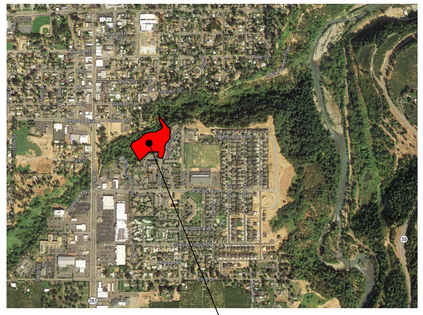


PROJECT LOCATION:
TAX LOTS 3300/3400
9TH COURT
HOOD RIVER, OR 97031

2 **SITE LOCATION MAP**

N

INDIAN CREEK

INDIAN CREEK TOP OF BANK

50' SETBACK LINE FROM INDIAN CREEK TOP OF BANK

PROPERTY LINE

THE RIVERSIDE

INDIAN CREEK VILLAGE

C-2 ZONE R-3 ZONE

9TH COURT

(E) SIDEWALK

34'

(E) SIDEWALK

1 **SITE PLAN - EXISTING CONDITIONS**

1" = 30'-0"

N

DRAWING LEGEND

(E) WETLAND

INDIAN CREEK PATH/EASEMENT

LEGAL DESCRIPTION

LOTS 1 & 2 OF ELIOT WOODS BUSINESS PARK, LOCATED IN THE NW QUADRANT OF THE SW QUARTER OF SECTION 36, TOWNSHIP 3 NORTH, RANGE 10 EAST, WILLAMETTE MERIDIAN, IN THE CITY OF HOOD RIVER, HOOD RIVER COUNTY, OREGON.

PROJECT INFORMATION

OWNER CONTACT

APPLE DEVELOPMENT, LLC
550 RIVERSIDE DRIVE
HOOD RIVER, OR 97031

DAVID RYAN

ARCHITECT

SURROUND ARCHITECTURE, INC.
150 SW HARRISON STREET, SUITE 100
PORTLAND, OR 97201
T: 503.224.6484

MARK VANDERZANDEN
E: mark@surroundinc.com

CIVIL ENGINEER

TENNESON ENGINEERING CORP.
3313 WEST SECOND STREET, SUITE 100
THE DALLES, OR 97058
T: 541.296.9177

KEVIN CHRISMAN
E: KChrisman@tennesoneng.com

DRAWING REVISIONS

NO.	DATED

SITE PLAN

SURROUND

THE CREEK

HOOD RIVER, OR

date: 08.29.2019

phase: PUD SUBMITTAL

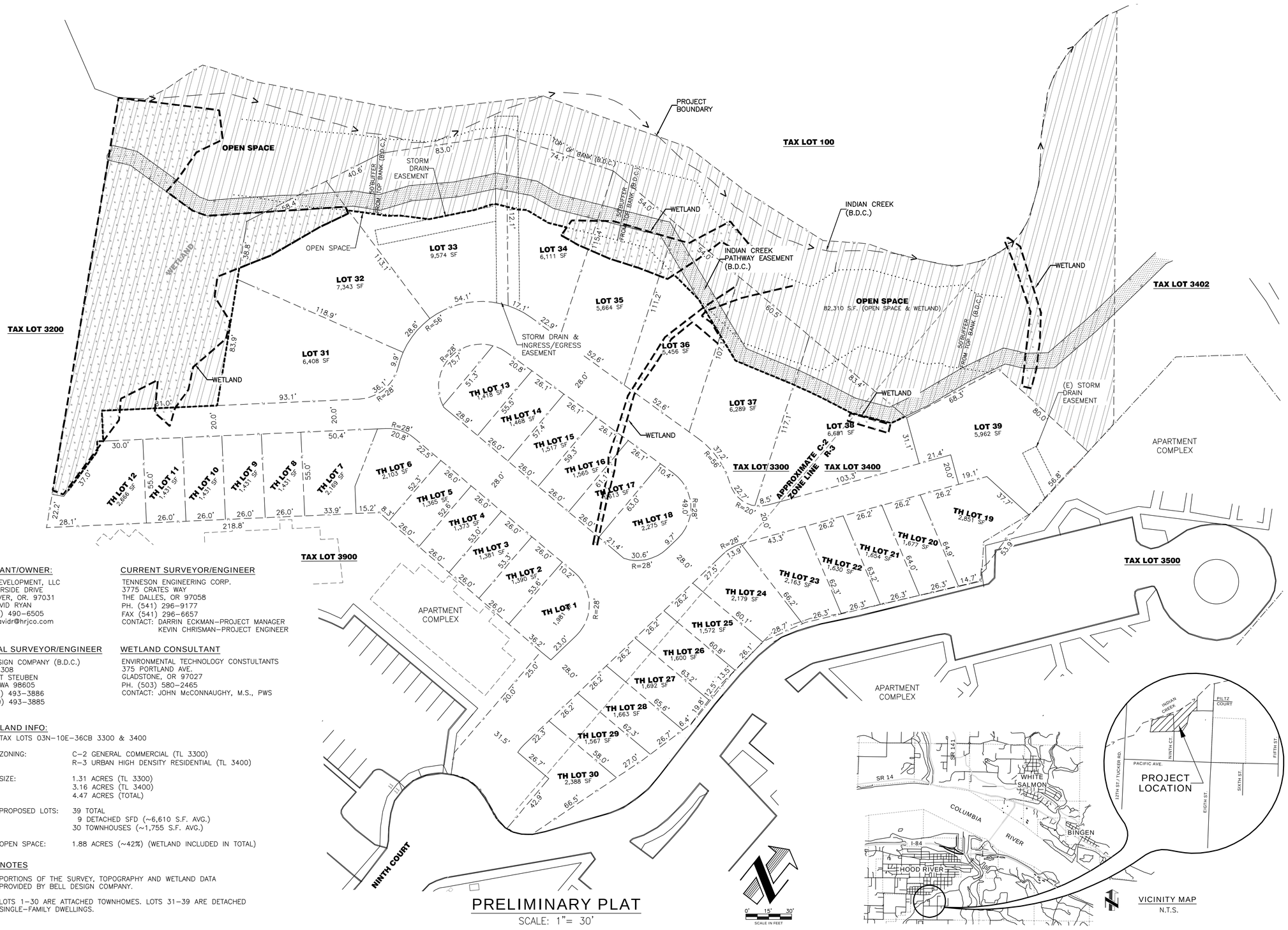
drawn by:

Surround Architecture, inc.

(C) 2016 SURROUND ARCHITECTURE, INC.

150 s.w. harrison, suite 100
portland, or 97201
t 503.224.6484
f 503.224.6485

A101



PRELIMINARY PLAT
SCALE: 1"= 30'

VICINITY MAP
N.T.S.

APPLICANT/OWNER:

APPLE DEVELOPMENT, LLC
550 RIVERSIDE DRIVE
HOOD RIVER, OR. 97031
ATTN: DAVID RYAN
PH: (541) 490–6505
EMAIL: davidr@hrjco.com

CURRENT SURVEYOR/ENGINEER

TENNESON ENGINEERING CORP.
3775 CRATES WAY
THE DALLES, OR 97058
PH. (541) 296–9177
FAX (541) 296–6657
CONTACT: DARRIN ECKMAN–PROJECT MANAGER
KEVIN CHRISMAN–PROJECT ENGINEER

ORIGINAL SURVEYOR/ENGINEER

BELL DESIGN COMPANY (B.D.C.)
PO BOX 308
900 WEST STEUBEN
BINGEN, WA 98605
PH. (509) 493–3886
FAX (509) 493–3885

WETLAND CONSULTANT

ENVIRONMENTAL TECHNOLOGY CONSTULTANTS
375 PORTLAND AVE.
GLADSTONE, OR 97027
PH. (503) 580–2465
CONTACT: JOHN McCONNAUGHY, M.S., PWS

LAND INFO:

TAX LOTS 03N–10E–36CB 3300 & 3400

ZONING: C–2 GENERAL COMMERCIAL (TL 3300)
R–3 URBAN HIGH DENSITY RESIDENTIAL (TL 3400)

SIZE: 1.31 ACRES (TL 3300)
3.16 ACRES (TL 3400)
4.47 ACRES (TOTAL)

PROPOSED LOTS: 39 TOTAL
9 DETACHED SFD (~6,610 S.F. AVG.)
30 TOWNHOUSES (~1,755 S.F. AVG.)

OPEN SPACE: 1.88 ACRES (~42%) (WETLAND INCLUDED IN TOTAL)

NOTES

PORTIONS OF THE SURVEY, TOPOGRAPHY AND WETLAND DATA PROVIDED BY BELL DESIGN COMPANY.

LOTS 1–30 ARE ATTACHED TOWNHOMES. LOTS 31–39 ARE DETACHED SINGLE–FAMILY DWELLINGS.

DESIGN: T.E.C./BELL
DWG. FILE: K:\WORK ORDERS\15200\15218\DRAWINGS\PREPLAT_15218 08.29.19.DWG
DATE: 8/29/2019
DRAWN: T.E.C./BELL
WORK ORDER: 15218
SURVEY: BELL
SCALE: AS NOTED

PRELIMINARY PLAT
FOR
INDIAN CREEK P.U.D.
HOOD RIVER, OREGON
PLOT DATE: 8/29/2019

TENNESON ENGINEERING CORP.
CONSULTING ENGINEERS
3775 CRATES WAY
THE DALLES, OREGON 97058
PH. 541–296–9177 FAX 541–296–6657

PRE APPLICATION ONLY

IF THIS BAR IS NOT ONE INCH, THEN ADJUST SCALES ACCORDINGLY

REGISTERED PROFESSIONAL ENGINEER
56,141 PE
OREGON
JAN. 15, 2002
KEVIN W. CHRISMAN
PRELIMINARY
RENEWAL DATE: 12/31/19

PRE-PLAT

SHEET 1

Work Order No. 15218

1 **SITE PLAN - PRELIMINARY DEVELOPMENT PLAN**
1" = 30'-0"

DRAWING LEGEND

- (E) WETLAND TO REMAIN
- INDIAN CREEK PATH/EASEMENT
- EASEMENT: UTILITY, ACCESS, STREET, & PARKING
- EASEMENT: UTILITY & ACCESS
- EASEMENT: OPEN SPACE

SUMMARY

OVERALL SITE AREA:	205,636.7 SF (4.72 ACRES)
TOTAL LOTS:	30 TOWNHOUSE LOTS 9 HOMESITE LOTS

DRAWING REVISIONS

NO.	DATED

SITE PLAN

THE CREEK

HOOD RIVER, OR

Surround Architecture, inc.

(C) 2016 SURROUND ARCHITECTURE, INC.

150 s.w. harrison, suite 100
portland, or 97201
t 503.224.8484
f 503.224.8485

date: 08.29.2019
phase: PUD SUBMITTAL
drawn by:

A111

1 **SITE PLAN - UNIT TYPES / DENSITY**
1" = 30'-0"

N

DRAWING LEGEND

- (E) WETLAND TO REMAIN
- INDIAN CREEK PATH/EASEMENT
- 3 BEDROOM, 1600sf UNIT + GARAGE
- 2 BEDROOM, 1200sf UNIT + GARAGE

DENSITY CALCULATIONS

C-2 ZONE

MINIMUM DENSITY:
C-2 BUILDABLE AREA (EXCLUDES WETLANDS, INDIAN CREEK BUFFER & PATH, STREET & PARKING RIGHTS OF WAY):
63,961 SF = 1.468 ACRES
X 11 UNITS/ACRE = MINIMUM 16.15 UNITS

MAXIMUM DENSITY: NONE

ACTUAL DENSITY: 25 UNITS
(18 TOWNHOUSE UNITS & 7 LOTS)

R-3 ZONE

MINIMUM DENSITY: NONE

MAXIMUM DENSITY:
R-3 OVERALL SITE AREA: 1.31 ACRES
X .70 = .917 ACRES = 39,944 SF
– 5,000 SF = 34,944 SF
/ 1500 SF/UNIT
= 23.29 UNITS + 2 UNITS
= 25.29 UNITS = 25 MAX UNITS

ACTUAL DENSITY: 14 UNITS
(12 TOWNHOUSE UNITS & 2 LOTS)

DRAWING REVISIONS

NO.	DATED

SITE PLAN

SURROUND

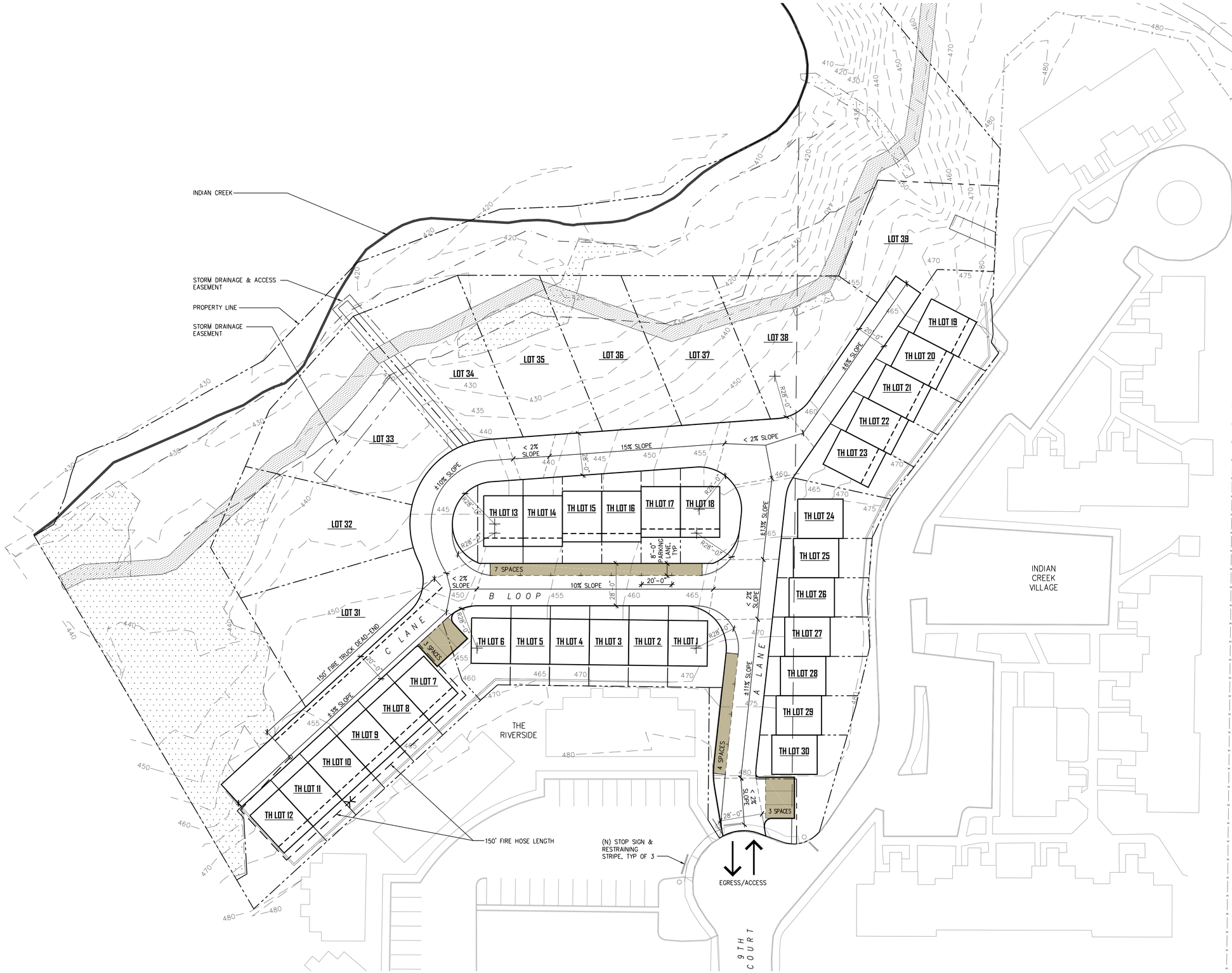
THE CREEK

HOOD RIVER, OR

Surround Architecture, inc.
(C) 2016 SURROUND ARCHITECTURE, INC.
150 s.w. harrison, suite 100
portland, or 97201
t 503.224.8484
f 503.224.8485

date: 08.29.2019
phase: PUD SUBMITTAL
drawn by:

A112



1 **SITE PLAN - TRANSPORTATION / ROADWAY / PARKING**
1" = 30'-0"

DRAWING LEGEND

- (E) WETLAND TO REMAIN
- INDIAN CREEK PATH/EASEMENT
- PARKING AREA

PARKING SPACES

PER FIGURE 16.12-G:
39 UNITS - 6 UNITS = 33 UNITS
33 UNITS x 0.5 PARKING SPACES = 16.5 = 17 SPACES REQUIRED.
17 SPACES PROVIDED.

TOWNHOUSE LOTS 1-30: EACH TOWNHOUSE UNIT WILL INCLUDE A GARAGE TO ACCOMMODATE 2 VEHICLES.

LOTS 31-39: CC&Rs WILL REQUIRE EACH HOMESITE LOT TO INCLUDE A GARAGE.

DRAWING REVISIONS

NO.	DATED

SITE PLAN

THE CREEK

HOOD RIVER, OR

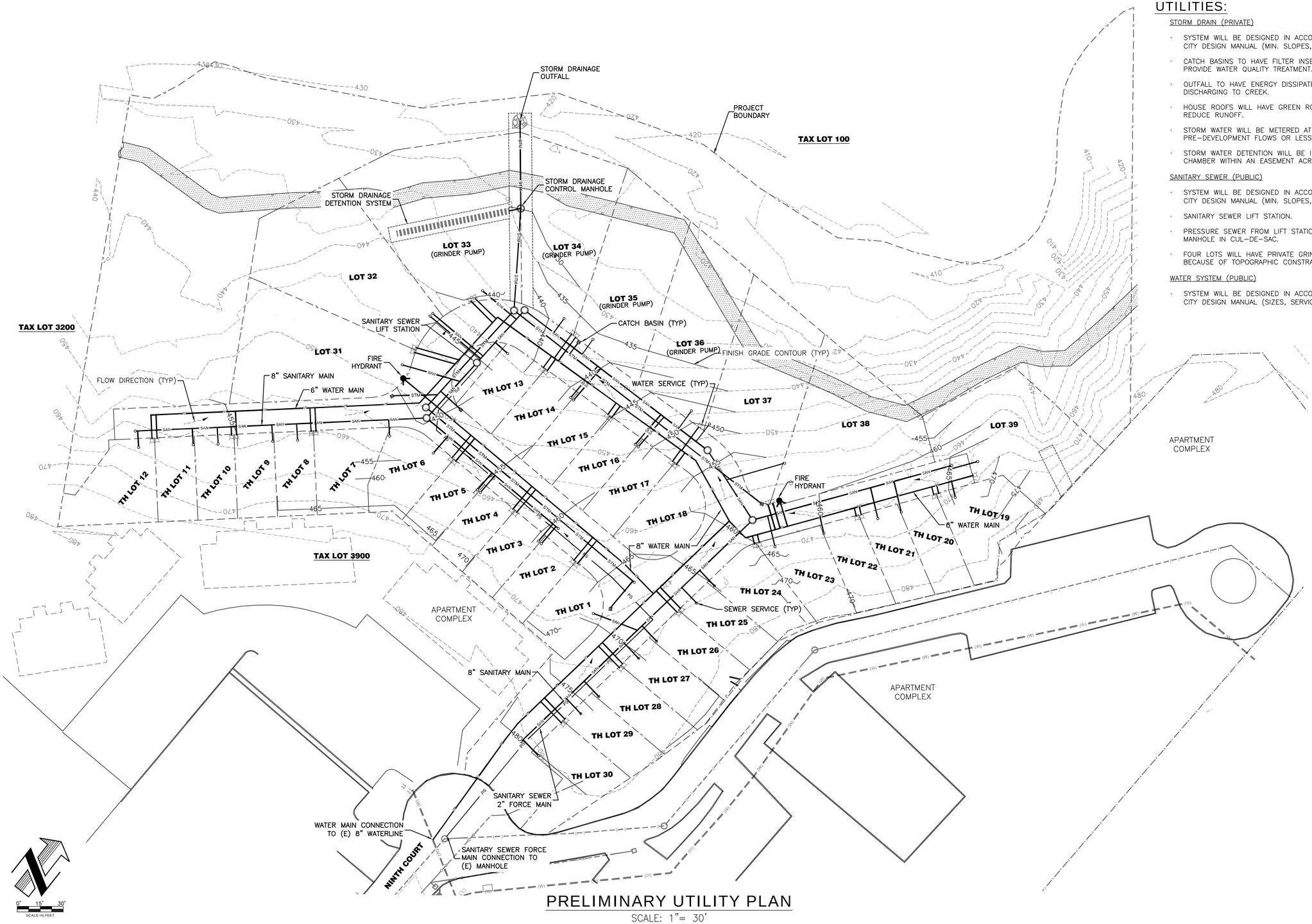
date: 08.29.2019

phase: PUD SUBMITTAL

drawn by:

Surround Architecture, inc.
(C) 2016 SURROUND ARCHITECTURE, INC.
150 s.w. harrison, suite 100
portland, or 97201
t 503.224.8484
f 503.224.8485

A113



UTILITIES:

STORM DRAIN (PRIVATE)

- SYSTEM WILL BE DESIGNED IN ACCORDANCE WITH CITY DESIGN MANUAL (MIN. SLOPES, SIZES, ETC.).
- CATCH BASINS TO HAVE FILTER INSERTS TO PROVIDE WATER QUALITY TREATMENT.
- OUTFALL TO HAVE ENERGY DISSIPATER PRIOR TO DISCHARGING TO CREEK.
- HOUSE ROOFS WILL HAVE GREEN ROOFS TO REDUCE RUNOFF.
- STORM WATER WILL BE METERED AT PRE-DEVELOPMENT FLOWS OR LESS.
- STORM WATER DETENTION WILL BE IN A BURIED CHAMBER WITHIN AN EASEMENT ACROSS LOT 33.

SANITARY SEWER (PUBLIC)

- SYSTEM WILL BE DESIGNED IN ACCORDANCE WITH CITY DESIGN MANUAL (MIN. SLOPES, SIZES, ETC.).
- SANITARY SEWER LIFT STATION.
- PRESSURE SEWER FROM LIFT STATION TO MANHOLE IN CUL-DE-SAC.
- FOUR LOTS WILL HAVE PRIVATE GRINDER PUMPS BECAUSE OF TOPOGRAPHIC CONSTRAINTS.

WATER SYSTEM (PUBLIC)

- SYSTEM WILL BE DESIGNED IN ACCORDANCE WITH CITY DESIGN MANUAL (SIZES, SERVICES, ETC.).

PRELIMINARY UTILITY PLAN

SCALE: 1"= 30'

DESIGN: T.E.C./BELL
DWG. FILE: K:\WORK ORDERS\15200\15218\DRAWINGS\PREPLM_15218 08.29.19.DWG
DATE: 8/29/2019
SURVEY: BELL
DRAWN: T.E.C./BELL
WORK ORDER: 15218
SCALE: AS NOTED

PRELIMINARY UTILITY PLAN

FOR

INDIAN CREEK P.U.D.

HOOD RIVER, OREGON
PLOT DATE: 8/29/2019

TENNESON ENGINEERING CORP.
CONSULTING ENGINEERS
3775 CRATES WAY
THE DALLES, OREGON 97058
PH. 541-296-9177 FAX 541-296-6657

PRE APPLICATION ONLY

IF THIS BAR IS NOT ONE INCH, THEN ADJUST SCALES ACCORDINGLY

REGISTERED PROFESSIONAL ENGINEER
56,141 PE
OREGON
JAN. 15, 2002
KEVIN W. CHRISMAN
PRELIMINARY
RENEWAL DATE: 12/31/19

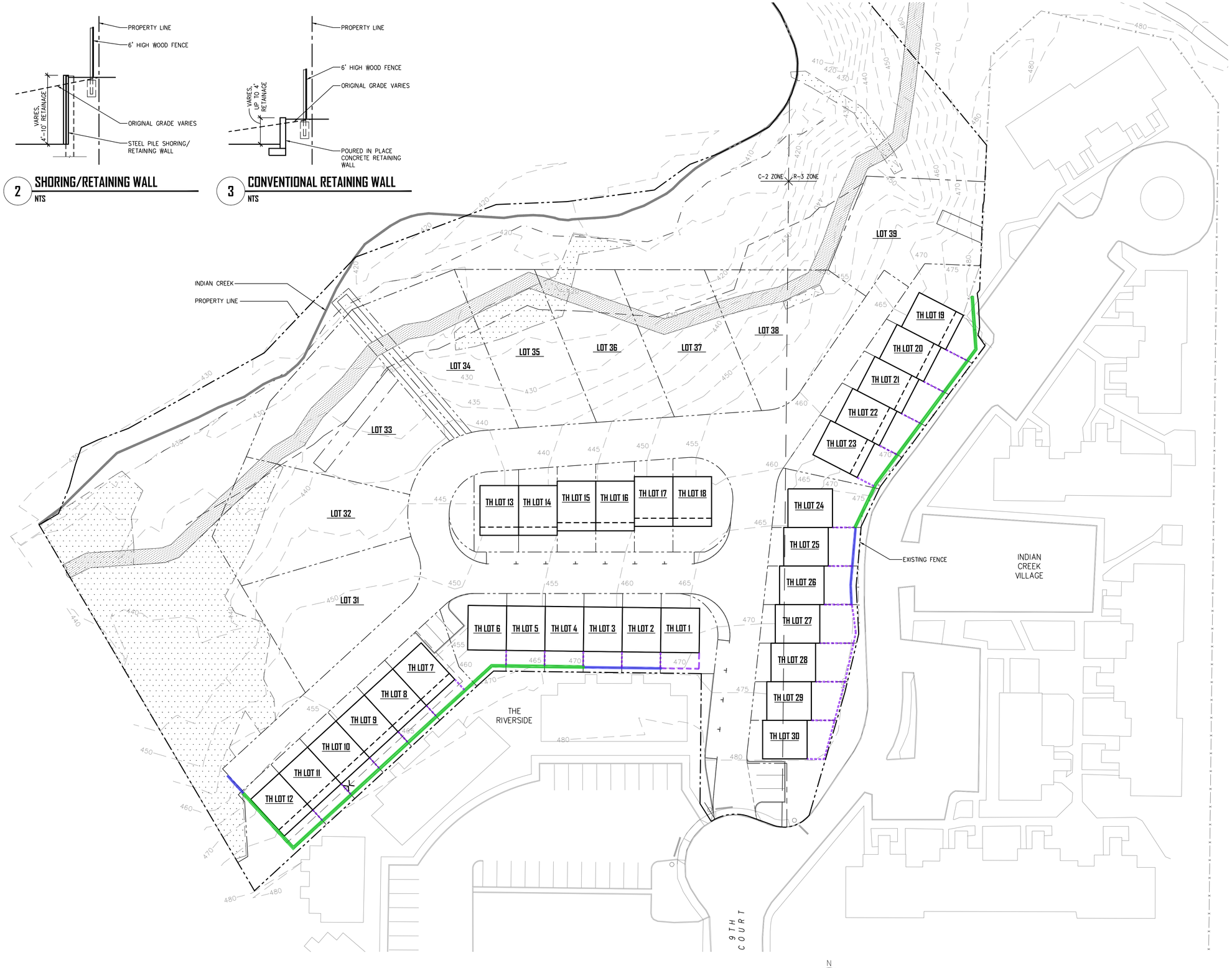
UTILITY

SHEET 2

Work Order No. 15218

2 **SHORING/RETAINING WALL**
NTS

3 **CONVENTIONAL RETAINING WALL**
NTS



1 **SITE PLAN - RETAINING WALL / FENCES**
1" = 30'-0"

N

DRAWING LEGEND

- (E) WETLAND TO REMAIN
- INDIAN CREEK PATH/EASEMENT
- 4'-10' SHORING/RETAINING WALL WITH 6' WOOD FENCE ABOVE, SEE DETAIL 2/A115
- CONVENTIONAL RETAINING WALL (UP TO 4') WITH 6' WOOD FENCE ABOVE, SEE DETAIL 3/A115
- 6' WOOD FENCE

DRAWING REVISIONS

NO.	DATED

SITE PLAN

SURROUND

THE CREEK

HOOD RIVER, OR

Surround Architecture, inc.
(C) 2016 SURROUND ARCHITECTURE, INC.
150 s.w. harrison, suite 100
portland, or 97201
t 503.224.8484
f 503.224.8485

date: 08.29.2019

phase: PUD SUBMITTAL

drawn by:

A115

1 SITE PLAN - NATURAL FEATURES / LANDSCAPE
1" = 30'-0"

N

DRAWING LEGEND

- (E) WETLAND TO REMAIN
- (E) WETLAND TO BE MITIGATED
- PRESERVED & ENHANCED NATURAL AREA
- LANDSCAPE AREA
- INDIAN CREEK PATH/EASEMENT

LANDSCAPE NOTES

INVASIVE SPECIES TO BE REMOVED TO THE EXTENT PRACTICAL.

LANDSCAPE CALCULATIONS

TOTAL SITE AREA:	205,636 SF
MIN 20% NATURAL/LANDSCAPE AREA:	41,127 SF
PROPOSED NATURAL/LANDSCAPE AREA:	85,966 SF (42%)

DRAWING REVISIONS

NO.	DATED

SITE PLAN

SURROUND

THE CREEK

HOOD RIVER, OR

date: 08.29.2019

phase: PUD SUBMITTAL

drawn by:

Surround Architecture, inc.
(C) 2016 SURROUND ARCHITECTURE, INC.
150 s.w. harrison, suite 100
portland, or 97201
t 503.224.6484
f 503.224.6485

A116

1 **SITE PLAN - OPEN SPACE**
1" = 30'-0"

DRAWING LEGEND

- (E) WETLAND TO REMAIN
- INDIAN CREEK PATH/EASEMENT
- C-2 ZONE: PRESERVED NATURAL OPEN SPACE
- C-2 ZONE: LANDSCAPE AREA
- R-3 ZONE: PRESERVED NATURAL OPEN SPACE
- R-3 ZONE: LANDSCAPE AREA

OPEN SPACE CALCULATIONS

C-2 ZONE - SITE AREA	
OVERALL C-2 SITE AREA	155,098 SF
MIN. 30% OPEN SPACE	46,529 SF
PROPOSED OPEN SPACE	63,432 SF
PROPOSED PAVING	37,056 SF

R-3 ZONE - SITE AREA	
OVERALL R-3 SITE AREA	50,555 SF
MIN. 30% OPEN SPACE	15,166 SF
PROPOSED OPEN SPACE	19,861 SF
PROPOSED PAVING	2,631 SF

DRAWING REVISIONS

NO.	DATED

SITE PLAN

THE CREEK

HOOD RIVER, OR

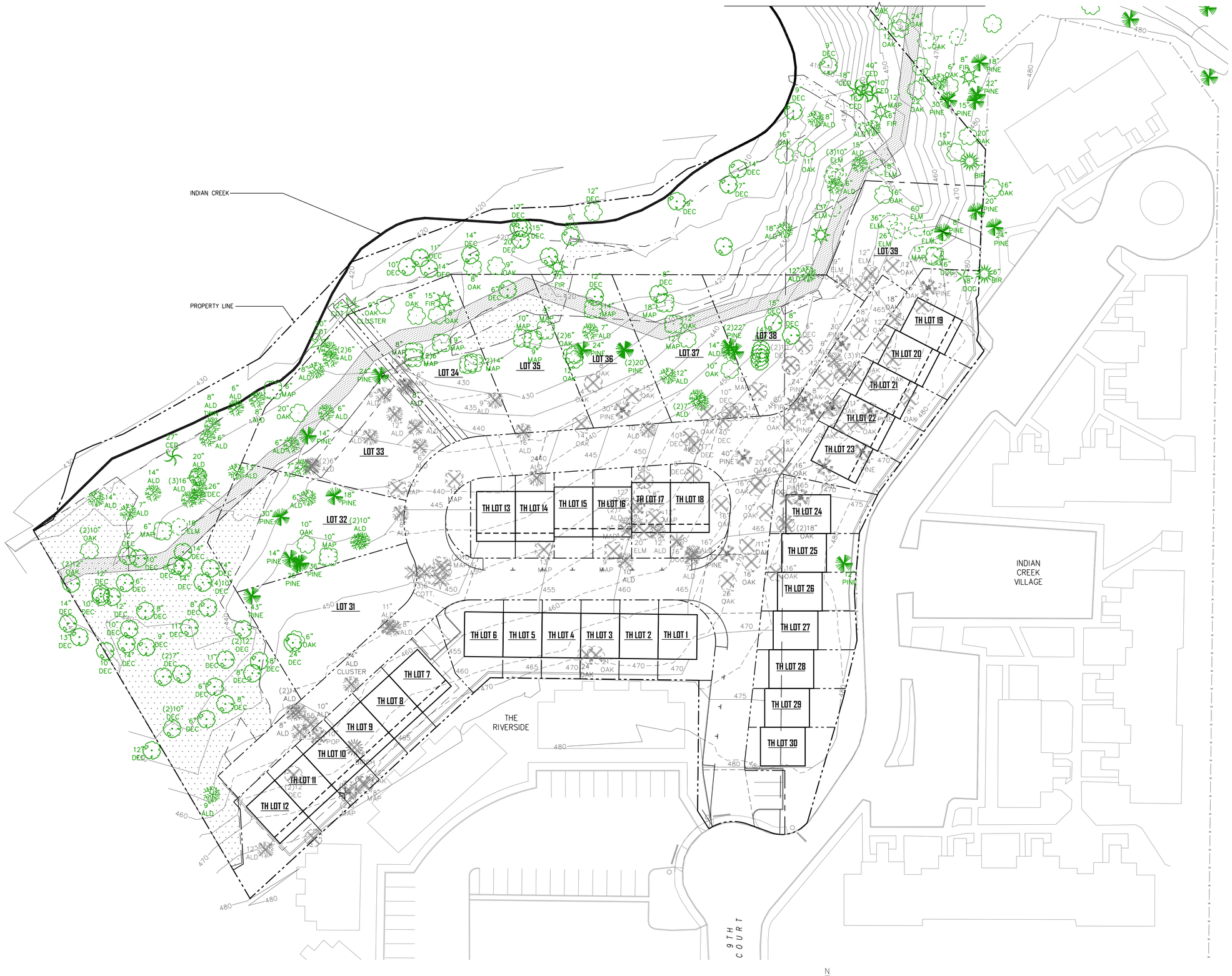
Surround Architecture, inc.
(C) 2016 SURROUND ARCHITECTURE, INC.
150 s.w. harrison, suite 100
portland, or 97201
t 503.224.8484
f 503.224.8485

date: 08.29.2019

phase: PUD SUBMITTAL

drawn by:

A117



1 SITE PLAN - TREES
1" = 30'-0"

DRAWING LEGEND

- (E) WETLAND TO REMAIN
- INDIAN CREEK PATH/EASEMENT
- TREE TO REMAIN
- TREE TO BE REMOVED

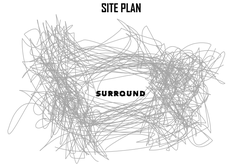
TREE TYPES

- POP–POPLAR
- DEC–DECIDUOUS
- OAK
- PINE
- BIR–BIRCH
- COTT–COTTONWOOD
- MAP–MAPLE
- ALD–ALDER
- DOG–DOGWOOD
- FIR
- CED–CEDAR
- ELM

DRAWING REVISIONS

NO.	DATED

SITE PLAN



THE CREEK

HOOD RIVER, OR

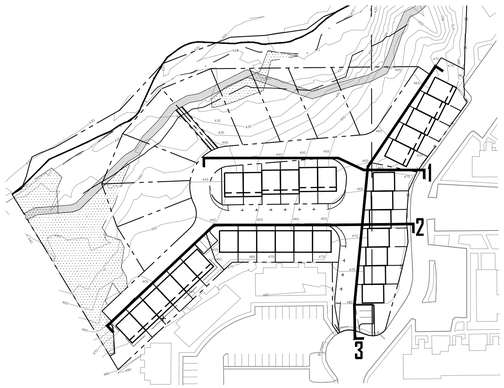
Surround Architecture, inc.
(C) 2016 SURROUND ARCHITECTURE, INC.
150 s.w. harrison, suite 100
portland, or 97201
t 503.224.8484
f 503.224.8485

date:
08.29.2019

phase:
PUD SUBMITTAL

drawn by:

A118



KEY PLAN

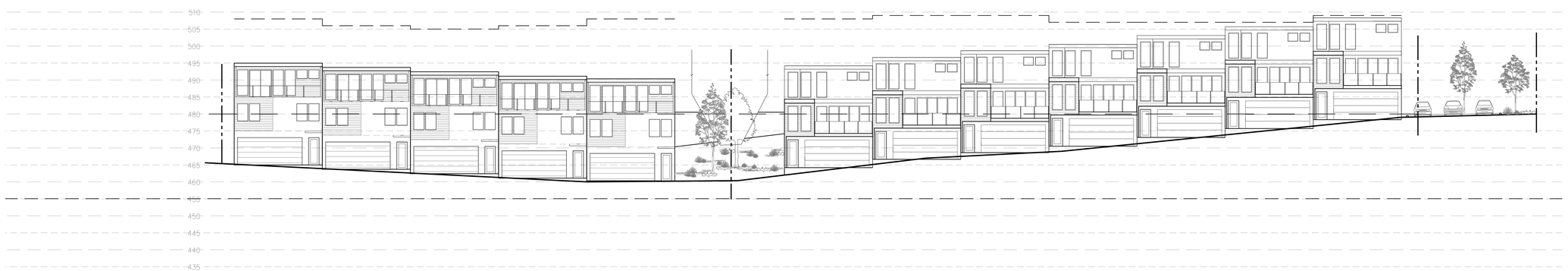
1"=100'-0"

1 SECTION THROUGH STREET

1/16"=1'-0"

2 SECTION THROUGH STREET

1/16"=1'-0"



3 SECTION THROUGH STREET

1/16"=1'-0"

DRAWING REVISIONS

NO.	DATED

BUILDING ELEVATIONS & SECTIONS

THE CREEK

HOOD RIVER, OR

Surround Architecture, inc.

