4. Geotechnical Soil Analysis Report

Exhibit 4 SUB25-1009

Report of Geotechnical Engineering Services

NW 18th Avenue Subdivision

Camas, Washington

May 28, 2025

Geotechnical ■ Environmental ■ Special Inspections

Columbia West

Engineering, Inc

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May 28, 2025

Allied Development
16430 North Scottsdale Road, Suite 210
Scottsdale, AZ 85254

Attention: Joe Deaser

Re: Report of Geotechnical Engineering Services
NW 18th Avenue Subdivision
4511 NW 18th Avenue
Camas, Washington
CWE Project: AlliedDev-1-01-1

Columbia West Engineering, Inc. (Columbia West) is pleased to present this report of geotechnical engineering services for the NW 18th Avenue Subdivision project located in Camas, Washington. Our services were conducted in accordance with our proposal dated March 27, 2025.

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

Sincerely,

Greg L. Williamson, PE
Senior Geotechnical Engineer

Daniel E. Lehto, PE, GE
Principal Engineer

Signed 05/28/2025
Expires 06/05/2025

GLW:DEL:kat
Attachments
Document ID: AlliedDev-1-01-1-052825-geor.docx

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EXECUTIVE SUMMARY

This executive summary presents the primary geotechnical considerations associated with the proposed NW 18th Avenue Subdivision project located in Camas, Washington. Our conclusions and recommendations are based on the subsurface information presented in the report and proposed development information provided by the design and construction team. Detailed discussion of the geotechnical considerations summarized here is presented in respective sections of the report.

- Proposed residential structures may be supported by conventional spread footings bearing on firm, native soil or engineered structural fill.

- The near-surface native soil is sensitive to disturbance when at a moisture content that is above optimum. As discussed in the report, the subgrade should be protected from disturbance and damage by construction traffic.

- Moisture conditioning will be required to use the on-site soil as structural fill. Accordingly, extended dry weather will be required to adequately condition and place the soil as structural fill. Adequately compacting the on-site soil during the rainy season or during prolonged periods of rainfall will be difficult, if not impossible.

- Gravel, cobbles, and boulders were encountered in portions of the site that caused excavator refusal in four locations (test pits TP-8 through TP-10 and TP-12) at depths between 5.5 and 7 feet BGS. The site is underlain by the Basaltic Andesite of Prune Hill geologic formation and the soil encountered resembled residual soil that formed over this material. If deep excavations or utilities are planned, additional exploration may be warranted in specific locations to determine if conventional excavation equipment will be adequate to complete site construction.

- Groundwater seepage was encountered in a few of our test pits at depths between 5.5 and 8 feet BGS. Dewatering may be required for deeper utilities, particularly in areas of cut and during the wet season. Drainage mat construction may be required where fill material needs to be placed over wet soil or areas of shallow groundwater seepage.

- Based on the results of our subsurface explorations and infiltration testing results, infiltration is not a feasible option for stormwater management.

- Based on the results of infiltration testing, the near-surface native soil meets the classification criteria for WWHM Soil Group 4.

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ABBREVIATIONS AND ACRONYMS

AC	asphalt concrete
AOS	apparent opening size
ASCE	American Society of Civil Engineers
ASTM	ASTM International
BGS	below ground surface
g	gravitational acceleration (32.2 feet/second^2)
H:V	horizontal to vertical
in/hr	inch(es) per hour
km	kilometer(s)
MCE	maximum considered earthquake
NAVD 88	North American Vertical Datum of 1988
OSHA	Occupational Safety and Health Administration
pcf	pounds per cubic foot
pci	pounds per cubic inch
psf	pounds per square foot
PVC	polyvinyl chloride
ReMi	refraction microtremor
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
WSS	Washington Standard Specifications for Road, Bridge, and Municipal Construction (2024)
WWHM	Western Washington Hydrology Model

REPORT OF GEOTECHNICAL ENGINEERING SERVICES
NW 18TH AVENUE SUBDIVISION
CAMAS, WASHINGTON

1.0 INTRODUCTION

Columbia West is pleased to submit this report of geotechnical engineering services for the NW 18th Avenue Subdivision project located in Camas, Washington. The 24.41-acre site is located northwest of the intersection of NW Brady Road and NW 20th Avenue. The site is shown relative to surrounding physical features on Figure 1. The existing conditions and exploration locations are shown on Figure 2. Abbreviations and acronyms used herein are defined immediately following the Table of Contents.

