

June 6, 2024

TD West, LLC
5900 NE 152nd Avenue
Vancouver, WA 98682

Attn: Dan Korpela

**Re: Addendum 1
Updated Geotechnical Recommendations
Juniper Ridge Subdivision
34011 NW 9th Avenue
La Center, Washington
CWE Project: TDW-1-01-1**

INTRODUCTION

Columbia West Engineering, Inc. (Columbia West) is pleased to submit this addendum to the geotechnical engineering report for the Juniper Ridge Subdivision residential development located in La Center, Washington.¹ We understand the property will be developed into 26 single-family residential lots. Construction will also consist of new public asphalt concrete roadways, essential utilities, and stormwater management facilities. The purpose of this addendum is to provide relevant updated design and construction recommendations to supplement the 2005 report.

The site is shown relative to surrounding physical features on Figure 1. A Pre-Application Plat prepared by SGA Engineering & Design is presented in Appendix A. An existing conditions plan prepared for the 2005 geotechnical report is presented in Appendix B.

BACKGROUND

A grading and plat plan was not available at the time of the 2005 geotechnical study. Therefore, general recommendations were provided for residential development on the property with a focus on slope stability analysis of existing steep slopes and areas of historical mass slope movement. Existing conditions and areas of historical mass slope movement documented by the 2005 study are shown in Appendix B.

The Pre-Application Plat (Appendix A) was prepared using the results of the 2005 slope stability analyses and associated 40-foot top of slope setback recommendations. Seismic design codes have been revised since the 2005 report, requiring updated seismic design criteria for proposed structures and re-assessment of slope stability. In addition, TDW West, LLC (TDW) has requested Columbia West evaluate setback recommendations as slopes decrease in total height approaching the southwest corner of the site.

¹ Columbia West Engineering, Inc., 2005. *Geotechnical Site Investigation Report; Ritola-Walizer Property; La Center, Washington*, dated December 5, 2005. CWE Project 05136

TDW is also proposing to cut approximately 10 to 20 feet of existing soil from the ridges of existing slopes and to shift the location of the stormwater retention pond currently proposed to be constructed southwest of Lot 11. TDW has requested Columbia West evaluate the feasibility of these proposals.

SEISMIC DESIGN CRITERIA

Seismic design for proposed structures and slopes is prescribed by ASCE 7-16. Based on results of subsurface exploration conducted during the 2005 study, the site soil meets the criteria for Site Class C. Seismic design parameters for Site Class C are provided in Table 1.

Table 1. Seismic Design Parameters in Accordance with ASCE 7-16

Parameter	Short Period (T_s)	1 Second Period (T_1)
Maximum Considered Earthquake Spectral Acceleration, S	$S_s = 0.804 \text{ g}$	$S_1 = 0.379 \text{ g}$
Site Class	C	
Site Coefficient, F	$F_a = 1.2$	$F_v = 1.5$
Adjusted Spectral Response Acceleration, S_{MS}	$S_{MS} = 0.964 \text{ g}$	$S_{M1} = 0.569 \text{ g}$
Design Spectral Response Acceleration, S_{DS}	$S_{DS} = 0.643 \text{ g}$	$S_{D1} = 0.379 \text{ g}$

g: gravitational acceleration (32.2 feet/second²)

SLOPE STABILITY

Slope stability analysis was completed during the 2005 study to evaluate global stability of ravine slopes located northwest of the proposed development. The 2005 report presents results for both static and pseudo-static seismic cases. Results of the analysis indicated the factors of safety of the existing slopes do not meet minimum factors of safety of 1.5 and 1.1 for static and seismic load cases, respectively. Seismic design codes have been revised since the 2005 report. Therefore, we have completed additional analysis of the pseudo-static seismic case using current seismic parameters.

We used SLOPE/W by GeoStudio to conduct two-dimensional limiting equilibrium analyses. The factor of safety against slope failure is simplistically defined as the ratio of the forces resisting slope movement (e.g., soil strength, soil mass, etc.) to the forces driving slope movement (e.g., soil weight, water pressure). The program predicts the location and geometry of "critical failure planes." Critical failure planes are the zones with the lowest factors of safety. A factor of safety of less than 1.0 infers that the model is not in equilibrium and slope movement is likely to occur.