(C) 2016 SURROUND ARCHITECTURE, INC.

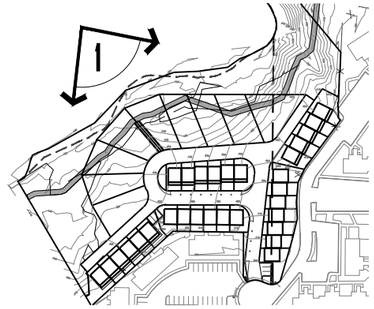
150 s.w. harrison, suite 100
portland, or 97201
t 503.224.8484
f 503.224.8485

date:
03.14.2019

phase:
PUD SUBMITTAL

drawn by:

A301



KEY PLAN

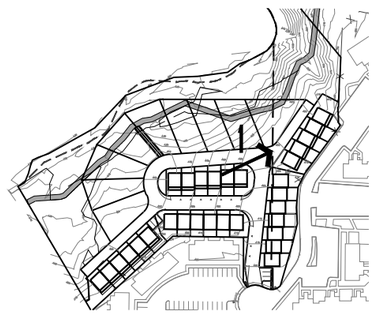
1 THE CREEK - OVERALL VIEW

project	THE CREEK
issue date	03.14.2019
ref. dwg	RENDERINGS

SURROUND

R1

surround architecture, inc. - portland, or - 503.224.6484
(c) 2013 surround architecture, inc.

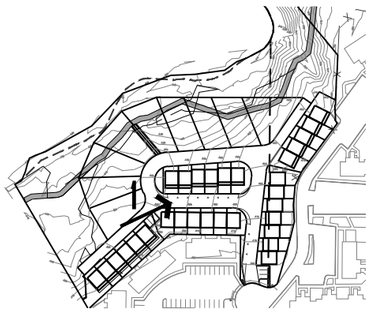


KEY PLAN

1 TOWNHOME VIEW - TYPE A

project	THE CREEK
issue date	03.14.2019
ref. dwg.	SITE PLAN R2

surround architecture, inc. - portland, or - 503.224.6484
(c) 2013 surround architecture, inc.



KEY PLAN

N

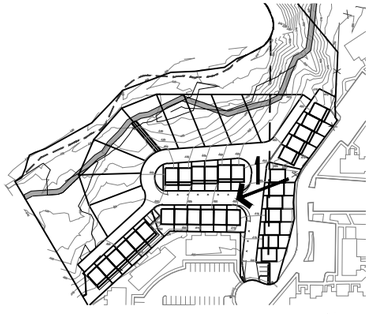
1 TOWNHOME VIEW - TYPE B

project	THE CREEK
issue date	03.14.2019
ref. dwg.	SITE PLAN

SURROUND

R3

surround architecture, inc. - portland, or - 503.224.6484
(c) 2013 surround architecture, inc.



KEY PLAN

N

1 TOWNHOME VIEW - TYPE C

project	THE CREEK
issue date	03.14.2019
ref. dwg.	SITE PLAN

SURROUND

R4

surround architecture, inc. - portland, or - 503.224.6484
(c) 2013 surround architecture, inc.

APPROVAL CRITERIA NARRATIVE

Development proposal

1. Planning Objectives: This proposal is a 39 unit residential development
2. Development schedule: This proposal is to be constructed in 2 phases: Phase I construction is planned for 2020-2021 for the west half of the development; Phase II construction for the east half will be either at that same time or 2022-2023. All roads and utilities would be constructed in Phase 1. All common areas would be improved or maintained as scope of phase 1.
3. Development: The owners would plan and build ALL townhomes and then either sell them each individually or rent them. The individual lots would be available for sale individually or as a group to either owner builders, or other developers.
4. Future selling of the planned development: The proposal would allow for the sale of each of the individual units, along with the open spaces adjacent to each.
5. The proposal includes common areas, and the owner will set up a Homeowners Association that would be responsible for maintaining all common areas, and private roads and any private utilities. Bylaws will provide restrictions and requirements for maintenance and will include architectural design guidelines for the single family home sites.
6. The owner and Architect held a neighborhood meeting (see attached documents) There were several neighbors from homes to the north, on the other side of Indian Creek, and there were also other Hood River residents who were interested in attendance. The proposal was presented and these comments were received:
   a. Provide a design that incudes dark and natural colors to best integrate into the areas natural colors.
   b. Provide hooded and indirect lighting along with design restrictions to keep light pollution to a minimum. Lighting type restrictions will be added to the Bylaws.
   c. The group asked the owners to remove “streetlights” from the private roads for the same reasons as b. above- We removed streetlights from the proposal.
   d. Neighbor Residents from the north specifically asked that the proposal NOT include any bridge across Indian Creek. (no bridge is proposed)

7. Compliance with approval criteria:

A. Conditional Use Criteria:
   1. Impact- This development is reasonably compatible with and will have minimal impact on abutting properties and the surrounding area. Increased residential use in this area will enhance livability, safety and encourage more pedestrian and bicycle use, greater town efficiency and sustainability.
   2. Nuisance- The project’s residential use will not generate any off-site nuisance conditions.
   3. Plan Consistency- This proposal’s use of residential is consistent with the City’s Comprehensive Plan and the requirements of the Zoning Code. Residential uses are allowed with the C-2 and R-3, and meet the City planning objectives to provide affordable housing.
   4. Scale- This site accommodates the proposed use as well as the required landscape and open space. The townhomes are scaled by height and mass similarly to adjacent apartment buildings and the homesites are separated from neighboring parcels by natural areas.
   5. Landscaping- The landscape design is in accordance with the landscape regulations of the Zoning Code. See Landscape drawings. Much of the parcel is landscaped in a natural state.
   6. Performance Bonds- Will be provided by the general contractor if required for any public infrastructure that is required.
   7. Burden of Proof- Is provided by the applicant in the supporting documentation of the proposal submittal.
   8. Final Plans- Showing conformance to the conditions will be provided by the applicant during permitting.

B. Additional (Site Plan Review) Criteria:

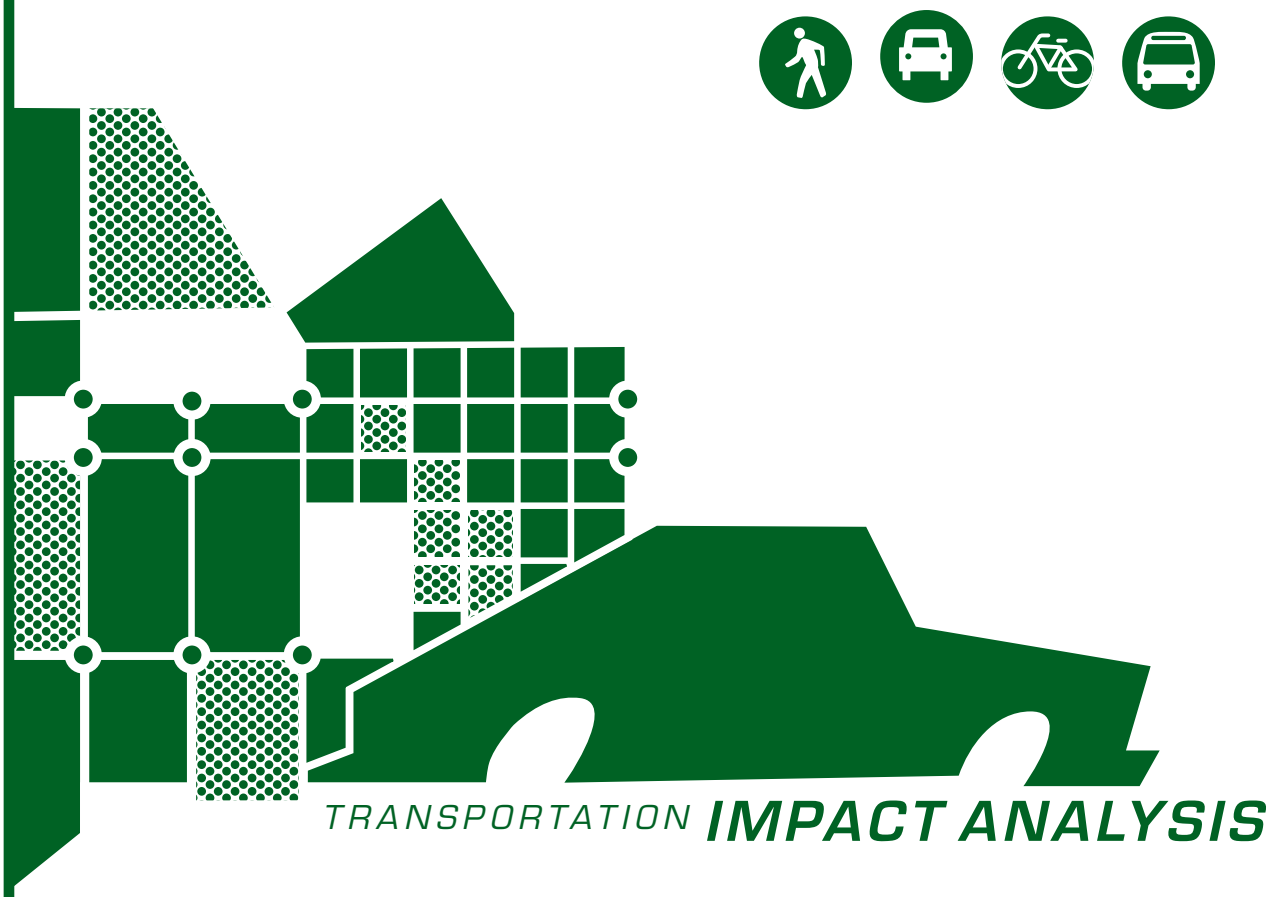
APPROVAL CRITERIA NARRATIVE

1. Natural Features-A large share of the natural features of the site will be maintained and enhanced by this proposal. The natural topography will be maintained up from the street to the entry drive on the north side as well at both the east and west ends of the property. Many existing trees will be maintained, as shown in the attached drawings.
2. Air Quality- Air quality will be unaffected by this development as residential uses do not generate pollutants.
3. Grading- The site will be graded and built out so that there will be no adverse affect on the public right of way on the south side. Retaining walls will be required, as shown. These walls will be Pile driven to eliminate any possible adverse effects. The areas not covered by new building and driveways will be planted landscaping or left in a mostly natural state. A subsurface, continuous drainage system will be installed at the building perimeter. Planting will be done immediately after construction is complete. A comprehensive erosion control plan will be put in place.
4. Public Facilities- The site has adequate public facilities available for the proposal including water, sanitary sewer, storm drain, fire protection and streets. Please refer to utility drawings and the Traffic assessment. Sewer will be pumped on site up to 9th. Storm water will be handled on site as shown.
5. Traffic- On site movement of vehicles is limited to those coming and going from the new drive to the Townhomes. An existing access and curb cut will be continuing to be used at the existing street.
6. Storage-Trash will be within each townhome of home site, and not in a common structure. Each residential unit will include a 2 car garage. There are no common storage areas..
7. Equipment Storage- The heating and ventilation system equipment will be internal to each unit and will not be visible. Gas and electric meters will be ganged and grouped and located inconspicuously and landscaped where possible.
8. Compatibility- The height, bulk and scale of buildings is compatible with the site and buildings in the surrounding area. The materials promote harmony with surrounding structures and sites. This development does not block views of any residential uses up hill. The buildings have been broken into pods of 4-6 units each, to minimize the bulk.
9. Design- The design of the new development will utilize architectural features and elements to create a rich, distinct design. This proposal will include the following twelve features to achieve the residential density bonus for one additional unit: 1) recessed entries; 2) pillars or posts; 3) eave projections; 4) offsetting building faces or roofs; 5) window trim; 6) bay windows; 7) balconies; 8) decorative patterns on exterior finish; 9) decorative cornices and roof lines; 10) façade articulation; 11) high quality exterior siding materials; 12) setback at penthouse (alternative feature).
10. Orientation- The entries of each dwelling unit will face the streets and/or private drives.
11. Parking- Vehicle parking will be provided in enclosed garages under each unit, as well as additional parking for visitors within the driveway areas, or as shown on the private roads..

C. Planned Unit Development (PUD) Criteria – Chapter 17.07:
1. Compliance with Title 16 – Subdivisions- Not Applicable
2. Minimum 30% Open Space Requirement for Residential Developments- 73.3% of the site is open space; 65% is landscaped.
3. Density- The C-2 zone minimum density is 17 units and we have 26 ….R3 zone maximum density is 25 units and we have 13.
4. No density bonus is requested,
5. Relationship to Natural and Physical Environment- The roughly 35% of the site is maintained in a natural state as open space, and that area's natural feature will be maintained and enhanced by this development. The natural topography will be maintained to the greatest extent possible.
6. Private Outdoor Recreation Areas – Multi-Family Use- Each unit has private balconies/decks at the south and north sides averaging 260 SF per townhome.

APPROVAL CRITERIA NARRATIVE

7. Shared Outdoor Recreation Areas – Multi-Family Use- Shared active outdoor space for the proposal includes a gazebo structure, and a green park area with water features averaging 400 SF per unit and is located primarily on the south, east + west sides of the project.
8. Parking- This proposal is providing an average of 2 parking spaces per unit, plus visitor spaces. This includes 17 dedicated visitor spaces, and likely driveway spaces. Every unit has at least 2 garage parking spaces. .5 parking spaces for (39-6) units.
9. Drainage- The site will be graded and built out to so that there will be no adverse affect on the public rights of way. Most of the area not covered by buildings is planted or natural landscaping. A sub-surface drainage system will be installed at the building perimeter. Planting will be done immediately after construction is complete. Storm systems will be provided as shown on the storm water drawings. Paved areas will use filtered catch basins for water quality. roofs
10. Flood Plain Dedication- not applicable. The proposal homesites are not located in a one hundred year floodplain. The parcels do not appear on FEMA flood plain maps.



TRANSPORTATION *IMPACT ANALYSIS*

project	**Indian Creek Townhomes**
location	9th Street / 9th Court
	Hood River, Oregon
client	Surround Architecture, Inc.
date	February, 2019

P.O. Box 1336 Bend, OR 97709 **PHONE** *541.617.9352* **FAX** *541.610.1504* **EMAIL** *info@traffic-team.us*

FERGUSON & ASSOCIATES, INC.
Transportation Planning/Traffic Engineering

Indian Creek Townhomes

Traffic Impact Study

Prepared for:

Surround Architecture, Inc

by:

Ferguson & Associates, Inc

February 27, 2019

TABLE OF CONTENTS

EXECUTIVE SUMMARY i
Study Area i
Summary of Findings and Conclusions i
INTRODUCTION 1
Purpose and Objectives 1
Proposed Development 1
Site Location and Study Area 1
AREA CONDITIONS 4
Existing Land Uses 4
Existing Street Network 4
Existing Traffic Flow and Conditions 6
Committed or Planned Street Improvements 6
Local and State Programs, Policies, and Regulations 6
TRAFFIC FORECAST 8
Site Generated Traffic 8
Trip Generation 8
Pass-by Trips 9
Modal Split 9
Trip Distribution and Assignment 9
Site Traffic Contribution 11
Approved Area Development 11
Future Traffic Flow Forecast with and without Project 11
TRAFFIC ANALYSIS 14
Intersection Operations 14
9th Street/Pacific Avenue 14
Traffic Signal Warrants 14
Sight Distance 15
Stopping Sight Distance Guidelines 15
Intersection Sight Distance Guidelines 15
Sight Distance at Study Intersections 16
Speed Change Lanes 17
Conclusions 17
FINDINGS AND CONCLUSIONS 21

LIST OF FIGURES

Figure 1 – Site Location 2
Figure 2 – Site Plan 3
Figure 3 – Lane Configuration and Intersection Controls 5
Figure 4 – Existing PM Peak Hour Traffic 7
Figure 5 – PM Peak Hour Trip Distribution & Assignment 10
Figure 6 – PM Peak Hour Traffic – Trip Forecast 13
Figure 7 – Left Turn Lane Analysis 18

List of Tables

Table 1 – Street Characteristics 4
Table 2 - Trip Generation Rates 8
Table 3 - Trip Generation Forecast..... 9
Table 4 – Site Traffic Contribution 11
Table 5 – PM Peak Hour Operations – 9th Street/Pacific Avenue..... 14
Table 6 – AASHTO Guidelines for Stopping and Intersection Sight Distance..... 16
Table 7 – Measured Sight Distance 16

APPENDICES

Appendix A – Intersection Count Summaries
Appendix B – In Process Development
Appendix C – Level of Service Calculations

EXECUTIVE SUMMARY

This study addresses the traffic impacts of a proposed residential subdivision which would consist of 30 townhouse lots and 9 single family detached home lots. The project is located on 9th Street/9th Court in Hood River. This study focuses on p.m. peak hour traffic operations at the site access and nearby higher-order (collector and arterial streets) intersections. The analysis was conducted for the buildout of the development (year 2019). All scenarios include an assessment of conditions with and without the proposed project. This study addresses key transportation issues such as roadway capacity, site distance, traffic signal warrants, left-turn lane warrants, and site access as appropriate.

STUDY AREA

Based on the requirements of staff, and the City of Hood River Development Code, the following study intersection was analyzed for this report:

- 9th Street / Pacific Avenue.

SUMMARY OF FINDINGS AND CONCLUSIONS

1. The proposed subdivision, which would consist of 30 townhouse lots and 9 single family detached home lots, was forecast to generate 26 p.m. peak hour trips and 205 daily trips. At this level of trip generation the Development Code requires a TIA. This report satisfies that requirement.
2. The intersection of 9th Street and Pacific Avenue was also reviewed at the request of the City of Hood River. This intersection was found to operate at acceptable levels of service, with the lowest level of service being Level of Service C, for the movements exiting the driveway at One Community Health – for conditions with or without the project.
3. Intersection sight-distance standards were met at 9th Street and Pacific Avenue; however, it was noted that plantings on the north side of Pacific Avenue should be periodically trimmed to maintain adequate sight-distances.
4. No inherent issues were identified related to visibility at the cul de sac and the planned private road. Grades should be designed to meet AASTHO or city standards for intersection sight distance.
5. Turn lane guidelines were met for conditions with or without the proposed project on Pacific Avenue at 9th Street in the eastbound direction. For a number of reasons -- primarily being that the off-set alignment with the One Pacific Health driveway would not accommodate a left-turn lane – a left-turn lane is not recommended at this location.

6. It is suggested that parking be eliminated on the south side of Pacific Avenue between the driveway on 9th Street (in compliance with Oregon law) and that signage be provided to encourage pedestrians to use the marked crosswalk.
7. All future streets should be constructed to City of Hood River requirements and modern engineering standards.

INTRODUCTION

This study addresses the traffic impacts of a proposed subdivision which would consist of 30 townhome lots and 9 single family detached home lots. The site for the proposed development is located on 9th Street/9th Court in Hood River. This study focuses on p.m. peak hour traffic operations at the site access and nearby higher-order (collector and arterial streets) intersections. The analysis was conducted for the buildout of the development (three years, or 2022, as per guidance from the City) and includes an assessment of conditions with and without the proposed project. This study addresses key transportation issues such as roadway capacity, site distance, traffic signal warrants, and site access evaluation as appropriate.

PURPOSE AND OBJECTIVES

This study has been performed for submission to the City of Hood River and is based on a scope of work developed with the guidance of the City of Hood River staff.

PROPOSED DEVELOPMENT

The proposed project is for a subdivision which would consist of 30 townhome lots and 9 single family detached home lots. The proposed project would be completed in a single phase.

SITE LOCATION AND STUDY AREA

The site for the proposed development is located on 9th Street/9th Court in Hood River, as shown in Figure 1. A site plan is shown in Figure 2. The following study intersection was analyzed for this report, in agreement with City of Hood River staff:

- 9th Street and Pacific Avenue

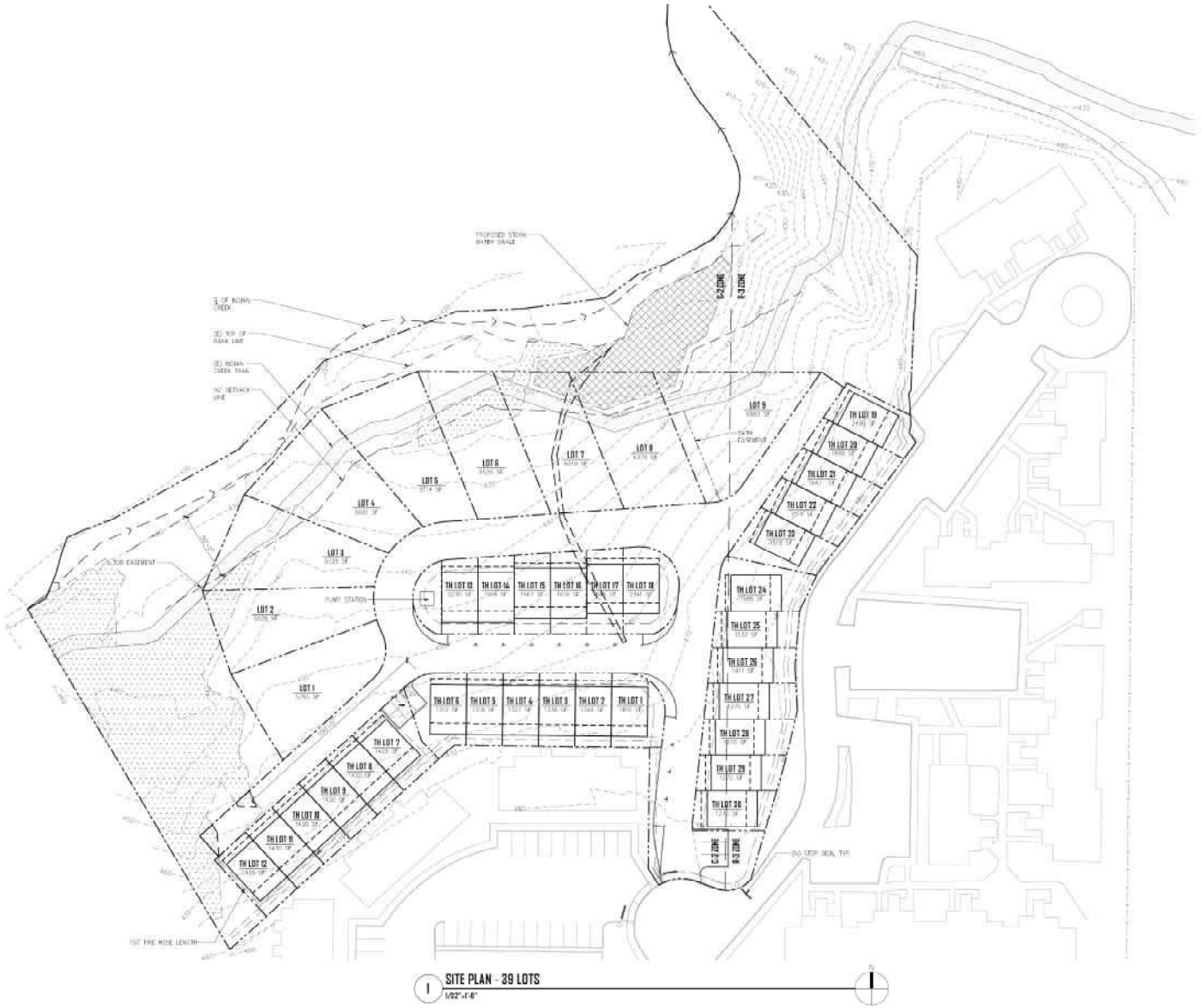
Site Location

Indian Creek Townhomes - Hood River, Oregon

#01580
February 27, 2019

Figure 1

Ferguson & Associates, Inc.



Site Plan

Indian Creek Townhomes - Hood River, Oregon

#01580
February 27, 2019

Figure 2

Ferguson & Associates, Inc.

AREA CONDITIONS

The characteristics of the surrounding street network, existing uses, and current zoning are presented in this section. Relevant policies and plans for future street improvements in the vicinity of the proposed project are discussed.

EXISTING LAND USES

The site where the development would occur is vacant.

EXISTING STREET NETWORK

This report analyzes traffic impacts at the intersection of 9th Street and Pacific Avenue. See Table 1 for existing street characteristics. Existing lane configurations and intersection controls at the study intersection are illustrated in Figure 3.

TABLE 1 – STREET CHARACTERISTICS

STREET	CLASS	LANES	SPEED (MPH)	CURBS	SIDE-WALKS	BIKE LANE	ON STREET PARKING
Pacific Avenue	Urban Collector	2	25	Yes	Yes	No	Yes
9th Street	Local	2	25	Yes	Yes	No	Yes

*Access to the sidewalk on the bridge is blocked by a guardrail. Sidewalks lack accessible ramps.

Lane Configuration & Intersection Controls

Indian Creek Townhomes - Hood River, Oregon

#01580
February 27, 2019

Figure 3

Ferguson & Associates, Inc.

EXISTING TRAFFIC FLOW AND CONDITIONS

PM peak period traffic counts were conducted at the study intersection in 15 minute intervals between 4:00 p.m. and 6:00 p.m. on Thursday, January 24th, 2019. The p.m. peak hour flow is defined as the hourly traffic flow representing the highest one-hour of traffic flow between 4:00 p.m. and 6:00 p.m. Intersection count data summaries can be found in Appendix A. The existing traffic flow shown in Figure 4 does not include trips expected to be generated by approved projects (area development) in the area. Traffic flows were balanced.

COMMITTED OR PLANNED STREET IMPROVEMENTS

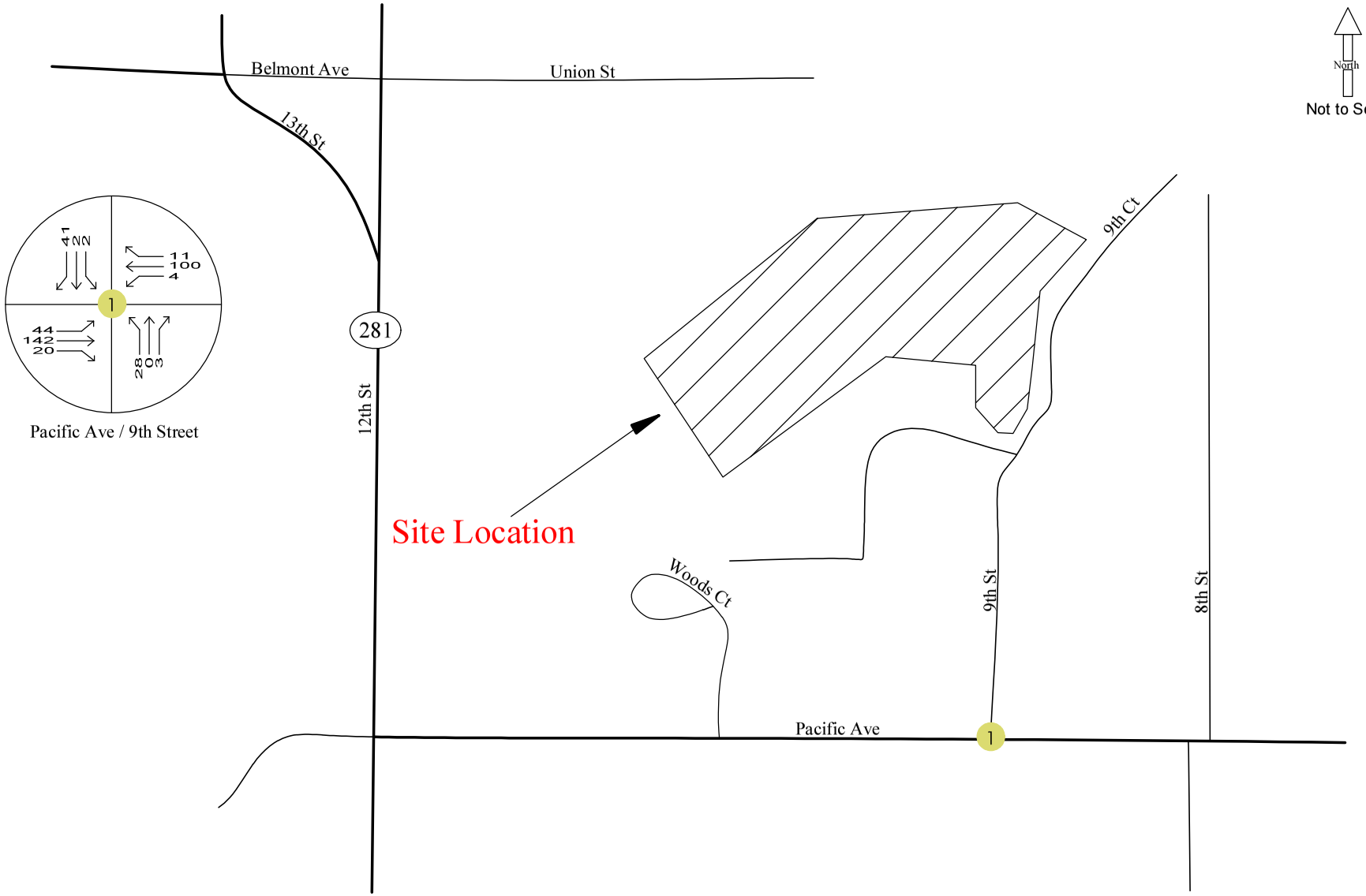
The City of Hood River Transportation System Plan (TSP) defines the long term (20 year) transportation network. The City's Capital Improvement Plan (CIP) lists the projects planned to be constructed in the near-term. No projects were identified in the area.

LOCAL AND STATE PROGRAMS, POLICIES, AND REGULATIONS

The primary guiding document which guided the preparation of this document is the Hood River Development Code. The code states that a Traffic Impact Analysis (TIA) is to be prepared, among other conditions, if as per section 17.20.060(C)(a):

> *"The proposed action is estimated to generate 250 Average Daily Trips (ADT) or more, or 25 or more weekday AM or PM peak hour trips (or as required by the City Engineer); "*

As shown herein this report, this condition is met and a TIA is required. The development code goes on to specify that the applicant shall discuss the requirements with the City. This action was taken and the scope herein reflects the agreed upon scope of work for this project.



Existing PM Peak Hour Traffic

Indian Creek Townhomes - Hood River, Oregon

#01580
February 27, 2019

Figure 4

Ferguson & Associates, Inc.

TRAFFIC FORECAST

The analysis scenarios were selected based on feedback from City of Hood River staff. The following p.m. peak hour analysis, with and without the project were analyzed:

- Existing conditions; and,
- Year 2022 with and without the project.

SITE GENERATED TRAFFIC

Daily and p.m. peak hour trips generated by the proposed project were forecast. The forecast considered pass-by trips and modal split. The p.m. peak hour trips were then distributed and assigned to the study area network. Details are presented below.