2.0 PROJECT UNDERSTANDING

Based on our correspondence and review of a preliminary site plan, we understand the proposed development includes construction of a residential subdivision with 155 single-family residential lots, AC-paved public roadways and private streets, underground utilities, and stormwater management facilities. Adjacent to NW Brady Road, approximately 6.5 acres of the site are proposed as open space. We assume that future residential structures will be of wood-framed construction with relatively light foundation loads. Based on site topography, cuts and fills are expected to be up to several feet each. We should be contacted to revise our recommendations if the assumptions stated above are incorrect.

3.0 PURPOSE AND SCOPE

The purpose of our services was to provide geotechnical engineering recommendations for use in design and construction of the proposed residential structures. Specifically, we completed the following tasks:

- Reviewed information available in Columbia West's files from previous geological and geotechnical studies conducted at and in the vicinity of the site.
- Coordinated and managed the field exploration program, which included coordinating site access and scheduling subcontractors and Columbia West field staff.
- Excavated 12 test pits to depths between 5.5 and 15 feet BGS.
- Conducted infiltration testing in three of the test pits in accordance with City of Camas requirements.
- Maintained continuous logs of the explorations and collected soil samples at representative intervals for laboratory testing.
- Completed a laboratory testing program using select soil samples collected from the explorations, which included the following:
  - Twelve moisture content determinations in general accordance with ASTM D2216
  - Six particle-size analyses in general accordance with ASTM D1140
  - Three Atterberg limits tests in general accordance with ASTM D4318
- Prepared this geotechnical report that includes the following:
  - Summary of soil and groundwater conditions at the site
  - Assessment of seismic hazards
  - Exploration logs and laboratory testing results

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- Recommendations for shallow spread footings, including foundation settlement potential
- Recommendations for floor slab subgrade preparation
- Recommendations for retaining walls, including lateral earth pressures, backfill, compaction, and drainage
- Recommendations for site preparation, including grading and drainage, stripping depths, fill type for imported material, compaction criteria, trench excavation and backfill, use of on-site soil, and wet/dry weather earthwork
- Recommendations for managing groundwater conditions that may affect the performance of structures and site improvements
- Infiltration testing results and WWHM soil group classifications
- Recommendations for AC pavement construction
- Code-based seismic design parameters in accordance with ASCE 7-16

4.0 SITE CONDITIONS

4.1 GEOLOGY

The site lies within the Willamette Valley/Puget Sound Lowland, a wide physiographic depression flanked by the mountainous Coast Range on the west and the Cascade Range on the east. Inclined or uplifted structural zones within the Willamette Valley/Puget Sound Lowland constitute highland areas, and depressed structural zones form sediment-filled basins. The site is located in the east portion of the Portland/Vancouver Basin, an open, somewhat elliptical, northwest-trending syncline approximately 60 miles wide.

The near-surface geology is expected to consist of Pleistocene-aged Basaltic Andesite of Prune Hill (Qbph; Evarts and O'Connor 2008). The unit is part of the Boring Volcanic Field, a series of volcanic vents that form several buttes or cone-shaped hills in the basin. The formation is exposed south of the site in the recently reclaimed Fisher Pit Quarry.

The Web Soil Survey identifies the surface soil primarily as Powell silt loam with a small swath mapped as Odne silt loam in the proposed open space area (USDA 2025). Powell and Odne series soils are generally fine-grained clays and silts with low permeability, moderate to high water capacity, and low shear strength. They are generally moisture sensitive, somewhat compressible, and described as having low to moderate shrink-swell potential. The erosion hazard is slight primarily based on slope grade. Odne soils are typically found in wetland areas and are mapped as "hydric" according to Clark County Maps Online (Clark County 2025).

