block: 4
Neighborhood	: 4TL0
Subdivision/Plat	:
School District	: Sherwood
Class Code	:
Land Use	: 1900 Vacant,Res,Potential Devel
Legal	: PARTITION PLAT 1991-078, LOT 2,
	: ACRES 3.71
	:

ASSESSMENT AND TAX INFORMATION

Mkt Land	: $480,820
Mkt Structure	:
Mkt Total	: $480,820
%Improved	:
M50AssdTotal	: $158,950
Levy Code	: 08810
12-13 Taxes	: $3,006.21
Millage Rate	: 18.9129

PROPERTY CHARACTERISTICS

Bedrooms	:	Year Built	:	Attic SqFt	:
Bathrooms	:	EffYearBlt	:	Deck SqFt	:
Heat Method	:	BsmFin SF	:	Ext Finish	:
Foundation	:	BsmUnfinSF	:	Const Type	:
Lot Acres	: 3.71	Bldg SqFt	:	Roof Shape	:
Lot SqFt	: 161,608	1stFlrSF	:	Roof Matl	:
Garage Type	:	UpperFlSF	:	InteriorMat	:
Garage SF	:	Porch SqFt	:	Paving Matl	:

This title information has been furnished, without charge, in conformance with the guidelines approved by the State of Oregon Insurance Commissioner. The Insurance Division cautions intermediaries that this service is designed to benefit the ultimate insureds. Indiscriminate use only benefiting intermediaries will not be permitted. Said services may be discontinued. No liability is assumed for any errors in this report.

by the Property. Grantee reserves Grantee's rights to foreclose the Deed of Trust at any time as to any party with any claim, interest, or lien on the Property.

Grantor directs and authorizes Grantee to collect any rentals due with respect to the Property.

Grantor acknowledges that the debt secured by the Deed of Trust is in default, that the Deed of Trust is subject to immediate foreclosure by Grantee, that Grantor is unable to pay or to cure the defaults, and that Grantor therefore desires to avoid litigation by granting this Deed in Lieu of Foreclosure.

Grantor is not acting under misapprehension as to the legal effect of this Deed or under duress, undue influence, or misrepresentation by Grantee or by Grantee's agent or attorney or by any other person.

Grantor acknowledges that the Deed of Trust is valid, subsisting and binding, and shall remain in force and effect.

Grantor hereby waives, surrenders, conveys, and relinquishes to Grantee any equity of redemption and statutory rights of redemption in respect to the Property. The true consideration for this instrument is Grantee's waiver of Grantee's right to enforce judgment against Grantor personally under the Promissory Note secured by the Deed of Trust and specifically Grantee's waiver of Grantee's right to enforce judgment against Grantor for deficiency.

Grantee does not expressly or impliedly agree to assume or to pay any principal balance of any debt, lien, charge, or obligation which encumbers, relates to, or is attributable to the Property.

BEFORE SIGNING OR ACCEPTING THIS INSTRUMENT, THE PERSON TRANSFERRING FEE TITLE SHOULD INQUIRE ABOUT THE PERSON'S RIGHTS, IF ANY, UNDER ORS 195.300, 195.301 AND 195.305 TO 195.336 AND SECTIONS 5 TO 11, CHAPTER 424, OREGON LAWS 2007, AND SECTIONS 2 TO 9 AND 17, CHAPTER 855, OREGON LAWS 2009. THIS INSTRUMENT DOES NOT ALLOW USE OF THE PROPERTY DESCRIBED IN THIS INSTRUMENT IN VIOLATION OF APPLICABLE LAND USE LAWS AND REGULATIONS. BEFORE SIGNING OR ACCEPTING THIS INSTRUMENT, THE PERSON ACQUIRING FEE TITLE TO THE PROPERTY SHOULD CHECK WITH THE APPROPRIATE CITY OR COUNTY PLANNING DEPARTMENT TO VERIFY THAT THE UNIT OF LAND BEING TRANSFERRED IS A LAWFULLY ESTABLISHED LOT OR PARCEL, AS DEFINED IN ORS 92.010 OR 215.010, TO VERIFY THE APPROVED USES OF THE LOT OR PARCEL, TO DETERMINE ANY LIMITS ON LAWSUITS AGAINST FARMING OR FOREST PRACTICES, AS DEFINED IN ORS 30.930, AND TO INQUIRE ABOUT THE RIGHTS OF NEIGHBORING PROPERTY OWNERS, IF ANY, UNDER ORS 195.300, 195.301

Title Data, Inc. FI POR10569 WN 2010032286.002

AND 195.305 TO 195.336 AND SECTIONS 5 TO 11, CHAPTER 424, OREGON LAWS 2007, AND SECTIONS 2 TO 9 AND 17, CHAPTER 855, OREGON LAWS 2009.

DATED this 28TH day of April, 2010.

J.C. REEVES CORPORATION, an Oregon corporation

By: Jerry C Reeves
Jerry C. Reeves, President

STATE OF OREGON)
) ss.
County of Clackamas)

This instrument was acknowledged before me on this 28th day of April, 2010, by Jerry C. Reeves, as President of J.C. Reeves Corporation, an Oregon corporation.

Janice K. Zimmerman
NOTARY PUBLIC FOR OREGON
My Commission Expires: July 13, 2013

OFFICIAL SEAL
JANICE K ZIMMERMAN
NOTARY PUBLIC-OREGON
COMMISSION NO. 440356
MY COMMISSION EXPIRES JULY 13, 2013

Title Data, Inc. FI POR10569 WN 2010032286.003

Clean Water Services
Our commitment is clear.

Service Provider Letter

CWS File Number: 10-002401

This form and the attached conditions will serve as your Service Provider Letter in accordance with Clean Water Services Design and Construction Standards (R&O 07-20).

Jurisdiction: Sherwood

Review Type: Corridor Averaging

Site Address / Location: SW Ironwood and Denali Lane, Sherwood, OR 97140

SPL Issue Date: July 14, 2011

SPL Expiration Date: July 13, 2013

Applicant Information:

Name:
Company: EMERIO DESIGN, LLC
Address: 6107 SW MURRAY BLVD BEAVERTON OR 97008
SUITE 147
Phone/Fax: (503) 515-5528
E-mail:

Owner Information:

Name:
Company: EMERIO DESIGN, LLC
Address: 6107 SW MURRAY BLVD BEAVERTON OR 97008
SUITE 147
Phone/Fax: (503) 515-5528
E-mail:

Tax lot ID: 2S133CB01000

Development Activity: 8-Lot Subdivision

Pre-Development Site Conditions:

Sensitive Area Present: [ ] On-Site [X] Off-Site
Vegetated Corridor Width: Variable; 50-80
Vegetated Corridor Condition: Degraded

Post Development Site Conditions:

Sensitive Area Present: [ ] On-Site [X] Off-Site
Vegetated Corridor Width: Variable; 50-100

Enhancement of Remaining Vegetated Corridor Required: [X]

Square Footage to be enhanced: 12,840

Encroachments into Pre-Development Vegetated Corridor:

Type and location of Encroachment:	Square Footage:
Lots (Permanent Encroachment; Mitigation Required)	265

Mitigation Requirements:

Type/Location	Sq. Ft./Ratio/Cost
On-site, located within Tract D and E.	1,066

[X] Conditions Attached [X] Development Figures Attached (5) [ ] Planting Plan Attached [X] Geotech Report Required

This Service Provider Letter does NOT eliminate the need to evaluate and protect water quality sensitive areas if they are subsequently discovered on your property.

In order to comply with Clean Water Services water quality protection requirements the project must comply with the following conditions:

1. No structures, development, construction activities, gardens, lawns, application of chemicals, uncontained areas of hazardous materials as defined by Oregon Department of Environmental Quality, pet wastes, dumping of materials of any kind, or other activities shall be permitted within the sensitive area or Vegetated Corridor which may negatively impact water quality, except those allowed in R&O 07-20, Chapter 3.
2. Prior to any site clearing, grading or construction the Vegetated Corridor and water quality sensitive areas shall be surveyed, staked, and temporarily fenced per approved plan. During construction the Vegetated Corridor shall remain fenced and undisturbed except as allowed by R&O 07-20, Section 3.06.1 and per approved plans.
3. Prior to any activity within the sensitive area, the applicant shall gain authorization for the project from the Oregon Department of State Lands (DSL) and US Army Corps of Engineers (USACE). The applicant shall provide Clean Water Services or its designee (appropriate city) with copies of all DSL and USACE project authorization permits. **No Activity Authorized.**
4. An approved Oregon Department of Forestry Notification is required for one or more trees harvested for sale, trade, or barter, on any non-federal lands within the State of Oregon.
5. **Prior to ground disturbance an Erosion Control Permit is required through the City. Appropriate Best Management Practices (BMP's) for Erosion Control, in accordance with Clean Water Services' Erosion Prevention and Sediment Control Planning and Design Manual, shall be used prior to, during, and following earth disturbing activities.**
6. Prior to construction, a Stormwater Connection Permit from Clean Water Services or its designee is required pursuant to Ordinance 27, Section 4.B.
7. Activities located within the 100-year floodplain shall comply with R&O 07-20, Section 5.10.
8. Removal of native, woody vegetation shall be limited to the greatest extent practicable.
9. The water quality facility shall be planted with Clean Water Services approved native species, and designed to blend into the natural surroundings.
10. **Should final development plans differ significantly from those submitted for review by Clean Water Services, the applicant shall provide updated drawings, and if necessary, obtain a revised Service Provider Letter.**

Special Conditions

11. The Vegetated Corridor width for sensitive areas within the project site shall be a minimum of 50 feet wide, as measured horizontally from the delineated boundary of the sensitive area.
12. **For Vegetated Corridors that extend 35 feet from the break in slope, the width of Vegetated Corridors may be reduced to 15 feet wide if a stamped geotechnical report confirms that slope stability can be maintained with the reduced setback from the break in slope. Stamped geotechnical report has been provided by GeoPacific Engineering, Inc. (June 8, 2011 Report, Project No. 11-2329.**
13. The applicant shall enhance the entire Vegetated Corridor to meet or exceed good corridor condition as defined in R&O 07-20, Section 3.14.2, Table 3-3.
14. Prior to any site clearing, grading or construction, the applicant shall provide Clean Water Services with a Vegetated Corridor enhancement/restoration plan. Enhancement/restoration of the Vegetated Corridor shall be provided in accordance with R&O 07-20, Appendix A, and shall include planting specifications for all Vegetated Corridor, including any cleared areas larger than 25 square feet in Vegetated Corridor rated "good."
15. Prior to installation of plant materials, all invasive vegetation within the Vegetated Corridor shall be removed per methods described in Clean Water Services' Integrated Pest Management Guide, 2009. During removal of invasive vegetation care shall be taken to minimize impacts to existing native tree and shrub species.