Trip Generation - Future trips generated by the development were forecast using trip generation rates found in the 10th Edition of Trip Generation (ITE, 2017). ITE land use codes 210 (Single Family Homes) and 220 Low Rise Apartments), was used to calculate the trips that would be generated by the proposed development, as shown in Table 2.

TABLE 2 - TRIP GENERATION RATES

		Trip Ends Rate (trips per t.s.f)		In/Out Split (percent)	
ITE Land Use & Code	Ind. variable	PM Peak Hour	Daily	PM Peak Hour	Daily
Single Family Homes 210	DU	0.99	9.44	63/37	50/50
Multifamily Housing Low Rise 220 (Formerly townhouses/condos)	DU	0.56	7.32	63/37	50/50

The proposed development was forecast to generate 48 p.m. peak hour trips and 684 daily trips, as shown in Table 3.

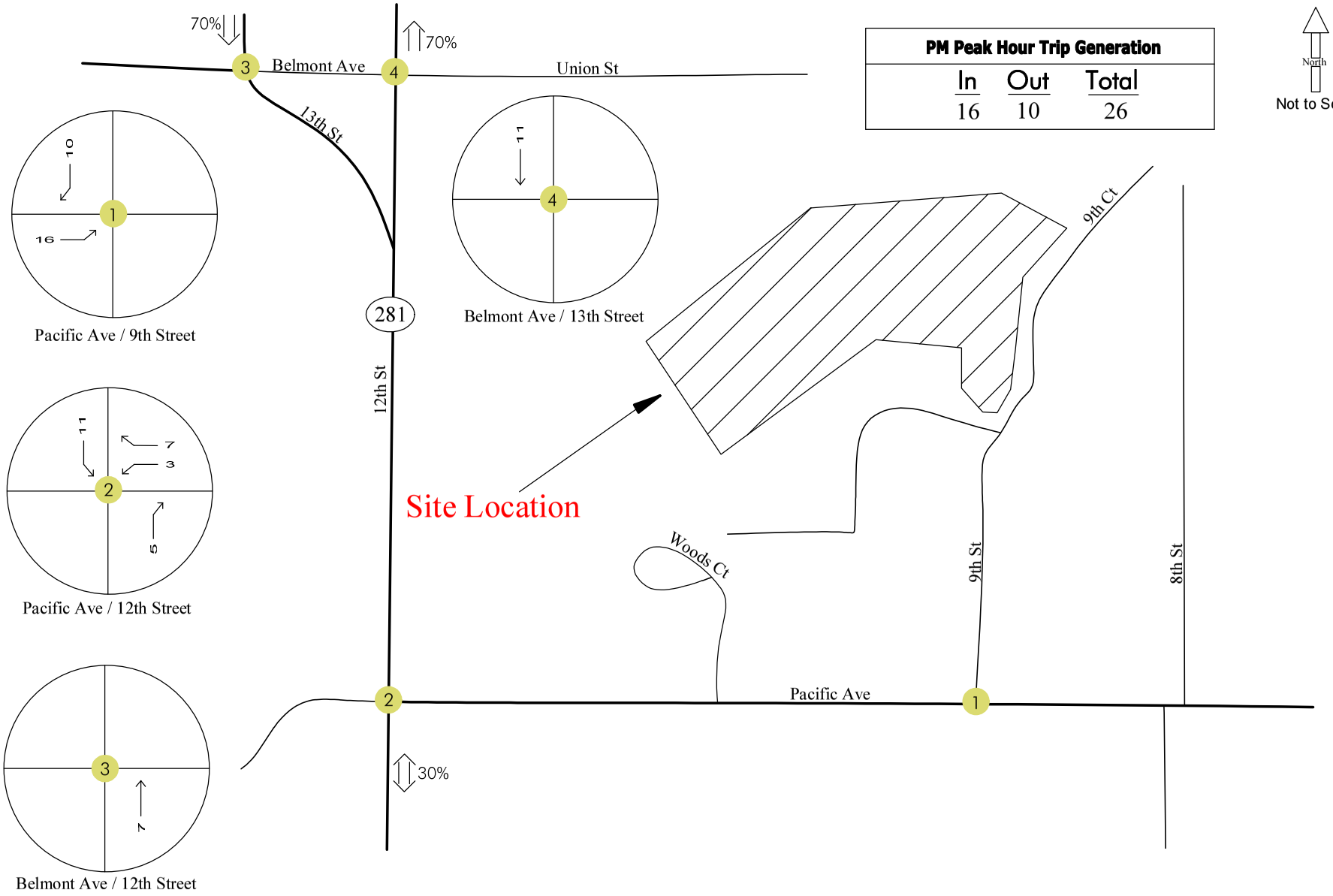
TABLE 3 - TRIP GENERATION FORECAST

ITE Land Use	Size (units)	PM Peak Hour Trip Ends In	Out	Total	Daily
Single Family Homes 210	9 DU	6	3	9	85
Multifamily Housing Low Rise 220 (Formerly Apartments)	30 DU	11	6	17	220
Total	39 DU	17	9	26	305

Pass-by Trips – It was assumed that there would be no pass-by trips. There is not an ITE pass-by rate for residential uses and few trips to a residential area are pass-by trips.

Modal Split - No reduction in vehicle trips was made to account for a potential shift away from the automobile. ITE trip rates are based on observed vehicle trip patterns at each land use and thereby account for a basic amount of non-auto travel.

Trip Distribution and Assignment - PM peak hour trips generated by the proposed project were distributed and assigned to the roadway system as shown in Figure 5. Distribution percentages are derived from turning movements documented in traffic counts performed for this report combined with a general knowledge of traffic distribution patterns in Hood River. The traffic operations calculations presented within this report are not highly sensitive to distribution assumptions, given the relatively small percentage increase in total intersection traffic at higher-order street intersections. The assignment of trips was extended to include the intersections of 12th Street/Belmont Avenue and 13th Street/Belmont Avenue, as per staff request.



PM Peak Hour Distribution & Assignment
Indian Creek Townhomes - Hood River, Oregon

#01580
February 27, 2019

Figure 5

Ferguson & Associates, Inc.

SITE TRAFFIC CONTRIBUTION

After built and occupied, the proposed project would result in an overall increase in the number of vehicles traveling in the area. The impact at each of the study area intersections for the p.m. peak hour traffic contribution is shown in Table 4, expressed as a percentage of total traffic.

TABLE 4 – SITE TRAFFIC CONTRIBUTION

INTERSECTION	PROJECT TOTAL (VPH)	YEAR 2018	
		INTERSECTION TOTAL* (VPH)	PERCENT OF TOTAL
9th Street/ Pacific Avenue	26	559	4.7

Notes: *Total traffic includes proposed project traffic.

APPROVED AREA DEVELOPMENT

The City of Hood River was consulted about approved area development. Staff determined that there were two projects in the works which would be considered in-process development. The One Community Health project and a residential subdivision to the east of the project (Sieverkropp Subdivision) which would primarily use Pacific Avenue for access. Information on these two project is contained in Appendix B.

Phase 3 of the Sieverkropp Subdivision is under construction and Phase 4 has recently been platted. These two phases would include a total of 51 homes which would generate 23 inbound and 19 outbound trips for a total of 50 trips. The traffic study for the Sieverkropp Subdivision assigned 85 percent of its traffic to Pacific Avenue. Assuming the same assignment patterns as studied, the project would add 27 eastbound (inbound) trips and 16 westbound (inbound) trips to Pacific Avenue through the intersection of 9th Avenue.

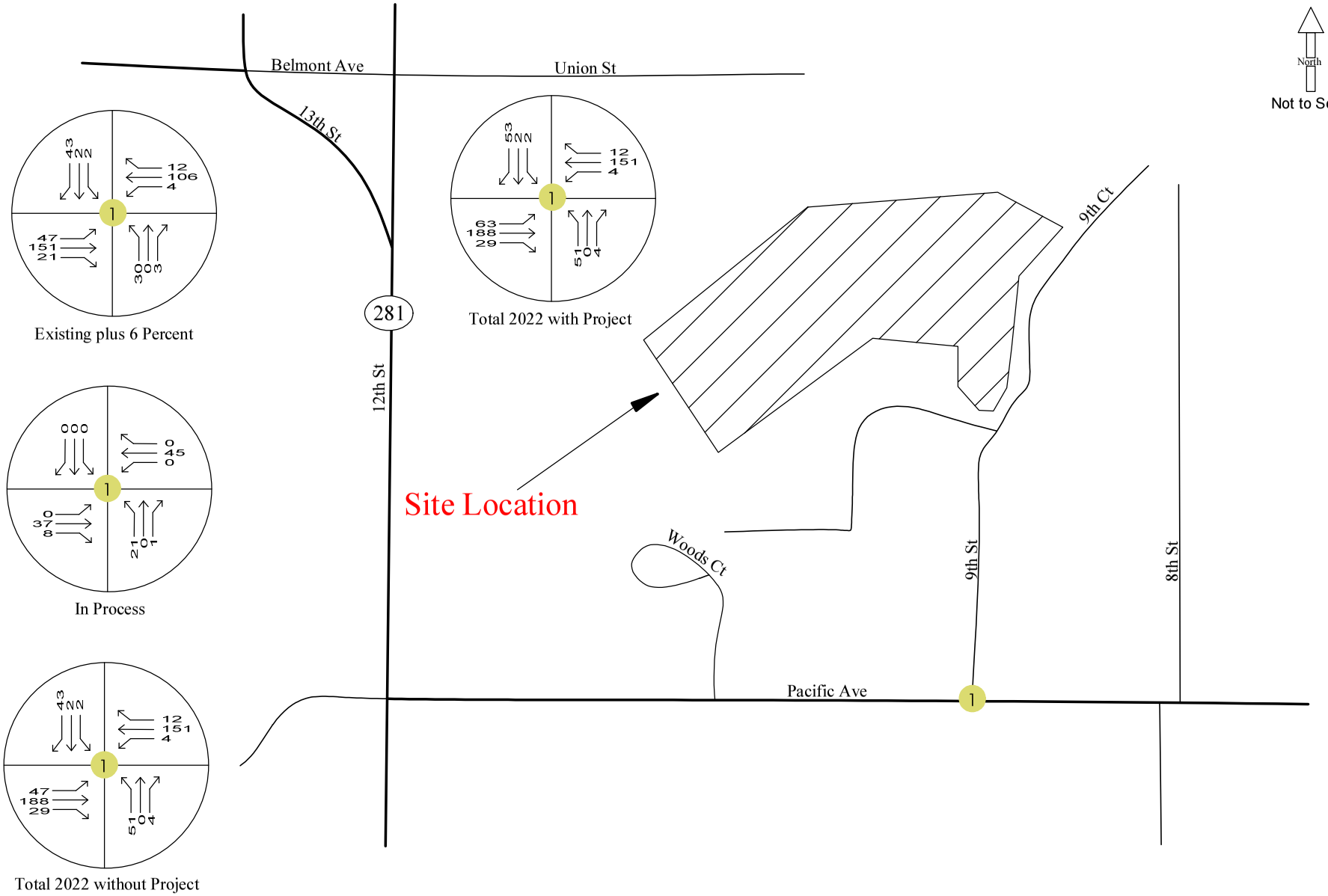
The traffic assignment developed for the One Community Health project was taken directly from the traffic study assignment shown in Appendix B. Traffic generated by this development was added to the traffic from the Sieverkropp Subdivision.

The impact of total in process development is was added together at the study intersection and is shown in Figure 6.

FUTURE TRAFFIC FLOW FORECAST WITH AND WITHOUT PROJECT

Traffic flow was forecast for year 2022 by factoring the existing counts upwards by 2 percent per year (for a total of 6 percent). The results are shown in Figure 6. In-process development was added to the factored existing counts, resulting in the

2022 forecast conditions without the proposed project. This is also shown in Figure 6. Finally, traffic generated by the project was added to the non-project 2022 forecast. The resulting year 2022 with-project forecast is also shown in Figure 6.



PM Peak Hour Trip Forecast
Indian Creek Townhomes - Hood River, Oregon

#01580
February 27, 2019

Figure 6

Ferguson & Associates, Inc.

TRAFFIC ANALYSIS

This section of the report presents the intersection operations analysis and the findings from other analysis conducted for the study. The operations analysis is essentially a means of assessing the quality of traffic flow at the key study intersections and is used to determine if City of Hood River Level of Service standards are met. Other issues are also addressed, including: the potential need for traffic signals; the need for new turn lanes; and, intersection sight-distance. Finally, where needs are identified, potential mitigation actions are presented.

INTERSECTION OPERATIONS

Average vehicle delay and volume-capacity ratios were calculated at the study intersections for the peak one-hour period during the p.m. peak period. Existing and future scenarios without traffic from the project were analyzed and compared with scenarios where project traffic was added. Average delay and volume-capacity ratios reflect conditions for the highest 15-minutes during the p.m. peak hour. Level of service calculations are found in Appendix C.

9th Street/Pacific Avenue – Under all scenarios, as shown in Table 5, the stop-controlled intersection of 9th Street and Pacific Avenue would operate at acceptable levels of service, with the lowest approach operating at Level of Service C in year 2022 with or without the proposed project.

TABLE 5 – PM PEAK HOUR OPERATIONS – 9TH STREET/PACIFIC AVENUE

SCENARIO	MOVEMENT	LEVEL OF SERVICE	DELAY (SEC/VEH)	ACCEPTABLE?
Year 2022 without Project	NB Approach	C	15.3	Yes
	SB Approach	A	9.8	
	EB Left	A	7.7	
	WB Left	A	7.7	
Year 2022 with project	NB Approach	C	16.4	Yes
	SB Approach	A	9.9	
	EB Left	A	7.7	
	WB Left	A	7.7	

TRAFFIC SIGNAL WARRANTS

There are a variety of traffic signal warrants, of which at least one must be met to justify the installation of a new traffic signal. These warrants reflect a minimum threshold under which a traffic signal should not be installed. In general, unwarranted traffic signals can lead to increased delays, more accidents, and unnecessary spending. For all of these reasons, unwarranted traffic signals are highly discouraged.

In this case, the intersection operates satisfactorily with 2-way stop control and no further investigation is needed.

SIGHT DISTANCE

Sight distance is a measure of how far a driver can see the road and/or other vehicles or potential hazards from various points in the roadway. Sight distance is measured in different ways and acceptable sight distance varies, depending on the type of sight distance that is important for a particular segment of road or intersection. There are two types of sight distance that are reviewed here: intersection sight-distance and stopping sight-distance. Stopping sight distance was measured only at the intersection (not along the travel way). These measurements are what the City of Hood River accepts to address the Transportation Impact Analysis Policy.

Stopping Sight Distance Guidelines - Stopping sight distance is the minimum required distance for a vehicle to stop before reaching a stationary object in its path. The standard assumptions used to determine minimum stopping sight distance are: Wet pavement, a driver's vision height of 3.5 feet, and a stationary object 2.0 feet high (A Policy on Geometric Design of Highways and Streets, AASHTO, 2004). Table 6 shows the AASHTO guidelines for stopping sight distance at a given speed.

Intersection Sight Distance Guidelines - Intersection sight distance is the distance a driver can see from a stop controlled approach to an intersection. The measurement is typically taken from a point about 14.4 feet back from the edge of the travel-way at a height of 3.5 feet to a height of 3.5 feet in the travel lane. The AASHTO intersection sight distance guidelines, as shown in Table 6, reflect the minimum distance that a driver needs to be able to see while stopped at an intersection so that the driver may proceed without slowing vehicles on the main street by more than 15 percent. The distance required for a left turn is slightly longer than the distance for a right-turn.

TABLE 6 – AASHTO GUIDELINES FOR STOPPING AND INTERSECTION SIGHT DISTANCE

DESIGN SPEED	STOPPING SIGHT DISTANCE (FT.)	INTERSECTION SIGHT DISTANCE FOR LEFT-TURNS FROM STOP (FT.) (1)	INTERSECTION SIGHT DISTANCE FOR RIGHT-TURNS FROM STOP AND CROSSING MANEUVER (FT.) (2)
15	80	170	145
20	115	225	195
25	155	280	240
30	200	335	290
35	250	390	335
40	305	445	385
45	360	500	430
50	425	555	480
55	495	610	530
60	570	665	575
65	645	720	625
70	730	775	670
75	820	830	720
80	910	885	765

Source: A Policy on Geometric Design of Highways and Streets, AASHTO 2004
(1) Minimum distance to the right from the stopped approach
(2) Minimum distance to the left for the right turn movements and in both directions for the stopped movement.

Sight Distance at Study Intersections - Stopping sight distance and intersection sight distance were measured at the intersection of 9th Street and Pacific Avenue. Stopping sight distance and intersection sight distance were measured at a distance of 15 feet back from the pavement. Measured sight distance is summarized in Table 7. AASHTO guidelines are met.

TABLE 7 – MEASURED SIGHT DISTANCE

INTERSECTION	MEASUREMENTS AND GUIDELINES	MEASURED DISTANCE			
		STOPPING SIGHT DISTANCE (FEET)		INTERSECTION SIGHT DISTANCE (FEET)	
		TO RIGHT	TO LEFT	TO RIGHT	TO LEFT
9th Street SB Stop at Pacific Avenue	Measured Sight Distance	>300	>300	>300	>300
	Guideline for 35mph	155	155	280	240
	Meets Guideline?	Yes	Yes	Yes	Yes

SPEED CHANGE LANES

Speed-change lanes (acceleration/deceleration lanes) are auxiliary lanes that accommodate traffic entering or leaving a roadway. Speed-change lanes are used primarily on high-speed, limited access roadways. Speed-change lanes are not typically constructed on the City's higher order streets.

Left Turn Lane Guidelines – The guideline for a left-turn lanes on Pacific Avenue at 9th Street were examined. It was found that the guideline is met for eastbound left-turns on Pacific Avenue with or without the proposed project, as shown in Figure 7. For reasons discussed in the Conclusions section of this report, a left turn lane is not recommended.

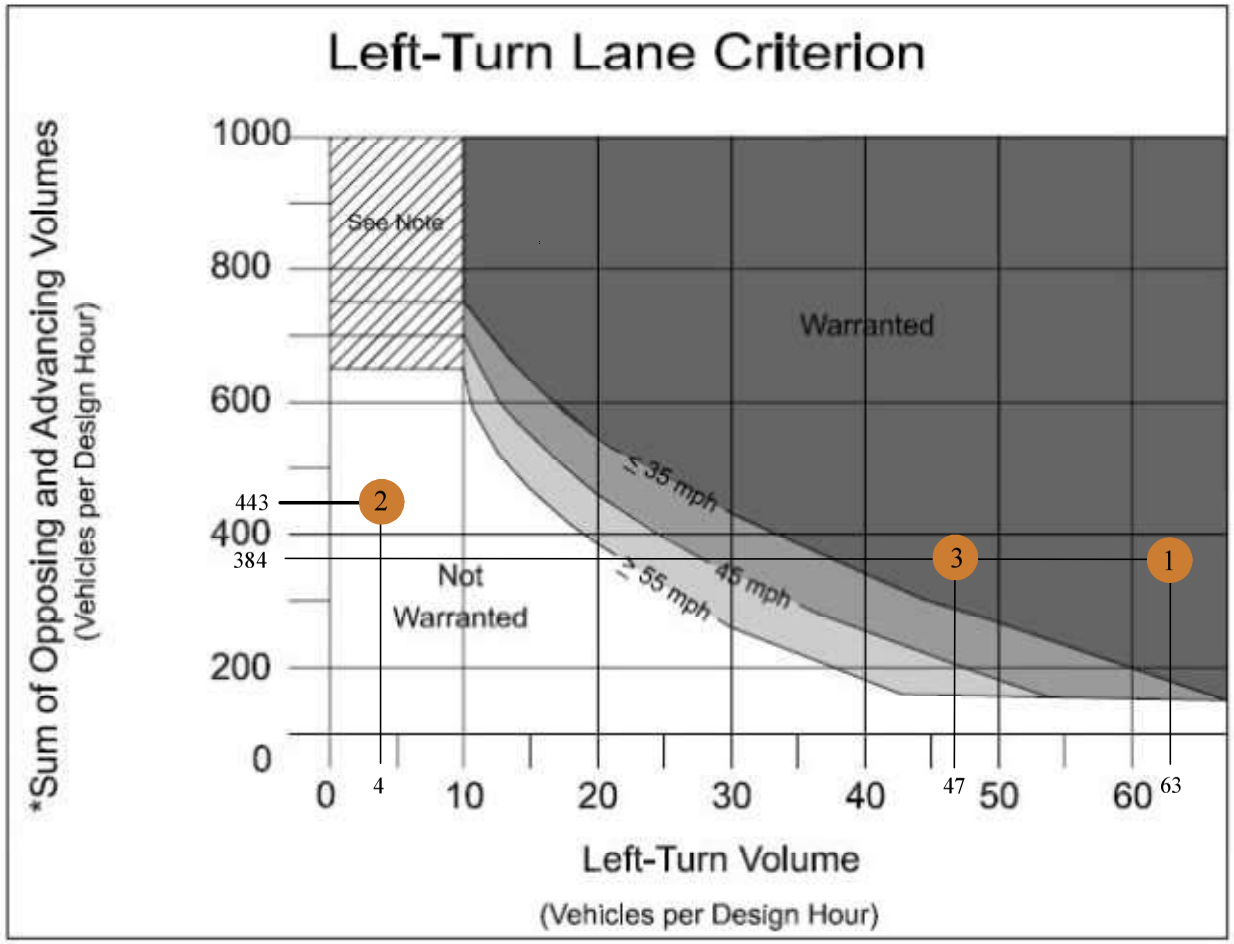
CONCLUSIONS

The analysis provided in this report does not indicate any operational problems and the project otherwise meets operational requirements (intersection levels-of-service) of the City.

No intersection sight distance issues were identified.

The TTI guideline for left-turn lanes was reviewed at the study intersection, as there is a relatively high volume of eastbound left-turn traffic which turns from Pacific Avenue to 9th Street and since Pacific Avenue is a higher-order street. It was found that the guideline was met at 35 miles per hour for conditions with or without the proposed project for left-turns into the site. (The guideline does not provide curves for speeds less than 35 miles per hour) The provision of a left-turn lane is not recommended in this case since:

1. the speed on Pacific Avenue is 25 miles per hour;
2. the volume of opposing traffic is relatively low (151 vehicles per hour, which is about two vehicles per minute);
3. there is adequate capacity for left turns (Level of Service A); and most importantly,
4. the existing location of the off-set driveway to One Community Health would need to be realigned if left-turns are to be maintained to the driveway.



1 9th Street / Pacific Ave (EB)

2 9th Street / Pacific Ave (WB)

3 9th Street / Pacific Ave (Existing EB)

Source: Oregon DOT Analysis Procedures Manual 2008

*(Advancing Vol/ # of Advancing Through Lanes)+
(Opposing Vol/ # of Opposing Through Lanes)

Left-Turn Lane Analysis - Year 2022 with Project
Indian Creek Townhomes - Hood River, Oregon

#01580
February 27, 2019

Figure 7

Ferguson & Associates, Inc.

Regarding the last point, City of Hood River staff was consulted to determine if the driveway to Community One Health were to be moved as part of the expansion project. The feedback from planning staff was that the driveway is to be moved to the east, but it would not align with 9th Street.

Other issues were noted during the field reconnaissance.

- A higher than typical number of pedestrians cross at the intersection of 9th Street and Pacific Avenue. (Most of these occurred outside of the peak hour.)
- The driveway to One Community Health is offset from 9th street by about 40 feet, center-to-center.
- There is a marked crosswalk on the east-side of Pacific Avenue, but not on the west-side. This tends to encourage people to cross Pacific Avenue on the east side of 9th Street, which is a far better place for a pedestrian to cross; however, for those who cross on the west-side of 9th Street, the off-set with the driveway to One Community Heath leads to some unexpected conflicts between vehicles and pedestrians, as pedestrians cross Pacific Avenue into the driveway.
- Moving the driveway to the east, as it is understood is the plan, will worsen these pedestrian/vehicle conflicts.
- Finally, it was noted that vehicles park on the south side of Pacific Avenue, opposite 9th Street. Technically, this is not legal as vehicles are required in Oregon to park at least 20 feet from a crosswalk; however, given the lack of curb returns on this side of the street, it is easy to see how a driver might mistake this as legal parking.
- There is a school bus stop at this intersection. This which also adds a significant number of children crossing the street; however, the crossings are protected by the stop on the bus and children use the crosswalk.

Depending on the final design for the One Community Health driveway (opposite 9th Street) it is suggested that these actions be considered:

1. Post no-parking signs for the segment between the driveway to One Community Health and the painted cross-walk.
2. Discourage pedestrians from crossing Pacific Avenue on the west side of with the use of appropriate MUTCD signage.

Exhibit 1 -- Vehicles park too close to crosswalk. Vehicles should be restricted from parking within 20-feet of the crosswalk (9th St/Pacific Ave, looking east)

FINDINGS AND CONCLUSIONS

1. The proposed subdivision, which would consist of 30 townhouse lots and 9 single family detached home lots, was forecast to generate 26 p.m. peak hour trips and 205 daily trips. At this level of trip generation the Development Code requires a TIA. This report satisfies that requirement.
2. The intersection of 9th Street and Pacific Avenue was also reviewed at the request of the City of Hood River. This intersection was found to operate at acceptable levels of service, with the lowest level of service being Level of Service C, for the movements exiting the driveway at One Community Health – for conditions with or without the project.
3. Intersection sight-distance standards were met at 9th Street and Pacific Avenue; however, it was noted that plantings on the north side of Pacific Avenue should be periodically trimmed to maintain adequate sight-distances.
4. No inherent issues were identified related to visibility at the cul de sac and the planned private road. Grades should be designed to meet AASTHO or city standards for intersection sight distance.
5. Turn lane guidelines were met for conditions with or without the proposed project on Pacific Avenue at 9th Street in the eastbound direction. For a number of reasons -- primarily being that the off-set alignment with the One Pacific Health driveway would not accommodate a left-turn lane – a left-turn lane is not recommended at this location.
6. It is suggested that parking be eliminated on the south side of Pacific Avenue between the driveway on 9th Street (in compliance with Oregon law) and that signage be provided to encourage pedestrians to use the marked crosswalk.
7. All future streets should be constructed to City of Hood River requirements and modern engineering standards.

Appendix A
Intersection Count Summaries

PEAK HOUR TRAFFIC COUNT SUMMARY

Count Location: Hood River OR

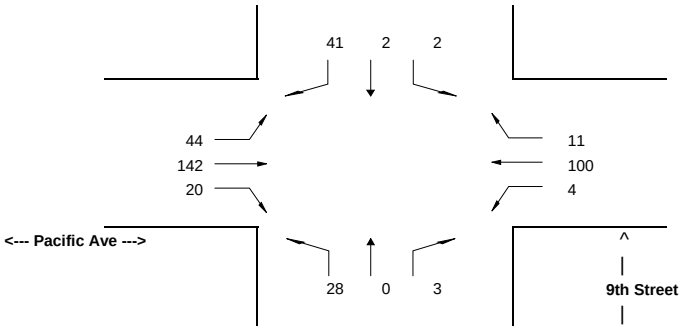
Count Date(s): Thursday, January 24, 2019

East-West Street Name: Pacific Ave

North-South Street Name: 9th Street

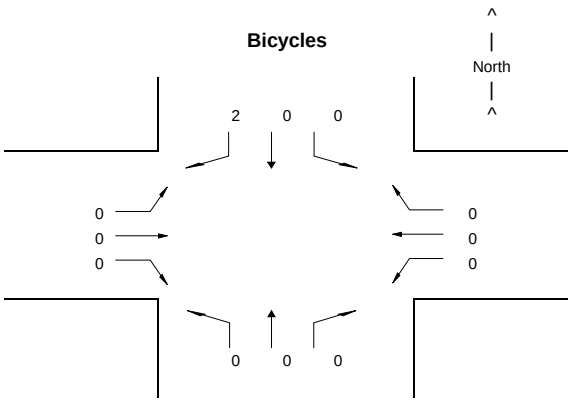
Peak Hour: 4:00 to 5:00 p.m.

Vehicles per Hour (all vehicles)



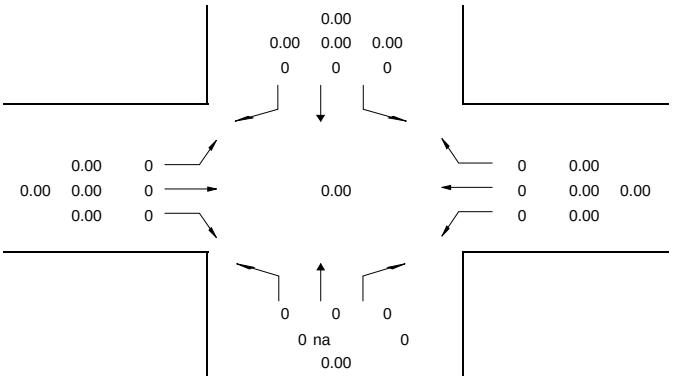
Total Entering Vehicles: 397

Bicycles



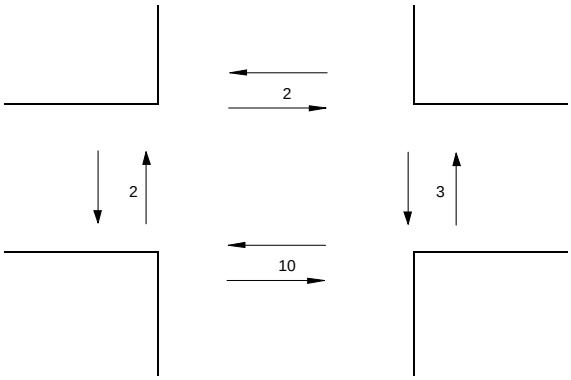
Total Entering Bicycles: 2

Heavy Vehicles (trucks per hour)

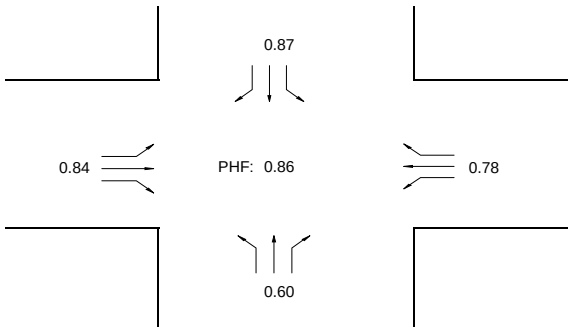


Total Entering Heavy Vehicles: 0

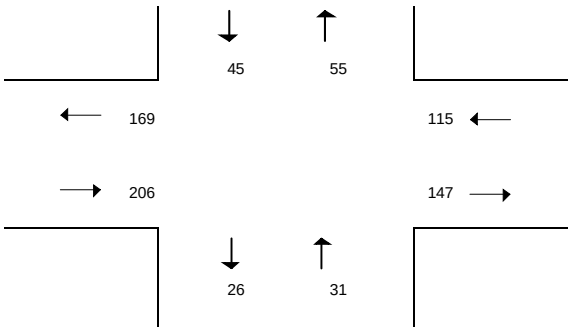
Pedestrians (crossings per hour)



Peak Hour Factor by Approach



Approach & Departure Volumes (vehicles per hour)



Ferguson & Associates, Inc
PO Box 1336
Bend, OR 97709
Phone: 541-617-9352
gscott@traffic-team.us

Project #: 1580

PEAK PERIOD TRAFFIC COUNT -- DETAILED COUNT DATA

Count Location:	Hood River OR	*East-West Street Name:*	Pacific Ave
		North-South Street Name:	9th Street
Count Date(s):	Thursday, January 24, 2019	*Peak Hour:*	4:00 to 5:00 p.m.