We evaluated two critical cross sections for the slopes (A-A' and B-B') at the approximate locations shown on the 2005 Boring and Test Pit Location Map presented in Appendix B. Modeled groundwater conditions were based on observations made during the 2005 investigation. A

pseudo-static seismic horizontal acceleration of 0.18 g was used for the seismic condition. Total stress (undrained) properties were used to analyze the slopes under short-term seismic loading.

Our analyses indicate that the factor of safety for the existing slopes does not meet the minimum factor of safety of 1.1 for the seismic load case. Critical slip surface entry points were located behind the top of slopes, which indicates the need for maintaining a horizontal setback distance for proposed structures and other external loads (i.e., fill placement, stormwater facilities).

GEOTECHNICAL BUFFER

The 2005 report recommended a horizontal setback distance of 40 feet from the top of slope. The results of our current analysis indicate this setback distance is sufficient to reduce the potential for slope instability based on existing conditions. However, we understand TDW is proposing to cut approximately 10 to 20 feet of material from the ridges of existing slopes, which may increase factors of safety against slope instability and allow for horizontal setback distances of less than 40 feet. With the proposed cuts reducing loading at the top of the slope, horizontal setback distances can likely be reduced to 25 feet for slopes with total heights between 40 and 70 feet and reduced to 15 feet for slopes with total heights of less than 40 feet. Additional analysis should be performed once a final grading plan is available to confirm both the top of slope locations and associated horizontal setback requirements.

The proper management of stormwater is important to the stability of slopes at the site. Runoff from impermeable surfaces should be collected and routed into a stormwater system or to a suitable discharge below the base of any slopes. Runoff should not be discharged or directed to flow toward the ravine slopes.

STORMWATER RETENTION POND

The preapplication plat (Appendix A) indicates a storm retention pond is proposed to be constructed southwest of Lot 11. We understand TDW is considering moving the location of the storm pond to the northwest (downslope) to increase available lot space. In general, Columbia West takes no exception to this approach from a geotechnical perspective as moving the pond further downslope will decrease the potential for infiltration from the pond to influence the slope below. Once the final pond location has been selected, we recommend contacting Columbia West to evaluate if any drainage or other requirements should be implemented to limit groundwater in the slope below the pond and to evaluate if the pond location adheres to recommended setback requirements.



We appreciate the opportunity to submit this addendum. Please do not hesitate to contact us if you have questions or require additional information.