16. The City or Clean Water Services shall be notified 72 hours prior to the start and completion of enhancement/restoration activities. Enhancement/restoration activities shall comply with the guidelines provided in Landscape Requirements (R&0 07-20, Appendix A).
17. Maintenance and monitoring requirements shall comply with R&O 07-20, Section 2.11.2. If at any time during the warranty period the landscaping falls below the 80% survival level, the owner shall reinstall all deficient planting at the next appropriate planting opportunity and the two year maintenance period shall begin again from the date of replanting.
18. Performance assurances for the Vegetated Corridor shall comply with R&O 07-20, Section 2.06.
19. **For any developments which create multiple parcels or lots intended for separate ownership, Clean Water Services shall require that the sensitive area and Vegetated Corridor be contained in a separate tract and subject to a "STORM SEWER, SURFACE WATER, DRAINAGE AND DETENTION EASEMENT OVER ITS ENTIRETY" to be granted to the City or Clean Water Services.**
20. **The easement over the Vegetated Corridor conveying storm and surface water management to Clean Water Services or the City would prevent the owner of the Vegetated Corridor from activities and uses inconsistent with the purpose of the corridor and any easements therein.**

FINAL PLANS

21. **Final construction plans shall include landscape plans.** In the details section of the plans, a description of the methods for removal and control of exotic species, location, distribution, condition and size of plantings, existing plants and trees to be preserved, and installation methods for plant materials is required. Plantings shall be tagged for dormant season identification and shall remain on plant material after planting for monitoring purposes.
22. **A Maintenance Plan shall be included on final plans** including methods, responsible party contact information, and dates (minimum two times per year, by June 1 and September 30).
23. **Final construction plans shall clearly depict the location and dimensions of the sensitive area and the Vegetated Corridor** (indicating good, marginal, or degraded condition). Sensitive area boundaries shall be marked in the field.
24. **Protection of the Vegetated Corridors and associated sensitive areas shall be provided by the installation of permanent fencing and signage** between the development and the outer limits of the Vegetated Corridors. Fencing and signage details to be included on final construction plans.

This Service Provider Letter is not valid unless CWS-approved site plan is attached.

Please call (503) 681-3653 with any questions.

Amber Wierck
Environmental Plan Review

Attachments (5)

GeoPacific Engineering, Inc.

Real-World Geotechnical Solutions
Investigation • Design • Construction Support

August 26, 2011
GeoPacific Project No. 11-2329

Community Financial Corporation

c/o Eric Evans / Ryan Walker
Emerio Design, LLC
6107 SW Murray Blvd.
Suite 147
Beaverton, Oregon 97008

Via e-mail with hard copy mailed

Subject: **GEOTECHNICAL ENGINEERING REPORT**
DENALI SUBDIVISION
SW IRONWOOD LANE
WEST LINN, OREGON

This report presents the results of a geotechnical engineering study conducted by GeoPacific Engineering, Inc. (GeoPacific) for the above referenced project. The purpose of this study was to evaluate subsurface conditions at the site and to provide geotechnical recommendations for site development. The scope of our work did not include environmental assessments or evaluations regarding the presence or absence of wetlands or hazardous or toxic substances in the soil, surface water, or groundwater at this site. This geotechnical study was performed in accordance with GeoPacific Proposal No. P-3903, dated January 26, 2011, and your subsequent authorization of our agreement and *General Conditions for Geotechnical Services.*

SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The site is located at the eastern terminus of SW Ironwood Lane in Sherwood, Oregon (Figure 1). The property is approximately 3.7 acres in size and vegetation consists of grasses, blackberries, and areas of dense trees. Topography is gently to moderately sloping with grades up to approximately 20 percent. Site elevations range from approximately 360 feet above mean sea level (msl) to 290 feet msl.

The proposed development consists of 8 lots for single family home construction and associated underground utilities. We understand that utilities as deep as about 10 feet will be installed. Approximately 500 lineal feet of new street will be installed and the southern portion of SW Ironwood Lane will be improved as part of the development.

SITE GEOLOGY

Regionally, the subject site lies within the Willamette Valley/Puget Sound lowland, a broad structural depression situated between the Coast Range on the west and the Cascade Range on the east. A series of discontinuous faults subdivide the Willamette Valley into a mosaic of fault-bounded, structural blocks (Yeats et al., 1996). Uplifted structural blocks form bedrock highlands, while down-warped structural blocks form sedimentary basins. Valley-fill sediment in the adjacent basin achieves a maximum thickness of 1,500 feet and overlies Miocene Columbia River Basalt at depth (Madin, 1990; Yeats et al., 1996).

Locally, the site is situated on an uplifted structural block of Columbia River Basalt (Schlicker and Finlayson, 1979). Columbia River Basalt is differentiated into several members. The basalt underlying the subject site is part of the Wanapum Basalt member, which is typically dark gray to black and displays blocky to columnar jointing (Burns et al, 1997). Interflow zones between flows are typically vesicular, scoriaceous, and brecciated, and sometimes include sedimentary rocks. Where highly weathered, the upper portion of the basalt is altered to a distinctive red-brown clayey silt known as laterite or residual soil.

REGIONAL SEISMIC SETTING

At least three major fault zones capable of generating damaging earthquakes are thought to exist in the vicinity of the subject site. These include the Portland Hills Fault Zone, the Gales Creek-Newberg-Mt. Angel Structural Zone, and the Cascadia Subduction Zone.

Portland Hills Fault Zone

The Portland Hills Fault Zone is a series of NW-trending faults that include the central Portland Hills Fault, the western Oatfield Fault, and the eastern East Bank Fault. These faults occur in a northwest-trending zone that varies in width between 3.5 and 5.0 miles. The combined three faults vertically displace the Columbia River Basalt by 1,130 feet and appear to control thickness changes in late Pleistocene (approx. 780,000 years) sediment (Madin, 1990). The Portland Hills Fault occurs along the Willamette River at the base of the Portland Hills, and is about 11 miles northeast of the site. The Oatfield Fault occurs along the western side of the Portland Hills, and is about 9 miles northeast of the site. The accuracy of the fault mapping is stated to be within 500 meters (Wong, et al., 2000). No historical seismicity is correlated with the mapped portion of the Portland Hills Fault Zone, but in 1991 a M3.5 earthquake occurred on a NW-trending shear plane located 1.3 miles east of the fault (Yelin, 1992). Although there is no definitive evidence of recent activity, the Portland Hills Fault Zone is assumed to be potentially active (Geomatrix Consultants, 1995).

Gales Creek-Newberg-Mt. Angel Structural Zone

The Gales Creek-Newberg-Mt. Angel Structural Zone is a 50-mile-long zone of discontinuous, NW-trending faults that lies about 9 miles southwest of the subject site. These faults are recognized in the subsurface by vertical separation of the Columbia River Basalt and offset seismic reflectors in the overlying basin sediment (Yeats et al., 1996; Werner et al., 1992). A geologic reconnaissance and

photogeologic analysis study conducted for the Scoggins Dam site in the Tualatin Basin revealed no evidence of deformed geomorphic surfaces along the structural zone (Unruh et al., 1994). No seismicity has been recorded on the Gales Creek or Newberg Faults (the fault closest to the subject site); however, these faults are considered to be potentially active because they may connect with the seismically active Mount Angel Fault and the rupture plane of the 1993 M5.6 Scotts Mills earthquake (Werner et al. 1992; Geomatrix Consultants, 1995).

Cascadia Subduction Zone

The Cascadia Subduction Zone is a 680-mile-long zone of active tectonic convergence where oceanic crust of the Juan de Fuca Plate is subducting beneath the North American continent at a rate of 4 cm per year (Goldfinger et al., 1996). A growing body of geologic evidence suggests that prehistoric subduction zone earthquakes have occurred (Atwater, 1992; Carver, 1992; Peterson et al., 1993; Geomatrix Consultants, 1995). This evidence includes: (1) buried tidal marshes recording episodic, sudden subsidence along the coast of northern California, Oregon, and Washington, (2) burial of subsided tidal marshes by tsunami wave deposits, (3) paleoliquefaction features, and (4) geodetic uplift patterns on the Oregon coast. Radiocarbon dates on buried tidal marshes indicate a recurrence interval for major subduction zone earthquakes of 250 to 650 years with the last event occurring 300 years ago (Atwater, 1992; Carver, 1992; Peterson et al., 1993; Geomatrix Consultants, 1995). The inferred seismogenic portion of the plate interface lies roughly along the Oregon coast at depths of between 20 and 40 miles.

FIELD EXPLORATION

Subsurface conditions were explored on June 13, 2011 by excavating 5 test pits to depths of 4 to 10 feet below ground surface, using a backhoe with a 2-foot-wide bucket and rock teeth provided by Dan Fischer Excavating. The approximate test pit locations are shown on the attached site plan (Figure 2). Test pit locations were determined and surveyed in the field prior to the exploration program. Two of the test pits were eliminated in the field, as shown on Figure 2.

During excavation of the test pits, a GeoPacific geologist observed and recorded soil information such as color, stratigraphy, strength, and soil moisture. Soils were classified in general accordance with the Unified Soil Classification System (USCS). Rock hardness was classified in accordance with Table 1, modified from the ODOT Rock Hardness Classification Chart.

Table 1. Rock Hardness Classification Chart

ODOT Rock Hardness Rating	Field Criteria	Unconfined Compressive Strength	Typical Equipment Needed For Excavation
Extremely Soft (R0)	Indented by thumbnail	<100 psi	Small excavator
Very Soft (R1)	Scratched by thumbnail, crumbled by rock hammer	100-1,000 psi	Small excavator
Soft (R2)	Not scratched by thumbnail, indented by rock hammer	1,000-4,000 psi	Medium excavator (slow digging with small excavator)
Medium Hard (R3)	Scratched or fractured by rock hammer	4,000-8,000 psi	Medium to large excavator (slow to very slow digging), typically requires chipping with hydraulic hammer or mass excavation)
Hard (R4)	Scratched or fractured w/ difficulty	8,000-16,000 psi	Slow chipping with hydraulic hammer and/or blasting
Very Hard (R5)	Not scratched or fractured after many blows, hammer rebounds	>16,000 psi	Blasting

Results of the exploration program are shown on the *Summary of Test Pit Explorations* attached to this report. At the completion of each test pit, the excavation was backfilled using the excavated soils, and tamped with the excavator bucket. This backfill should not be expected to behave as engineered fill and some settling and/or erosion of the ground surface may occur.

Field tests were also conducted with a Portable Dynamic Cone Penetrometer (PDCP) to determine the strength parameters of the soil for support of pavement. Correlated California Bearing Ratio (CBR) values at each test location are summarized on Table 2, for the depth intervals indicated.

Table 2. PDCP Field Test Results and Correlated CBR Values

PDCP Designation	Material Tested	Depth Interval of Test (feet)	Average Penetration Per Blow (mm)	Correlated CBR
PDCP-1	CLAY (CL) with Basalt Rock	0.8 – 2.6	25.3	10
PDCP-2	CLAY (CL) with Basalt Rock	0.5 – 1.5	7.7	40

SUBSURFACE CONDITIONS

Soil and Rock

The following report sections summarize subsurface conditions anticipated at the site, based on our exploration program. On-site soils consist of undocumented fill, topsoil, residual soil, and Columbia River Basalt materials, as described below.

Undocumented Fill: Undocumented fill was encountered in the northern portion of the site off Ironwood Lane, in test pit TP-5. The fill consisted generally of very stiff, silty clay and subangular basalt fragments. The fill extended to a depth of 2 feet where encountered in TP-5.

Topsoil: In all test pits, the ground surface is directly underlain by topsoil consisting of dark brown, highly organic silt with fine roots throughout. Topsoil thickness in test pits was about 12 inches as shown on the attached *Summary of Test Pit Explorations*. However, there is the potential for some tree roots and thicker topsoil zones in the wooded areas on site (Lots 1 and 2). A thin (6 inch thick) moderately organic, topsoil horizon had developed on the undocumented fill encountered in TP-5.

Residual Soil: Underlying the topsoil, the test pits encountered stiff to very stiff, silty clay residual soil. The residual soil was typically light reddish brown in color with orange and gray mottling. Highly weathered basalt clasts were common within the residual soil. The residual soil was encountered in all test pits with the exception of TP-5 and transitioned to less weathered basalt bedrock with boulders as discussed below.