ALL VEHICLES

TIME		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
STARTING	ENDING	Right	Through	Left	Right	Through	Left	Right	Through	Left	Right	Through	Left	TOTAL
4:00	4:15	1	0	7	6	41	14	9	1	0	10	26	0	115
4:15	4:30	2	0	11	7	32	11	10	1	2	0	18	3	97
4:30	4:45	0	0	6	4	35	11	13	0	0	0	36	1	106
4:45	5:00	0	0	4	3	34	8	9	0	0	1	20	0	79
5:00	5:15	0	0	9	1	37	3	21	0	1	0	31	0	103
5:15	5:30	1	0	12	5	37	5	4	3	0	0	31	0	98
5:30	5:45	1	0	8	1	17	8	10	0	0	0	12	0	57
5:45	6:00	0	0	7	1	12	7	6	0	1	0	9	0	43
6:00	6:15	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15	6:30	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30	6:45	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45	7:00	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00	7:15	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15	7:30	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30	7:45	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45	8:00	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		5	0	64	28	245	67	82	5	4	11	183	4	698
Peak Hour		**3**	**0**	**28**	**20**	**142**	**44**	**41**	**2**	**2**	**11**	**100**	**4**	**397**

HEAVY VEHICLES

TIME		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
STARTING	ENDING	Right	Through	Left	Right	Through	Left	Right	Through	Left	Right	Through	Left	TOTAL
4:00	4:15	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15	4:30	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30	4:45	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45	5:00	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00	5:15	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15	5:30	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30	5:45	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45	6:00	0	0	0	0	0	0	0	0	0	0	0	0	0
6:00	6:15	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15	6:30	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30	6:45	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45	7:00	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00	7:15	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15	7:30	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30	7:45	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45	8:00	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

BICYCLES

TIME		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
STARTING	ENDING	Right	Through	Left	Right	Through	Left	Right	Through	Left	Right	Through	Left	TOTAL
4:00	4:15	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15	4:30	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30	4:45	0	0	0	0	0	0	2	0	0	0	0	0	2
4:45	5:00	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00	5:15	0	0	0	0	1	0	0	0	0	0	0	0	1
5:15	5:30	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30	5:45	1	0	0	0	0	0	0	0	0	0	0	0	1
5:45	6:00	0	0	0	0	0	0	0	0	0	0	0	0	0
6:00	6:15	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15	6:30	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30	6:45	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45	7:00	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00	7:15	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15	7:30	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30	7:45	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45	8:00	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		1	0	0	0	1	0	2	0	0	0	0	0	4
Peak Hour		**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**2**

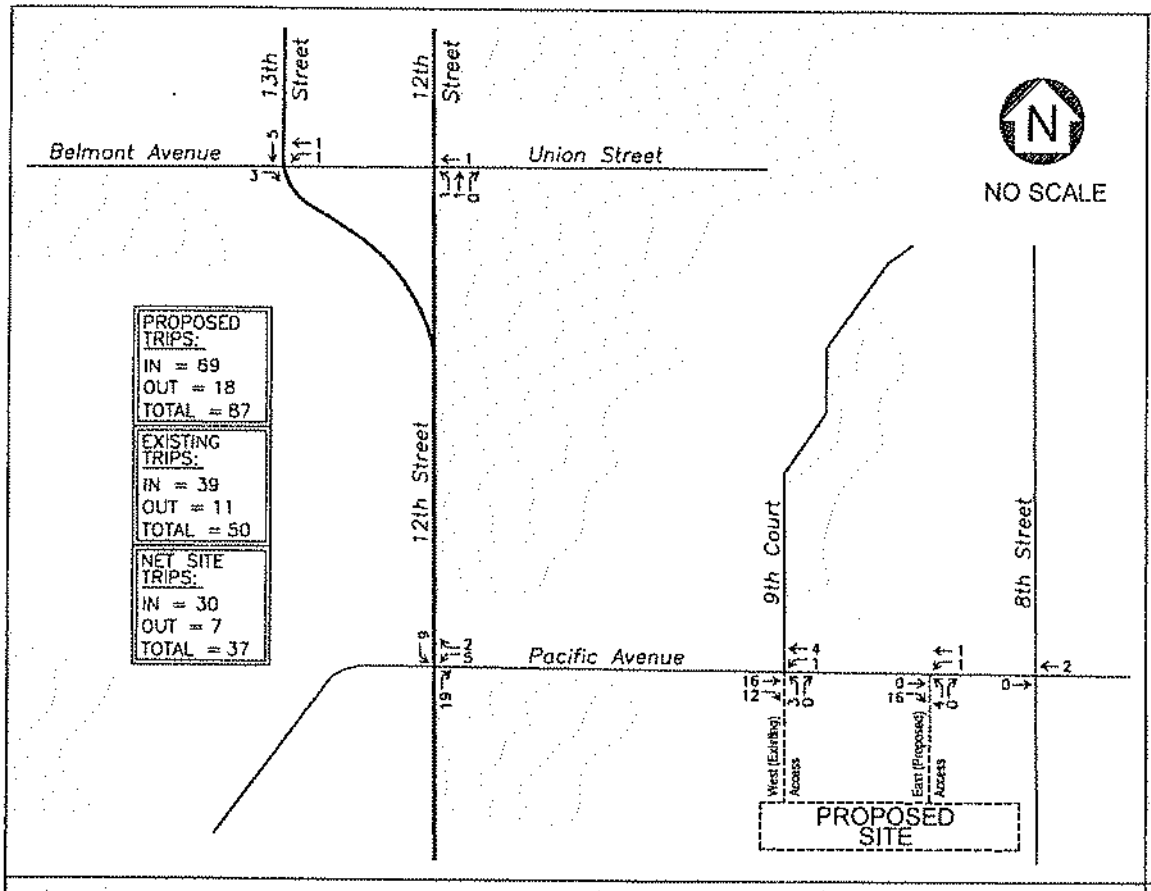
PEDESTRIANS

TIME		CROSSINGS			
STARTING	ENDING	South Leg	West Leg	North Leg	East Leg
4:00	4:15	0	0	0	0
4:15	4:30	6	2	1	2
4:30	4:45	3	0	1	1
4:45	5:00	1	0	0	0
5:00	5:15	0	0	0	0
5:15	5:30	0	0	3	0
5:30	5:45	0	0	0	0
5:45	6:00	0	0	0	0
6:00	6:15	0	0	0	0
6:15	6:30	0	0	0	0
6:30	6:45	0	0	0	0
6:45	7:00	0	0	0	0
7:00	7:15	0	0	0	0
7:15	7:30	0	0	0	0
7:30	7:45	0	0	0	0
7:45	8:00	0	0	0	0
TOTAL		10	2	5	3
Peak Hour		10	2	2	3

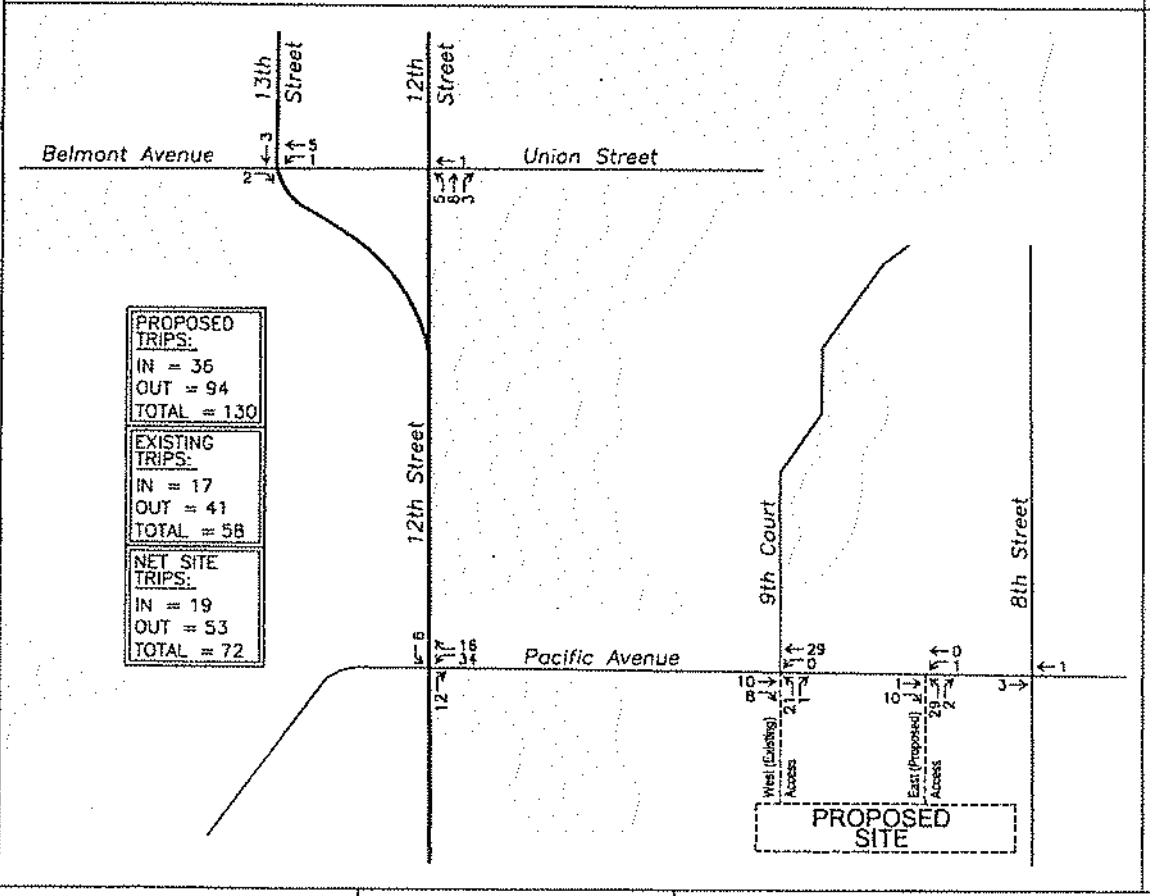
Ferguson & Associates, Inc
PO Box 1336
Bend, OR 97709
Phone: 541-617-9352
gscott@traffic-team.us

Project #: 1580

Appendix B
In Process Development



AM PEAK HOUR



PM PEAK HOUR

FILE NAME: 1808flow.dwg

PLOT DATE: 02.26.18

CHARBONNEAU ENGINEERING LLC

PROJECT: 18-08

NOTES: The trip generation of proposed site is based on Medical-Dental Office (ITE 720) trip rates. Existing site trips taken from traffic counts.

NET TRIP ASSIGNMENT
ONE COMMUNITY HEALTH

FIGURE 6

20172983

TERRA SURVEYING

SUBDIVISION PLAT OF MOUNTAIN VISTAS PHASE 3

PAGE 1 OF 3

LOCATION OF SURVEY:

A PORTION OF THE SOUTHEAST QUARTER AND THE SOUTHWEST QUARTER OF SECTION 36, TOWNSHIP 3 NORTH, RANGE 10 EAST, WILLAMETTE MERIDIAN, CITY OF HOOD RIVER, HOOD RIVER COUNTY, OREGON.

HOOD RIVER COUNTY SURVEYOR'S OFFICE
CS# 2017 037
DATE FILED: 8/31/2017
BY: B.C.

CS# 2017 037-1

OWNER:
SIEVERKROPP DEVELOPMENT, INC.
20040 SW EDY ROAD
SHERWOOD, OR 97140

SCALE: 1" = 100'

BASIS OF BEARING:
HOOD RIVER COUNTY SURVEY No. 2015-021

A POINT 400' NORTH OF THE NORTHWEST CORNER OF THE SOUTHWEST QUARTER OF SOUTHEAST QUARTER OF SECTION 36.

TAX LOT 600 (3N-10E-36D)

TRACT 1 CONTAINS 6.31 ACRES., MORE OR LESS

INITIAL POINT BEING THE NORTHEAST CORNER OF TRACT 1 OF PHASE 2.

GEOLOGICAL SETBACK LINE.

PUBLIC UTILITY EASEMENT MICROFILM No. 2001-0032 (DOES NOT SHOW PORTIONS IN RIGHT OF WAY)

30 FOOT EASEMENT DESCRIBES FOLLOWING, 10 FEET SOUTH AND 20 FEET NORTH OF THE MEANDER LINE OF DRAINAGE, TERMINATING ON THIS LINE.

PORTIONS OF THE PUBLIC UTILITY EASEMENT MICROFILM No. 2001-0032

TRACT 2 POND AND PUBLIC STORM WATER EASEMENT CREATED ON MT. VISTAS-PHASE 2

REFERENCE MONUMENT SET FOR CORNER OF LOT 48

CORNER FALLS ON A 4-WAY FENCE CORNER POST

NO CAP

BRASS CAP IN MONUMENT CASE

3/4" IRON PIPE AT 1/16th CORNER

PACIFIC AVENUE — ELIOT PARK SUBDIVISION PHASE 1 — ELIOT PARK SUBDIVISION PHASE 3 — ELIOT PARK SUBDIVISION PHASE 4 — PACIFIC HEIGHTS SUBDIVISION PHASE 1 — PACIFIC HEIGHTS SUBDIVISION PHASE 2 — MOUNTAIN VISTAS PHASE 1 — MOUNTAIN VISTAS PHASE 2 — 2ND ST. (PUBLIC R/W) — 3rd STREET (PUBLIC RIGHT OF WAY) — 4th STREET — 5th STREET — 6th STREET — SIEVERKROPP AVENUE — CAMEO DRIVE — ELIOT DRIVE (40 FOOT RIGHT OF WAY) — PEAR BLOSSOM ROAD

LINE	BEARING	DISTANCE
L13	N 89°19'03" W	2.64'
L14	S 89°19'03" E	2.64'
L15	N 00°31'36" E	28.93' (29.00')
L16	N 00°30'07" E	29.27' (29.00')
L17	N 00°44'01" E	96.81' (97.00')
L18	S 89°34'44" W	50.00' (50.00')
L19	S 89°26'28" E	39.98' (39.98')
L20	N 89°26'28" W	42.11' (42.11')
L21	N 00°34'14" E	29.00'
L22	N 01°01'52" E	28.94'
L24	S 89°18'35" E	10.30'
L25	S 89°30'45" E	58.00'
L26	N 00°38'23" E	57.96'
L28	N 00°42'27" E	95.51'
L29	N 00°38'23" E	1.00'
L30	N 00°48'52" E	1.77'
L31	S 00°49'01" W	13.25'
L32	S 00°49'01" W	1.55'
L33	S 00°49'01" W	1.00'
L34	N 00°49'01" E	10.00'
L35	S 89°18'35" E	96.62'
L36	S 89°18'35" E	40.01'
L37	N 00°38'43" E	15.00'
L38	N 89°18'35" W	39.97'
L39	N 89°18'35" W	96.63'
L40	N 89°19'03" W	88.77'
L41	N 89°18'35" W	89.02'
L42	S 00°38'27" W	10.00'
L43	N 00°34'12" E	29.00'
L44	N 00°34'14" E	15.00'
L47	N 54°16'12" E	18.94'
L48	N 68°37'21" W	10.97'
L49	N 18°00'40" W	56.86'
L50	S 33°47'26" E	61.71'
L51	S 11°37'43" E	85.30'
L52	N 52°48'58" E	39.26'
L53	S 89°26'29" E	5.10'
L54	S 01°02'38" W	58.00'
L55	N 89°26'29" W	5.00'
L56	S 00°47'48" W	87.07'
L57	N 00°40'18" E	19.30'
L58	S 89°14'03" E	100.00'
L59	N 89°43'09" W	25.00'
L60	N 89°41'49" E	4.36'
L61	S 89°41'28" E	3.92'

TABLE DOES NOT CONTAIN LINES 1-13, 27, 45, 46

LINE	BEARING	DISTANCE
L91	N 62°54'56" E	129.12'
L92	N 34°53'06" E	106.33'
L93	S 63°51'01" W	16.50'
L94	N 51°31'10" W	49.03'
L95	S 38°00'08" E	57.92'
L96	N 54°26'28" E	52.76'

CURVE	RADIUS	ARC LENGTH	CHORD BEARING	CHORD LENGTH	DELTA ANGLE
C1	8.00'	12.53'	N 45°41'15" E	11.29'	89°44'27"
C2	8.00'	12.60'	N 44°18'40" W	11.34'	90°15'38"
C3	8.00'	12.53'	S 45°40'38" W	11.29'	89°45'38"

SHEET INDEX:
PAGE 1 - BOUNDARY
PAGE 2 - SUBDIVISION PHASE 3
PAGE 3 - SIGNATURES

REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
December 30, 2005
ERIK M. CARLSON
72306
Expires: December, 2017

LEGEND:

- ⊙ SET 5/8" X 30" IRON ROD WITH PLASTIC CAP (7/25/17)
- ● SET 5/8" X 30" IRON ROD WITH PLASTIC CAP (POST MON)
- ⊖ FOUND 5/8" IRON ROD WITH RED CAP, L.S.72306, (C.S.2016-042)
- ⊗ FOUND 5/8" IRON ROD WITH RED CAP, L.S.72306, (C.S.2015-021)
- ▼ FOUND 5/8" IRON ROD WITH YELLOW CAP, L.S.2393. (C.S.2001-068)
- ⊛ FOUND 5/8" IRON ROD WITH CAP, L.S. 72306. (C.S.2017-016)
- ⊠ FOUND 5/8" IRON ROD WITH YELLOW CAP, L.S.932. (C.S.89097)
- ⊕ FOUND 5/8" IRON ROD WITH YELLOW CAP, L.S.2393. (C.S.2000-045)
- ◎ FOUND 1-1/2" ALUMINUM CAP, L.S. 50800. (C.S.2007-105)
- ✱ FOUND 1/2" IRON ROD WITH CAP, L.S. 1028. (C.S.2005-095)
- ○ FOUND MONUMENT AS NOTED ON PLAT
- ◇ FOUND 5/8" X 30" IRON ROD WITH NO CAP (C.S.83060)
- ( ) DEED OR PLAT CALL
- □ CALCULATED, NOT FOUND OR SET
- • ANGLE POINT FOR GEOLOGICAL SETBACK

TERRA SURVEYING
P.O. BOX 617
HOOD RIVER, OREGON 97031
PHONE: (541) 386-4531
E-Mail: terra@gorge.net

DATE: JULY 26, 2017
PROJECT: 17076PHASE3
SCALE: 1" = 100'
ASSESSORS MAP: 3N-10E-36CD TL 9400
ASSESSORS MAP: 3N-10E-36D TL 600

Z01902.01

TERRA SURVEYING

HOOD RIVER COUNTY SURVEYOR'S OFFICE	
CS#	2019 006
DATE FILED:	1/24/2019
BY:	

CS# 2019 006

OWNER:
SIEVERKROPP DEVELOPMENT, INC.
20040 SW EDY ROAD
SHERWOOD, OR 97140

5/8" IRON ROD FOUND, WEST 1/4 L.C.#621

N 89°52'52" E 2644.86'

FOUND 5/8" IRON ROD, L.S.72306, C.S.2017016.

N 89°52'52" E 2647.48'

N 89°52'52" E 678.69'

100.00'

980.00' ALONG A LINE 100 FOOT WEST AND PARALLEL OF THE WEST BANK OF THE HOOD RIVER

HOOD RIVER

SUBDIVISION APPROVAL:
THIS PLAT CONFORMS WITH THE CITY OF HOOD RIVER SUBDIVISION CONDITIONS OF APPROVAL PER HOOD RIVER COUNTY PLANNING FILE NO. 2013-29.

NOTE:
ORS 92.044(7), PROHIBITION OF UTILITY INFRASTRUCTURE WITHIN ONE FOOT OF ALL SURVEY MONUMENTS.

N 00°49'04" E 366.50'

N 00°49'12" E 83.32'

N 00°49'12" E 92.47' L19

TRACT A
CONTAINS 16.00 ACRES., MORE OR LESS

TAX LOT 500 (3N-10E-36D)

UNSURVEYED

BETTY LOU AVENUE N00°49'42"E 25.99'

CS

C4

S 25°23'31" E 88.73'

CITY LIMITS

N 00°49'42" E 312.07'

N 00°38'12" W 215.15'

TRACT B

TRACT E

NOTE ABOUT THE TRACTS:
THE PURPOSE OF CREATING TRACTS A THROUGH E IS TO DEFINE THESE AREAS OF LAND INTO TRACTS. THESE TRACTS ARE NOT RESIDENTIAL LOTS AND CONSIDERED UN-BUILDABLE. THESE LOTS ARE NOT COVERED BY DEVELOPMENT CCR'S.
TRACT A-LARGE STEEP HILLSIDE TRACT TO BE TRANSFERRED TO LAND TRUST, UNBUILDABLE.
TRACT B-STEEP AREA OVER THE TOP OF BANK, UN-BUILDABLE.
TRACT C-10 FOOT STRIP OF LAND PROVIDING ACCESS TO THE PROPERTY TO THE EAST.
TRACT D-A LARGE DRAINAGE FEATURE WITH CITY STORM DRAINAGE EASEMENT AS SHOWN.
TRACT E-A TRACT OF LAND ON THE TOP OF BANK FOR THE PURPOSE OF FUTURE TRAIL.

LOT 75 LOT 76 LOT 77 LOT 78 LOT 86

LOT 74 LOT 79 LOT 73 LOT 80 LOT 87 LOT 72 LOT 81 LOT 88 LOT 71 LOT 82

3RD STREET (58' PUBLIC R/W)

LOT 70 LOT 83 LOT 89 LOT 69 LOT 84 LOT 90 INITIAL POINT

N 89°52'52" E 300.29'

S 89°52'52" W 728.14'

100.00'

MOUNTAIN VISTA SUBDIVISION PHASE 4

TAX LOT 1500 (3N-10E-36D)

LOT 68 LOT 85 LOT 91 LOT 67 LOT 86 LOT 92 LOT 66 LOT 87 LOT 93 LOT 65 LOT 88 LOT 94 LOT 64 LOT 89 LOT 95 LOT 63 LOT 90 LOT 96

ELIOT PARK SUBDIVISION PHASE 3

NORTHWEST CORNER OF THE SOUTHWEST 1/4 OF THE SOUTHEAST 1/4 OF SECTION 36.

PACIFIC AVENUE

2ND STREET (50' PUBLIC R/W)

LOT 85 LOT 97 LOT 66 LOT 98 LOT 67 LOT 99 LOT 68 LOT 100 LOT 69 LOT 101 LOT 70 LOT 102 LOT 71 LOT 103

MOUNTAIN VISTAS PHASE 3

BASIS OF BEARING

2ND STREET

LOT 83 LOT 82 LOT 81 LOT 80 LOT 79 LOT 78 LOT 77 LOT 76 LOT 75 LOT 74 LOT 73 LOT 72 LOT 71

TRACT C

GEOLOGICAL SETBACK LINE

SEE PAGE 3 FOR DETAILS

PUBLIC RIGHT OF WAY

TRACT D

S 54°13'20" W 283.34'

S 35°41'16" E 148.98'

TRACT 2 STORM WATER EASEMENT

LOT 58 LOT 57 LOT 56 LOT 55 LOT 50 LOT 49

MOUNTAIN VISTAS PHASE 3

S 00°48'52" W 837.50'

SUBDIVISION PLAT OF MOUNTAIN VISTAS PHASE 4

PAGE 1 OF 4

LOCATION OF SURVEY:
A PORTION OF THE SOUTHEAST QUARTER OF SECTION 36, TOWNSHIP 3 NORTH, RANGE 10 EAST, WILLAMETTE MERIDIAN, CITY AND COUNTY OF HOOD RIVER, HOOD RIVER COUNTY, OREGON.

0' 100' 200' 300'

SCALE: 1" = 100'

NARRATIVE:
THE PURPOSE OF THIS SURVEY WAS TO PLAT TAX LOT 1500 (3N-10E-36D) AND TAX LOT 500 (3N-10E-36D) INTO PHASE 4 OF MOUNTAIN VISTAS SUBDIVISION. TAX LOT 1500 IS TRACT 1 OF MOUNTAIN VISTAS, PHASE 3. ALL OF THE EXTERIOR BOUNDARY MONUMENTS ARE STILL INTACT AND HELD AS CONTROLLING MONUMENTS, WITH EXCEPTION OF THE NORTHEAST CORNER. UPON INVESTIGATION OF TAX LOT 500, WE WERE OBLIGATED TO HOLD THE SOUTH LINE OF TAX LOT 500 PARALLEL TO THE NORTH LINE OF THE QUARTER. THIS CHANGED THE POSITION OF SAID CORNER BY 2.5 FEET TO THE NORTH. TAX LOT 500 IS DESCRIBED AS MEASURING SOUTH ALONG THE NORTH-SOUTH CENTER SECTION LINE TO A POINT 400 FOOT NORTH OF AN IRON PIPE AT THE NORTHWEST CORNER OF THE SOUTHWEST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 36. THE PIPE WAS NOT RECOVERED, BUT WE DID FIND A IRON ROD, WHICH HISTORICALLY HAD A 1-1/2" ALUMINUM CAP AT THAT POSITION, WE RESET THIS MONUMENT AS IT WAS DISTURBED BY GAS LINE WORK. THE DESCRIPTION THEN CALLS EAST PARALLEL TO THE NORTH LINE OF THE NORTHWEST CORNER OF THE SOUTHWEST QUARTER WHICH IS CALCULATED BY USING THE SECTION BREAKDOWN FROM C.S.95111 TO A POINT THAT IS 100 FEET WEST OF WEST BANK OF HOOD RIVER, THENCE NORTHWESTERLY AND 100 FOOT PARALLEL FROM SAID WEST BANK TO THE NORTH LINE OF THE SOUTHEAST QUARTER OF SECTION 36, THENCE WEST ALONG SAID NORTH LINE TO THE POINT OF BEGINNING. WE USED COUNTY AERIAL PHOTOGRAPHS TO DETERMINE SAID WEST BANK. TAX LOT 500 IS CONSIDERED "UN-SURVEYED" DUE TO THE SIZE EXCEEDING SURVEY REQUIREMENT.

THE BASIS OF BEARING FOR THIS PLAT WAS MEASURED BETWEEN TWO 5/8" IRON RODS, L.S.72306 MONUMENTING THE SOUTHEAST CORNER OF 71 AND THE OTHER IS FOUND 2.27 FEET WEST OF THE NORTHEAST CORNER OF LOT 65, BOTH IN PHASE 3 OF MOUNTAIN VISTAS SUBDIVISION.

BASIS OF BEARING:
HOOD RIVER COUNTY SURVEY No. 2017-037

LEGEND:

- SET 5/8" X 30" IRON ROD WITH PLASTIC CAP (OCTOBER 4, 2018)
- SET 1-5/32" DIAMETER COPPER PLUG, L.S. 72306 (OCTOBER 4, 2018)
- FOUND MONUMENT OF RECORD AS NOTED ON PLAT
- FOUND 5/8" IRON ROD WITH RED CAP, L.S.72306, PREVIOUSLY SET AS REF. MON.(C.S.2017-037)
- FOUND 5/8" IRON ROD WITH RED CAP, L.S.72306, (C.S.2017-037)
- FOUND 5/8" IRON ROD WITH YELLOW CAP, L.S.50800, (C.S.2007-105)
- FOUND 5/8" IRON ROD WITH YELLOW CAP, L.S.50800, (C.S.2008-045)
- FOUND 5/8" IRON ROD WITH CAP, L.S.72306, (C.S.2017-16)
- CALCULATED, NOT FOUND OR SET

LINE LEGEND:

- LOT LINE
- EASEMENT LINE
- GEOLOGICAL SETBACK LINE
- STREET CENTERLINE

SHEET INDEX:
PAGE 1 - BOUNDARY
PAGE 2 - SUBDIVISION DETAIL (NORTH)
PAGE 3 - SUBDIVISION DETAIL (SOUTH)
PAGE 4 - SIGNATURES, LINE AND CURVE TABLE.

REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
December 30, 2005
ERIK M. CARLSON
72306
Expires: December, 2019

TERRA SURVEYING
P.O. BOX 617
HOOD RIVER, OREGON 97031
PHONE: (541) 386-4531
E-Mail: terra@gorge.net

DATE: DECEMBER 3, 2018
PROJECT: 18146PHASE4
SCALE: 1" = 100'
ASSESSORS MAP: 3N-10E-36D TL 1500, 500

Appendix C
Level of Service Calculations

9th Street Residential Subdivision #01580
PM Peak Hour

Level Of Service Computation Report
2000 HCM Unsignalized Method (Base Volume Alternative)

Intersection #1 9th Street/Pacific Avenue

Average Delay (sec/veh): 3.0 Worst Case Level Of Service: B[12.6]

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L - T - R			L - T - R			L - T - R			L - T - R		
Control:	Stop Sign			Stop Sign			Uncontrolled			Uncontrolled		
Rights:	Include			Include			Include			Include		
Lanes:	0 0 1! 0 0			0 0 1! 0 0			0 0 1! 0 0			0 0 1! 0 0		
Volume Module:												
Base Vol:	28	0	3	2	2	41	44	142	20	4	100	11
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	28	0	3	2	2	41	44	142	20	4	100	11
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
PHF Volume:	33	0	3	2	2	48	51	165	23	5	116	13
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	33	0	3	2	2	48	51	165	23	5	116	13
Critical Gap Module:												
Critical Gp:	7.1	6.5	6.2	7.1	6.5	6.2	4.1	xxxx	xxxxx	4.1	xxxx	xxxxx
FollowUpTim:	3.5	4.0	3.3	3.5	4.0	3.3	2.2	xxxx	xxxxx	2.2	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	436	417	177	413	423	123	129	xxxx	xxxxx	188	xxxx	xxxxx
Potent Cap.:	534	529	872	553	526	934	1469	xxxx	xxxxx	1398	xxxx	xxxxx
Move Cap.:	490	509	872	535	505	934	1469	xxxx	xxxxx	1398	xxxx	xxxxx
Volume/Cap:	0.07	0.00	0.00	0.00	0.00	0.05	0.03	xxxx	xxxx	0.00	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	0.1	xxxx	xxxxx	0.0	xxxx	xxxxx
Control Del:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	7.5	xxxx	xxxxx	7.6	xxxx	xxxxx
LOS by Move:	*	*	*	*	*	*	A	*	*	A	*	*
Movement:	LT - LTR - RT			LT - LTR - RT			LT - LTR - RT			LT - LTR - RT		
Shared Cap.:	xxxx	512	xxxxx	xxxx	872	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	0.2	xxxxx	xxxxx	0.2	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	12.6	xxxxx	xxxxx	9.4	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	B	*	*	A	*	*	*	*	*	*	*
ApproachDel:		12.6			9.4			xxxxxx			xxxxxx	
ApproachLOS:		B			A			*			*	

Note: Queue reported is the number of cars per lane.

Traffix 8.0.0715 (c) 2008 Dowling Assoc. Licensed to FERGUSON and ASSOC.

9th Street Residential Subdivision #01580
PM Peak Hour

Level Of Service Computation Report
2000 HCM Unsignalized Method (Base Volume Alternative)

Intersection #1 9th Street/Pacific Avenue

Average Delay (sec/veh): 3.2 Worst Case Level Of Service: C[15.3]

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L - T - R			L - T - R			L - T - R			L - T - R		
Control:	Stop Sign			Stop Sign			Uncontrolled			Uncontrolled		
Rights:	Include			Include			Include			Include		
Lanes:	0 0 1! 0 0			0 0 1! 0 0			0 0 1! 0 0			0 0 1! 0 0		
Volume Module:												
Base Vol:	51	0	4	2	2	43	47	188	29	4	151	12
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	51	0	4	2	2	43	47	188	29	4	151	12
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
PHF Volume:	59	0	5	2	2	50	55	219	34	5	176	14
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	59	0	5	2	2	50	55	219	34	5	176	14
Critical Gap Module:												
Critical Gp:	7.1	6.5	6.2	7.1	6.5	6.2	4.1	xxxx	xxxxx	4.1	xxxx	xxxxx
FollowUpTim:	3.5	4.0	3.3	3.5	4.0	3.3	2.2	xxxx	xxxxx	2.2	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	563	544	235	539	553	183	190	xxxx	xxxxx	252	xxxx	xxxxx
Potent Cap.:	440	449	809	456	444	865	1397	xxxx	xxxxx	1325	xxxx	xxxxx
Move Cap.:	399	430	809	439	424	865	1397	xxxx	xxxxx	1325	xxxx	xxxxx
Volume/Cap:	0.15	0.00	0.01	0.01	0.01	0.06	0.04	xxxx	xxxx	0.00	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	0.1	xxxx	xxxxx	0.0	xxxx	xxxxx
Control Del:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	7.7	xxxx	xxxxx	7.7	xxxx	xxxxx
LOS by Move:	*	*	*	*	*	*	A	*	*	A	*	*
Movement:	LT - LTR - RT			LT - LTR - RT			LT - LTR - RT			LT - LTR - RT		
Shared Cap.:	xxxx	414	xxxxx	xxxx	797	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	0.5	xxxxx	xxxxx	0.2	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	15.3	xxxxx	xxxxx	9.8	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	C	*	*	A	*	*	*	*	*	*	*
ApproachDel:	15.3			9.8			xxxxxx			xxxxxx		
ApproachLOS:	C			A			*			*		

Note: Queue reported is the number of cars per lane.

Traffix 8.0.0715 (c) 2008 Dowling Assoc. Licensed to FERGUSON and ASSOC.

9th Street Residential Subdivision #01580
PM Peak Hour

Level Of Service Computation Report
2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #1 9th Street/Pacific Avenue

Average Delay (sec/veh): 3.5 Worst Case Level Of Service: C[16.4]

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Uncontrolled			Uncontrolled		
Rights:	Include			Include			Include			Include		
Lanes:	0 0 1! 0 0			0 0 1! 0 0			0 0 1! 0 0			0 0 1! 0 0		
Volume Module:												
Base Vol:	51	0	4	2	2	43	47	188	29	4	151	12
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	51	0	4	2	2	43	47	188	29	4	151	12
Added Vol:	0	0	0	0	0	10	16	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	51	0	4	2	2	53	63	188	29	4	151	12
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
PHF Volume:	59	0	5	2	2	62	73	219	34	5	176	14
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	59	0	5	2	2	62	73	219	34	5	176	14
Critical Gap Module:												
Critical Gp:	7.1	6.5	6.2	7.1	6.5	6.2	4.1	xxxx	xxxxx	4.1	xxxx	xxxxx
FollowUpTim:	3.5	4.0	3.3	3.5	4.0	3.3	2.2	xxxx	xxxxx	2.2	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	606	581	235	576	591	183	190	xxxx	xxxxx	252	xxxx	xxxxx
Potent Cap.:	412	428	809	431	422	865	1397	xxxx	xxxxx	1325	xxxx	xxxxx
Move Cap.:	364	403	809	410	398	865	1397	xxxx	xxxxx	1325	xxxx	xxxxx
Volume/Cap:	0.16	0.00	0.01	0.01	0.01	0.07	0.05	xxxx	xxxx	0.00	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	0.2	xxxx	xxxxx	0.0	xxxx	xxxxx
Control Del:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	7.7	xxxx	xxxxx	7.7	xxxx	xxxxx
LOS by Move:	*	*	*	*	*	*	A	*	*	A	*	*
Movement:	LT - LTR - RT			LT - LTR - RT			LT - LTR - RT			LT - LTR - RT		
Shared Cap.:	xxxx	379	xxxxx	xxxx	801	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	0.6	xxxxx	xxxxx	0.3	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	16.4	xxxxx	xxxxx	9.9	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	C	*	*	A	*	*	*	*	*	*	*
ApproachDel:	16.4			9.9			xxxxxx			xxxxxx		
ApproachLOS:	C			A			*			*		

Note: Queue reported is the number of cars per lane.

Traffix 8.0.0715 (c) 2008 Dowling Assoc. Licensed to FERGUSON and ASSOC.

Oregon
Kate Brown, Governor

Department of State Lands
775 Summer Street NE, Suite 100
Salem, OR 97301-1279
(503) 986-5200
FAX (503) 378-4844
www.oregon.gov/dsl

State Land Board

Kate Brown
Governor

Bev Clarno
Secretary of State

Tobias Read
State Treasurer

August 27, 2019

Apple Development, LLC
Attn: Dan Ryan
550 Riverside Drive
Hood River, OR 97031

Re: WD # 2018-0414 **Approved with Revisions**
Wetland Delineation Report for Indian Creek Homes PUD
Hood River County, T3N R10E S36CB TL 3300 and 3400 (Portion)

Dear Mr. Ryan:

The Department of State Lands has reviewed the wetland delineation report prepared by Environmental Technology Consultants for the site referenced above. Please note that the study area includes only a portion of the tax lots described above (see the attached maps). Based upon the information presented in the report, a site visit on June 21, 2019, and additional information submitted upon request, we concur with the wetland and waterway boundaries as mapped in revised Figure 6C of the report. Please replace all copies of the preliminary wetland map with this final Department-approved map.