Sincerely,



Jason F. Merritt, PE
Senior Project Engineer



Shawn M. Dimke, PE
Principal Engineer



Signed 06/06/2024

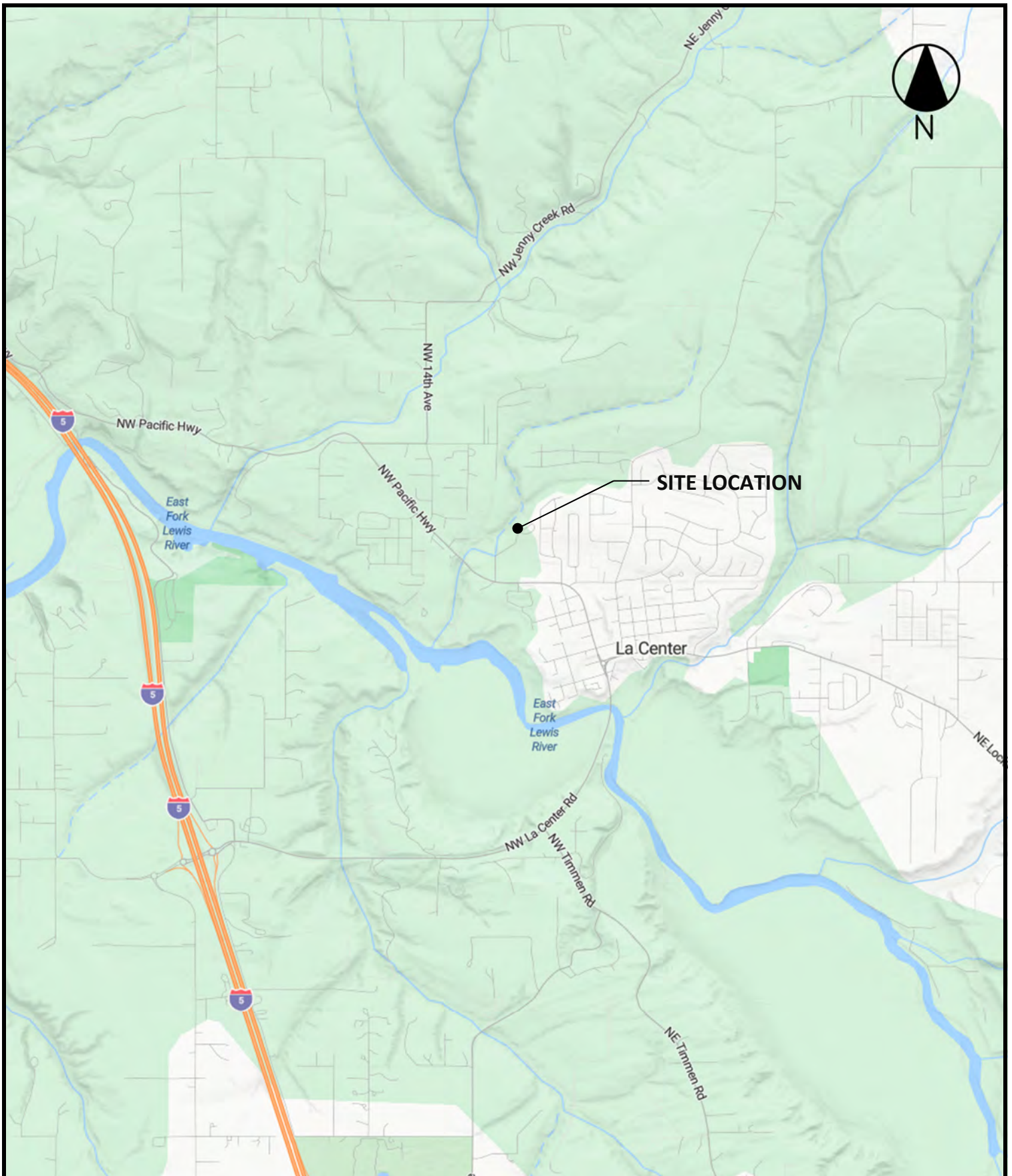
JFM:SMD:kat

Attachments

Document ID: TDW-1-01-1-060624-geoa-1.docx