Columbia River Basalt: Underlying the residual soil in test pits TP-1 through TP-4 and the undocumented fill in test pit TP-5, test pits encountered weathered basalt bedrock materials belonging to the Columbia River Basalt formation. The basalt encountered was typically highly weathered and was generally very soft (R1) to hard (R4). Where encountered, basalt resulted in practical refusal on medium hard (R3) to hard (R4) basalt in test pits TP-1 and TP-4 at depths of 4 to 8 feet, using a John Deere 310E backhoe with 2-foot-wide bucket and rock teeth. The basalt extended to the maximum depth of exploration, where encountered.

Groundwater

On June 13, 2011, groundwater seepage was not encountered in test pits excavated to a depth of 10 feet. The groundwater conditions reported above are for the specific date and locations indicated, and therefore may not necessarily be indicative of other times and/or locations. It is anticipated that groundwater conditions will vary depending on the time of year, rainfall, local subsurface conditions, changes in site utilization, and other factors. During periods of heavy and prolonged precipitation, shallow perched groundwater conditions can occur over fine-grained native deposits such as those beneath the site, particularly during the wet season.

CONCLUSIONS AND RECOMMENDATIONS

Results of this study indicate that the proposed development is geotechnically feasible, provided the recommendations of this report are followed. In our opinion, the greatest geotechnical constraints for project development are the presence of shallow, medium hard rock underlying much of the site.

The proposed residential structures may be supported on shallow foundations bearing on competent undisturbed native soils and/or engineered fill, designed and constructed as recommended in this report. The recommendations of this report assume the single-family structures will have raised floors and crawlspaces.

Slope Stability and CWS Slope Setbacks

Areas of the site having moderate slopes are generally underlain by very stiff to hard residual soils and are considered competent and resistant to deep-seated landsliding unless adversely impacted by natural processes or human activities. Based on our field reconnaissance observations, these natural slopes were generally smooth and uniform, consistent with relatively stable conditions. No evidence of past deep-seated instability (such as scarplets, ground cracks, benches, etc.) was observed. It should be noted that this evaluation is based on limited observation of surficial features, the excavator test pits performed and review of available geologic literature.

During our site reconnaissance, we did not observe indications of unstable slope conditions. No seeps or springs were noted on the subject slopes. The property is underlain by hard basalt bedrock materials with a relatively thin veneer of surface soils. In our opinion, the slopes on site have a very low potential for slope instability and erosion. Therefore, it is our opinion that a 15-foot setback is adequate for the project. In fact, based on geotechnical issues alone, development could likely be performed over the existing slopes on site while still maintaining adequate slope stability factors of safety.

We recommend that fill and cut slopes for the project be planned no steeper than 2H:1V. For fill and cut slopes constructed at 2H:1V or flatter, and comprised of native material and/or engineered fill placed and compacted as recommended herein, we anticipate that adequate factors of safety against global failure will be maintained.

Homes on hillside lots require additional maintenance measures because they are subject to natural slope processes such as runoff, erosion, shallow soil sloughing, soil creep, perched groundwater, etc. The primary measures include maintaining vegetation on the slope face and protecting the slope from surface water runoff, to reduce the potential for minor sloughing and erosion. Surface water should be controlled and under no circumstance should water be allowed to flow uncontrolled over slope faces.

Site Preparation

We recommend that the areas to be graded should first be cleared of vegetation and organic debris. Organic materials from clearing should be removed from the site or utilized in landscaping. Organic-rich topsoil should then be removed to competent native soils. Topsoil depths were on the order of about 12 inches and we anticipate that the average depth of stripping may be roughly 9 inches over most of the site. Thicker topsoil is likely present in treed areas, for example the area of Lots 1 and 2.

The final depth of stripping removal may vary depending on local subsurface conditions and the contractor's methods, and should be determined on the basis of site observations after the initial stripping has been performed. Stripped organic soil should be stockpiled only in designated areas or removed from the site and stripping operations should be observed and documented by GeoPacific. Existing subsurface structures (tile drains, old utility lines, septic leach fields, etc.) beneath structures and pavements should be removed and the excavations backfilled with engineered fill.

In construction areas, once stripping of a particular area is approved the area should be ripped or tilled to a depth of 10 inches, moisture conditioned, and compacted in-place prior to the placement of engineered fill or crushed aggregate base for pavement. We anticipate that some root picking operations may necessary in areas of the site with abundant trees (Lot 1 and Lot 2). Exposed subgrade soils should be evaluated by GeoPacific. For large areas, this evaluation is normally performed by proof-rolling the exposed subgrade with a fully loaded scraper or dump truck. For smaller areas where access is restricted, the subgrade should be evaluated by probing the soil with a steel probe. Soft/loose soils identified during subgrade preparation should be compacted to a firm and unyielding condition or over-excavated and replaced with engineered fill, as described below. The depth of overexcavation, if required, should be evaluated by GeoPacific at the time of construction.

Undocumented Fill Removal

We recommend that the zone of undocumented fill encountered in test pit TP-5, and any other undocumented fill encountered on site, be removed and replaced with engineered fill. The fill encountered in TP-5 did not appear to have been compacted as engineered fill. The depth of fill in the test pit was about 2 feet. We anticipate that the majority of the undocumented fill will be suitable for re-use provided any organic debris is removed and the soils moisture-conditioned (dried) to allow compaction to project specifications.

Engineered Fill

On-site native soils will be suitable for use as engineered fill during dry weather, provided they are adequately moisture conditioned prior to compacting. Imported fill material should be reviewed by the geotechnical engineer prior to being imported to the site. Oversize material greater than 6 inches in size should not be used within 3 feet of foundation footings, and material greater than 12 inches in diameter should not be used in engineered fill. Placement of boulders greater than 12 inches in size may be feasible in deeper fill areas, provided the boulders are surrounded in properly compacted engineered fill and boulders are not nested or stacked. Specific recommendations should be provided by GeoPacific in the field based on the quantity and size of rock materials being generated in the cuts.

Engineered fill should be compacted in horizontal lifts not exceeding 12 inches using heavy vibratory compaction equipment. We recommend that engineered fill be compacted to at least 90% of the maximum dry density determined by Modified Proctor (ASTM D1557) or equivalent. We anticipate that aeration of native soil will be necessary for compaction operations.

Proper test frequency and earthwork documentation usually requires daily observation and testing during stripping, rough grading, and placement of engineered fill. Field density testing should conform to ASTM D2922 and D3017, or D1556. Engineered fill should be periodically observed and tested by GeoPacific. Typically, one density test is performed for at least every 2 vertical feet of fill placed or every 500 yd^3, whichever requires more testing. Because testing is performed on an on-call basis, we recommend that the earthwork contractor be held contractually responsible for test scheduling and frequency.

Fill Slopes

We recommend that fill slopes for the project be planned no steeper than 2H:1V and be constructed in accordance with the Fill Slope Detail, Figure 3. For fill slopes constructed at 2H:1V or flatter, and comprised of engineered fill placed and compacted as recommended herein, we anticipate that adequate factors of safety against global failure will be maintained.

Prior to placing compacted fill against the existing natural slopes, all loose undocumented fill, topsoil, and soft soils must first be removed. For slopes greater than 20 percent, adequate benching must be maintained, in accordance with Figure 3. Fill slope keyways should be constructed with a minimum depth of 2 feet and minimum width of H/2 (10 feet minimum), where H equals the vertical height between the base and top of the fill slope. Both benches and keyways should be roughly horizontal in the downslope direction, but may slope up to 20 percent along topographic contours. A subdrain should be incorporated in the fill slope keyway, and a GeoPacific engineer or geologist should observe the keyway excavations and drainage prior to the placement of fill.

Measures should be taken to prevent surficial instability and/or erosion of embankment material. This can be accomplished by conscientious compaction of the embankment fills all the way out to the slope face, by maintaining adequate drainage, and planting the slope face as soon as possible after construction. To achieve the specified relative compaction at the slope face, it may be necessary to overbuild the slopes several feet, and then trim back to design finish grade, as shown on Figure 3. In our experience, compaction of slope faces by "track-walking" is generally ineffective and is therefore not recommended.

Wet Weather Earthwork

Soils underlying the site are moisture sensitive and will be difficult to handle or traverse with construction equipment during periods of wet weather. Earthwork is typically most economical when performed under dry weather conditions. Earthwork performed during the wet-weather season will probably require expensive measures such as cement treatment or imported granular material to compact fill to the recommended engineering specifications. If earthwork is to be performed or fill is to be placed in wet weather or under wet conditions when soil moisture content is difficult to control, the following recommendations should be incorporated into the contract specifications.

- Earthwork should be performed in small areas to minimize exposure to wet weather. Excavation or the removal of unsuitable soils should be followed promptly by the placement and compaction of clean engineered fill. The size and type of construction equipment used may have to be limited to prevent soil disturbance. Under some circumstances, it may be necessary to excavate soils with a backhoe to minimize subgrade disturbance caused by equipment traffic;
- The ground surface within the construction area should be graded to promote run-off of surface water and to prevent the ponding of water;
- Material used as engineered fill should consist of clean, granular soil containing less than 5 percent fines. The fines should be non-plastic. Alternatively, cement treatment of on-site soils may be performed to facilitate wet weather placement;

- The ground surface within the construction area should be sealed by a smooth drum vibratory roller, or equivalent, and under no circumstances should be left uncompacted and exposed to moisture. Soils which become too wet for compaction should be removed and replaced with clean granular materials;
- Excavation and placement of fill should be observed by the geotechnical engineer to verify that all unsuitable materials are removed and suitable compaction and site drainage is achieved; and
- Bales of straw and/or geotextile silt fences should be strategically located to control erosion.

If cement or lime treatment is used to facilitate wet weather construction, GeoPacific should be contacted to provide additional recommendations and field monitoring.

Structural Foundations

Assuming our recommendations for site preparation are followed, native deposits and/or engineered fill soils will be encountered at or near the foundation level of the proposed structures. Native soils underlying the site are generally very stiff to hard and should provide adequate support of the structural loads.

Shallow, conventional isolated or continuous spread footings may be used to support the proposed structures, provided they are founded on competent native soils or compacted engineered fill placed directly upon the competent native soils. We recommend a maximum allowable bearing pressure of 2,000 pounds per square foot (psf) for designing the footings. The recommended maximum allowable bearing pressure may be increased by 1/3 for short term transient conditions such as wind and seismic loading. All footings should be founded at least 18 inches below the lowest adjacent finished grade. Minimum footing widths should be determined by the project engineer/architect in accordance with applicable design codes.

Assuming construction is accomplished as recommended herein, and for the foundation loads anticipated, we estimate total settlement of spread foundations of less than about 1 inch and differential settlement between two adjacent load-bearing components supported on competent soil of less than about ½ inch. We anticipate that the majority of the estimated settlement will occur during construction as loads are applied.

Wind, earthquakes, and unbalanced earth loads will subject the proposed structure to lateral forces. Lateral forces on a structure will be resisted by a combination of sliding resistance of its base or footing on the underlying soil and passive earth pressure against the buried portions of the structure. For use in design, a coefficient of friction of 0.45 may be assumed along the interface between the base of the footing and subgrade soils with no factor of safety included. Passive earth pressure for buried portions of structures may be calculated using an equivalent fluid weight of 360 pounds per cubic foot (pcf), assuming footings are cast against dense, natural soils or engineered fill. The recommended coefficient of friction and passive earth pressure values do not include a safety factor. The upper 12 inches of soil should be neglected in passive pressure computations unless it is protected by pavement or slabs on grade.