Within the study area, 5 wetlands (Wetlands 3, 5, 6, 7 and 8, totaling approximately 0.52 acres), Indian Creek, and several unnamed drainages within Wetland 3 were identified. In addition, Wetland 8, described as a hillside seep wetland/waterway, was added to the map using offsite methods due to steep topography. All these features are subject to the permit requirements of the state Removal-Fill Law. Under current regulations, a state permit is required for cumulative fill or annual excavation of 50 cubic yards or more in wetlands or below the ordinary high-water line (OHWL) of the waterway (or the 2-year recurrence interval flood elevation if OHWL cannot be determined).

This concurrence is for purposes of the state Removal-Fill Law only. We recommend that you attach a copy of this concurrence letter to any subsequent state permit application to speed application review. Federal or local permit requirements may apply as well. The U.S. Army Corps of Engineers will determine jurisdiction under the Clean Water Act, which may require submittal of a complete Wetland Delineation Report.

Please be advised that state law establishes a preference for avoidance of wetland impacts. Because measures to avoid and minimize wetland impacts may include reconfiguring parcel layout and size or development design, we recommend that you

work with Department staff on appropriate site design before completing the city or county land use approval process.

This concurrence is based on information provided to the agency. The jurisdictional determination is valid for five years from the date of this letter unless new information necessitates a revision. Circumstances under which the Department may change a determination are found in OAR 141-090-0045 (available on our web site or upon request). In addition, laws enacted by the legislature and/or rules adopted by the Department may result in a change in jurisdiction; individuals and applicants are subject to the regulations that are in effect at the time of the removal-fill activity or complete permit application. The applicant, landowner, or agent may submit a request for reconsideration of this determination in writing within six months of the date of this letter.

Thank you for having the site evaluated. If you have any questions, please contact the Jurisdictional Coordinator for Hood River County, Chris Stevenson, at (503) 986-5246.

Sincerely,

Peter Ryan, PWS
Aquatic Resource Specialist

Enclosures

ec: John McConnaughey, Environmental Technology Consultants
City of Hood River Planning Department (Maps enclosed for updating LWI)
Winston Zack, Corps of Engineers
Heidi Hartman, DSL

WETLAND DELINEATION / DETERMINATION REPORT COVER FORM

This form must be included with any wetland delineation report submitted to the Department of State Lands for review and approval. A wetland delineation report submittal is not "complete" unless the fully completed and signed report cover form and the required fee are submitted. Attach this form to the front of an unbound report or include a hard copy of the completed form with a CD/DVD that includes a single PDF file of the report cover form and report (minimum 300 dpi resolution) and submit to: **Oregon Department of State Lands, 775 Summer Street NE, Suite 100, Salem, OR 97301-1279.** A single PDF attachment of the completed cover from and report may be e-mailed to **Wetland_Delineation@dsl.state.or.us**. For submittal of PDF files larger than 10 MB, e-mail instructions on how to access the file from your ftp or other file sharing website. Fees can be paid by check or credit card. Make the check payable to the Oregon Department of State Lands. To pay the fee by credit card, call 503-986-5200.

RECEIVED
JUL 16 2018
RECEIVED $ [redacted]
DEPARTMENT OF STATE LANDS

☒ Applicant ☒ Owner Name, Firm and Address:
APPLE DEVELOPMENT, LLC
550 RIVERSIDE DRIVE
HOOD RIVER, OR. 97031
ATTN: DAVID RYAN

Business phone # 541-490-6505
Mobile phone #
E-mail: DavidR@hrjco.com

☒ Authorized Legal Agent, Name and Address:
Environmental Technology Consultants
375 Portland Ave, Gladstone, OR 97027

Business phone # 360-696-4403
Mobile phone # **503-580-2465**
E-mail: JohnM@etcEnvironmental.net

I either own the property described below or I have legal authority to allow access to the property. I authorize the Department to access the property for the purpose of confirming the information in the report, after prior notification to the primary contact.
Typed/Printed Name: David Ryan Signature: _____
Date: **Aug 10, 2017** Special instructions regarding site access: **None. Publicly accessible.**

Project and Site Information (using decimal degree format for lat/long of site or start & end points of linear project)

Project Name: **Indian Creek Homes PUD**	Latitude: ~~**N 45.69849**~~ 45.698645 Longitude: ~~**W -121.51999**~~ -121.520417
Proposed Use: **Single Family Homes**	Tax Map # **03N10E36CB**
Project Street Address (or other descriptive location): ~~**1050 Multnomah Road, Hood River, OR 97031**~~ S of 9th Court, HR, OR	Township **03N** Range **10E** Section **36** QQ CB Tax Lot(s) **3300 and 3400**
City: Hood River County: Hood River	Waterway: Indian Creek River Mile: NWI Quad(s): Hood River

Wetland Delineation Information

Wetland Consultant Name, Firm and Address:
John McConnaughey, PWS
Environmental Technology Consultants
375 Portland Ave, Gladstone, OR 97027
360-696-4403 desk 503-580-2465 cell

Phone # **360-696-4403**
Mobile phone # **503-580-2465**
E-mail: **JohnM@etcEnvironmental.net**

The information and conclusions on this form and in the attached report are true and correct to the best of my knowledge.
Consultant Signature: Date: **March 5, 2018**

Primary Contact for report review and site access is ☒ Consultant ☐ Applicant/Owner ☐ Authorized Agent

Wetland/Waters Present? ☒ Yes ☐ No | Study Area size 3.97 **acres** | Total Wetland Acreage: **0.52 Acres**

Check Box Below if Applicable: Fees: $437 (2018)

- ☐ R-F permit application submitted
- ☐ Mitigation bank site
- ☐ Wetland restoration/enhancement project (not mitigation)
- ☐ Industrial Land Certification Program Site
- ☐ Reissuance of a recently expired delineation
  Previous DSL # Expiration date _____
- ☒ Fee payment submitted **$437**
- ☐ Fee ($100) for resubmittal of rejected report
- ☐ No fee for request for reissuance of an expired report

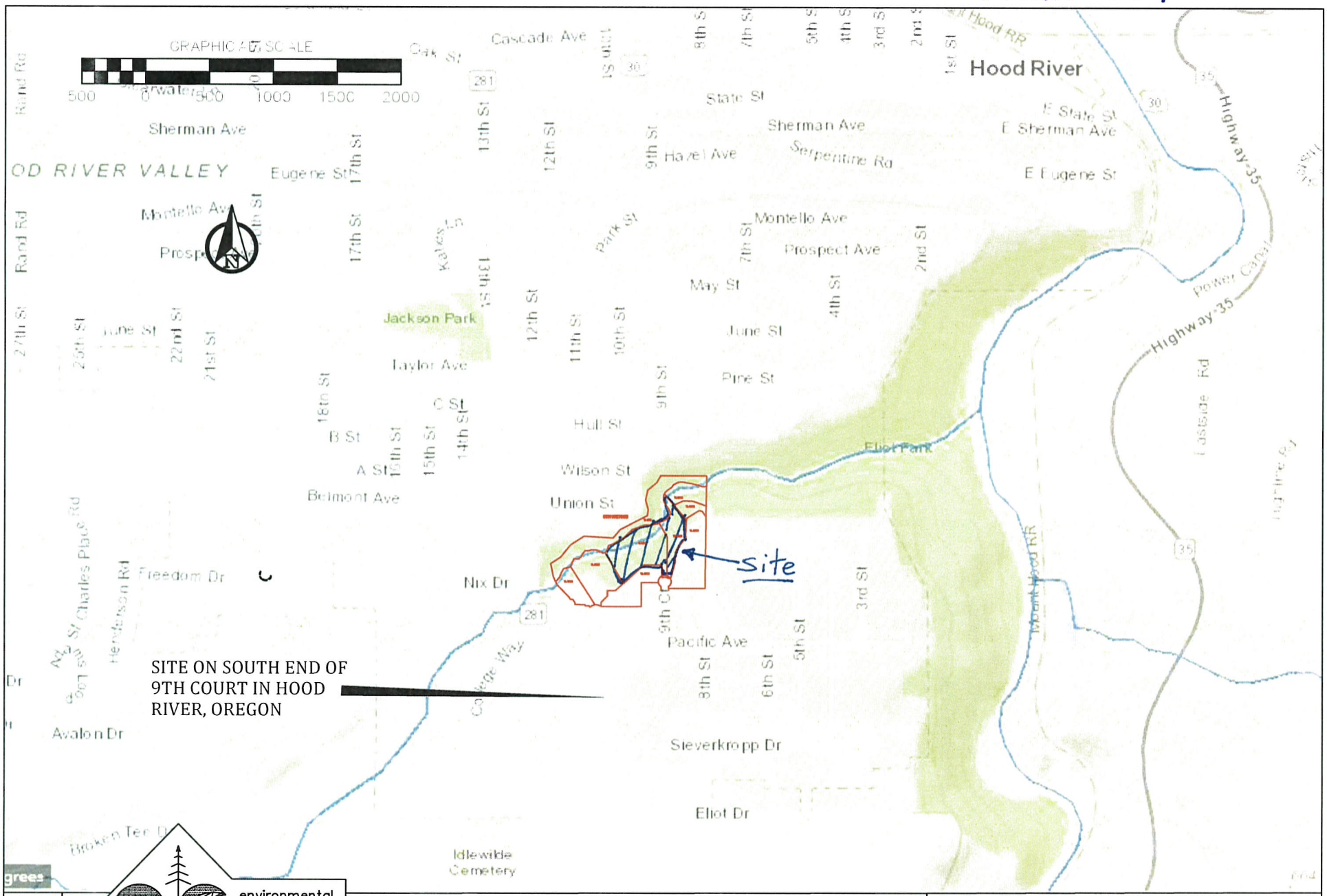
Other Information:	Y	N	
Has previous delineation/application been made on parcel?	☒	☐	If known, previous DSL # WD1998-0003 AND WD2005-0328
Does LWI, if any, show wetland or waters on parcel?	☒	☐	

For Office Use Only

DSL Reviewer: CS Fee Paid Date: 7 / 16 / 18 DSL WD # 2018-0414
Date Delineation Received: 7 / 16 / 18 DSL Project # _____ DSL Site # _____
Scanned: ☑ Final Scan: ☐ DSL WN # _____ DSL App. # _____

Pt# 60336

WD2018-0414



environmental technology consultants

PO Box 821185
Vancouver, WA 98682
360-696-4403

SHEET 1

Aug 14, 2019

LOCATION MAP
ON STREAMNET MAP

INDIAN CREEK HOMES PUD
APPLE DEVELOPMENT LLC
550 RIVERSIDE DRIVE
HOOD RIVER, OR 97031
DAVIDR@HRJCO.COM 541-490-6505

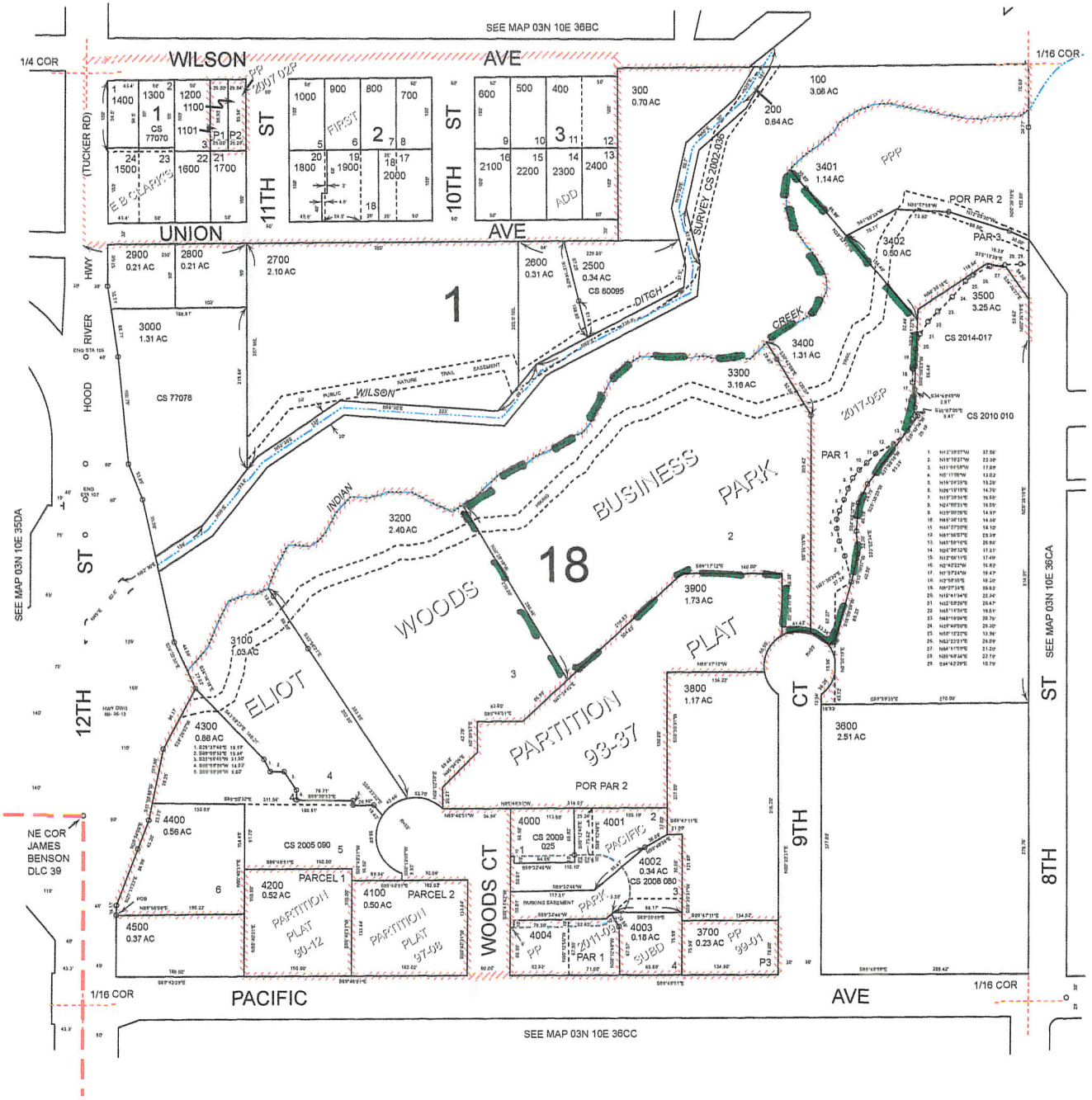
THIS MAP WAS PREPARED FOR ASSESSMENT PURPOSE ONLY

0 50 100 150 200 Feet

N.W.1/4 S.W.1/4 SEC.36 T.3N. R.10E. W.M.
HOOD RIVER COUNTY
1" = 100'

03N10E36CB
HOOD RIVER

Cancelled
4005



Revised: MA
05/31/2017

HOOD RIVER

WD2018-0414

LEGEND

- ETC 2018 WETLAND AREAS
- 4 — WETLAND NAME.
- P6 — ETC DATA PLOT
- 8 — PHOTO LOCATION AND DIRECTION
- PROPERTY LINE
- STUDY BOUNDARY

GRAPHICAL SCALE
40 0 40 80 120 160

DSL WD # 2018-0414
Approval Issued 08/27/2019
Approval Expires 08/27/2024

PROPERTY INCLUDES SOME LANDS ON LEFT BANK OF INDIAN CREEK. STUDY AREA. INCLUDES ONLY LANDS ABOVE THE RIGHT BANK OHWM OF INDIAN CREEK.

VERY STEEP AREA, WETLAND 8 IS ONLY MAPPED ±3' ACCURACY

PATH ON LOW BRIDGE THROUGH WETLAND AREA

WETLAND #3 EXTENDS OFFSITE TO WEST

WETLAND #3 IS A HILLSIDE SEEP AREA, MULTIPLE TINY STREAMS ORIGINATE HERE, COMBINE AND FLOW TO INDIAN CREEK. THEY ARE BELIEVED TO BE PERENNIAL. NONE OF THE STREAMS IN WETLAND 3 ORIGINATED OUTSIDE THE WETLAND 3.

FRENCH DRAIN

ETC Wetland Flags and Data points surveyed by:
PLS # 02786PLS Bradley Huffmon
Tenneson Engineering Corp.
3775 Crates Way, The Dalles, OR
ACCURACY IS ±0.01FT

Disclaimer per OAR 141-090-0035 (7)(k)
This report documents the investigation, best professional judgment and conclusions of the investigator. It is correct and complete to the best of my knowledge. It should be considered a Preliminary Jurisdictional Determination of wetlands and other waters and used at your own risk unless it has been reviewed and approved in writing by the Oregon Department of State Lands in accordance with OAR 141-090-0005 through 141-090-0055.

REVISIONS

INDIAN CREEK HOMES PUD
APPLE DEVELOPMENT LLC
550 RIVERSIDE DRIVE
HOOD RIVER, OR 97031
DAVIDR@HRJCO.COM 541-490-6505

WD2018-0414 DELINEATED WETLAND BOUNDARIES
OF LOTS 03N-10E-36CB 3300
AND 3400 IN HOOD RIVER, OREGON

environmental technology consultants
375 Portland Avenue
Gladstone, OR 97027
360-696-4403

DATE Aug 14, 2019
SCALE NOTED
DRAWN JHM
JOB EVA18-002
SHEET 6C
OF 6 SHEETS

Earth Engineers, Inc.

2411 Southeast 8th Avenue ● Camas ● WA 98607
Phone: 360-567-1806 ● Fax: 360-253-8624
www.earth-engineers.com

June 21, 2019

Apple Development, LLC
550 Riverside Drive
Hood River, Oregon 97031
Attention: David Ryan

Phone: 541-490-6505
E-mail: davidr@hrjco.com

Subject: **Geotechnical Investigation Report**
Proposed 39-Lot Residential Subdivision
Indian Creek Planned Unit Development
Accessed at the North Terminus of 9th Court
Hood River, Hood River County, Oregon
EEI Report No. 19-080-1

Dear Mr. Ryan:

Earth Engineers, Inc. (EEI) is pleased to provide our attached Geotechnical Investigation Report for the above referenced project. This report includes the results of our field investigation, an evaluation of geotechnical factors that may influence the proposed construction, and geotechnical recommendations for the proposed building and general site development.

We appreciate the opportunity to perform this geotechnical study and look forward to continued participation during the design and construction phases of this project. If you have any questions pertaining to this report, or if we may be of further service, please contact our office at 360-567-1806.

Sincerely,
Earth Engineers, Inc.

Troy Hull, P.E., G.E.
Principal Geotechnical Engineer

Jacqui Boyer
Geotechnical Engineering Associate

Attachment: Geotechnical Investigation Report

Distribution (electronic copy only): Addressee
Mark VanderZanden, Surround Architecture (mark@surroundinc.com)
Kevin Chrisman, Tenneson Engineering Corporation (kchrisman@tennesoneng.com)
Darrin Eckman, Tenneson Engineering Corporation (deckman@tennesoneng.com)

GEOTECHNICAL INVESTIGATION REPORT

Proposed 39-Lot Residential Subdivision
Indian Creek Planned Unit Development
Accessed at the North Terminus of 9th Court
Hood River, Hood River County, Oregon

Prepared for:

Apple Development, LLC
550 Riverside Drive
Hood River, Oregon 97031
Attention: David Ryan

Prepared by:

Earth Engineers, Inc.
2411 Southeast 8th Avenue
Camas, Washington 98607
Phone: 360-567-1806
Fax: 360-253-8624

EEI Report No. 19-080-1

June 21, 2019

Earth Engineers, Inc.

Jacqui Boyer
Geotechnical Engineering Associate

Troy Hull, P.E.
Principal Geotechnical Engineer

TABLE OF CONTENTS

Page No.

1.0 PROJECT INFORMATION 1

1.1 Project Authorization 1
1.2 Project Description 1
1.3 Purpose and Scope of Services 5

2.0 SITE AND SUBSURFACE CONDITIONS 7

2.1 Site Location and Description 7
2.2 Mapped Geology and Soils 11
2.3 Subsurface Materials 13
2.4 Groundwater Information 15
2.5 Seismicity 15
2.6 Slope Stability 16

3.0 EVALUATION AND FOUNDATION RECOMMENDATIONS 17

3.1 Geotechnical Discussion 17
3.2 General Site Preparation 18
3.3 Structural Fill 19
3.4 Foundation Recommendations 20
3.5 Floor Slab Recommendations 21
3.6 Retaining Wall Recommendations 21

4.0 CONSTRUCTION CONSIDERATIONS 24

4.1 Moisture Sensitive Soils/Weather Related Concerns 24
4.2 Drainage and Groundwater Considerations 24
4.3 Excavations 24

5.0 REPORT LIMITATIONS 26

APPENDICES: Appendix A – Site Location Plan
Appendix B – Exploration Location Plan
Appendix C – Exploration Logs
Appendix D – Bell Design Company Exploration Location Plan and Logs
Appendix E – Soil Classification Legend
Appendix F – Surcharge-Induced Lateral Earth Pressures for Wall Design

1.0 PROJECT INFORMATION

1.1 Project Authorization

Earth Engineers, Inc. (EEI) has completed a geotechnical investigation report for the proposed 39-lot residential development to be located at the north terminus of 9th Court in Hood River, Hood River County, Oregon. Our geotechnical services were authorized by David Ryan with Apple Development, LLC on May 10, 2019 by signing our Proposal No. 18-P055-R1 issued on February 12, 2018 and revised on May 10, 2019.

1.2 Project Description

Our current understanding of the project is based on the information provided to us by Darrin Eckman and Kevin Chrisman with Tenneson Engineering Corp. (TEC) via e-mail, which included the following documents:

- **A site plan titled "Preliminary Plat for Indian Creek P.U.D." dated May 9, 2019, prepared by TEC.** This site plan shows the locations of the 39 lots of the proposed subdivision in relation to the existing site features. As indicated on the plan, lots 1-30 are attached townhomes, while the remaining 9 lots are detached single-family homes. This site plan can be seen below in Figure 1.

- **A marked up plan titled "Preliminary Utility Plan for Indian Creek P.U.D." dated May 9, 2019, prepared by TEC.** This plan shows the location of the proposed utilities on the subject site, including the location of sanitary sewer lines, water service lines, catch basin, fire hydrants and a retaining wall. This plan has also been marked up to show the proposed pond areas. Figure 1 below has outlined the proposed retaining wall and highlighted the proposed pond areas.

- **A 101-page application submitted to the City of Hood River for the proposed Indian Creek residential development dated March, 2019.** This application includes a development proposal narrative, site plans of existing and proposed conditions (including utilities, parking, retaining walls, landscaping etc.), cross-sections, renderings, a traffic impact analysis, a geotechnical report produced by Bell Design Company (referenced below), and a wetland report.

- **A geotechnical report titled "Report of Geotechnical Considerations For: Indian Creek Homes PUD" dated July 30, 2010, prepared by Bell Design Company.** This report indicates that there is no significant slope stability dangers present, and scour hazards are present on the property. Bell Design recommended an allowable soil bearing pressure of 1,500 psf for conventional foundations placed on 6-inches of compacted 1-¼'' minus gravel. The report also indicates that the groundwater table

should be lowered such that it is a minimum of 4 feet below the proposed elevation of the residential structures during construction.

Attached to the Bell Design report is a March 19, 2008 report by Mark Yinger Associates that includes 3 soil boring logs reportedly performed on the project site. There is not a boring location plan included with the report indicating where the borings were performed on the property.

Additionally, Appendix C of the Bell Design report includes a July 31, 2008 memorandum from Mark Yinger Associates titled "Regional and Local Geologic Setting – Indian Creek Homes PUD, Hood River, Oregon." This memorandum provides a summary of the geology for both the project site and surrounding region.

- **An undated, unsigned word document titled "Construction Dewatering".** It is our understanding that this is an excerpt from the Geotechnical Report by Bell Design.

- **A letter from Kevin Liburdy, a Senior Planner at the City of Hood River, dated April 1, 2010.** This letter has 11 questions/comments posed by Kevin Liburdy about an unreferenced set of plans. The only questions that appear to relate to our geotechnical services are:

    - #6, which asks about proposed retaining walls and whether the Geotechnical Engineer has reviewed the designs; and

    - #8, which asks about large excavations on lots 6-12 and whether the Geotechnical Engineer has reviewed these excavations in the context of the existing apartment buildings located uphill. It should be noted that the lot locations have changed since this letter was issued. Lots 6-12 from the preliminary site plan coincide with lots 3-12 of the most current plan (shown in Figure 1).

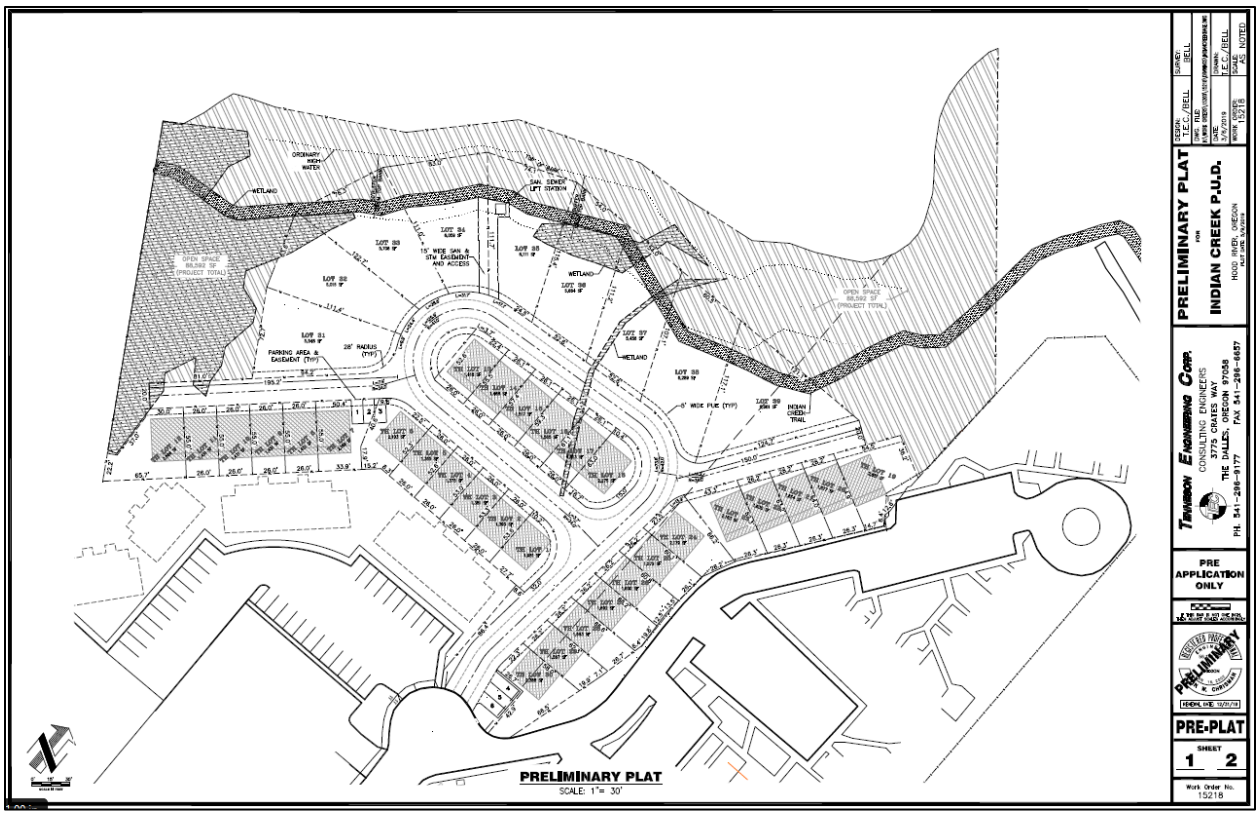


Figure 1: Site plan provided by TEC showing 39 lots – 30 townhomes, and 9 detached homes.

Briefly, we understand that Apple Development, LLC is in the process of developing the property into a 39-lot residential development (i.e. Indian Creek P.U.D.). As described above, lots 1 through 30 are planned to be attached townhomes, while the remaining 9 lots are planned to be detached single-family homes. It is our understanding that the townhomes are proposed to be 3-stories in total (2 levels of living space plus a daylight basement garage beneath). The townhome lots range from 1,365 square feet to 2,851 square feet, while the single-family home lots range from 5,015 square feet to 6,681 square feet. While the planned townhome buildings are shown on the drawings, the single family residential lots do not have any designs yet. We assume the home designs will be determined later.

Based on the drawings provided to us, we understand that there are both permanent shoring walls and conventional retaining walls planned to be used along the southern and eastern perimeter of the proposed development (i.e. near neighboring structures). According to the site plan showing retaining wall and fence locations, the shoring walls are proposed to vary in height ranging from 4 feet to 10 feet and are planned to be supported on steel piles; whereas the conventional retaining walls are proposed to vary in height up to 4 feet (maximum) and is planned to be supported on shallow foundations. See Figure 2 below for the proposed location of the shoring and conventional retaining walls. Figure 3 below shows the cross-sections of the two types of walls.

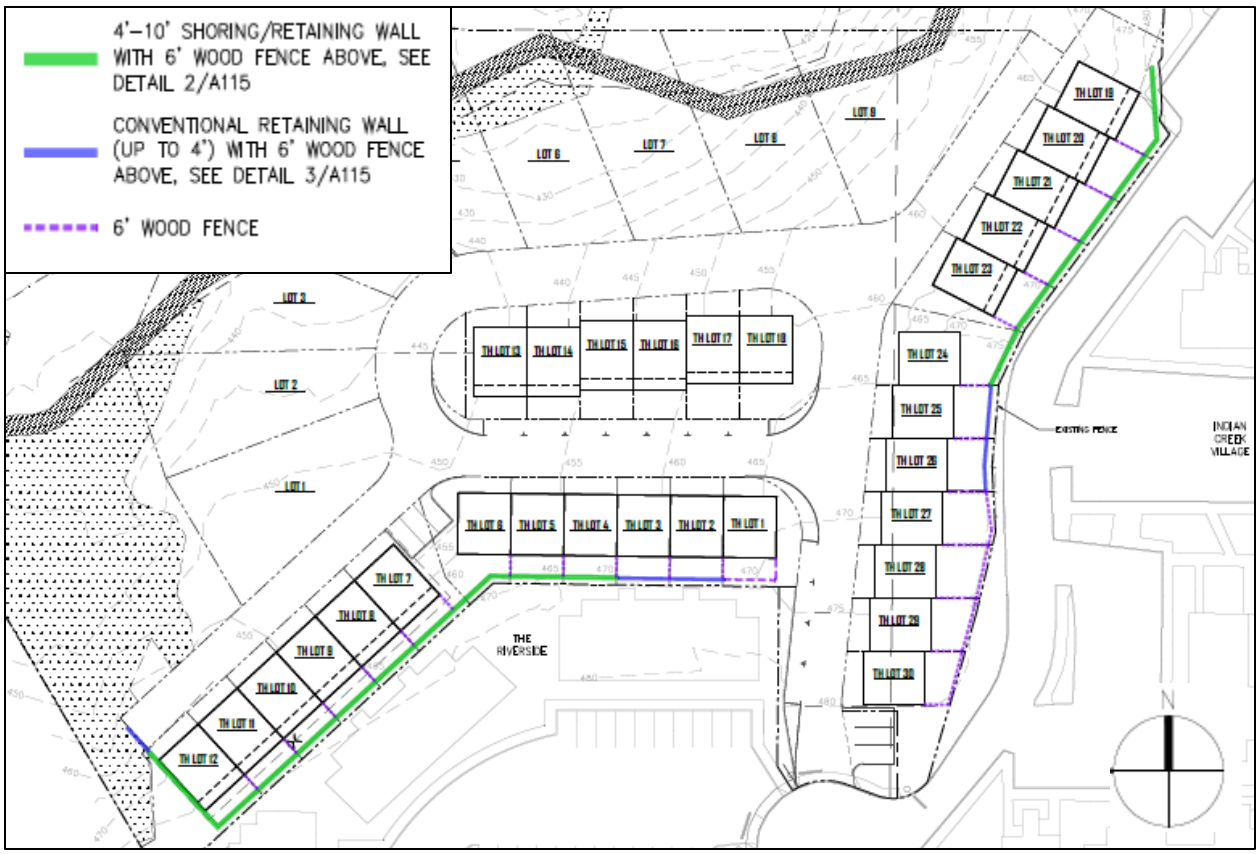


Figure 2: Site plan showing the locations of the proposed shoring and retaining walls for the proposed development. The proposed shoring wall locations are outlined in green, and the proposed conventional retaining wall locations are outlined in blue. The dashed purple lines are 6-foot wooden fences.

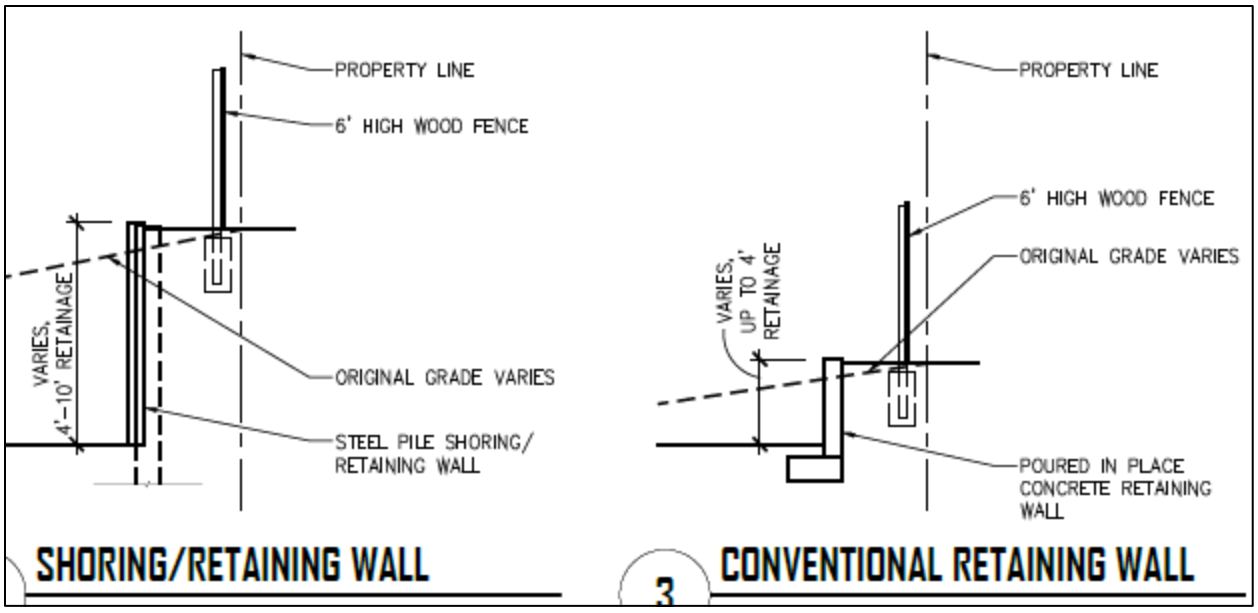


Figure 3: Detail from retaining wall site plan referenced above showing the cross-section of the proposed shoring and retaining walls for the proposed development.