FIGURES





APPENDIX A

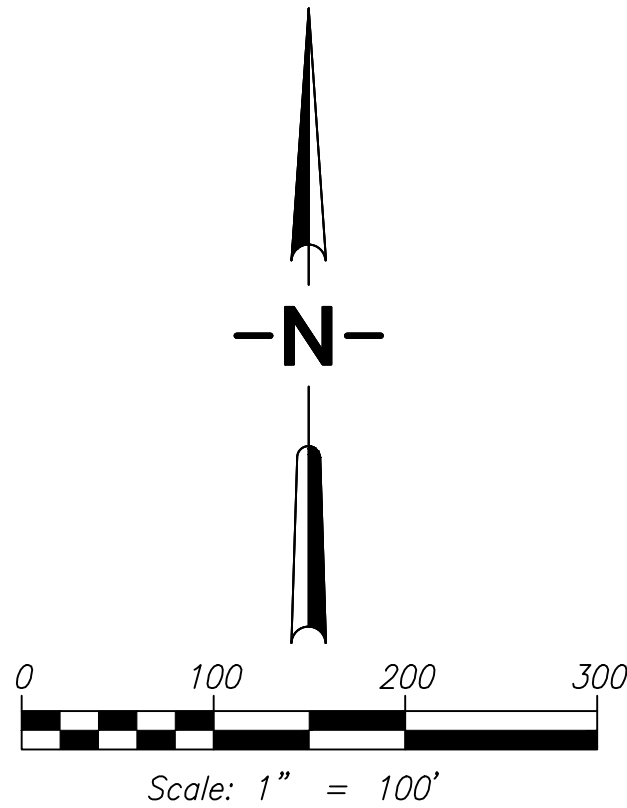
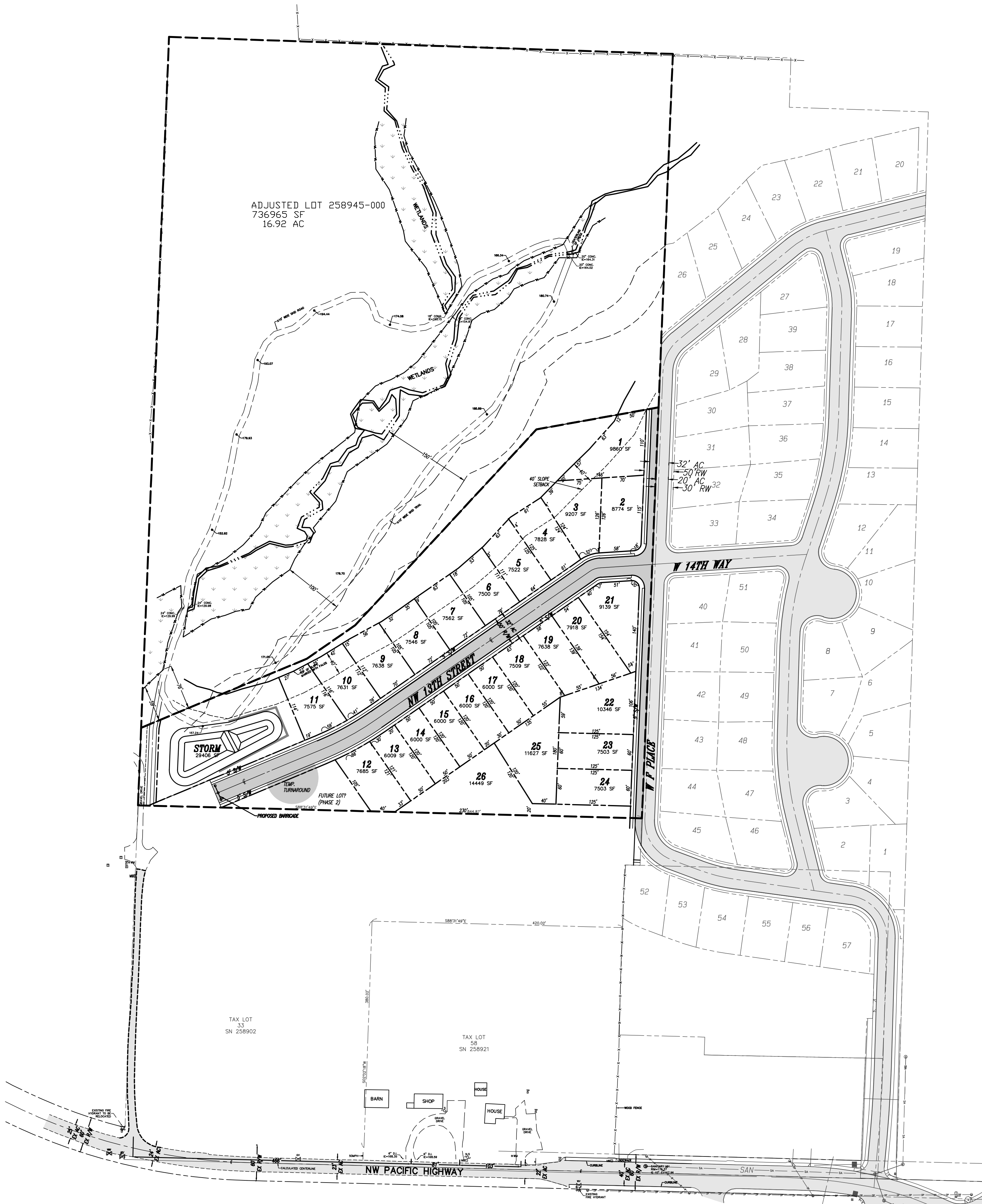
APPENDIX A

PRE-APPLICATION PLAT

The Pre-Application Plat prepared by SGA Engineering & Design is presented in this appendix.