Footing excavations should be trimmed neat and the bottom of the excavation should be carefully prepared. Loose, wet or otherwise softened soil should be removed from the footing excavation prior to placing reinforcing steel bars.

The above foundation recommendations are for dry weather conditions. Due to the high moisture sensitivity of on-site soils, construction during wet weather may require overexcavation of footings and backfill with compacted, crushed aggregate.

Footing and Roof Drains

To minimize the fluctuation of soil moisture content near structural foundations, we recommend that the structures be constructed with perimeter footing drains. The outside edge of all perimeter footings should be provided with a drainage system consisting of 3-inch minimum diameter perforated plastic pipe embedded in a minimum of 1 ft^3 per lineal foot of clean, free-draining sand and gravel or 2"-1/2" drain rock. The drain pipe and surrounding drain rock should be wrapped in non-woven geotextile (Mirafi 140N, or approved equivalent) to minimize the potential for clogging and/or ground loss due to piping. Water collected from the footing drains should be directed into the local storm drain system or other suitable outlet. A minimum 0.5 percent fall should be maintained throughout the drain and non-perforated pipe outlet. The footing drains should include clean-outs to allow periodic maintenance and inspection.

Construction should include typical measures for controlling subsurface water beneath the homes, including positive crawlspace drainage to an adequate low-point drain exiting the foundation, visqueen covering the exposed ground in the crawlspace, and crawlspace ventilation (foundation vents). The homebuyers should be informed and educated that some slow flowing water in the crawlspaces is considered normal and not necessarily detrimental to the home given these other design elements incorporated into its construction. Appropriate design professionals should be consulted regarding crawlspace ventilation, building material selection and mold prevention issues, which are outside GeoPacific's area of expertise.

Down spouts and roof drains should collect roof water in a system separate from the footing drains in order to reduce the potential for clogging. Roof drain water should be directed to an appropriate discharge point well away from structural foundations. Grades should be sloped downward and away from buildings to reduce the potential for ponded water near structures.

Seismic Design

Structures should be designed to resist earthquake loading in accordance with the methodology described in the 2009 International Residential Code (IRC) for One- and Two-Family Dwellings, with applicable Oregon Structural Specialty Code (OSSC) revisions. We recommend Site Class D be used for design per the OSSC, Table 1613.5.2. Design values determined for the site using the USGS (United States Geological Survey) *Earthquake Ground Motion Parameters* utility are summarized below.

Table 3. Recommended Earthquake Ground Motion Parameters (2009 IRC)

Parameter	Value
Location (Lat, Long), degrees	45.350, -122.823
Mapped Spectral Acceleration Values (MCE):	
Short Period, S_s	0.88 g
1.0 Sec Period, S_1	0.33 g
Soil Factors for Site Class D:	
F_a	1.15
F_v	1.75
Residential Site Value = 2/3 x F_a x S_s	0.67 g
Residential Seismic Design Category	D_1

Soil liquefaction is a phenomenon wherein saturated soil deposits temporarily lose strength and behave as a liquid in response to earthquake shaking. Soil liquefaction is generally limited to loose, granular soils located below the water table. Following development, on-site soils will consist predominantly of engineered fill, native fine-grained soils and weathered basalt bedrock, which are not considered susceptible to liquefaction. Therefore, it is our opinion that special design or construction measures are not required to mitigate the effects of liquefaction.

Excavating Conditions and Utility Trenches

Subsurface test pit exploration indicates that very soft (R1) to hard (R4) basalt underlies the site at shallow depths. In some areas, we expect utility trenches less than about 10 feet below existing grade can be excavated in the soft basalt using conventional large trackhoe equipment. However, practical refusal on medium hard (R3) to hard (R4) basalt bedrock was reached in test pits TP-1 and TP-4 at depths of 4 to 8 feet, with the medium-sized backhoe used in our exploration. Medium hard Columbia River Basalt typically contains clay seams and fractures, and can be excavated employing a rock bucket and ripper tooth. Some use of pneumatic rock breaker attachments may be necessary, particularly in deeper utility trench excavations.

We anticipate that perched groundwater will be encountered in utility trenches, particularly during the wet weather season. We anticipate that dewatering systems consisting of ditches, sumps and pumps would be adequate for control of groundwater in utility trenches where encountered during construction conducted during the dry season. The contractor is responsible to design and implement a dewatering system that will enable installation of utilities "in the dry." Regardless of the dewatering system used, it should be installed and operated such that in-place soils are prevented from being removed along with the groundwater.

Maintenance of safe working conditions, including temporary excavation stability, is the responsibility of the contractor. Actual slope inclinations at the time of construction should be determined based on safety requirements and actual soil and groundwater conditions. All temporary cuts in excess of 4 feet in height should be sloped in accordance with U.S. Occupational Safety and Heath Administration (OSHA) regulations (29 CFR Part 1926), or be shored. The existing native soils classify as Type A soil and temporary excavation side slope inclinations as

steep as 1H:1V may be assumed for planning purposes. This cut slope inclination is applicable to excavations above the water table only.

Vibrations created by traffic and construction equipment may cause some caving and raveling of excavation walls. In such an event, lateral support for the excavation walls should be provided by the contractor to prevent loss of ground support and possible distress to existing or previously constructed structural improvements.

PVC pipe should be installed in accordance with the procedures specified in ASTM D2321. We recommend that structural trench backfill be compacted to at least 95% of the maximum dry density obtained by Standard Proctor ASTM D698 or equivalent. Initial backfill lift thicknesses for a ¾"-0 crushed aggregate base may need to be as great as 4 feet to reduce the risk of flattening underlying flexible pipe. Subsequent lift thickness should not exceed 1 foot. If imported granular fill material is used, then the lifts for large vibrating plate-compaction equipment (e.g. hoe compactor attachments) may be up to 2 feet, provided that proper compaction is being achieved and each lift is tested. Use of large vibrating compaction equipment should be carefully monitored near existing structures and improvements due to the potential for vibration-induced damage.

Adequate density testing should be performed during construction to verify that the recommended relative compaction is achieved. Typically, one density test is taken for every 4 vertical feet of backfill on each 200-lineal-foot section of trench.

Pavement Sections

Table 4 presents recommended minimum pavement section for dry weather construction conditions. A subgrade soil R-value of 15 was assumed for design purposes. The recommended pavement sections were formulated using the Crushed Base Equivalent method and assuming a Traffic Index of 4 for on-site streets. The Traffic Index is generally appropriate for minor residential streets and cul-de-sacs. The project engineer or architect should review the assumed traffic indices to evaluate their suitability for this project. Changes in anticipated traffic levels will affect the corresponding pavement section.

Table 4. Recommended Minimum Dry Weather Pavement Sections

Material Layer	Minimum Thickness (inches)	Compaction Standard
Asphaltic Concrete (AC)	3	92% of Rice Density (top lift) 91% of Rice Density (lower lifts) AASHTO T-209
Crushed Aggregate Base ¾"-0 (leveling course)	2	95% of Modified Proctor ASTM D1557
Crushed Aggregate Base 1½"-0	8	95% of Modified Proctor ASTM D1557
Recommended Subgrade	12	95% of Standard Proctor or approved native

In new pavement areas, native soil subgrade in pavement areas should be ripped or tilled to a minimum depth of 12 inches, moisture conditioned, and recompacted in-place to at least 95 percent of ASTM D698 (Standard Proctor) or equivalent. In order to verify subgrade strength, we recommend proof-rolling directly on subgrade with a loaded dump truck during dry weather and on top of base course in wet weather. Soft areas that pump, rut, or weave should be stabilized prior to paving. If pavement areas are to be constructed during wet weather, GeoPacific should review subgrade at the time of construction so that condition specific recommendations can be provided. Wet weather pavement construction is likely to require soil amendment or geotextile fabric and an increase in base course thickness.

During placement of pavement section materials, density testing should be performed to verify compliance with project specifications. Generally, one subgrade, one base course, and one AC compaction test is performed for every 100 to 200 linear feet of paving.

Erosion Control Considerations

During our field exploration program, we did not observe soil types near the ground surface that would be considered highly susceptible to erosion. In our opinion, the primary concern regarding erosion potential will occur during construction, in areas that have been stripped of vegetation. Erosion at the site during construction can be minimized by implementing the project erosion control plan, which should include judicious use of straw bales and silt fences. If used, these erosion control devices should be in place and remain in place throughout site preparation and construction.

Erosion and sedimentation of exposed soils can also be minimized by quickly re-vegetating exposed areas of soil, and by staging construction such that large areas of the project site are not denuded and exposed at the same time. Areas of exposed soil requiring immediate and/or temporary protection against exposure should be covered with either mulch or erosion control netting/blankets. Areas of exposed soil requiring permanent stabilization should be seeded with an approved grass seed mixture, or hydroseeded with an approved seed-mulch-fertilizer mixture.

UNCERTAINTY AND LIMITATIONS

We have prepared this report for the owner and their consultants for use in design of this project only. This report should be provided in its entirety to prospective contractors for bidding and estimating purposes; however, the conclusions and interpretations presented in this report should not be construed as a warranty of the subsurface conditions. Experience has shown that soil and groundwater conditions can vary significantly over small distances. Inconsistent conditions can occur between explorations that may not be detected by a geotechnical study. If, during future site operations, subsurface conditions are encountered which vary appreciably from those described herein, GeoPacific should be notified for review of the recommendations of this report, and revision of such if necessary.

Sufficient geotechnical monitoring, testing and consultation should be provided during construction to confirm that the conditions encountered are consistent with those indicated by explorations. Recommendations for design changes will be provided should conditions revealed during

construction differ from those anticipated, and to verify that the geotechnical aspects of construction comply with the contract plans and specifications.

Within the limitations of scope, schedule and budget, GeoPacific attempted to execute these services in accordance with generally accepted professional principles and practices in the fields of geotechnical engineering and engineering geology at the time the report was prepared. No warranty, expressed or implied, is made. The scope of our work did not include environmental assessments or evaluations regarding the presence or absence of wetlands or hazardous or toxic substances in the soil, surface water, or groundwater at this site.

We appreciate this opportunity to be of service.

Sincerely,

GEOPACIFIC ENGINEERING, INC.

REGISTERED PROFESSIONAL ENGINEER 64,422PE OREGON SEPTEMBER 26, 2000 SCOTT L. HARDMAN

8-26-11

EXPIRES: 06-30-2013

Beth K. Rapp, G.I.T.
Project Geologist

Scott L. Hardman, P.E., G.E.
Principal Geotechnical Engineer

Attachments: References
Maintenance of Hillside Homesites
Figure 1 – Vicinity Map
Figure 2 – Site Plan and Exploration Locations
Figure 3 – Fill Slope Detail
Logs of Test Pits TP-1 through TP-5

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MAINTENANCE OF HILLSIDE HOMESITES

All homes require a certain level of maintenance for general upkeep and to preserve the overall integrity of structures and land. Hillside homesites require some additional maintenance because they are subject to natural slope processes, such as runoff, erosion, shallow soil sloughing, soil creep, perched groundwater, etc. If not properly controlled, these processes could adversely affect your or neighboring properties. Although surface processes are usually only capable of causing minor damage, if left unattended, they could possibly lead to more serious instability problems.

The primary source of problems on hillsides is uncontrolled surface water runoff and blocked groundwater seepage which can erode, saturate and weaken soil. Therefore, it is important that drainage and erosion control features be implemented on the property, and that these features be maintained in operative condition (unless changed on the basis of qualified professional advice). By employing simple precautions, you can help properly maintain your hillside site and avoid most potential problems. The following is an abbreviated list of common Do's and Don'ts recommended for maintaining hillside homesites.