At this time we have not been provided design drawings for the project. For the purposes of this proposal, we have assumed maximum building loads will not exceed 60 kips, 5 kips per linear foot, and 150 psf for isolated column footings, continuous wall footings, and floor slabs, respectively. We also assume maximum cuts and fills will be on the order of 10 and 4 feet, respectively.

We have assumed that the proposed construction will be designed in accordance with the 2017 Oregon Residential Specialty Code (ORSC), which is an amendment to the 2015 International Residential Code or the 2014 Oregon Structural Specialty Code (OSSC), which is an amendment to the 2012 International Building Code.

1.3 Purpose and Scope of Services

The purpose of our services was to provide an updated geotechnical report with final geotechnical design recommendations as requested during the pre-application meeting with the City of Hood River. After reviewing the Bell Design report, we determined it was necessary to conduct additional subsurface explorations to better define the existing soil, rock, and groundwater properties in order to provide updated geotechnical related recommendations for the proposed development. Note that by issuing our geotechnical report, we are taking over from Bell Design as the Geotechnical Engineer of Record for this project. Our report is intended to completely replace the previous geotechnical reports issued by others for this property.

In order to evaluate the subsurface conditions, we performed ten test pits (TP-1 through TP-10) around the subject property. The explorations extended to depths of 10 feet below the existing ground surface, or practical digging refusal (whichever occurred first). In order to characterize soil strength, we supplemented the test pits with drive probe testing. The explorations were performed by an excavator provided by our client, Apple Development, LLC. Disturbed grab samples were obtained from the major soil units in the test pits at the discretion of the representative of the Geotechnical Engineer and returned to our office for laboratory testing.

Select soil samples were tested in the laboratory to determine the material's properties for our evaluation. Laboratory testing was accomplished in general accordance with ASTM procedures.

This report briefly outlines the testing procedures, presents available project information, describes the site and subsurface conditions, and presents recommendations regarding the following:

- A discussion of subsurface conditions encountered including pertinent soil and rock properties as well as the encountered groundwater conditions.
- Geotechnical related recommendations for foundation design including allowable bearing capacity and estimated settlements. Deep foundation design recommendations will be provided if needed.
- Seismic design parameters in accordance with the 2017 ORSC.

- Recommendations for the overall suitability of the in-situ soils for use as utility backfill and structural fill.
- Floor slab recommendations.
- Retaining wall recommendations, including addressing Question #6 in the 2010 letter from the City of Hood River once we have been provided drawings C2.6 and C2.8.
- Generic shoring wall earth pressure recommendations.
- Geotechnical recommendations for permanent and temporary slopes, including addressing Question #8 in the 2010 letter from the City of Hood River once we have been provided drawing C2.9.
- Discussions on geotechnical issues that may impact the project.

Unless requested otherwise, the report will be issued electronically in PDF format. Hard copies can be provided upon request.

Note that the scope of this report is to address the overall subdivision development, including the creation of the building lots, townhomes, streets, and underground utilities. At this time, there are no designs available for the single family homes and our current scope of services does not provide final geotechnical design recommendations for the homes (we are just providing preliminary geotechnical recommendations for the single family home lots). We envision that lot-specific final geotechnical reports will need to be issued once home plans are developed and provided to us for review.

2.0 SITE AND SUBSURFACE CONDITIONS

2.1 Site Location and Description

As noted above, the site is located at the north terminus of 9th Court in Hood River, Hood River County, Oregon. The property is bounded to the south and east by residential properties, to the west by a commercial property and to the north by Indian Creek. See Figure 4 below for the project vicinity.

Figure 4: Vicinity Map (base map source - http://hrccd.co.hood-river.or.us/county-webmap/). The subject property is outlined in red.

As shown on Figure 4 above, the subject property is currently located on two separate Hood River County tax lots: Tax Lot 3300 and 3400. Tax Lot 3300 is 3.14-acres in size and Tax Lot 3400 is 1.43 acres in size. In terms of topography, the subject property is generally sloping down to the north at an average slope of around 3.5H:1V (i.e. a declination of about 15 degrees). There are localized steeper slopes located in the northern portion of Tax Lot 3400, with slopes up to 2H:1V (i.e. 26 degrees). None of the slopes on the property are considered oversteepened. See Figure 5 below for site topography.

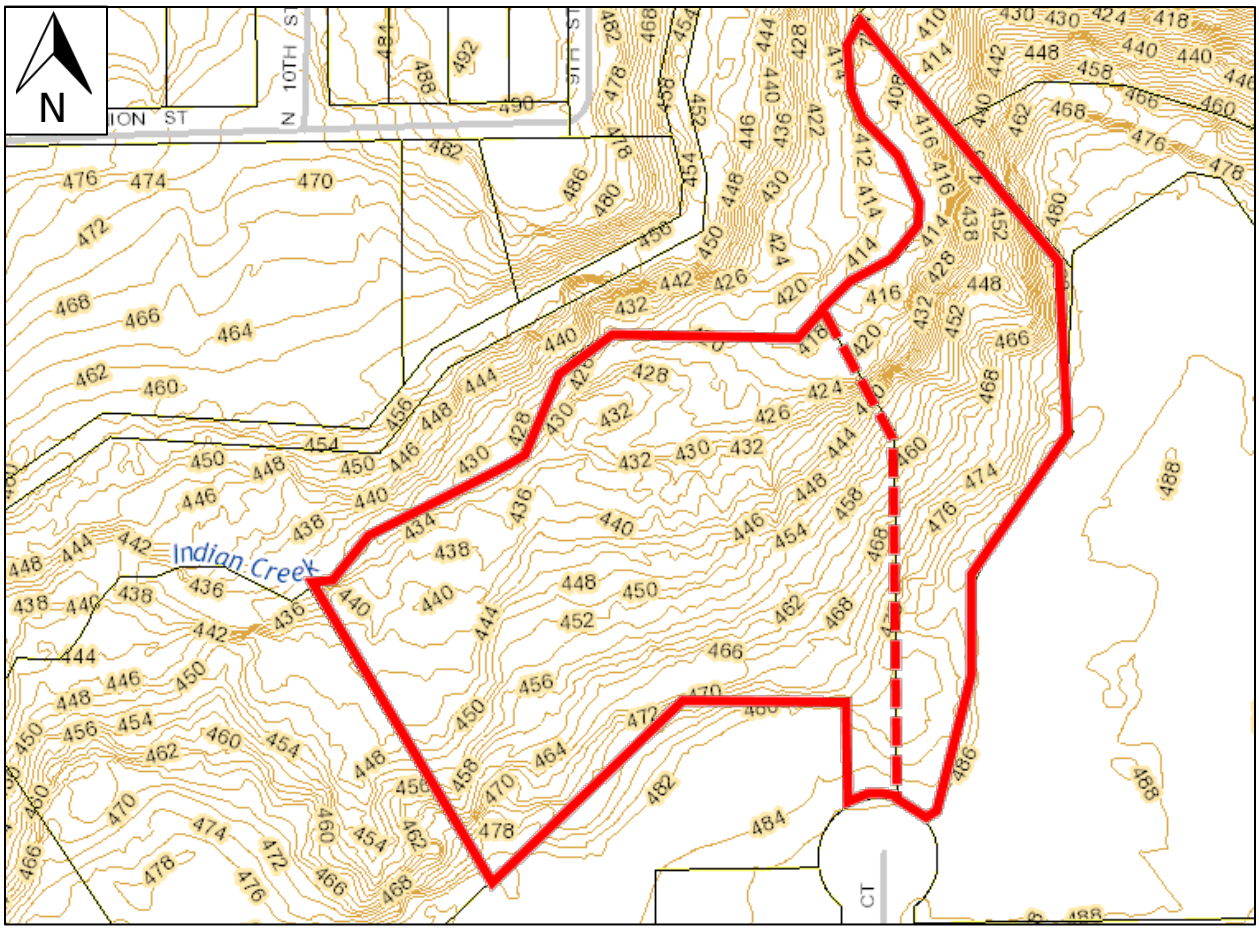


Figure 5: Site topography (base map source - http://hrccd.co.hood-river.or.us/county-webmap/). The subject property is outlined in red. Contour lines are marked on 2-foot intervals.

The subject property is currently vacant, with an unmarked foot trail running through the property. In addition, the Indian Creek Trail runs through the subject property, generally parallel to and approximately 50 feet south of Indian Creek. The property is currently heavily vegetated with grass, brush, and trees; however, trees have been cleared from the area directly north of 9th Court (at its terminus). We did not observe signs of previous historic soil movement such as clearly identifiable landslide head scarps. We did, however, observe signs of previous shallow soil instability such as leaning/bent tree trunks (shown in Photo 1 below) and hummocky topography (shown in Photo 2 below). We also observed erosion and scouring on the subject site, indicating shallow soil instability and sensitivity to water (see Photo 3 below). See Photos 4 and 5 below for current site conditions.

Photo 1: Photo taken during our Pre-Proposal Site Reconnaissance (February 9, 2018), showing bent and leaning trees along the southern boundary of the subject site.

Photo 2: Photo taken during our Pre-Proposal Site Reconnaissance (February 9, 2018) showing hummocky and variable topography.

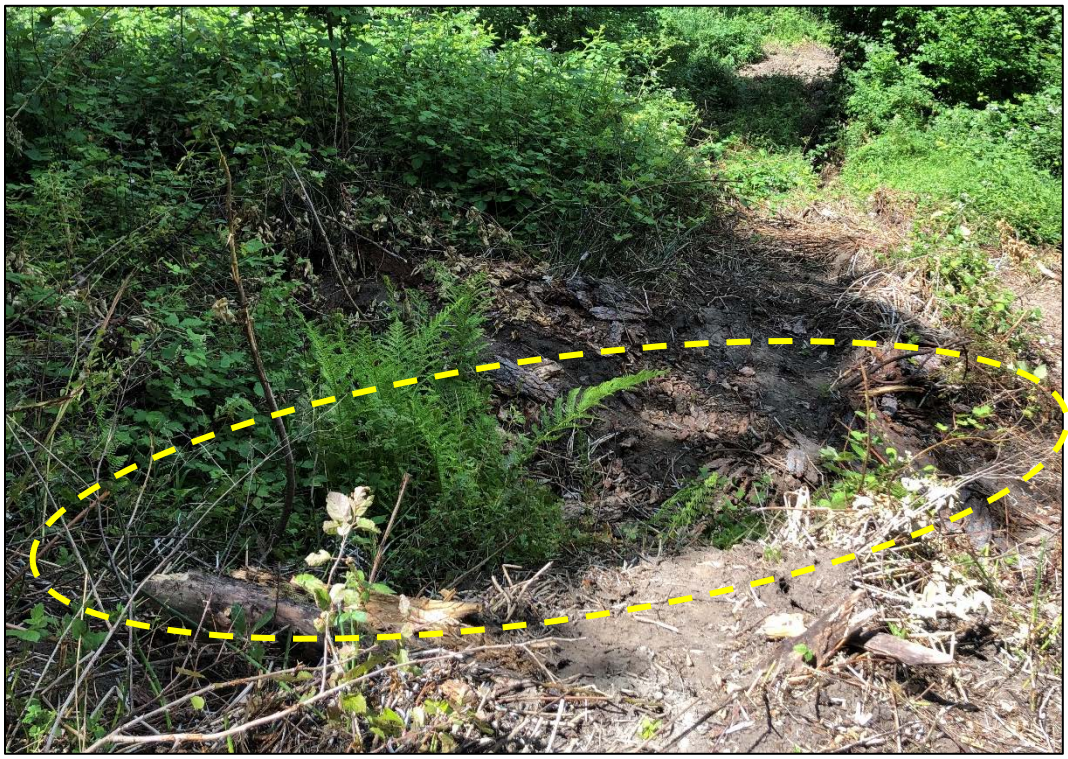


Photo 3: Soil scouring observed on the subject site.

Photo 4: Current site conditions (taken from the terminus of 9th Court, facing northwest).

Photo 5: Current site conditions (taken from the unmarked foot trail, facing north).

2.2 Mapped Geology and Soils

The subject property is located on the west side of the Hood River Valley near its confluence with the Columbia River. The Hood River Valley is located in a graben set between the Columbia Gorge and the Cascade Range to the west and the Columbia Plateau to the east.

The Oregon Department of Geology and Mineral industries (DOGAMI) maps the geologic unit on the Geologic Map of the Hood River Quadrangle, Oregon[1] in the area of the subject property as Quaternary older alluvium of Hood River Valley, Qoah (2.58 million years ago to 12,000 years ago). This material is described as "unconsolidated glacial outwash and minor interbedded lacustrine deposits and debris flows filling the Hood River valley--includes basal conglomerate and fluvial sand".

The surface soils on the subject property are mapped by the United States Department of Agriculture (USDA) Soil Survey as Wind River fine sandy loam (Unit 26B) and Xerumbrepts (Unit 31F)[2]. The sandy loam accounts for 5 percent of the subject property, north of the terminus of 9th Court. This is a well-drained soil formed on terraces from moderately coarse textured alluvium. The Xerumbrepts soil unit covers approximately 95 percent of the subject property. This well-drained soil is formed on the footslope of mountain slopes from colluvium materials. A

[1] Beaulieu, John D, Bulletin 91, Geologic Hazards of Parts of Northern Hood River, Wasco, and Sherman Counties, Oregon 1977.

typical profile for this soil unit is very stony silt loam, overlying clay loam, overlying unweathered bedrock.

As part of our due diligence for this report, we reviewed the Oregon Department of Geology and Mineral Industries Statewide Geohazards Viewer (DOGAMI, HazVu[2]). Based on the published mapping, the property is located in an area with a very strong expected earthquake shaking, a moderate risk of soil liquefaction during a design-level seismic event, a high to very high landslide hazard, and is within a mapped landslide deposit. In addition, the subject property is mapped 0.4 miles west of the Mount Hood moderate volcano hazard zone.

We also reviewed the DOGAMI Statewide Landslide Information Layer for Oregon (SLIDO version 3.2) which shows mapped landslides in Oregon. This tool also maps a portion of the subject property within a landslide deposit (see Figure 6), however the database does not provide any information on said deposit.

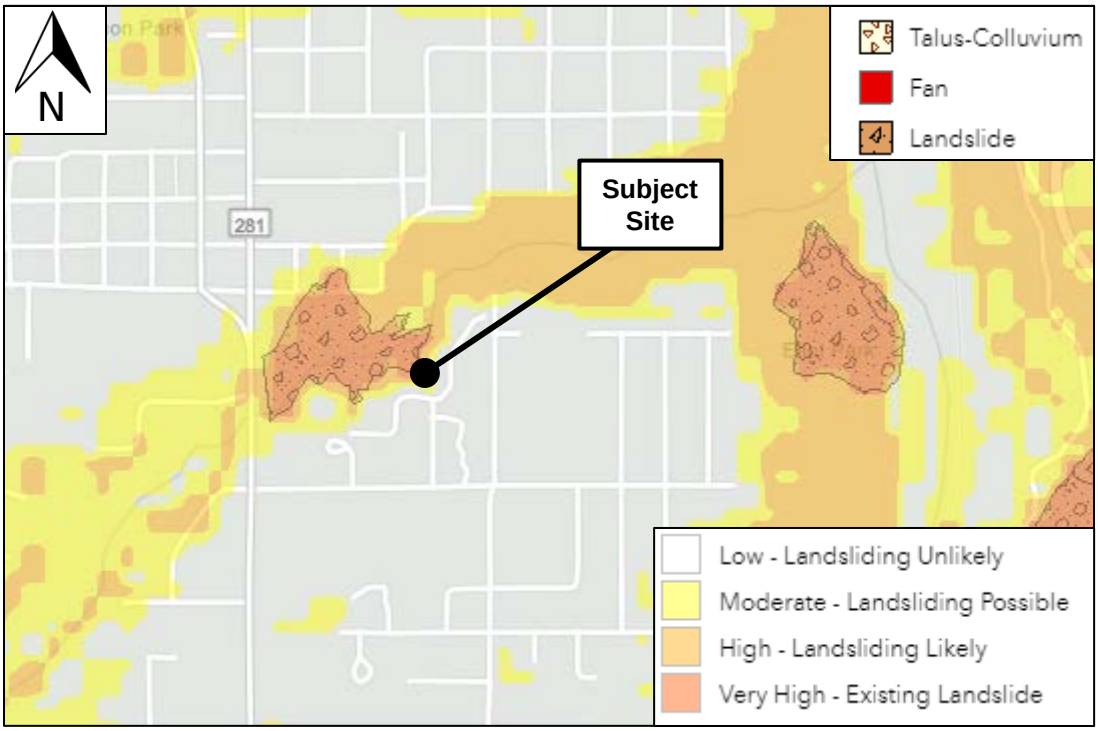


Figure 6: SLIDO Landslide map of the subject property and vicinity.

According to the USGS Quaternary Fault and Fold Database, the nearest fault that has been active during the Quaternary (last 1.8 million years) is the Hood River fault zone, which is located approximately 1.2 miles east of the property[3]. See Figure 7 below. The Hood River fault zone defines the eastern margin of a half graben that forms the Upper Hood River Valley in the High Cascades of northern Oregon. The Hood River fault zone strikes northwest, has a normal sense of movement, and a slip rate of less than 0.2 mm/year.

2 Oregon Department of Geology and Mineral Industries, Statewide Geohazards Viewer: http://www.oregongeology.org/hazvu/

[3] Personius, S.F., compiler, 2002, Fault number 875, Oatfield fault, in Quaternary fault and fold database of the United States: U.S. Geological Survey website, https://earthquakes.usgs.gov/hazards/qfaults, accessed 06/07/2019.

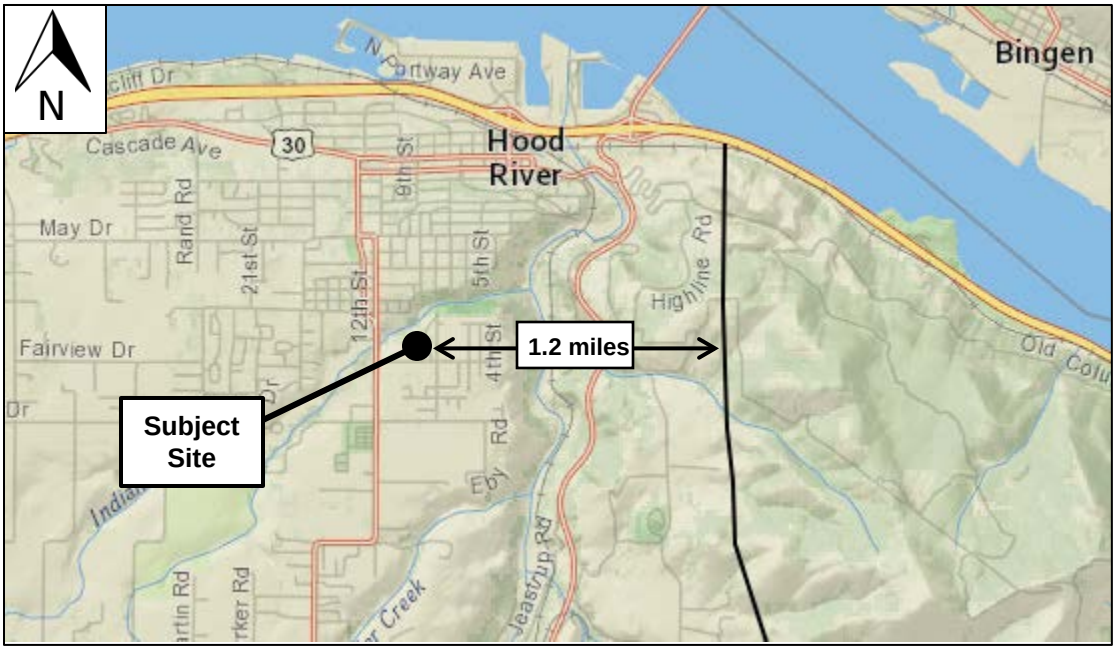


Figure 7: USGS Quaternary Fault and Fold Database map showing the Hood River Fault Zone with respect to the subject property.

2.3 Subsurface Materials

As stated above, we explored the site with ten test pits (TP-1 through TP-10) around the subject property. The site was also previously explored by others using drilled borings and test pits (see Appendix D). We reviewed and considered that information by other consultants in our evaluation of the site subsurface conditions.

Our test pits were advanced using a Deere 160D Excavator equipped with a 2-foot bucket subcontractor provided by our client, Apple Development, LLC. For the approximate exploration locations, see the "Exploration Location Plan" in Appendix B. Results of the test pits are reported in Appendix C. Upon completion, the test pits were loosely backfilled with the excavated soil and tamped down with the excavator bucket.

Soil samples were periodically obtained from the major soil strata encountered during the excavation process. Each sample was marked and identified by the date sampled, project number, test pit number, and sample depth. The samples were transported to our laboratory for visual identification and laboratory testing and will be retained for at least 60 days from the date of this report.

Select soil samples were tested in the laboratory to determine material properties for our evaluation. Laboratory testing was accomplished generally in accordance with ASTM procedures. The testing performed included moisture content tests (ASTM D 2216) and fines content determinations (ASTM D 1140). The test results have been included on the exploration logs located in Appendix C.

In general, we encountered a surficial layer of topsoil overlying fill material transitioning to native sand and/or silt with depth. The thickness of the strata varied across the site. Each individual stratum encountered is discussed in further detail below.

TOPSOIL

In all of our test pits, the surficial layer encountered consisted of a moist, dark brown sandy silt with gravel, roots and rootlets. The thickness of this stratum was 6 to 18 inches in our explorations.

FILL SOILS

In all of our test pits we encountered what we interpreted to be fill soils immediately underlying the topsoil stratum. It should be noted that the subsurface investigation logs by other consultants did not classify the near-surface soils as fill. The fill generally consisted of a brown to gray-brown sand with organics (i.e. roots and rootlets). We also encountered gravel and cobbles within this stratum. Laboratory moisture content testing on samples obtained within this stratum ranged from 11 to 29 percent. It should be noted that in TP-9 the sample obtained had a moisture content of 64 percent due to the presence of organics. Fines content laboratory testing for samples obtained within this stratum ranged from 24 to 41 percent passing the #200 sieve. The depth of this fill stratum ranged from 2 to 4 feet bgs in our explorations.

SAND (SW)

In our test pit explorations, we encountered sand underlying the fill soils that generally extended to the terminal depths of these explorations. This sand stratum was generally a brown to gray-brown sand with some silt and orange mottling. In some of our explorations we encountered gravel and fractured basalt. Laboratory moisture content testing on samples obtained within this stratum ranged from 9 to 42 percent, indicating a dry to wet condition. Fines content laboratory testing for samples obtained within this stratum ranged from 2 to 33 percent passing the #200 sieve. Based on the excavator digging effort and supplementary drive probe testing readings, we consider the sand stratum to be very loose to very dense. It should be noted that the depth of medium dense sand ranged from 3 to 4 feet bgs where tested. This sand stratum extended to the terminal depths of our explorations in all of our test pits (i.e. 10 feet bgs or digging refusal) except for TP-3, TP-7 and TP-10.

SILT (ML)

In TP-3, TP-7 and TP-10, we encountered silt soils extending to the terminal depths of these explorations. The silt stratum was generally a light brown to brown sandy silt. In TP-7 and TP-10 the silt observed was cemented, and we also observed rounded gravel and fractured basalt rock in these explorations. It is possible that this silt stratum is a volcanic tuff (i.e. cemented ash), characterized by its “powdery” nature and rounded gravel. Laboratory moisture content testing on samples obtained within this stratum ranged from 20 to 35 percent, indicating a moist condition. Fines content laboratory testing for samples obtained within this stratum ranged from 54 to 55 percent passing the #200 sieve. Based on the digging effort and supplementary drive probe testing readings, we consider the silt stratum to be very stiff to hard. It should be noted

that, based on our fines content laboratory testing, this material was only slightly more silty than sandy (i.e. if less than 50 percent passed the #200 sieve, this material would have been classified as a sand).

The above subsurface description is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The exploration logs included in the Appendices should be reviewed for specific information at specific locations. These records include soil descriptions, stratifications, and locations of the samples. The stratifications shown on the logs represent the conditions only at the actual exploration locations. Variations may occur and should be expected between locations. The stratifications represent the approximate boundary between subsurface materials and the actual transition may be gradual. The fill extent at each exploration location was estimated based on an examination of the soil samples, the presence of foreign materials, field measurements, and the subsurface data. The explorations performed are not adequate to accurately identify the full extent of existing fill across the site. Consequently, the actual fill extent may be much greater than that shown on the exploration logs and discussed herein. The samples that were not altered by laboratory testing will be retained for 60 days from the date of this report and then will be discarded.

2.4 Groundwater Information

As stated above, we encountered groundwater in our explorations at depths ranging from 3 feet bgs to 7.5 feet bgs. It should be noted that the Geotechnical Report produced by Bell Design (referenced in Section 1.2 above) indicates that groundwater was encountered in their explorations at depths ranging from 3 feet bgs to 6 feet bgs. We interpret the groundwater encountered to generally be a perched layer on top of the hard tuff layer.

In addition, we reviewed publically available well logs from the Oregon Water Resources Department website (http://apps.wrd.state.or.us/apps/gw/well_log/) for historic groundwater information. We found the depth to groundwater from a well located 0.4 miles from the subject property to be 15 feet below the ground surface.

It should be noted that the groundwater elevations can fluctuate seasonally, especially during periods of extended wet or dry weather, or from changes in land use. Immediately upgradient of the project site is an apartment complex with lush green landscaping. It's possible that irrigation water from the apartment complex is infiltrating the ground and flowing onto the subject property. We do expect that perched groundwater will be encountered within excavations made during construction.

2.5 Seismicity

In accordance with the 2015 International Building Code (IBC) and Table 20.3-1 of ASCE7-10, we recommend a Site Class D (stiff soil profile) for this site when considering the average of the upper 100 feet of bearing material beneath the foundations. This recommendation is based on the results of our subsurface investigation as well as our understanding of the local geology.

Inputting our recommended Site Class as well as the site latitude and longitude into the United States Geological Survey (USGS) Seismic Design Maps web application, available online at http://earthquake.usgs.gov/designmaps/us/application.php, we obtained the seismic design parameters for a return interval of 2 percent exceedance in 50 years shown in Table 1 below.

Table 1: Seismic Design Parameter Recommendations (Site Class D)

Parameter	Recommendation
S_s	0.550g
S_1	0.251g
F_a	1.360
F_v	1.898
S_{MS} (=S_s x F_a)	0.748g
S_{M1} (=S_1 x F_v)	0.477g
S_{DS} (=2/3 x S_{MS})	0.498g
Design PGA (=S_{DS}/2.5)	0.199g
MCE_G PGA	0.226g
F_{PGA}	1.348
PGA_M (=F_{PGA} x MCE_G PGA)	0.305g

Note: Site latitude = 45.698675, longitude = -121.519839

2.6 Slope Stability

As discussed in Section 2.2 above, a portion of the site is mapped in a pre-historic (i.e. greater than 150 years old) landslide. Based on the mapping, it appears that it has been interpreted that the banks of Indian Creak were destabilized at some time in the ancient past. It is important to note that the mapping does not appear to indicate the landsliding extended all the way up the slope to the south.

We do not interpret the existing soil slopes on the property to be oversteepened (i.e. generally greater than 2H:1V or 27 degrees). And based on the soil conditions encountered (i.e. sandy soils overlying a hard pan), deep seated slope instability is not a concern. The primary slope stability risks appear to be from (1) the fact that the soils are very highly erosive, and (2) the shallow, near-surface soils are generally loose. As such, it is our professional opinion that a quantitative slope stability evaluation is not necessary (i.e. we are evaluating the risk of slope instability based on a qualitative approach)—the slope stability issues are considered to be shallow. Provided soil erosion is mitigated and the buildings are not supported directly on the near-surface, loose sandy soils, we do not anticipate any major issues related to slope instability. **To address the potential for soil erosion caused by Indian Creek, we are recommending a minimum 25 foot geotechnical setback from the edge of the creek.**

3.0 EVALUATION AND FOUNDATION RECOMMENDATIONS

3.1 Geotechnical Discussion

The following geotechnical factors may influence the proposed construction:

1. **Presence of volcanic tuff material** – In our explorations we observed what we interpreted to be volcanic tuff (i.e. cemented soil) material in TP-7 and TP-10. This material is extremely moisture sensitive, as such foundations bearing on this material will act differently during periods of wet weather, causing significant reduction to the soil strength and support capabilities. As such, water should not be allowed to collect in foundation excavations or on prepared subgrades, and care should be taken when operating construction equipment on the exposed subgrade. While not required, we recommend consideration be given to performing construction in the dry summer months. See more detailed recommendations for drainage in Section 4.1.

2. **Evidence of shallow soil instability/erosion** – As stated above, we encountered shallow soil instability as evidenced by erosion and scouring (see Photo 1 above). The scour feature observed indicated the surface soils are sensitive to water runoff. In addition, there is potential for scour related erosion along Indian Creek. From a geotechnical standpoint, the Indian Creek scour related erosion is not anticipated to affect the proposed development, however we recommend a minimum horizontal setback of 25 feet from Indian Creek. It should be noted that water runoff should be controlled during construction and during the life of the project. See Section 4.2 below for drainage recommendations.

   In addition, Bell Design Company report referenced above indicates that a gully was formed within the subject parcel caused by improperly controlled runoff from the neighboring apartment complex. According to their geotechnical report, the water has since been contained. It is possible that this is the scouring we observed in Photo 1 above.

3. **Presence of weak/compressible fill soils** – As discussed above, fill soils, as evidenced by the presence of rootlets, charcoal and non-uniform textural characteristics, were encountered in all of our explorations. The presence of such materials could result in excess settlements and unsatisfactory foundation performance. Therefore, we do not recommend supporting any residence foundations on the apparent fill soils; instead, the foundations should bear on medium dense/medium stiff to hard native soil underlying the fill. These native soil conditions were generally encountered at a depth of 4 feet below the existing ground surface in our explorations. However, we do expect that the depth to the bottom of the loose soils will be somewhat variable and it will be imperative that a representative of the Geotechnical Engineer is on site to approve all subgrade excavations.

4. **Shallow groundwater** – As mentioned previously, water was encountered seeping into our explorations at a depth ranging from 3 feet to 7.5 feet bgs. To reduce the chance of water seeping into the foundation excavations, we recommend excavations take place during the dryer time of the years. Additionally, we recommend all foundation drains include a full-height 12-inch wide curtain of drain rock against the uphill sides of the foundations exposed to native soil.

5. **Lack of detailed design drawings –** We have not been provided with a complete design drawing set. Once the drawings for the entire development are complete, we should review those drawings to determine if the design complies with our recommendations or if our recommendations need to be modified.

In summary, provided the recommendations in this report are adhered to, we do not foresee any major issues that would preclude the proposed construction. The above-mentioned factors are listed to draw the attention of the reader to the issues to address during design and construction of the proposed development.

3.2 General Site Preparation

Prior to starting construction, the contractor should locate the test pits performed as part of this study, excavate to the depths shown on the test pit logs, and backfill each excavation with properly compacted granular structural fill under the observation of a representative of the Geotechnical Engineer.

Topsoil, vegetation, roots, debris, fill soils, and any other deleterious soils will need to be stripped from beneath the proposed construction areas to expose medium dense/medium stiff to hard native soils. The topsoil thickness was about 6 to 18 inches in our test pits. The depth of the fill soil ranged from 2 to 4 feet bgs. It is not unusual for topsoil and fill soil thickness to vary from these depths. A representative of the Geotechnical Engineer should determine the depth of soil removal at the time of construction and verify that the subgrade material is consistent with our recommendations.

After the subgrade has been properly stripped and excavated to grade, it should be heavily recompacted with either a large, vibrating roller or a hoepack—assuming that it is sandy. If the material exposed is the hard, cemented soil (i.e. tuff), then we do not anticipate it will need to be recompacted. Once recompaction has been completed and approved by a representative of the Geotechnical Engineer, a proof roll should be performed with a fully loaded dump truck or water truck to verify the strength of the soil subgrades before concrete is placed (if possible). Soils that are observed to rut or deflect excessively under the moving load, or are otherwise judged to be unsuitable, should be undercut and replaced with properly compacted structural fill. Alternately, the exposed subgrades will need to be visually evaluated by the Geotechnical Engineer or his representative using a ½-inch diameter steel geo-probe. The proof rolling and undercutting activities should be witnessed by a representative of the Geotechnical Engineer and should be performed during a period of dry weather.

Utilities will need to be located and rerouted as necessary and any abandoned pipes or utility conduits should be removed to inhibit the potential for subsurface soil erosion. Utility trench excavations should be backfilled with properly compacted structural fill that is constructed as outlined in Section 3.3 of this report.

Based on the existing soil conditions, the design of roadway pavement section can be based on a Subgrade Resilient Modulus (M_r) of 16,000 psi.

3.3 Structural Fill

In general, if site grades are to be raised with structural fill, then care will need to be taken not to destabilize the slopes. Any structural fill to be placed should be free of organics or other deleterious materials, have a maximum particle size less than 3 inches, be relatively well graded, and have a liquid limit less than 45 and plasticity index less than 25. In our professional opinion, the on-site native sand soils are appropriate for use as structural fill. We recommend fill be moisture conditioned to within 3 percentage points below and 2 percentage points above optimum moisture as determined by ASTM D1557 (Modified Proctor).

Fill should be placed in relatively uniform horizontal lifts on the prepared subgrade which has been stripped of deleterious materials and approved by the Geotechnical Engineer or their representative. If loose soils exist on the prepared subgrades, they should be re-compacted. Each loose lift should be about 1-foot thick. The type of compaction equipment used will ultimately determine the maximum lift thickness. Structural fill should be compacted to at least 95 percent of standard proctor maximum dry density as determined by ASTM Designation D1557. Each lift of compacted engineered fill should be tested by a representative of the Geotechnical Engineer prior to placement of subsequent lifts.