© SGA ENGINEERING PLLC - DATE PLOTTED: Mar. 18, 2024 - 1:45 PM SGA DRAWING FILE: W:\DWG\2406- JUNIPER RIDGE\DRAWINGS\1- PRE-APP SHEET SET\PRE-APPLICATION PLATTING



JUNIPER RIDGE SUBDIVISION

BEING A PORTION OF THE SOUTHWEST QUARTER OF SECTION 34, TOWNSHIP 5 NORTH, RANGE 1
EAST OF THE WILLAMETTE MERIDIAN CLARK COUNTY, WASHINGTON

PRE-APPLICATION

MARCH 2024

APPLICANT:

TD WEST, LLC
ATTN: DAN & TODD KORPELA
5900 NE 152ND AVENUE
VANCOUVER, WA 98682
PH: 360-921-7991 & 360-798-7268
EM: dan@4kequipment.com &
todd@4kequipment.com

PROPERTY OWNER:

MARY RITOLA
34011 NW 9TH AVE
LA CENTER, WA 98629

PARCEL # & PROPERTY ADDRESS:

258945-000 & 258944-000
34011 & 34017 NW 9TH AVE.
LA CENTER, WA 98629

CONTACT PERSON:

SGA ENGINEERING, PLLC
ATTN: SCOTT TAYLOR
2005 BROADWAY STREET
VANCOUVER, WA 98663
PH: 360.993.0911
FX: 360.993.0912
EM: STAYLOR@SGAENGINEERING.COM

EXISTING SITE INFORMATION

EXISTING PARCEL NUMBERS	258945-000 & 258944-000
CURRENT USE	TWO EXISTING SINGLE-FAMILY RESIDENCES
ZONING DESIGNATION	LDR-7.5
GROSS SITE AREA	24.94 ACRES 1,086,226 S.F.
TRANSIT ROUTES	NO KNOWN C-TRAN ROUTES WITHIN 1 MILE OF THE SITE.
EXISTING WATER AND SEWER	SEWER SERVICE WILL BE PROVIDED BY THE CITY OF LA CENTER, PUBLIC WATER SERVICE WILL BE PROVIDED BY THE CLARK PUBLIC UTILITIES. THERE ARE TWO SEPTIC SYSTEMS ON SITE. ONE WELL IS KNOWN TO EXIST ON-SITE.

ENVIRONMENTAL CONDITIONS

THE SITE CONTAINS SOME OF THE SIGNIFICANT ENVIRONMENTAL CONDITIONS LISTED IN THE APPLICATION CHECKLIST. THE SITE IS LOCATED IN THE EAST FORK LEWIS RIVER WATERSHED. THE SITE IS MAPPED AS HAVING A MODERATE-HIGH PROBABILITY FOR ARCHAEOLOGICAL.

EXISTING CONDITIONS DISCLAIMER

THE EXISTING CONDITIONS SHOWN ON THIS PLAN WERE OBTAINED FROM INFORMATION PROVIDED BY PUBLIC RESOURCES. SGA ENGINEERING, PLLC DOES NOT GUARANTEE THE ACCURACY OF THIS INFORMATION.

PROPOSED SITE INFORMATION

PROPOSED USE

SINGLE-FAMILY RESIDENTIAL (26 LOT) SUBDIVISION

DEVELOPMENT STANDARDS

MINIMUM LOT AREA	7,500 SF (6,000 SF WITH DENSITY TRANSFER)
MINIMUM LOT WIDTH	60' MIN. ALLOWED
MINIMUM LOT DEPTH	90' MIN. ALLOWED
FRONT YARD SETBACK	20'
STREET SIDE YARD SETBACK	10'
INTERIOR SIDE YARD SETBACK	7.5' MIN.
REAR YARD SETBACK	20'
MAXIMUM BUILDING LOT COVERAGE	35%
MAXIMUM BUILDING HEIGHT	35'