Do List

1. Make sure that roof rain drains are connected to the street, local storm drain system, or transported via enclosed conduits or lined ditches to suitable discharge points away from structures and improvements. In no case, should rain drain water be discharged onto slopes or in an uncontrolled manner. Energy dissipation devices should be employed at discharge points to help prevent erosion.

2. Check your roof drains, gutters and spouts to make sure that they are clear. Roofs are capable of producing a substantial flow of water. Blocked gutters, etc., can cause water to pond or run off in such a way that erosion or adverse oversaturation of soil can occur.

3. Make sure that drainage ditches and/or berms are kept clear throughout the rainy season. If you notice that a neighbor's ditches are blocked such that water is directed onto your property or in an uncontrolled manner, politely inform them of this condition.

4. Locate and check all drain inlets, outlets and weep holes from foundation footings, retaining walls, driveways, etc. on a regular basis. Clean out any of these that have become clogged with debris.

5. Watch for wet spots on the property. These may be caused by natural seepage or indicate a broken or leaking water or sewer line. In either event, professional advice regarding the problem should be obtained followed by corrective action, if necessary.

6. Do maintain the ground surface adjacent to lined ditches so that surface water is collected in the ditch. Water should not be allowed to collect behind or flow under the lining.

Don't List

1. Do not change the grading or drainage ditches on the property without professional advice. You could adversely alter the drainage pattern across the site and cause erosion or soil movement.

2. Do not allow water to pond on the property. Such water will seep into the ground causing unwanted saturation of soil.

3. Do not allow water to flow onto slopes in an uncontrolled manner. Once erosion or oversaturation occurs, damage can result quickly or without warning.

4. Do not let water pond against foundations, retaining walls or basements. Such walls are typically designed for fully-drained conditions.

5. Do not connect roof drainage to subsurface disposal systems unless approved by a geotechnical engineer.

6. Do not irrigate in an unreasonable or excessive manner. Regularly check irrigation systems for leaks. Drip systems are preferred on hillsides.

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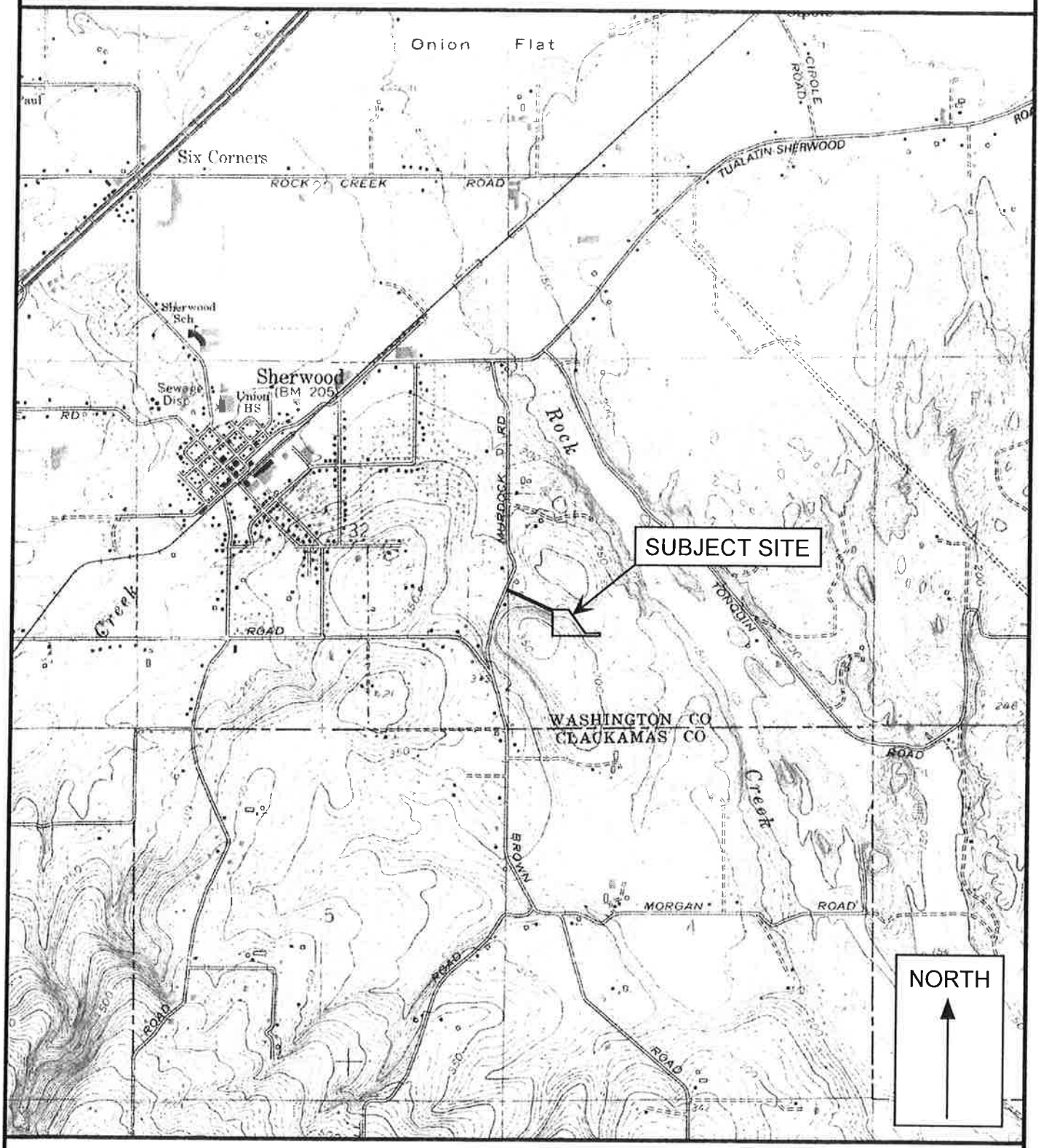
VICINITY MAP



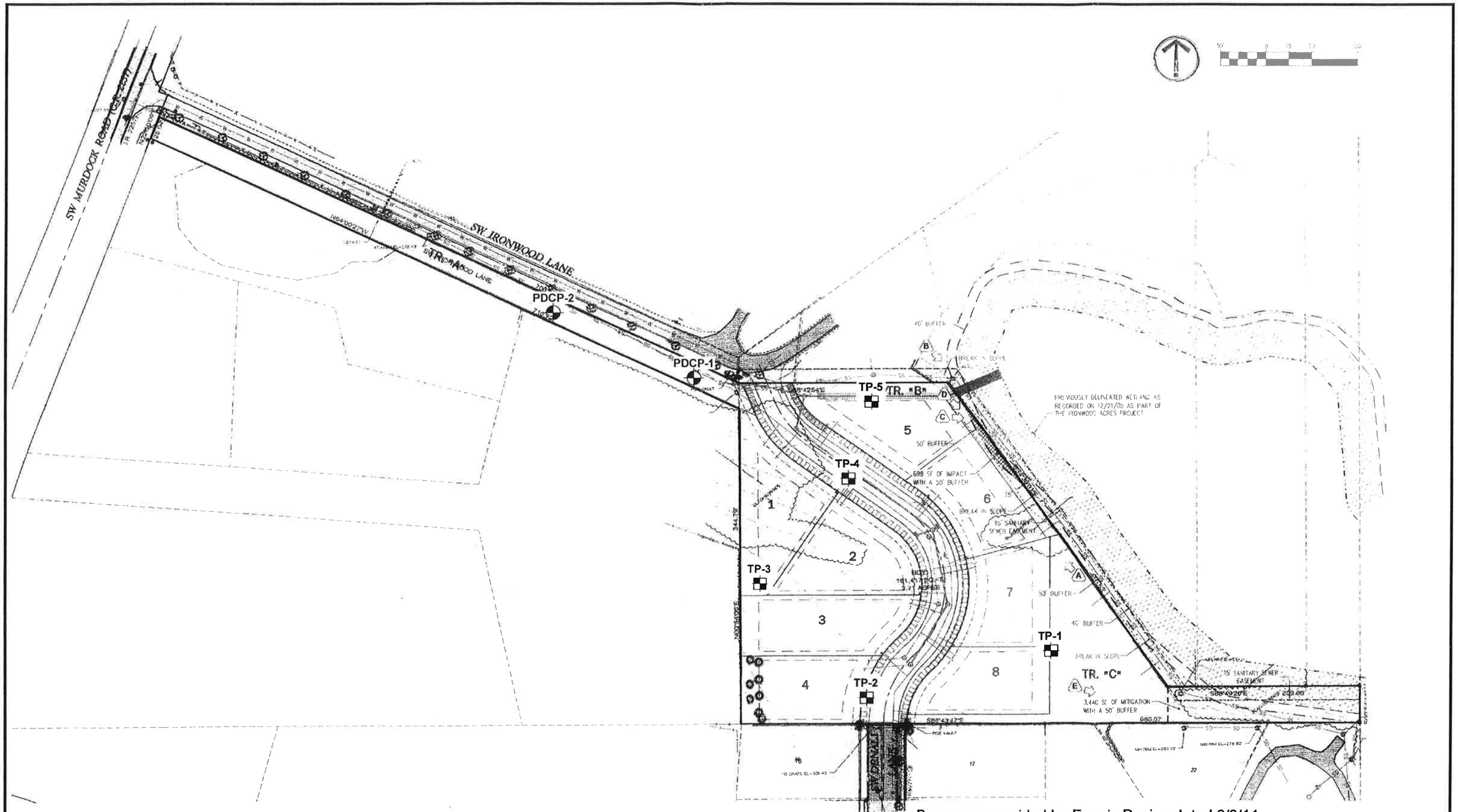
Legend

Approximate Scale 1 in = 2,000 ft

Date: 06/13/11
Drawn by: EKR

Base map: U.S. Geological Survey 7.5 minute Topographic Map Series, Sherwood, Oregon Quadrangle, 1961 (Photorevised 1984)

Project: Denali Subdivision Sherwood, Oregon	Project No. 11-2329	FIGURE 1



Base map provided by Emerio Design dated 6/6/11

Legend

TP-1 Test Pit Designation and Approximate Location

PDCP-1 PDCP Designation and Approximate Location

Note: Location of all geotechnical information is approximate.