Any structural fill placed on slopes at or greater than 5H:1V should be properly benched. Level benches excavated into the existing slope should be a minimum of 4 feet wide laterally, and should be cut into the slope for no more than every five feet of vertical rise. The placement of fill should begin at the base of the fill. All benches should be inspected by a representative of the Geotechnical Engineer and approved prior to placement of structural fill lifts. If evidence of seepage is observed in the bench excavations, a supplemental drainage system may need to be designed and installed to prevent hydrostatic pressure buildup behind the fill. Final fill and/or cut slopes should be kept at or below a slope of 2H:1V. The fill should extend horizontally outward beyond the exterior perimeter of the building and pavements at least 5 feet and 3 feet respectively, prior to sloping.

To reiterate, each lift of compacted engineered fill should be tested by a representative of the Geotechnical Engineer prior to placement of subsequent lifts.

3.4 Foundation Recommendations

Once the site has been properly prepared as discussed above, the planned residential subdivision can be supported on a conventional shallow foundation system. Spread footings for isolated columns and continuous bearing walls can be designed for an allowable soil bearing pressure of up to 2,000 psf when bearing on the recompacted medium dense native sand stratum/medium stiff native silt stratum, or new, properly placed structural fill overlying the recompacted native sand/silt strata. Our recommended allowable bearing capacity is based on dead load plus design live load, and can be increased by one-third when including short-term wind or seismic loads. Minimum footing dimensions should be in compliance with the 2017 ORSC.

Lateral frictional resistance between the base of footings and the subgrade can be expressed as the applied vertical load multiplied by a coefficient of friction of 0.32 for concrete foundations bearing directly the medium dense/medium stiff to hard native soils. In addition, lateral loads may be resisted by passive earth pressures based on an equivalent fluid pressure of 250 pounds per cubic foot (pcf) for footings poured "neat" against the native soils, or properly backfilled structural fill. These are ultimate values—we recommend a factor of safety of 1.5 be applied to the equivalent fluid pressure, which is appropriate due to the amount of movement required to develop full passive resistance. To be clear, no safety factor has been applied to the friction coefficient discussed above.

Exterior footings and foundations in unheated areas should be located at a depth of at least 18 inches below the final exterior grade to provide adequate frost protection. If the buildings are to be constructed during the winter months or if the foundation soils will likely be subjected to freezing temperatures after foundation construction, then the foundation soils should be adequately protected from freezing. Otherwise, interior foundations can be located at nominal depths compatible with architectural and structural considerations.

Again, variable conditions (i.e. fill soils, etc.) are anticipated to be present during construction. The foundation excavations should be observed by a representative of the Geotechnical Engineer prior to steel or concrete placement to assess that the foundation materials are capable of supporting the design loads and are consistent with the materials discussed in this report. Unsuitable soil zones encountered at the bottom of the foundation excavations should be removed to the level of suitable soils or properly compacted structural fill as directed by the Geotechnical Engineer.

After opening, foundation excavations should be observed and concrete placed as quickly as possible to avoid exposure of the excavation bottoms to wetting and drying. Surface run-off water should be drained away from the excavations and not be allowed to pond. If possible, the foundation concrete should be placed during the same day the excavation is made. If the soils will be exposed for more than 2 days, consideration should be given to placing a thin layer of rock atop the exposed subgrade to protect it from the elements.

Based on the known subsurface conditions and site geology, laboratory testing and past experience, we anticipate that properly designed and constructed foundations supported on the recommended materials should experience maximum total and differential settlements on the order of 1-inch and ½-inch, respectively.

3.5 Floor Slab Recommendations

For the purposes of this report, we have assumed that maximum floor slab loads will not exceed 150 psf. Based on the existing soil conditions, the design of slabs-on-grade can be based on a subgrade modulus (k) of 125 pci. This subgrade modulus value represents an anticipated value which would be obtained in a standard in-situ plate test with a 1-foot square plate. Use of this subgrade modulus for design or other on-grade structural elements should include appropriate modification based on dimensions as necessary.

Concrete floor slabs-on-grade should be supported on at least 6 inches of properly compacted crushed rock gravel structural fill overlying the recompacted, medium dense/medium stiff to hard native soils, as outlined in Section 3.3 above. We do not recommend the floor slabs be supported on the existing fill soils. The floor slabs should have an adequate number of joints to reduce cracking resulting from any differential movement and shrinkage.

Prior to placing the structural fill, the exposed subgrade surface should be prepared as discussed in Section 3.2 which includes a proof-roll utilizing a fully loaded, dual axle dump truck or water truck in order to identify any unstable areas that should be removed prior to structural fill placement. The proofroll should be observed by a representative of the Geotechnical Engineer. If the subgrade cannot be accessed with a dump truck, then the subgrade will need to be visually evaluated by a representative of the Geotechnical Engineer by soil probing. If fill is required, the structural fill should be placed on the prepared subgrade after it has been approved by the Geotechnical Engineer.

The 6-inch thick crushed rock structural fill should provide a capillary break to limit migration of moisture through the slab. If additional protection against moisture vapor is desired, a moisture vapor retarding membrane may also be incorporated into the design. Factors such as cost, special considerations for construction, and the floor coverings suggest that decisions on the use of vapor retarding membranes be made by the project design team, the contractor and the owner.

3.6 Retaining Wall Recommendations

We are providing soil parameters to be used for the design of both permanent shoring walls and retaining walls for project. For the purposes of this report, we have assumed that no walls will be greater than 10 feet tall. The passive and active earth pressure recommendations below can be applied to both retaining walls and shoring walls as needed. We have assumed the contractor will ultimately design the shoring walls based on their needs. We are available to provide detailed shoring wall designs upon request.

Retaining wall footings should be designed in general accordance with the recommendations contained in Section 3.4 above. Lateral earth pressures on walls, which are not restrained at the top, may be calculated on the basis of an “active” equivalent fluid pressure of 35 pcf for level backfill, and 60 pcf for sloping backfill with a maximum 2H:1V slope. Lateral earth pressures on walls that are restrained from yielding at the top may be calculated on the basis of an “at-rest” equivalent fluid pressure of 55 pcf for level backfill, and 90 pcf for sloping backfill with a maximum 2H:1V slope. The stated equivalent fluid pressures do not include surcharge loads, such as foundation, vehicle, equipment, etc., adjacent to walls, hydrostatic pressure buildup, or earthquake loading.

Lateral frictional resistance between the base of footings and the subgrade can be expressed as the applied vertical load multiplied by a coefficient of friction of 0.32 for concrete foundations bearing directly on the medium dense/medium stiff to hard native material. In addition, lateral loads may be resisted by passive earth pressures based on an equivalent fluid density of 250 pounds per cubic foot (pcf) for footings poured "neat" against in-situ soils, or properly backfilled with structural fill. These are ultimate values - we recommend a factor of safety of 1.5 be applied to the equivalent fluid pressure, which is appropriate due to the amount of movement required to develop full passive resistance.

We recommend that retaining walls be designed for an earth pressure determined using the Mononobe-Okabe method to mitigate future seismic forces. Our calculations were based on one-half of the Design Peak Ground Acceleration (PGA) value of 0.199g, which was obtained from Table 1 above. We have assumed that the retained soil/rock will have a minimum friction angle of 29 degrees and a total unit weight of about 115 pounds per cubic foot. For seismic loading on retaining walls with level backfill, new research indicates that the seismic load is to be applied at 1/3 H of the wall instead of 2/3 H, where H is the height of the wall[4]. We recommend that a Mononobe-Okabe earthquake thrust per linear foot of 5.4 psf * H^2 be applied at 1/3 H from the base of the wall, where H is the height of the wall measured in feet. Note that the recommended earthquake thrust value is appropriate for slopes behind the retaining wall of up to 10 degrees.

With regard to the permanent shoring piles, they should be designed in accordance with the earth pressures outlined above. We are available to design the pile sizes and embedment depths upon request.

All backfill for retaining walls should be select granular material, such as sand or crushed rock with a maximum particle size between ¾ and 1½ inches, having less than five percent material passing the No. 200 sieve. Because of the fines content, the soil on site will not meet this requirement, and it will be necessary to import specified material to the project for structural drainage backfill behind retaining walls. Silty soils can be used for the last 18 to 24 inches of backfill, thus acting as a seal to the granular backfill.

[4] Lew, M., et al (2010). “Seismic Earth Pressures on Deep Building Basements,” SEAOC 2010 Convention Proceedings, Indian Wells, CA.

All backfill behind retaining walls should be moisture conditioned to within +/- 2 percent of optimum moisture content and compacted to a minimum of 92 percent of the material's maximum dry density as determined in accordance with ASTM D698 (Standard Proctor). This recommendation applies to all backfill located within a horizontal distance equal to 75 percent of the wall height, but should be no less than 4 feet.

An adequate subsurface drain system will need to be designed and installed behind retaining walls to prevent hydrostatic buildup. A waterproofing system should be designed to mitigate against moisture intrusion.

4.0 CONSTRUCTION CONSIDERATIONS

EEI should be retained to provide observation and testing of construction activities involved in the foundation, earthwork, and related activities of this project. EEI cannot accept any responsibility for any conditions that deviate from those described in this report, nor for the performance of the foundations if not engaged to also provide construction observation for this project.

4.1 Moisture Sensitive Soils/Weather Related Concerns

The soils encountered at this site are expected to be sensitive to disturbances caused by construction traffic and to changes in moisture content. During wet weather periods, increases in the moisture content of the soil can cause significant reduction in the soil strength and support capabilities. In addition, soils that become wet may be slow to dry and thus significantly retard the progress of grading and compaction activities. It will, therefore, be advantageous to perform earthwork and foundation construction activities during dry weather.

4.2 Drainage and Groundwater Considerations

Water should not be allowed to collect in the foundation excavations or on prepared subgrades for the floor sections during construction. Positive site drainage should be maintained throughout construction activities. Undercut or excavated areas should be sloped toward one corner to facilitate removal of any collected rainwater, groundwater, or surface runoff. If groundwater is encountered, a system of sumps and pumps may be required to keep footing excavations drained until the footing is placed to prevent softening of the subgrade soils.

A site grading plan should be developed to provide rapid drainage of surface water permanently away from the building areas and to inhibit infiltration of surface water around the perimeter of the building and beneath slabs. The grades should be sloped away from the building areas. Roof runoff should be piped (tightlined) away from the subdivision residences.

4.3 Excavations

In Federal Register, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, part 1926, Subpart P". This document and subsequent updates were issued to better insure the safety of workmen entering trenches or excavations. It is mandated by this federal regulation that excavations, whether they be utility trenches, basement excavations or footing excavations, be constructed in accordance with the new OSHA guidelines. It is our understanding that these regulations are being strictly enforced and if they are not closely followed, the owner and the contractor could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor's "responsible person", as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

We are providing this information solely as a service to our client. EEI does not assume responsibility for construction site safety or the contractor's compliance with local, state, and federal safety or other regulations.

5.0 REPORT LIMITATIONS

As is standard practice in the geotechnical industry, the conclusions contained in our report are considered preliminary because they are based on assumptions made about the soil, rock, and groundwater conditions exposed at the site during our subsurface investigation. A more complete extent of the actual subsurface conditions can only be identified when they are exposed during construction. Therefore, EEI should be retained as your consultant during construction to observe the actual conditions and to provide our final conclusions. If a different geotechnical consultant is retained to perform geotechnical inspection during construction then they should be relied upon to provide final design conclusions and recommendations and should assume the role of geotechnical engineer of record, as is the typical procedure required by the governing jurisdiction.

The geotechnical recommendations presented in this report are based on the available project information, and the subsurface materials described in this report. If any of the noted information is incorrect, please inform EEI in writing so that we may amend the recommendations presented in this report, if appropriate, and if desired by the client. EEI will not be responsible for the implementation of its recommendations when it is not notified of changes in the project.

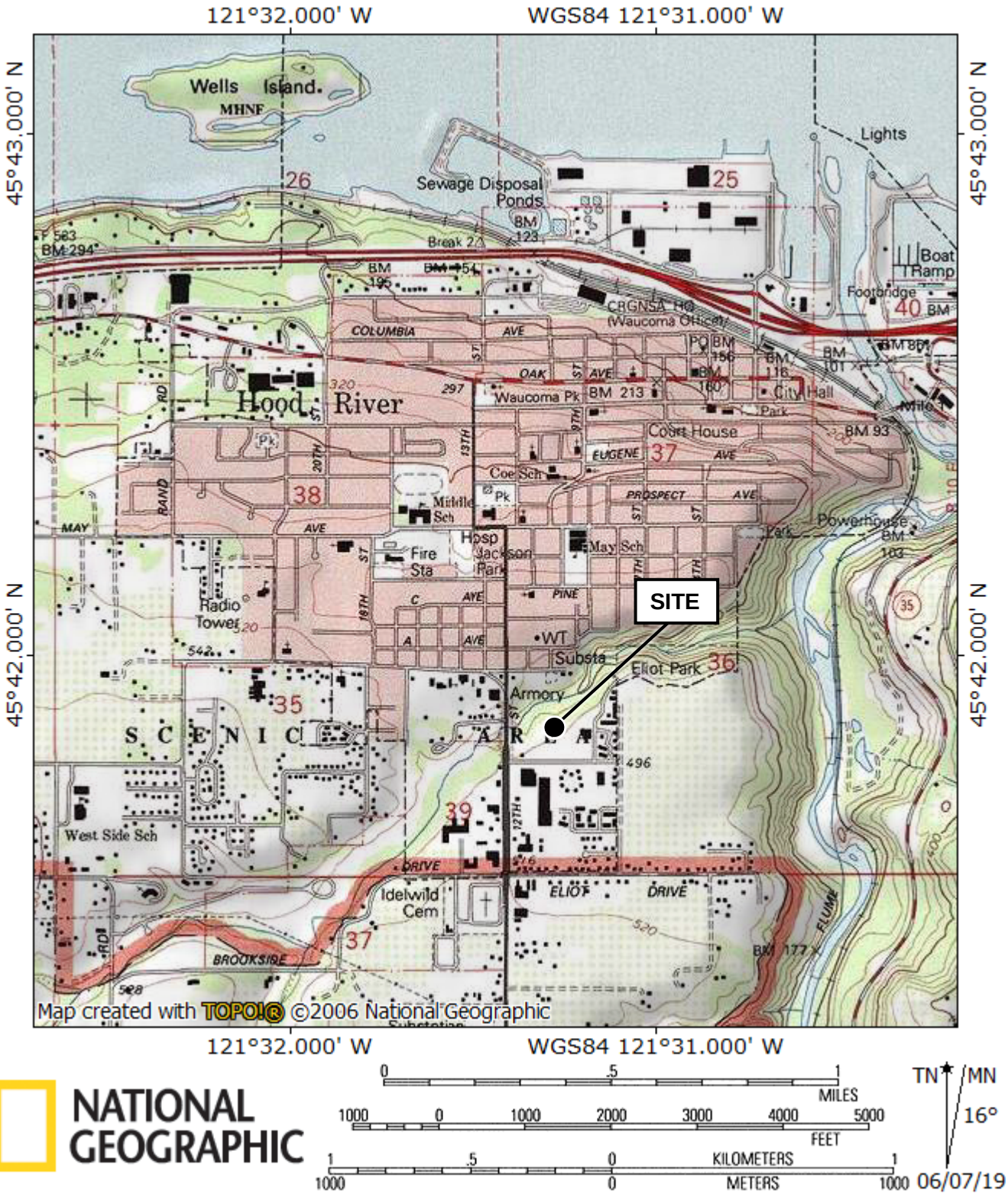
Once construction plans are finalized and a grading plan has been prepared, EEI should be retained to review those plans, and modify our existing recommendations related to the proposed construction, if determined to be necessary.

The Geotechnical Engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

This report has been prepared for the exclusive use of our client, Apple Development, LLC, for the proposed 39-unit Indian Creek PUD residential subdivision located at the terminus of 9th Court in Hood River, Oregon. EEI does not authorize the use of the advice herein nor the reliance upon the report by third parties without prior written authorization by EEI.

APPENDICES

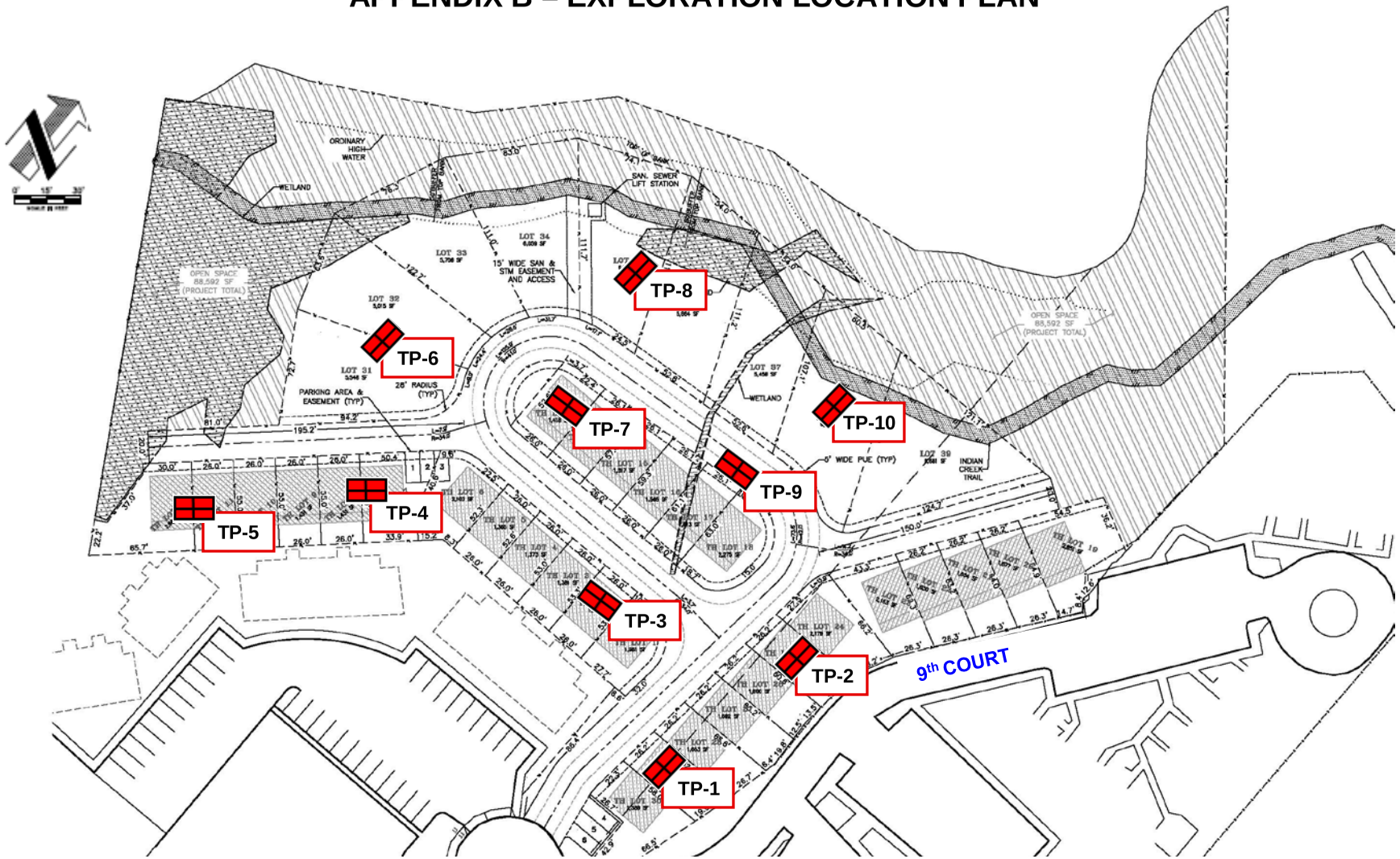
APPENDIX A – SITE LOCATION PLAN



NATIONAL GEOGRAPHIC

Earth Engineers, Inc.	**Proposed 39-Lot Residential Subdivision Indian Creek Planned Unit Development Accessed at the North Terminus of 9th Court Hood River, Hood River County, Oregon**	**Report No. 19-080-1** **June 21, 2019**

APPENDIX B – EXPLORATION LOCATION PLAN



= Approximate Test Pit Location

Base drawing source: "Preliminary Plat for Indian Creek P.U.D." produced by Tenneson Engineering Corp. dated March 6, 2019.

Earth Engineers, Inc.	**Proposed 39-Lot Residential Subdivision Indian Creek Planned Unit Development Accessed at the North Terminus of 9th Court Hood River, Hood River County, Oregon**	**Report No. 19-080-1**	**June 21, 2019**

Appendix C: Test Pit TP-1

Earth Engineers, Inc.

Client: Apple Development, LLC
Project: Proposed 39-Lot Residential Subdivision
Site Address: Accessed at the North Terminus of 9th Court
Location of Test Pit: See Appendix B
Date Excavated: 5/23/2019
Logged By: Jacqui Boyer

Report Number: 19-080-1
Excavation Contractor: Apple Development, LLC
Excavation Method: Excavator
Excavation Equipment: Deere 160D
Approximate Elevation (ft msl): 480

Depth (ft)	Water Level	Lithology: Lithologic Symbol	Lithology: Geologic Description of Soil and Rock Strata	Sampling Data: Sample Number	Sampling Data: Drive Probe Blows Per 6 Inches	Sampling Data: % Passing #200 Sieve	Sampling Data: Liquid Limit	Sampling Data: Plastic Limit	Sampling Data: Moisture Content (%)	Remarks
0			TOPSOIL - dark brown sandy silt with gravel, roots and rootlets, moist		24					easy digging effort
1			FILL - brown sand, some rootlets and gravel, dry		21, 15, 5					
2			SAND (SW) - brown sand with little silt, dry to moist, very loose to loose	GRAB 1	3				11	
3				GRAB 2	4, 8	23			14	
4			6" thick vein of red sand		9					
5			SAND (SW) - gray-brown sand with few silt, some orange mottling, dry to moist, medium dense	GRAB 3	11, 12, 14, 10				15	
6					11					
7					11, 18					
8				GRAB 4	21, 32	5			13	
9				GRAB 5					13	
10										
11										
12										
13										
14										
15										

Notes : Test pit terminated at a depth of approximately 10 feet bgs. Drive probe terminated at a depth of approximately 8.5 feet bgs. Groundwater was not encountered at the time of our exploration. Test pit loosely backfilled with excavated soil on 5/23/2019. Approximate elevation based on Google Earth.

Appendix C: Test Pit TP-2

Earth Engineers, Inc.

Client: Apple Development, LLC
Project: Proposed 39-Lot Residential Subdivision
Site Address: Accessed at the North Terminus of 9th Court
Location of Test Pit: See Appendix B
Date Excavated: 5/23/2019
Logged By: Jacqui Boyer

Report Number: 19-080-1
Excavation Contractor: Apple Development, LLC
Excavation Method: Excavator
Excavation Equipment: Deere 160D
Approximate Elevation (ft msl): 485

Depth (ft)	Water Level	Lithology: Lithologic Symbol	Lithology: Geologic Description of Soil and Rock Strata	Sampling Data: Sample Number	Drive Probe Blows Per 6 Inches	% Passing #200 Sieve	Liquid Limit	Plastic Limit	Moisture Content (%)	Remarks
0			TOPSOIL - dark brown sandy silt with gravel, roots and rootlets, moist							easy digging effort
1			FILL - brown to orange-brown sand, some rootlets and gravel, dry							
2				GRAB 1					11	
3			SAND (SW) - gray-brown to orange-brown sand with few silt, dry to moist, medium dense							
4				GRAB 2					10	
5										
6				GRAB 3					12	
7										
8										
9				GRAB 4					9	
10										
11										
12										
13										
14										
15										

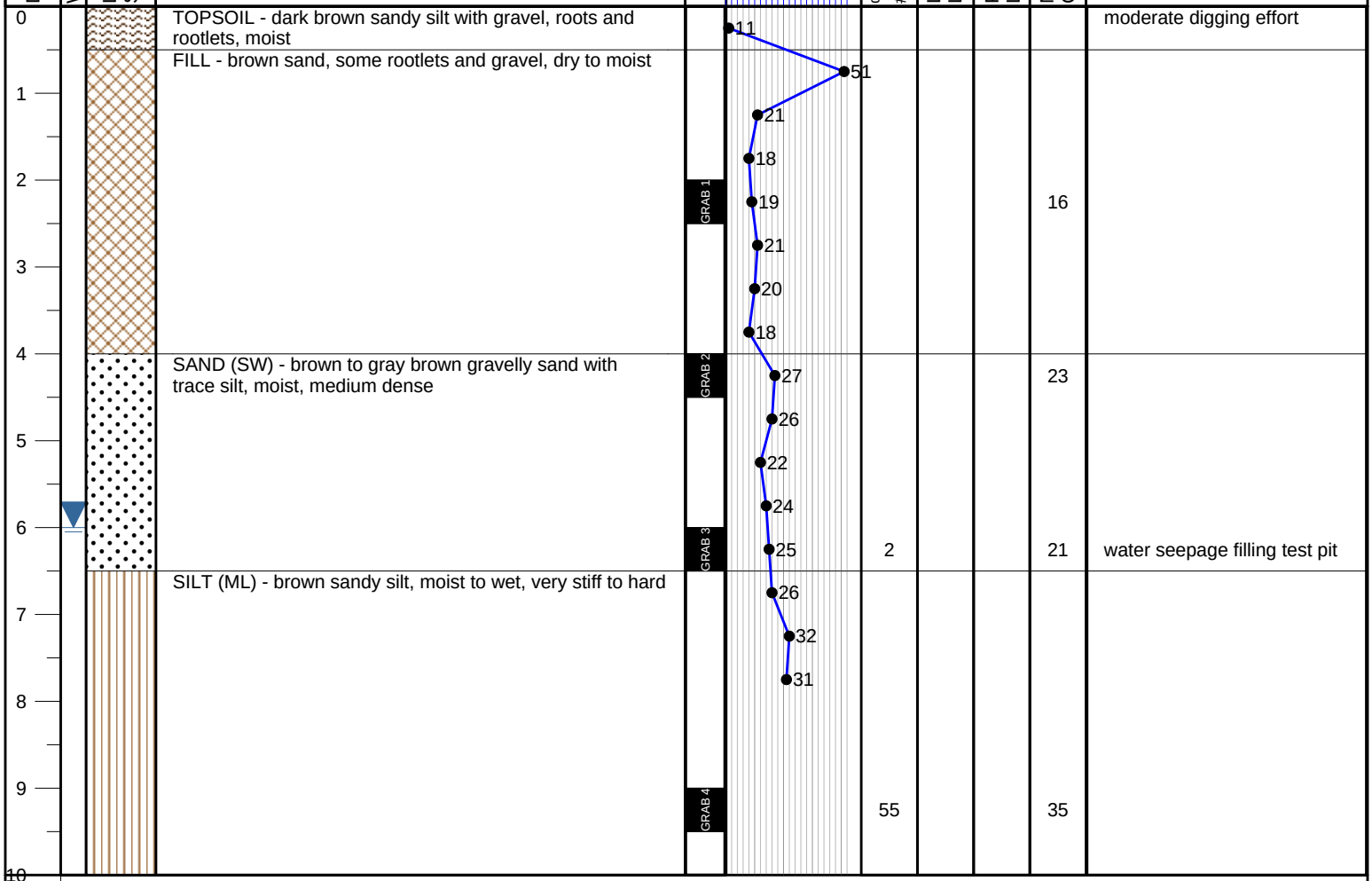
Notes : Test pit terminated at a depth of approximately 10 feet bgs. Drive probe testing not attempted at this exploration location. Groundwater was not encountered at the time of our exploration. Test pit loosely backfilled with excavated soil on 5/23/2019. Approximate elevation based on Google Earth.

Appendix C: Test Pit TP-3

Earth Engineers, Inc.

Client: Apple Development, LLC
Project: Proposed 39-Lot Residential Subdivision
Site Address: Accessed at the North Terminus of 9th Court
Location of Test Pit: See Appendix B
Date Excavated: 5/23/2019
Logged By: Jacqui Boyer

Report Number: 19-080-1
Excavation Contractor: Apple Development, LLC
Excavation Method: Excavator
Excavation Equipment: Deere 160D
Approximate Elevation (ft msl): 470



Notes : Test pit terminated at a depth of approximately 10 feet bgs. Drive probe terminated at a depth of approximately 8 feet bgs. Groundwater encountered at a depth of approximately 6 feet bgs. Test pit loosely backfilled with excavated soil on 5/23/2019. Approximate elevation based on Google Earth.

Appendix C: Test Pit TP-4

Earth Engineers, Inc.

Client: Apple Development, LLC
Project: Proposed 39-Lot Residential Subdivision
Site Address: Accessed at the North Terminus of 9th Court
Location of Test Pit: See Appendix B
Date Excavated: 5/23/2019
Logged By: Jacqui Boyer

Report Number: 19-080-1
Excavation Contractor: Apple Development, LLC
Excavation Method: Excavator
Excavation Equipment: Deere 160D
Approximate Elevation (ft msl): 465

Depth (ft)	Water Level	Lithologic Symbol	Geologic Description of Soil and Rock Strata	Sample Number	Drive Probe Blows Per 6 Inches	% Passing #200 Sieve	Liquid Limit	Plastic Limit	Moisture Content (%)	Remarks
0			TOPSOIL - dark brown sandy silt with gravel, roots and rootlets, moist		15, 17					moderate digging effort
1			FILL - gray-brown sand with little to some silt, rootlets and gravel, moist		16					
2			1' thick dark gray organic seam	GRAB 1	8, 5	31			27	possible buried topsoil zone
3					6, 8, 7					
4			SAND (SW) - brown to gray-brown sand with some silt, some orange mottling, moist to wet, medium dense	GRAB 2	16, 20	27			32	
5					16					
6					15, 11					
7	▼			GRAB 3	12, 16				30	
8					19, 20					water seepage observed
9				GRAB 4	20, 19				28	water filling test pit
10					17, 17					
11					16, 18					
12					19					
13										
14										
15										

Notes : Test pit terminated at a depth of approximately 10 feet bgs. Drive probe terminated at a depth of approximately 12 feet bgs. Groundwater encountered at a depth of approximately 7.5 feet bgs. Test pit loosely backfilled with excavated soil on 5/23/2019. Approximate elevation based on Google Earth.

Appendix C: Test Pit TP-5

Earth Engineers, Inc.

Client: Apple Development, LLC
Project: Proposed 39-Lot Residential Subdivision
Site Address: Accessed at the North Terminus of 9th Court
Location of Test Pit: See Appendix B
Date Excavated: 5/23/2019
Logged By: Jacqui Boyer

Report Number: 19-080-1
Excavation Contractor: Apple Development, LLC
Excavation Method: Excavator
Excavation Equipment: Deere 160D
Approximate Elevation (ft msl): 470

Depth (ft)	Water Level	Lithology: Lithologic Symbol	Lithology: Geologic Description of Soil and Rock Strata	Sampling Data: Sample Number	Sampling Data: Drive Probe Blows Per 6 Inches	Sampling Data: % Passing #200 Sieve	Sampling Data: Liquid Limit	Sampling Data: Plastic Limit	Sampling Data: Moisture Content (%)	Remarks
0			TOPSOIL - dark brown sandy silt with gravel, roots and rootlets, moist							moderate digging effort
1			FILL - brown to dark brown sand, roots and rootlets, gravel, dry							
2				GRAB 1					14	
3										hard digging due to presence of thick root
4			SAND (SW) - brown sand with some silt, dry to moist, medium dense	GRAB 2		31			15	
5			SAND (SW) - gray-brown sand with little to some silt, orange mottling, moist, medium dense							
6										
7				GRAB 3		27			26	
8										
9				GRAB 4					26	
10										
11										
12										
13										
14										
15										

Notes : Test pit terminated at a depth of approximately 10 feet bgs. Drive probe testing not attempted at this exploration location. Groundwater was not encountered at the time of our exploration. Test pit loosely backfilled with excavated soil on 5/23/2019. Approximate elevation based on Google Earth.

Appendix C: Test Pit TP-6

Earth Engineers, Inc.

Client: Apple Development, LLC
Project: Proposed 39-Lot Residential Subdivision
Site Address: Accessed at the North Terminus of 9th Court
Location of Test Pit: See Appendix B
Date Excavated: 5/23/2019
Logged By: Jacqui Boyer

Report Number: 19-080-1
Excavation Contractor: Apple Development, LLC
Excavation Method: Excavator
Excavation Equipment: Deere 160D
Approximate Elevation (ft msl): 452

Depth (ft)	Water Level	Lithology: Lithologic Symbol	Lithology: Geologic Description of Soil and Rock Strata	Sampling Data: Sample Number	Sampling Data: Drive Probe Blows Per 6 Inches	Sampling Data: % Passing #200 Sieve	Sampling Data: Liquid Limit	Sampling Data: Plastic Limit	Sampling Data: Moisture Content (%)	Remarks
0			TOPSOIL - dark brown sandy silt with gravel, roots and rootlets, moist							moderate digging effort
1			FILL - brown silty sand with roots and rootlets, some orange-gray mottling, moist	GRAB 1					27	
2										
3			SAND (SW) - blue-gray to gray sand with some silt, orange mottling, moist to wet, medium dense	GRAB 2		33			34	
4										
5										
6			SAND (SW) - gray-brown sand with some silt, moist to wet, medium dense	GRAB 3					29	
7										
8			soil appears to be more wet, some orange mottling observed	GRAB 4					28	
9										
10										
11										
12										
13										
14										
15										

Notes : Test pit terminated at a depth of approximately 10 feet bgs. Drive probe testing not attempted at this exploration location. Groundwater was not encountered at the time of our exploration. Test pit loosely backfilled with excavated soil on 5/23/2019. Approximate elevation based on Google Earth.

Appendix C: Test Pit TP-7

Earth Engineers, Inc.