UTILITY PROVIDERS

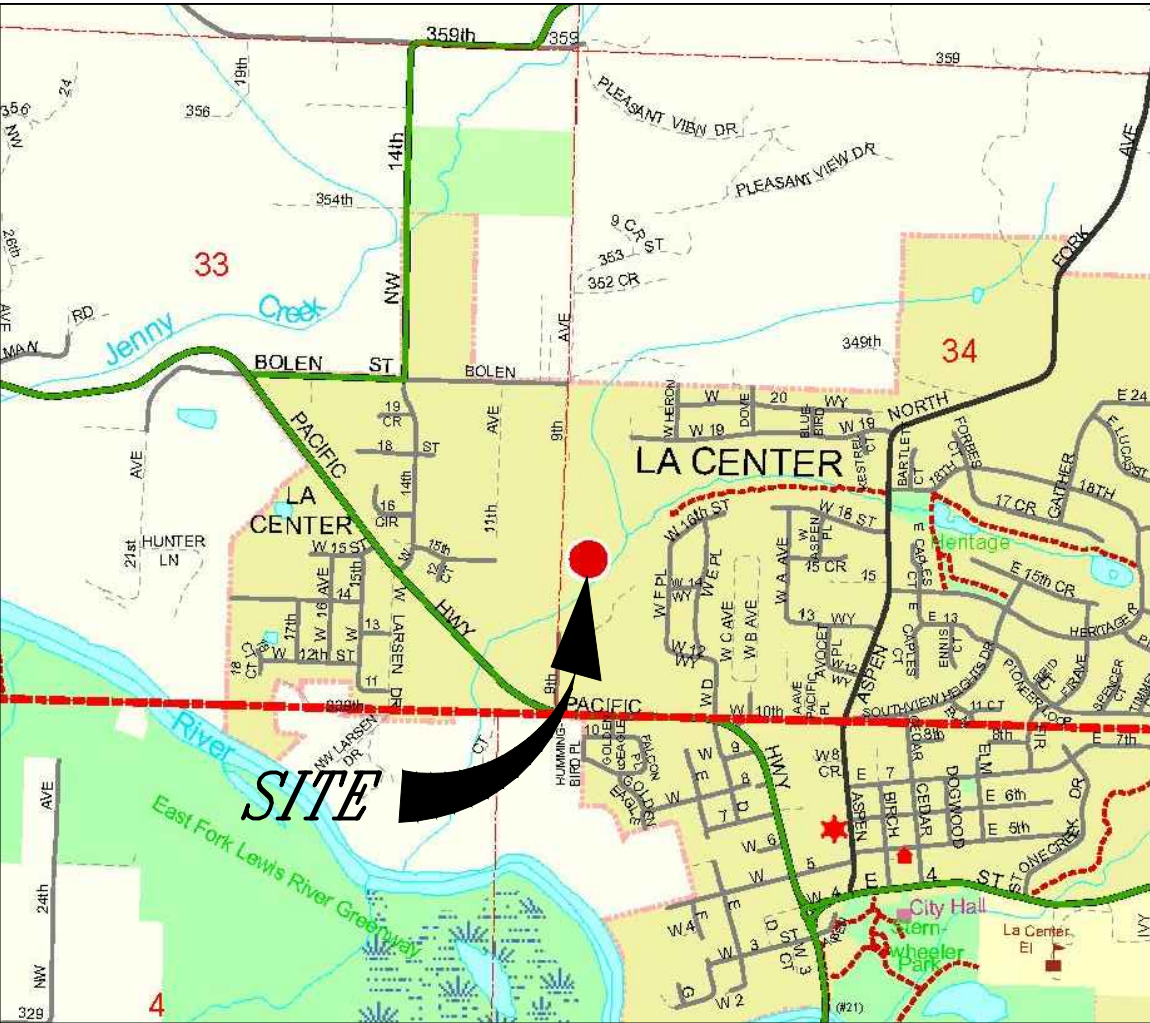
SEWER	CITY OF LA CENTER
WATER	CLARK PUBLIC UTILITIES
ELECTRICAL	CLARK PUBLIC UTILITIES