SCALE

0 100 200 FEET

1 IN = 100 FT

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SITE PLAN AND EXPLORATION LOCATIONS

Project: Denali Subdivision Sherwood, Oregon	Project No. 11-2329	Drawn By: EKR	FIGURE 2

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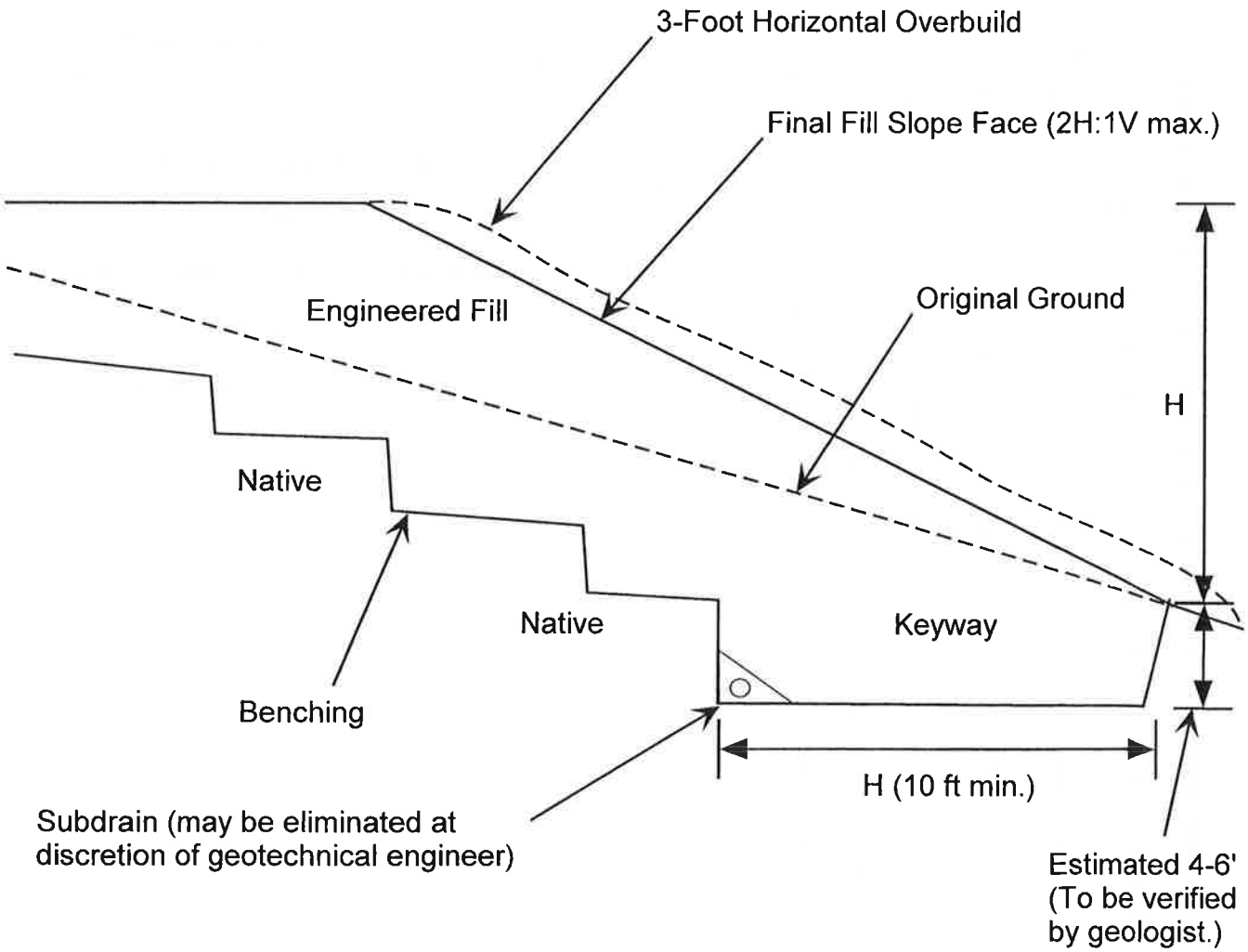
FILL SLOPE DETAIL

TYPICAL KEYWAY, BENCHING & FILL SLOPE DETAIL



Recommended subdrain is minimum 3-inch-diameter ADS Heavy Duty grade (or equivalent), perforated plastic pipe enveloped in a minimum of 3 cubic feet per lineal foot of 2" to 1/2" open-graded gravel drain rock wrapped with geotextile filter fabric (Mirafi 140N or equivalent).

Project: Denali Subdivision Sherwood, Oregon	Project No. 11-2329	FIGURE 3

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TEST PIT LOG

Project: Denali Subdivision
Sherwood, Oregon

Project No. 11-2329

Test Pit No. **TP- 1**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	In-Situ Dry Density (lb/ft³)	Moisture Content (%)	Water Bearing Zone	Material Description
1	1.5					Highly organic SILT (OL-ML), dark brown, fine roots throughout, loose, moist (Topsoil Horizon)
2	2.5					Stiff to very stiff, silty CLAY (CL) and gray weathered basalt fragments, light reddish brown, trace fine roots throughout, strong orange and gray mottling, micaceous, moist (Residual Soil)
3						Medium hard (R3) to Hard (R4) BASALT, gray, moist (Columbia River Basalt Formation)
4						
5						Practical Refusal on Medium Hard (R3) to Hard (R4) Basalt at 4 Feet.
6						Note: No seepage or groundwater encountered.
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

LEGEND

Bag Sample | Bucket Sample | Shelby Tube Sample | Seepage | Water Bearing Zone | Water Level at Abandonment

Date Excavated: 6/13/11
Logged By: B. Rapp
Surface Elevation:

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TEST PIT LOG

Project: Denali Subdivision
Sherwood, Oregon

Project No. 11-2329

Test Pit No. **TP-2**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	In-Situ Dry Density (lb/ft³)	Moisture Content (%)	Water Bearing Zone	Material Description
						Highly organic SILT (OL-ML), dark brown, fine roots throughout, loose, moist (Topsoil Horizon)
1	3.0					Stiff to very stiff, silty CLAY (CL) and gray weathered basalt fragments, light reddish brown, trace fine roots throughout, strong orange and gray mottling, micaceous, moist (Residual Soil)
2	2.0					
3	1.5					
4						
5						Very soft (R1) to Medium Hard (R3) BASALT, trace light reddish brown silty clay matrix, gray to light brown, black staining, yellow secondary mineralization, moist (Columbia River Basalt Formation)
6						
7						
8						
9						
10						Test Pit Terminated at 10 Feet.
11						
12						Note: No seepage or groundwater encountered.
13						
14						
15						
16						
17						

LEGEND

Bag Sample | Bucket Sample | Shelby Tube Sample | Seepage | Water Bearing Zone | Water Level at Abandonment

Date Excavated: 6/13/11
Logged By: B. Rapp
Surface Elevation:

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TEST PIT LOG

Project: Denali Subdivision
Sherwood, Oregon

Project No. 11-2329

Test Pit No. **TP-3**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	In-Situ Dry Density (lb/ft³)	Moisture Content (%)	Water Bearing Zone	Material Description
1	2.0					Highly organic SILT (OL-ML), dark brown, fine roots throughout, loose, moist (Topsoil Horizon)
2	3.0					Stiff to very stiff, silty CLAY (CL) and gray weathered basalt fragments, light reddish brown, trace fine roots throughout, strong orange and gray mottling, micaceous, moist (Residual Soil)
3	3.0					
4	2.5					
5						
6						Very soft (R1) to Medium Hard (R3) BASALT, trace light reddish brown silty clay matrix, gray to light brown, black staining, yellow secondary mineralization, moist (Columbia River Basalt Formation)
7						
8						
9						Test Pit Terminated at 9 Feet.
10						
11						Note: No seepage or groundwater encountered.
12						
13						
14						
15						
16						
17						

LEGEND

Bag Sample | Bucket Sample | Shelby Tube Sample | Seepage | Water Bearing Zone | Water Level at Abandonment

Date Excavated: 6/13/11
Logged By: B. Rapp
Surface Elevation:

GeoPacific Engineering, Inc.
13910 SW Galbreath Drive, Suite 102
Sherwood, Oregon 97140
Tel: (503) 625-4455 Fax: (503) 625-4405

TEST PIT LOG

Project: Denali Subdivision Sherwood, Oregon	Project No. 11-2329	Test Pit No. **TP-4**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	In-Situ Dry Density (lb/ft³)	Moisture Content (%)	Water Bearing Zone	Material Description
1	2.0					Highly organic SILT (OL-ML), dark brown, fine roots throughout, loose, moist (Topsoil Horizon)
2	3.5					Very stiff, silty CLAY (CL) and gray weathered basalt fragments, light reddish brown, trace fine roots throughout, strong orange and gray mottling, micaceous, moist (Residual Soil)
3	2.5					
4	4.5					
5						Very Soft (R1) to Hard (R4) BASALT, trace light reddish brown silty clay matrix, gray, vesicular, hard (R4) below 7.5 feet, moist (Columbia River Basalt Formation)
6						
7						
8						Practical Refusal on Medium Hard (R3) to Hard (R4) Basalt at 8 Feet.
9						
10						Note: No seepage or groundwater encountered.
11						
12						
13						
14						
15						
16						
17						

LEGEND

Bag Sample | Bucket Sample | Shelby Tube Sample | Seepage | Water Bearing Zone | Water Level at Abandonment

Date Excavated: 6/13/11
Logged By: B. Rapp
Surface Elevation:

GeoPacific Engineering, Inc.
13910 SW Galbreath Drive, Suite 102
Sherwood, Oregon 97140
Tel: (503) 625-4455 Fax: (503) 625-4405

TEST PIT LOG

Project: Denali Subdivision
Sherwood, Oregon

Project No. 11-2329

Test Pit No. **TP-5**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	In-Situ Dry Density (lb/ft³)	Moisture Content (%)	Water Bearing Zone	Material Description
						Moderately organic SILT (OL-ML), dark brown, roots throughout, moist (Topsoil Horizon)
1						Very stiff, silty CLAY (CL) and subangular gray basalt fragments, light reddish brown, moist (Fill)
2						
3						Soft (R2) to Medium Hard (R3) BASALT, trace light reddish brown silty clay matrix, gray, highly fractured, vesicular, significant sidewall caving, moist (Columbia River Basalt Formation)
4						
5						
6						
7						
8						Test Pit Terminated at 8 Feet.
9						
10						Note: No seepage or groundwater encountered.
11						
12						
13						
14						
15						
16						
17						

LEGEND

Bag Sample | Bucket Sample | Shelby Tube Sample | Seepage | Water Bearing Zone | Water Level at Abandonment

Date Excavated: 6/13/11
Logged By: B. Rapp
Surface Elevation:

EMERIO
Design

CIVIL ENGINEERS & PLANNERS

Final Stormwater Management Report

Denali Partition
3 - Lots

Emerio Project Number: 136-001

City of Sherwod Permit Numbers: MLP 13-01

Prepared By:
Eric D. Evans, PE
Emerio Design, LLC
6107 SW Murray Blvd., Suite 147
Beaverton, Oregon 97008
(503) 853-1910
eric@emeriodesign.com

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APPENDIX A
(1) Vicinity Map
APPENDIX B
(1) Soils Maps-"Soils Survey for Washington County"
(2) Curve Number Table
APPENDIX C
(1) Flow Through Planter Design Data From CWS Manual
(2) Post-Developed Basin Map

Project Overview and Description:

The purpose of this report is to address storm water management requirements for the proposed three lots created with this development. No water quality improvements will be constructed with the initial development of the site. Rather, the development of individual lots will contain on lot treatment for each of the new homes. As the actual house product selected for each home cannot be determined at this time, a theoretical house and treatment facility is used for feasibility design purposes as part of this report.

Soil Classification:

The NRCS soil survey of Washington County, Oregon classifies the onsite soils as Laurelwood Silt Loam and Xerochrepts-Rock Outcrop Complex. The associated hydrologic group of this soil is B & D. The associated curve numbers utilized in this design is 79 and 98 for pervious and impervious surfaces respectively, reference appendixes B(1) and B(2). No specific reference was made to curve numbers in this report due to the use of the LIDA facilities.

Proposed Facilities:

Each lot will be constructed with an LIDA facility identified in the CWS LIDA manual. The method chosen for this site is the flow-through planter. The lined flow through planter was chose due to the poorly draining soils and the proximity of the site to steep slopes. Reference design data provided in appendix C(1) take from the CWS LIDA manual.