Client: Apple Development, LLC
Project: Proposed 39-Lot Residential Subdivision
Site Address: Accessed at the North Terminus of 9th Court
Location of Test Pit: See Appendix B
Date Excavated: 5/23/2019
Logged By: Jacqui Boyer

Report Number: 19-080-1
Excavation Contractor: Apple Development, LLC
Excavation Method: Excavator
Excavation Equipment: Deere 160D
Approximate Elevation (ft msl): 447

Depth (ft)	Water Level	Lithology: Lithologic Symbol	Lithology: Geologic Description of Soil and Rock Strata	Sampling Data: Sample Number	Sampling Data: Drive Probe Blows Per 6 Inches (0 0 1 1 1)	Sampling Data: % Passing #200 Sieve	Sampling Data: Liquid Limit	Sampling Data: Plastic Limit	Sampling Data: Moisture Content (%)	Remarks
0			TOPSOIL - dark brown sandy silt with gravel, roots and rootlets, moist							moderate digging effort
2			FILL - gray-brown sand with rootlets, moist	GRAB 1		41			29	
3			SILT (ML) - light brown consolidated sandy silt with gravel and fractured basalt cobbles, moist, hard	GRAB 2		54			20	hard digging effort
5				GRAB 3					20	excavator scraping on consolidated sandy silt

Notes : Test pit terminated at a depth of approximately 5 feet bgs due to excavator refusal. Drive probe testing not attempted at this exploration location. Groundwater was not encountered at the time of our exploration. Test pit loosely backfilled with excavated soil on 5/23/2019. Approximate elevation based on Google Earth.

Appendix C: Test Pit TP-8

Earth Engineers, Inc.

Client: Apple Development, LLC
Project: Proposed 39-Lot Residential Subdivision
Site Address: Accessed at the North Terminus of 9th Court
Location of Test Pit: See Appendix B
Date Excavated: 5/23/2019
Logged By: Jacqui Boyer

Report Number: 19-080-1
Excavation Contractor: Apple Development, LLC
Excavation Method: Excavator
Excavation Equipment: Deere 160D
Approximate Elevation (ft msl): 431

Depth (ft)	Water Level	Lithology: Lithologic Symbol	Lithology: Geologic Description of Soil and Rock Strata	Sampling Data: Sample Number	Sampling Data: Drive Probe Blows Per 6 Inches	Sampling Data: % Passing #200 Sieve	Sampling Data: Liquid Limit	Sampling Data: Plastic Limit	Sampling Data: Moisture Content (%)	Remarks
0			TOPSOIL - dark brown sandy silt with gravel, roots and rootlets, moist							moderate to hard digging effort
1										
2			FILL - brown sand with cobbles and roots, moist							
3	▽									water seepage observed
4			SAND (SW) - brown to gray-brown sand with little silt, gravel and cobble, moist, hard	GRAB 1					27	hard to very hard digging effort due to presence of boulders/fractured basalt
5			boulders observed							
6				GRAB 2		15			22	
7										
8										
9										
10										
11										
12										
13										
14										
15										

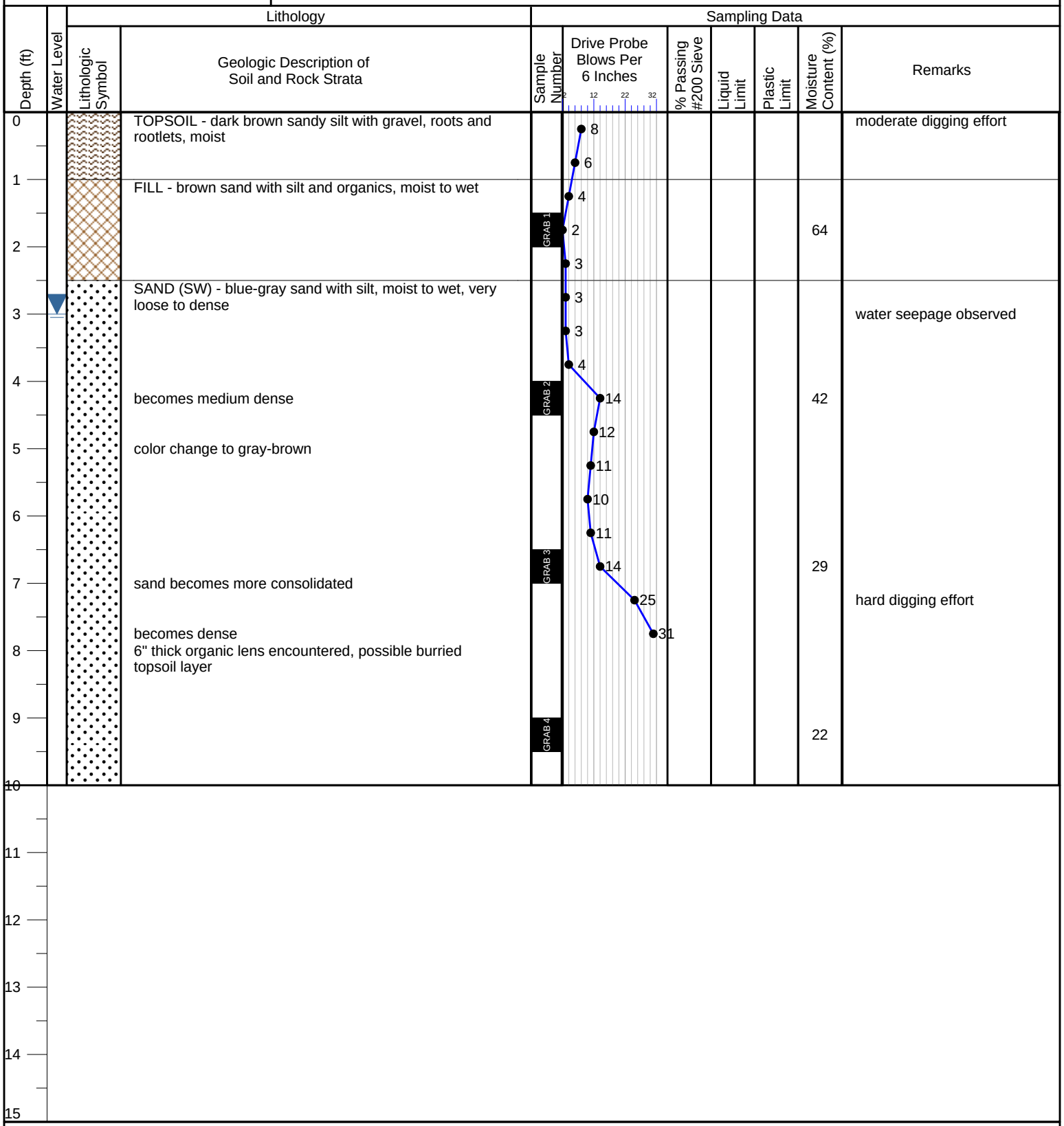
Notes : Test pit terminated at a depth of approximately 7 feet bgs due to excavator refusal. Drive probe testing not attempted at this exploration location. Groundwater encountered at a depth of approximately 3 feet bgs. Test pit loosely backfilled with excavated soil on 5/23/2019. Approximate elevation based on Google Earth.

Appendix C: Test Pit TP-9

Earth Engineers, Inc.

Client: Apple Development, LLC
Project: Proposed 39-Lot Residential Subdivision
Site Address: Accessed at the North Terminus of 9th Court
Location of Test Pit: See Appendix B
Date Excavated: 5/23/2019
Logged By: Jacqui Boyer

Report Number: 19-080-1
Excavation Contractor: Apple Development, LLC
Excavation Method: Excavator
Excavation Equipment: Deere 160D
Approximate Elevation (ft msl): 450



Notes : Test pit terminated at a depth of approximately 10 feet bgs. Drive probe terminated at a depth of approximately 8 feet bgs. Groundwater encountered at a depth of approximately 3 feet bgs. Test pit loosely backfilled with excavated soil on 5/23/2019. Approximate elevation based on Google Earth.

Appendix C: Test Pit TP-10

Earth Engineers, Inc.

Client: Apple Development, LLC
Project: Proposed 39-Lot Residential Subdivision
Site Address: Accessed at the North Terminus of 9th Court
Location of Test Pit: See Appendix B
Date Excavated: 5/23/2019
Logged By: Jacqui Boyer

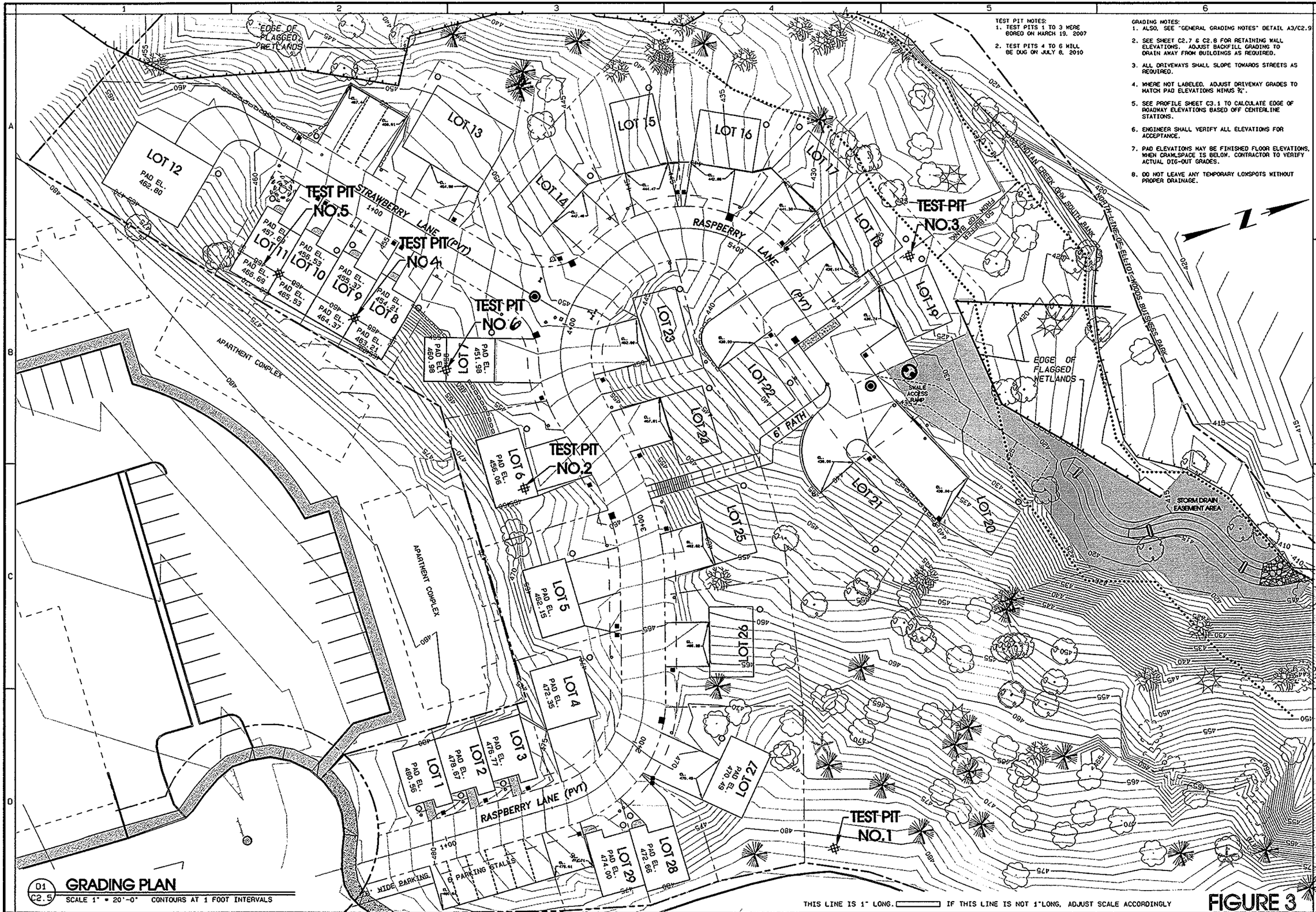
Report Number: 19-080-1
Excavation Contractor: Apple Development, LLC
Excavation Method: Excavator
Excavation Equipment: Deere 160D
Approximate Elevation (ft msl): 434

Depth (ft)	Water Level	Lithology: Lithologic Symbol	Lithology: Geologic Description of Soil and Rock Strata	Sampling Data: Sample Number	Sampling Data: Drive Probe Blows Per 6 Inches	Sampling Data: % Passing #200 Sieve	Sampling Data: Liquid Limit	Sampling Data: Plastic Limit	Sampling Data: Moisture Content (%)	Remarks
0			TOPSOIL - dark brown sandy silt with gravel, roots and rootlets, moist							moderate digging effort
2			FILL - brown silty sand with gravel and cobble, roots and rootlets, moist	GRAB 1		24			24	hard digging effort
3			SILT (ML) - light brown consolidated sandy silt with gravel and fractured basalt cobbles, dry to moist, hard	GRAB 2					22	

Notes : Test pit terminated at a depth of approximately 7 feet bgs due to excavator refusal. Drive probe testing not attempted at this exploration location. Groundwater was not encountered at the time of our exploration. Test pit loosely backfilled with excavated soil on 5/23/2019. Approximate elevation based on Google Earth.

APPENDIX D

BELL DESIGN COMPANY EXPLORATION PLAN AND LOGS



TEST PIT NOTES:
1. TEST PITS 1 TO 3 WERE BORED ON MARCH 19, 2007
2. TEST PITS 4 TO 6 WILL BE DUG ON JULY 8, 2010

GRADING NOTES:
1. ALSO, SEE "GENERAL GRADING NOTES" DETAIL A3/C2.9
2. SEE SHEET C2.7 & C2.8 FOR RETAINING WALL ELEVATIONS. ADJUST BACKFILL GRADING TO DRAIN AWAY FROM BUILDINGS AS REQUIRED.
3. ALL DRIVEWAYS SHALL SLOPE TOWARDS STREETS AS REQUIRED.
4. WHERE NOT LABELED, ADJUST DRIVEWAY GRADES TO MATCH PAD ELEVATIONS MINUS ¾".
5. SEE PROFILE SHEET C3.1 TO CALCULATE EDGE OF ROADWAY ELEVATIONS BASED OFF CENTERLINE STATIONS.
6. ENGINEER SHALL VERIFY ALL ELEVATIONS FOR ACCEPTANCE.
7. PAD ELEVATIONS MAY BE FINISHED FLOOR ELEVATIONS, WHEN CRAWLSPACE IS BELOW. CONTRACTOR TO VERIFY ACTUAL DIG-OUT GRADES.
8. DO NOT LEAVE ANY TEMPORARY LOWSPOTS WITHOUT PROPER DRAINAGE.

D1 / C2.5 **GRADING PLAN**
SCALE 1" = 20'-0" CONTOURS AT 1 FOOT INTERVALS

THIS LINE IS 1" LONG. IF THIS LINE IS NOT 1" LONG, ADJUST SCALE ACCORDINGLY

FIGURE 3

O:\2007\8010\CONSTRUCTION_2.pro

COPYRIGHT 2010
BELL DESIGN COMPANY, INC
ALL RIGHTS RESERVED.
REPRODUCTION OR USE IN ANY FORM OR BY ANY MEANS -- GRAPHIC, ELECTRONIC, MECHANICAL, ETC. -- WITHOUT WRITTEN PERMISSION OF BELL DESIGN COMPANY IS UNLAWFUL AND SUBJECT TO CRIMINAL PROSECUTION.

BELL DESIGN COMPANY
CIVIL ENGINEERING LAND SURVEYING
1000 EAST STEUBEN STREET, P.O.B. 308, BINGEN, WA. 98605
PHONE: (509) 493-3886 FAX: (509) 493-3885

GRADING PLAN
INDIAN CREEK HOMES PUD
INDIAN CREEK HOMES, LLC
HOOD RIVER OREGON

JOB NO.	07B010
DATE	1/28/10
DRAWN BY RLR	CHECKED BY DAB
REVISIONS	DATE
RECORD DRAWINGS	DATE

REGISTERED PROFESSIONAL ENGINEER 65,818 OREGON MAR. 13 2001 DENNY A. BELL
EXPIRES 12-31-11 1/28/10

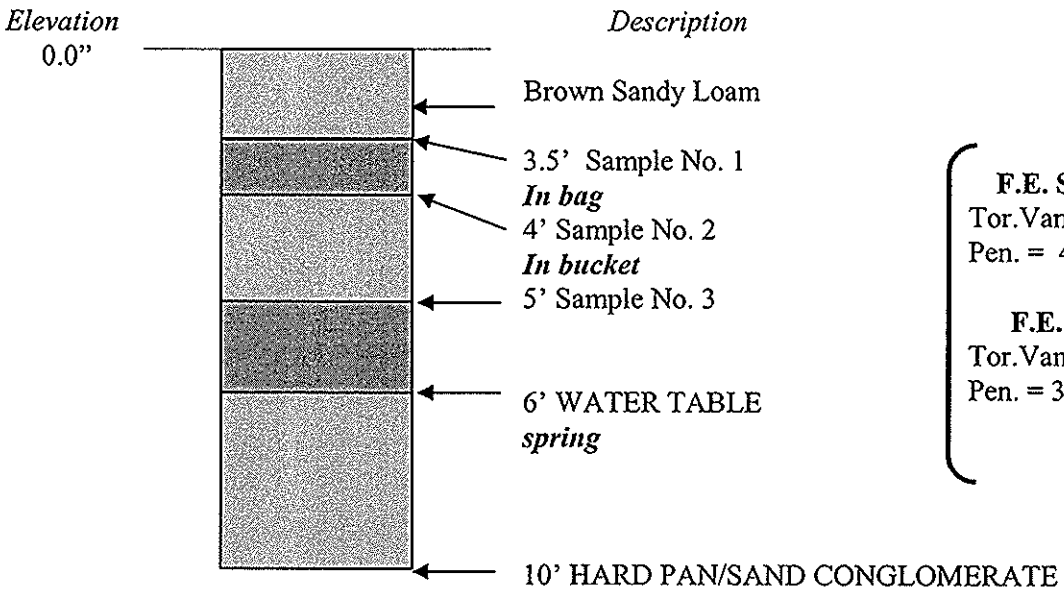
SHEET NO. C2.5

Appendix A

GEOECHNICAL EVALUATION,
CAT 305C Rubber Track Hoe with Bucket & Thump

Pit No. 4

Location: See Appendix A--C1.1 in for Location.

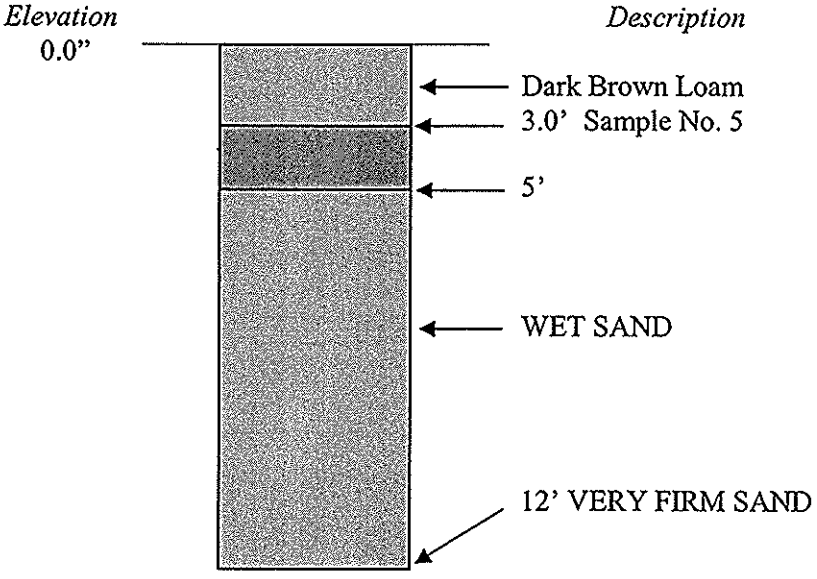


F.E. Sample No. 1 @ 4.5'
Tor.Vane = 1.5, 2.0 tsf
Pen. = 4.5, 3.5 3.5 tsf

F.E. Sample No. 2 @3'
Tor.Vane = 3.25, 2.5, 2.0 tsf
Pen. = 3.0, 2.75, 3.0 tsf

Pit No. 5

Location: See Appendix A--C1.1 for Location.



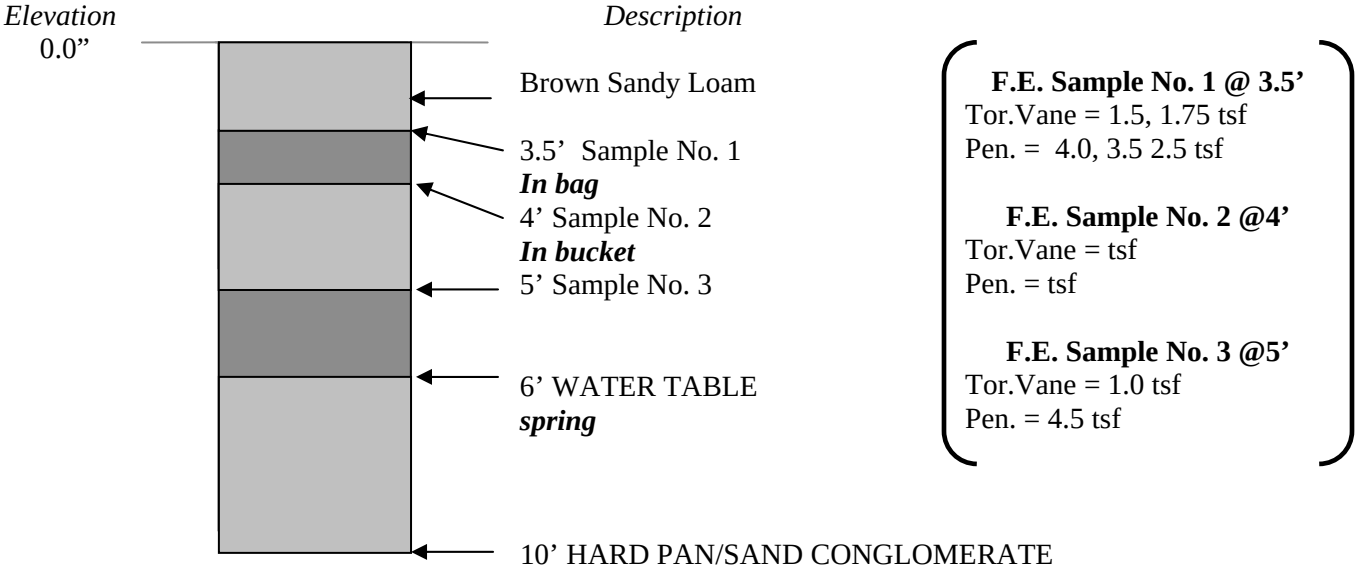
F.E. Sample No. 3 @ 3'
Tor.Vane = 1.0, 2.0, 2.0 tsf
Pen. = 5.0, 3, 2.0, 1.5 tsf

FIGURE 3

GEOTECHNICAL EVALUATION,
CAT 305C Rubber Track Hoe with Bucket & Thump

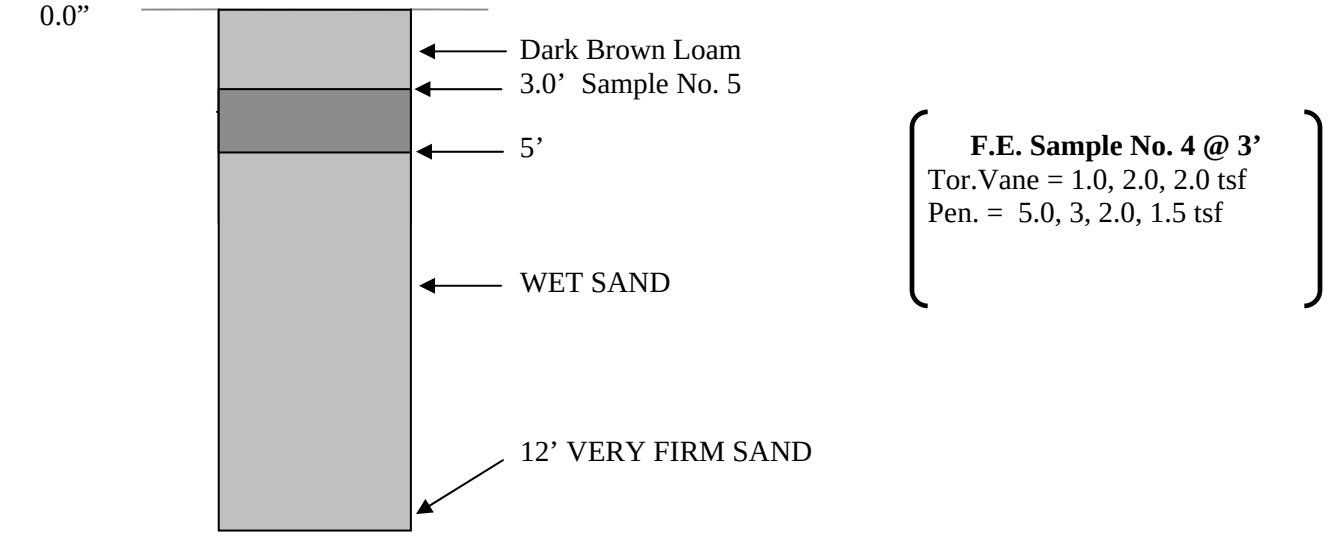
Pit No. 4

Location: See Appendix A--C1.1 in for Location.



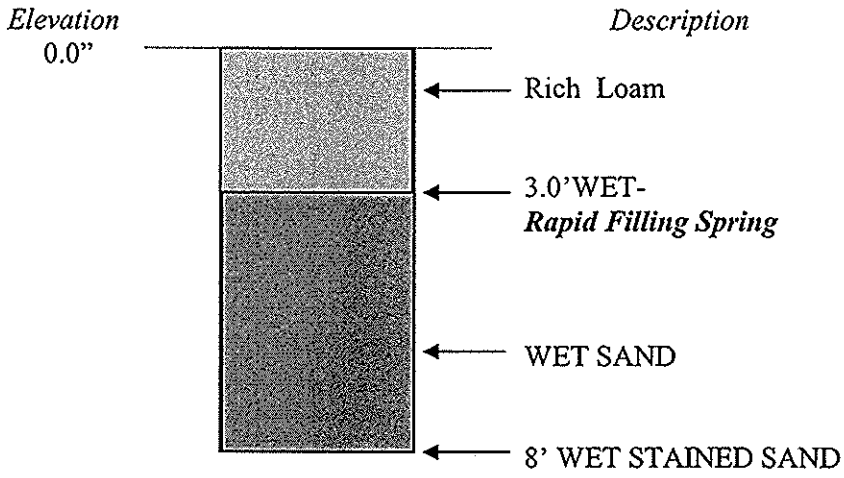
Pit No. 2

Location: See Appendix A--C1.1 for Location.



Pit No. 6

Location: See Appendix A--C1.1 for Location.



APPENDIX E: SOIL CLASSIFICATION LEGEND

APPARENT CONSISTENCY OF COHESIVE SOILS (PECK, HANSON & THORNBURN 1974, AASHTO 1988)				
Descriptor	**SPT N_{60} (blows/foot)***	**Pocket Penetrometer, Qp (tsf)**	**Torvane (tsf)**	**Field Approximation**
Very Soft	< 2	< 0.25	< 0.12	Easily penetrated several inches by fist
Soft	2 – 4	0.25 – 0.50	0.12 – 0.25	Easily penetrated several inches by thumb
Medium Stiff	5 – 8	0.50 – 1.0	0.25 – 0.50	Penetrated several inches by thumb w/moderate effort
Stiff	9 – 15	1.0 – 2.0	0.50 – 1.0	Readily indented by thumbnail
Very Stiff	16 – 30	2.0 – 4.0	1.0 – 2.0	Indented by thumb but penetrated only with great effort
Hard	> 30	> 4.0	> 2.0	Indented by thumbnail with difficulty

* Using SPT N_{60} is considered a crude approximation for cohesive soils.

APPARENT DENSITY OF COHESIONLESS SOILS (AASHTO 1988)	
Descriptor	**SPT N_{60} Value (blows/foot)**
Very Loose	0 – 4
Loose	5 – 10
Medium Dense	11 – 30
Dense	31 – 50
Very Dense	> 50

MOISTURE (ASTM D2488-06)	
Descriptor	**Criteria**
Dry	Absence of moisture, dusty, dry to the touch, well below optimum moisture content (per ASTM D698 or D1557)
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table, well above optimum moisture content (per ASTM D698 or D1557)

PERCENT OR PROPORTION OF SOILS (ASTM D2488-06)	
Descriptor	**Criteria**
Trace	Particles are present but estimated < 5%
Few	5 – 10%
Little	15 – 25%
Some	30 – 45%
Mostly	50 – 100%
Percentages are estimated to nearest 5% in the field. Use "about" unless percentages are based on laboratory testing.	

SOIL PARTICLE SIZE (ASTM D2488-06)	
Descriptor	**Size**
Boulder	> 12 inches
Cobble	3 to 12 inches
Gravel - Coarse Fine	¾ inch to 3 inches No. 4 sieve to ¾ inch
Sand - Coarse Medium Fine	No. 10 to No. 4 sieve (4.75mm) No. 40 to No. 10 sieve (2mm) No. 200 to No. 40 sieve (.425mm)
Silt and Clay ("fines")	Passing No. 200 sieve (0.075mm)

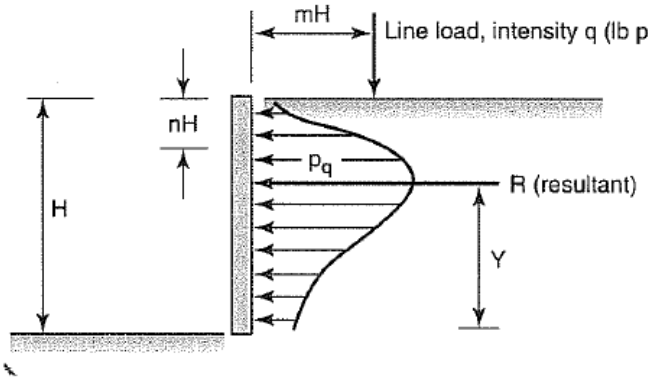
UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D2488)				
Major Division			**Group Symbol**	**Description**
Coarse Grained Soils (more than 50% retained on #200 sieve)	**Gravel** (50% or more retained on No. 4 sieve)	Clean Gravel	GW	Well-graded gravels and gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines
		Gravel with fines	GM	Silty gravels and gravel-sand-silt mixtures
			GC	Clayey gravels and gravel-sand-clay mixtures
	Sand (> 50% passing No. 4 sieve)	Clean sand	SW	Well-graded sands and gravelly sands, little or no fines
			SP	Poorly-graded sands and gravelly sands, little or no fines
		Sand with fines	SM	Silty sands and sand-silt mixtures
			SC	Clayey sands and sand-clay mixtures
Fine Grained Soils (50% or more passing #200 sieve)	**Silt and Clay** (liquid limit < 50)		ML	Inorganic silts, rock flour and clayey silts
			CL	Inorganic clays of low-medium plasticity, gravelly, sandy & lean clays
			OL	Organic silts and organic silty clays of low plasticity
	Silt and Clay (liquid limit > 50)		MH	Inorganic silts and clayey silts
			CH	Inorganic clays or high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
Highly Organic Soils			PT	Peat, muck and other highly organic soils

Earth Engineers, Inc.

GRAPHIC SYMBOL LEGEND		
GRAB		Grab sample
SPT		Standard Penetration Test (2" OD), ASTM D1586
ST		Shelby Tube, ASTM D1587 (pushed)
DM		Dames and Moore ring sampler (3.25" OD and 140-pound hammer)
CORE		Rock coring

APPENDIX F: SURCHARGE-INDUCED LATERAL EARTH PRESSURES FOR WALL DESIGN

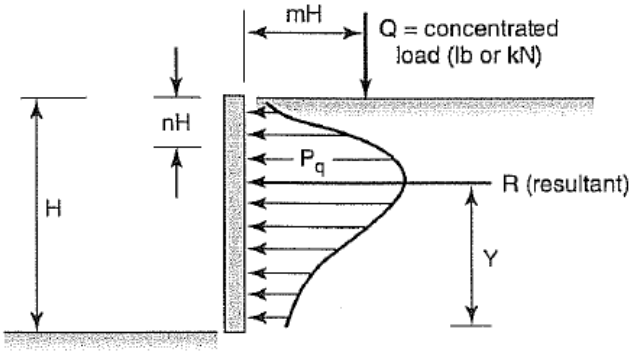
LINE LOAD (applicable for retaining walls not exceeding 20 feet in height):



m	R	Y
0.2	0.55q	0.60 H
0.4	0.55q	0.58 H
0.6	$\frac{0.64q}{m^2+1}$	0.52 H

Figure 16-28 Pressure distribution against vertical wall resulting from line load of intensity *q*.

CONCENTRATED POINT LOAD (applicable for retaining walls not exceeding 20 feet in height):



m	R	Y
0.2	$0.78\frac{Q}{H}$	0.59 H
0.4	$0.78\frac{Q}{H}$	0.59 H
0.6	$0.48\frac{Q}{H}$	0.48 H

Figure 16-27 Pressure distribution against vertical wall resulting from point load, *Q*.

AREAL LOAD:

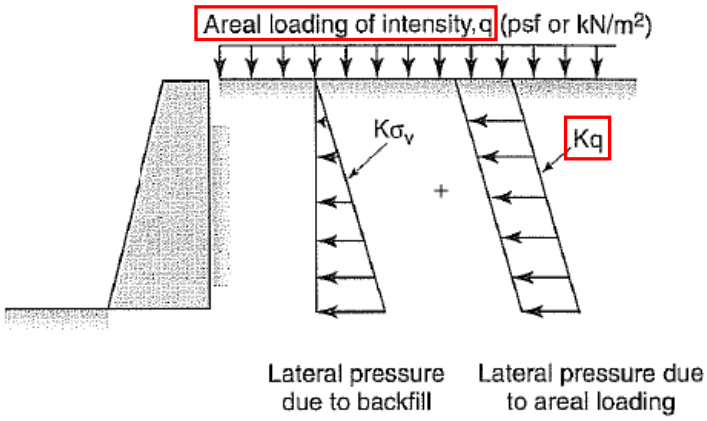
Figure 16-26 Influence of areal loading on wall pressures.

use K=0.4 for active condition (i.e. top of wall allowed to deflect laterally)

use K=0.9 for at-rest condition (i.e. top of wall not allowed to deflect laterally)

Resultant, R = K * q * H

Where H = wall height (feet)



Source of Figures: McCarthy, D.F., 1998, "Essentials of Soil Mechanics and foundations, Basic Geotechnics, Fifth Edition."