STORMWATER MANAGEMENT

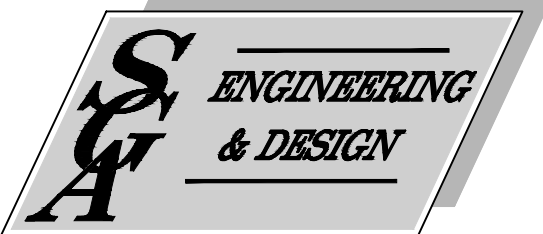
TREATMENT	CLARK COUNTY STANDARDS
DISPOSAL	STORMWATER IS PROPOSED TO BE TREATED USING BIO-RETENTION FACILITIES OR OTHER APPROVED BMP'S. STORMWATER WILL BE INFILTRATED INTO THE GROUND WHERE FEASIBLE OR DETAINED AND RELEASED AT OR BELOW PRE-DEVELOPED RATES.

PROPOSED SITE AREA SUMMARY

	ACRES	S.F.
GROSS SITE AREA (AFTER BLA)	8.02	349261
NET SITE AREA (GROSS AREA-R/W)	6.70	291716
AVERAGE LOT AREA	0.18	8202
PUBLIC RIGHT-OF-WAY DEDICATED	0.01	57545



VICINITY MAP
NTS



CIVIL ENGINEERING ~ LAND PLANNING
DEVELOPMENT SERVICES
LANDSCAPE ARCHITECTURE

2005 BROADWAY
VANCOUVER, WA 98663
PHONE (360)993-0911
FAX (360)993-0912



PRE-APPLICATION PLAT

JUNIPER RIDGE SUBDIVISION

WASHINGTON

CITY OF LA CENTER

PRE-APPLICATION

REVISIONS

DESIGNED BY:	SAT,SEM
DRAWN BY:	SAT,SEM
CHECKED BY:	JAI
SCALE:	1" = 100'

JOB NUMBER
2406

SHEET
PRE2.0

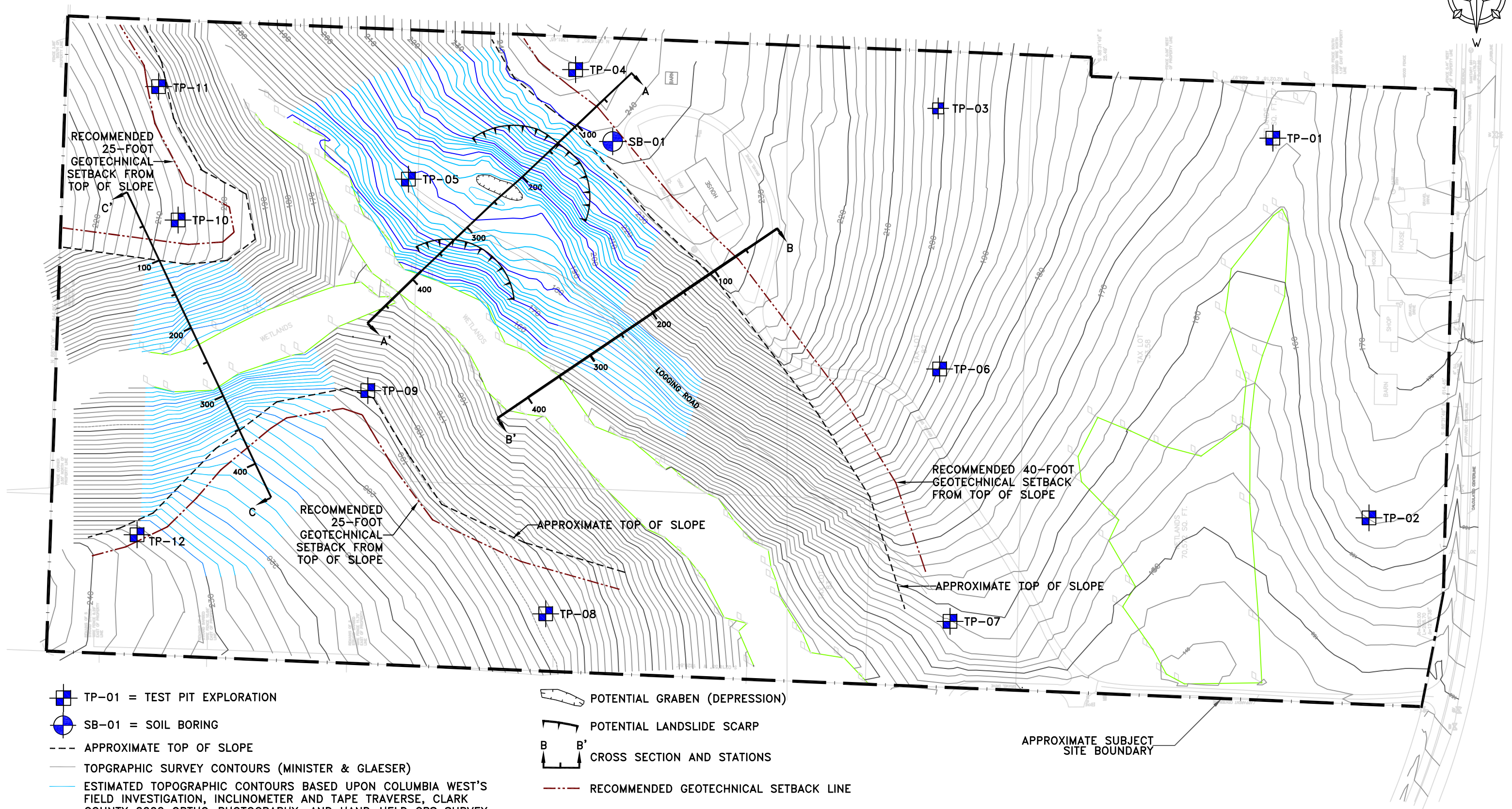
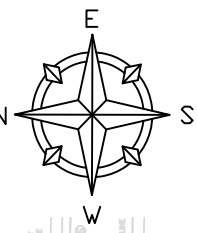