The set sizing ratio for this treatment facility is 6% of the total impervious area created. Appendix C(2) shows a theoretical home and driveway layout that is used for feasibility calculations. Tabulated below is a list of lot areas and proposed flow through planters sizing.

THEORETICAL LOT IMPERVIOUS AREAS

LOT NO.	DRIVEWAY IMPERVIOUS AREA (SF)	ROOF IMPERVIOUS AREA (SF)	TOTAL IMPERVIOUS AREA (SF) (=TIA)	PLANTER AREA IMPERVIOUS AREA (SF) (TIA x 0.06)
1	2248	3339	5587	335
2	3234	3339	6573	394
3	2277	3000	5277	316

As shown above all facilities have been design to meet or exceed the required 6% ratio.

Point of Discharge:

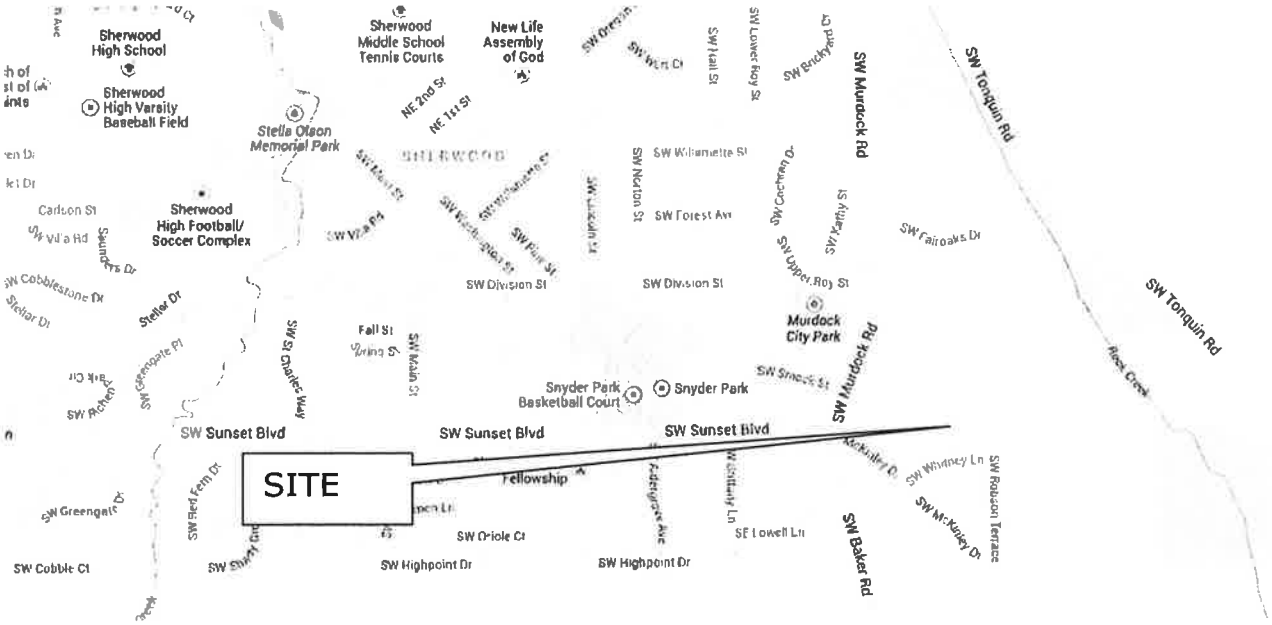
To the east of the proposed site is a large pond. All runoff will be routed to this pond. Lots one and three are adjacent to this pond and their runoff will be routed more or less directly to this pond. Lot 2 will follow an existing roadside ditch to this pond.

Engineering Conclusions:

The theoretical design of the proposed site satisfies the conveyance and pollution reduction standards required by City of Sherwood and Cleanwater Services Code.

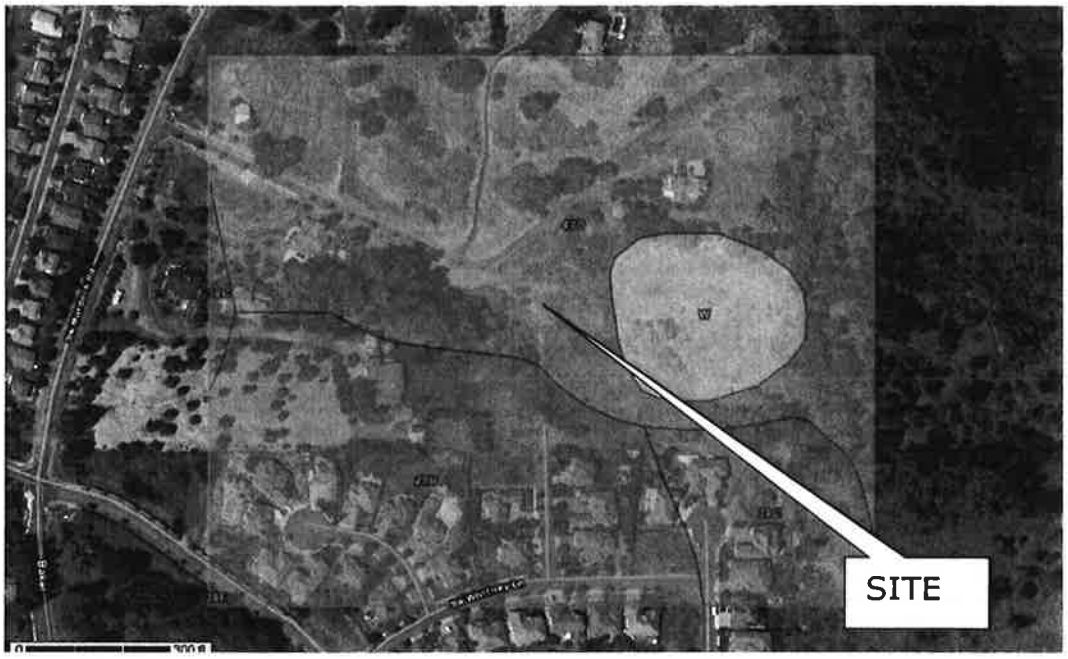
Appendix A:

Appendix A(1)
Vicinity Map



Appendix B:

Appendix B(1)
Soil Classification



Tables — Hydrologic Soil Group — Summary By Map Unit

Summary by Map Unit — Washington County, Oregon (OR067)

Map unit symbol	Map unit name	Rating
28B	Laurelwood silt loam, 3 to 7 percent slopes	B
38C	Saum silt loam, 7 to 12 percent slopes	C
38F	Saum silt loam, 30 to 60 percent slopes	C
47D	Xerochrepts-Rock outcrop complex	D
W	Water	
Totals for Area of Interest		

RUNOFF CURVE NUMBERS (TR55)

Table 2-2a: Runoff curve numbers for urban areas [1]

Cover description		CN for hydrologic soil group			
Cover type and hydrologic condition	Average percent impervious area[2]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3]:					
Poor condition (grass cover <50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover >75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5]	77	86	91	94	
Idle lands (CNs are determined using cover types similar to those in table 2-2c)					

1: Average runoff condition, and $I_a = 0.2S$.

2: The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas hava a CN of 98, and pervious areas are considered eq

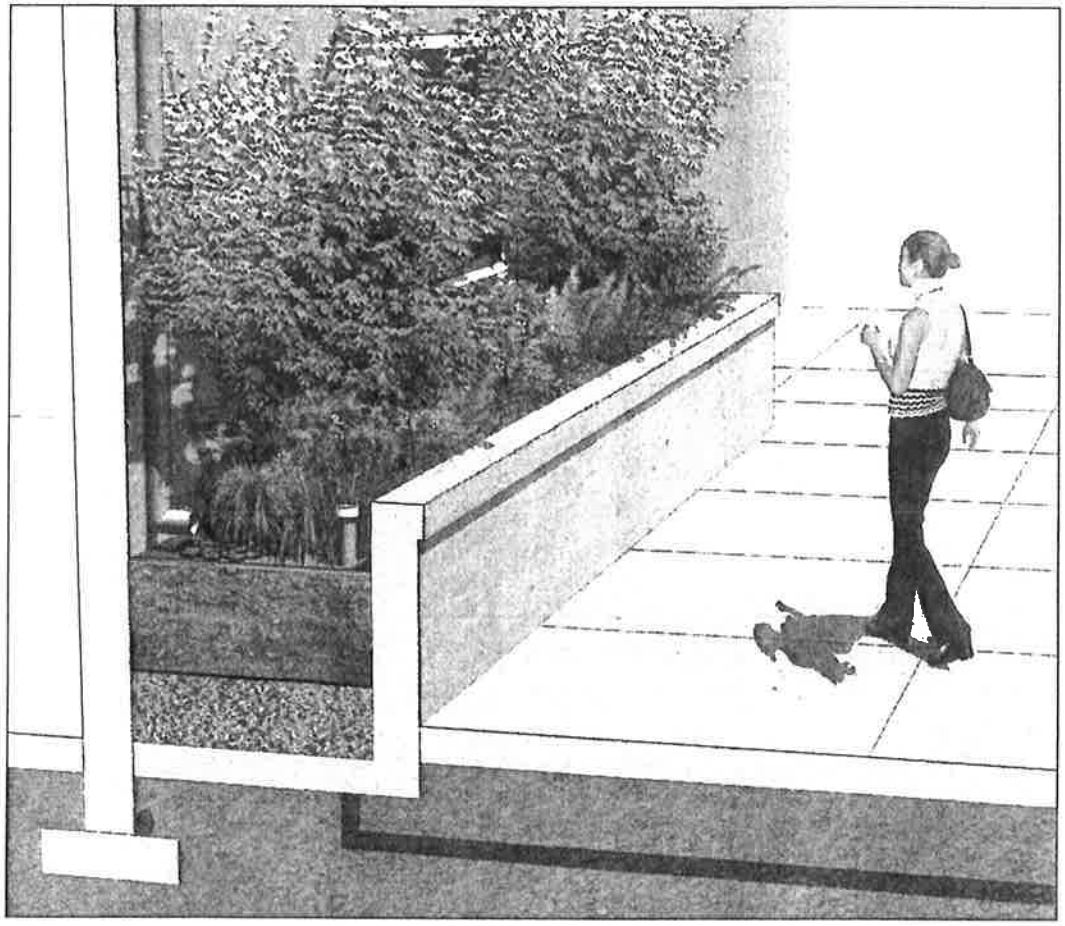
3: CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

4: Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic con

5: Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

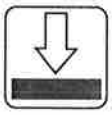
Appendix C:

Flow-Through Planter



buildings

parking areas & impermeable landscape



impermeable soils

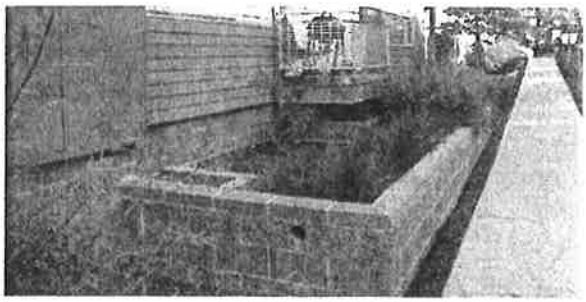
Description

Flow-through planters are structural landscaped reservoirs that collect stormwater and filter out pollutants as the water percolates through the vegetation, growing medium, and gravel. These are appropriate where soils do not drain well or there are site constraints. A liner may be required when located adjacent to buildings, over contaminated soils, and on unstable slopes. Excess stormwater collects in a perforated pipe at the bottom of the flow-through planter and drains to an approved discharge point.