APPENDIX B

APPENDIX B 2005 BORING AND TEST PIT LOCATION MAP

The Boring and Test Pit Location Map prepared by Columbia West in 2005 is presented in this appendix. The map also shows existing conditions, the location of historical map slope movement, and the locations of slope cross sections evaluated for this addendum.





- TP-01 = TEST PIT EXPLORATION
- SB-01 = SOIL BORING
- APPROXIMATE TOP OF SLOPE
- TOPGRAPHIC SURVEY CONTOURS (MINISTER & GLAESER)
- ESTIMATED TOPOGRAPHIC CONTOURS BASED UPON COLUMBIA WEST'S FIELD INVESTIGATION, INCLINOMETER AND TAPE TRAVERSE, CLARK COUNTY 2002 ORTHO-PHOTOGRAPHY, AND HAND-HELD GPS SURVEY EQUIPMENT.
- POTENTIAL GRABEN (DEPRESSION)
- POTENTIAL LANDSLIDE SCARP
- CROSS SECTION AND STATIONS
- RECOMMENDED GEOTECHNICAL SETBACK LINE

NOTES:
1. SITE BASE MAP PROVIDED BY MINISTER AND GLAESER.
2. BORING AND TEST PIT LOCATIONS ARE BASED UPON HAND-HELD GPS SURVEY DATA.
3. TEST PITS BACKFILLED LOOSELY WITH ONSITE SOIL AFTER EXCAVATION.
4. TOP OF SLOPE AND GEOTECHNICAL SETBACK LINE APPROXIMATE AND SHOULD BE FIELD VERIFIED PRIOR TO FINAL DESIGN.

Columbia West Engineering, Inc.
8019 NE 13th Avenue
Vancouver, Washington
360-993-2879

Design:	Drawn: TTR	BORING AND TEST PIT LOCATION MAP	FIGURE 2
Checked: LVL	Date: 11/17/05		
Client: Altius	Rev By Date		
Job No: 05136			
CAD File: Figure 2			
Scale: 1IN=125FT		RITOLA-WALIEZER PROPERTY LA CENTER, WASHINGTON	