Tree box filters are flow-through planters with a concrete "box" that contains filtering growing media and a tree or large shrub. Tree box filters are used singly or in multiples, often adjacent to streets where runoff is directed to them to treat stormwater runoff before it enters a catch basin.

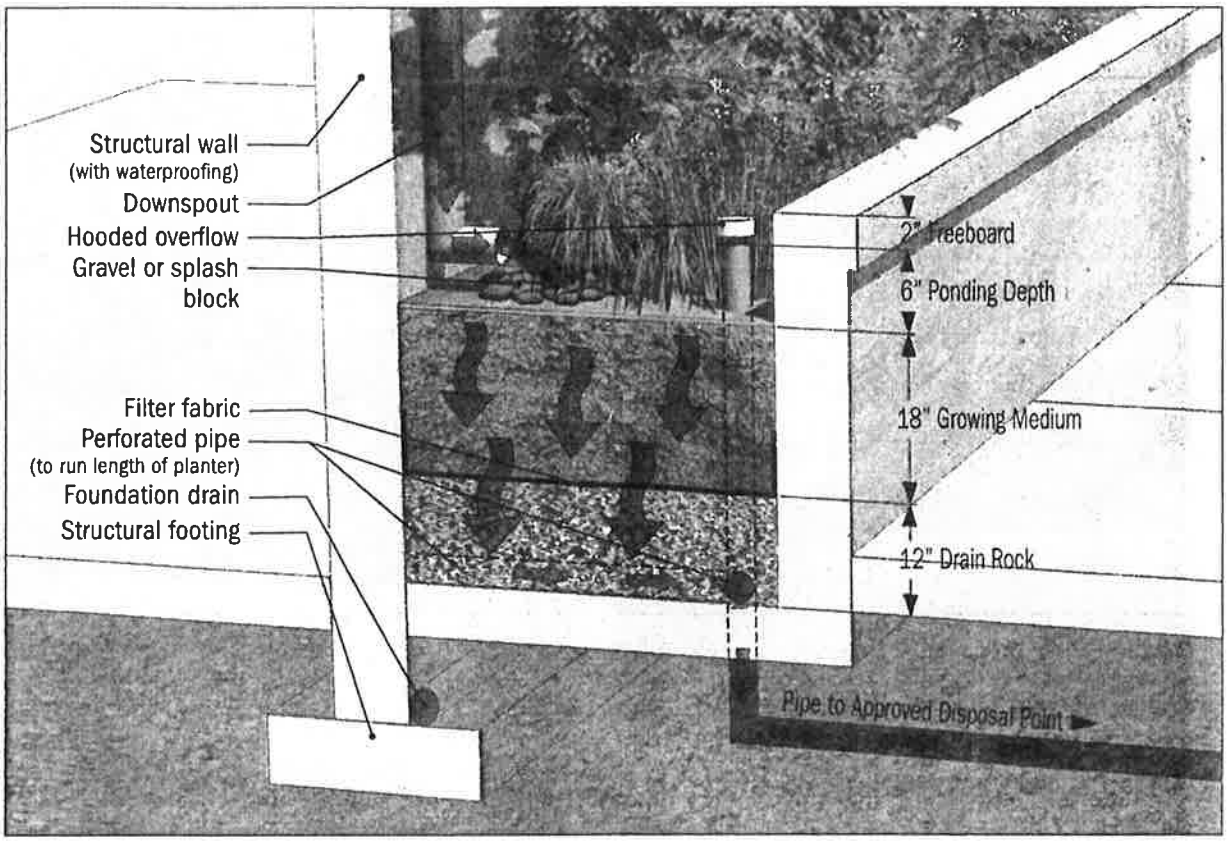
Application & Limitations

Flow-through planters may help fulfill a site's landscaping area requirement and can be used to manage stormwater runoff from all types of impervious surfaces on private property and within the public right-of-way. Check with the local jurisdiction if proposing to use a flow-through planter in the public right-of-way. Flow-through planters can be placed next to buildings and are ideal for sites with poorly draining soils, steep slopes or other constraints. Design variations of shape, wall treatment, and planting scheme will fit the character of any site.



Headwaters at Tryon Creek, Portland

Flow-Through Planter



Design Factors

Sizing

To calculate the planter size, multiply the impervious surface (rooftops, driveways, parking lots, etc.) area by 6%. The square footage is the peak water surface prior to overflow. For example, a 1,200 sf rooftop and 300 sf driveway (1,500 sf total impervious area) requires a 90 sf stormwater planter (1,500 x 0.06). This could be accomplished with one 9-foot by 10-foot flow-through planter.

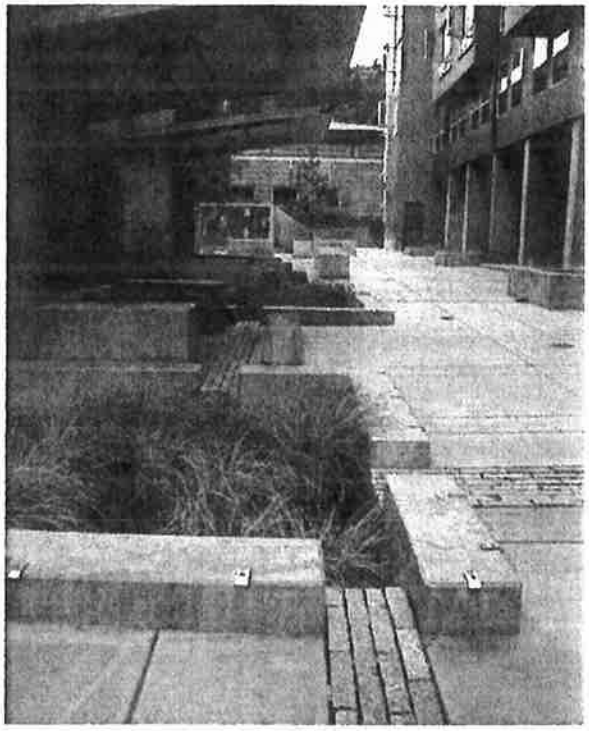
Geometry/Slopes

- Stormwater planters may be any shape, and can be designed as square, rectangular, circular, oblong, or irregular.
- Regardless of the shape, a minimum planter width of 30 inches is needed to achieve sufficient time for treatment and to avoid short-circuiting.
- The minimum treatment depth of 18 inches is achieved in the growing medium.
- Planters are designed to evenly distribute and filter flows. Surface longitudinal slopes should be less than 0.5%.

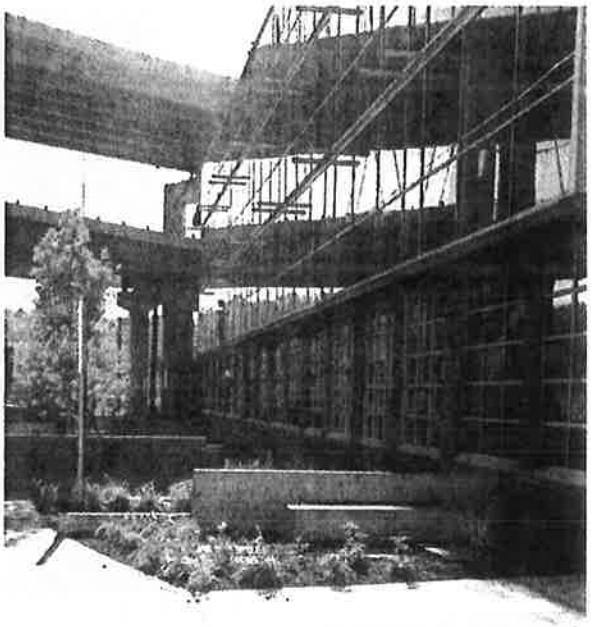
Piping for Flow Through Planters

Follow Plumbing Code requirements for piping that directs stormwater from impervious surfaces to flow-through planters. Stormwater may flow directly from the public street right-of-way or adjacent parking lot areas via curb openings. The overflow drain allows not more than 6 inches of water to pond in the planter prior to overflow. A perforated pipe system under the planter drains water that has filtered through the topsoil to prevent long-term ponding. On private property, the overflow drain and piping must meet Plumbing Code requirements and direct excess and filtered stormwater to an approved disposal point. Check with the local jurisdiction or use Clean Water Services Design and Construction Standards for additional information on piping material for use in the public right-of-way.

Portland Rebuilding Center



PSU Stephen Epler Hall, Portland



RiverEast Center, SE Portland

Design Factors (continued)

Setbacks

Check with the local building department to confirm site-specific requirements.

- For planters without an impermeable liner, generally the minimum setback from building structures is 10 feet.
- Typically, no building setback is required for planters lined with waterproofed concrete or 60 mil. PVC liner to prevent infiltration.

Soil Amendment/Mulch

Amended soils with appropriate compost serve numerous benefits: infiltration; detention; retention; better plant establishment and growth; reduced summer irrigation needs; reduced fertilizer need; increased physical/chemical/microbial pollution reduction; and reduced erosion potential. Primary treatment will occur in the top 18 inches of the infiltration planter. Amended soil in the treatment area is composed of imported soil, mix of one part organic compost, one part gravelly sand, and one part top soil. Compost is weed-free, decomposed, non-woody plant material; animal waste is not allowed. Check with the local jurisdiction or Clean Water Services for Seal of Testing Approval Program (STA) Compost provider.

To avoid erosion, use approved erosion control BMPs for non-structural infiltration planters.

Vegetation

Planted vegetation helps to attenuate stormwater flows and break down pollutants by interactions with bacteria, fungi, and other organisms in the planter soil. Vegetation also traps sediments, reduces erosion, and limits the spread of weeds. Appropriate and carefully considered plantings enhance the aesthetic and habitat value of a flow-through planter.

Because the entire facility will be inundated periodically, plant the water quality treatment area with herbaceous species such as rushes, sedges, perennials, ferns and shrubs appropriate for wet-to-moist soil conditions. Most moisture-tolerant plants can withstand seasonal droughts during the dry summer months and do not need irrigation after they become established.

Native plants are encouraged, but non-invasive ornamentals that add aesthetic and functional values are acceptable. Vegetation should be planted densely and evenly for proper hydrological function of the flow-through planter and to prevent erosion.

Quantities per 100 square feet:

- 115 Herbaceous plants, 1' on center spacing, ½-gal container size; or
- 100 Herbaceous plants, 1' on center, and 4 shrubs, 1-gal container size, 2' on center

Flow-Through Planter

Rose Quarter parking structure, NE Portland

Washougal Town Square

Aloha Dog and Cat Clinic, Washington County

Buckman Terrace Apartments, Portland

Maintenance

- Water efficient irrigation should be applied the first two years after construction of the facility, particularly during dry summer months, while plantings become established. After that, irrigation is at the owner's discretion.
- If public, the permittee is responsible for the maintenance of the flow-through planter for a minimum of two years following construction and acceptance of the facility. All publicly maintained facilities, not in the public right-of-way must have a public easement. If private, the property owner will be responsible for ongoing maintenance per a recorded maintenance agreement (see Appendix for example maintenance agreement).
- Water should drain through the planter within 24 hours after a major storm event.
- All planter components should be inspected for proper operation during major storm events.
- Remove nuisance or invasive plants such as weeds or blackberry and ivy when discovered.
- Remove and replace damaged or dead plants.
- Provide insect and rodent control as necessary.
- See Appendix for detailed maintenance checklist.

References

- Clean Water Services Design and Construction Standards
- Green Development Practices for Stormwater Management; City of Gresham, 2007.
- Stormwater Management Manual; City of Portland Bureau of Environmental Services, 2008.