4.2 SURFACE CONDITIONS

The 24.41-acre site is generally bounded by industrial development to the west, undeveloped acreage to the north, NW Brady Road to the east, and NW 18th Avenue to the south. The site consists of vacant, undeveloped land that is forested through the central area and vegetated with grass to the east and west. Along the southern site boundary, remnant asphalt, debris, and small piles of gravel are present adjacent to NW 18th Avenue. Review of historical aerial photographs indicates that the remnant materials may be associated with residential and agricultural structures that were present on the site between the 1970s and 1990s. The site slopes gently down from west to east with elevations ranging from approximately 520 to 420 feet (NAVD 88).

4.3 SUBSURFACE CONDITIONS

Subsurface conditions were explored by excavating 12 test pits (TP-1 through TP-12) to depths between 5.5 and 15 feet BGS. The exploration locations are shown on Figure 2. A description of the field exploration program and the exploration logs are presented in Appendix A. A description of the laboratory testing program and the testing results are presented in Appendix B. A summary of the subsurface conditions is presented below.

4.3.1 Tilled Zone/Topsoil and Root Zone

All of the test pits were explored through grass vegetation with 14 to 18 inches of tilled zone/topsoil and a 3- to 4-inch-thick root zone. The tilled zone/topsoil generally consists of sandy clay with trace organics.

4.3.2 Clay

Underlying the tilled zone/topsoil layer in all test pits, clay extends to depths between 5.5 and 15 feet BGS. The clay contains varying proportions of sand and is medium stiff in consistency. In test pits TP-6, TP-8 through TP-10, and TP-12, the clay contains gravel, cobbles, and boulders at depths below 4 to 10 feet BGS. We interpret the gravel to indicate the transition between the near-surface residual clay and underlying basaltic andesite bedrock. In test pits TP-8 through TP-10 and TP-12, refusal of the excavator was observed on boulders or basalt. The moisture content of the clay ranged from 20 to 31 percent at the time of exploration. Atterberg limits testing indicates that the clay exhibits low to high plasticity.

4.3.3 Basalt

Underlying the clay in test pits TP-8 through TP-10 and TP-12, refusal of the excavator was observed on boulders or basalt at depths between 5.5 and 7 feet BGS. The boulders and basalt appear to represent the Pleistocene-aged Basaltic Andesite of Prune Hill (Evarts and O'Connor 2008). Where encountered, boulders were up to 36 inches in diameter.

4.3.4 Groundwater

Groundwater seepage was observed in test pits TP-1, TP-3, and TP-8 at depths between 5.5 and 8 feet BGS. Based on our knowledge of the surrounding area, groundwater levels are subject to seasonal variation and may rise during extended periods of increased precipitation or flooding. Perched groundwater may also be present in localized areas at shallow depths, as indicated.

4.4 INFILTRATION TESTING

Infiltration testing was completed in three of the test pits to assist in the evaluation of stormwater infiltration facilities for the project. The infiltration testing was conducted using the single-ring, failing head test method in general accordance with the *Clark County Stormwater Manual* (Clark County 2021). Table 1 summarizes our infiltration testing results and fines content determinations. The exploration logs and laboratory testing results are presented in Appendices A and B, respectively. Based on the infiltration testing results and presence of shallow groundwater seepage and near-surface rock, infiltration is not considered to be a feasible option for stormwater management.

Table 1. Infiltration Testing Results

Location	Depth (feet BGS)	Soil Description	Fines Content[1] (percent)	Unfactored Saturated Hydraulic Conductivity (in/hr)
TP-5	2	CLAY (CL)	86	Negligible
TP-8	2	CLAY (CL)	86	Negligible
TP-11	2	CLAY (CL)	87	Negligible

1. Percent passing U.S. Standard No. 200 sieve

4.4.1 WWHM Soil Group Classification

As shown in Table 1, infiltration rates were negligible in the tested locations. Based on review of Table 7-2 of the USDA hydrologic soil group criteria (USDA 2009), Appendix 2-A of the 2021 *Clark County Stormwater Manual,* and the Clark County Western Washington Hydrology Model (WWHM) Soil Groupings Memorandum (Otak 2010), the near-surface native soil meets the classification criteria for WWHM Soil Group 4.

4.5 SEISMIC HAZARDS

4.5.1 Liquefaction

Liquefaction is caused by a rapid increase in pore water pressure that reduces the effective stress between soil particles. Granular soil, which relies on interparticle friction for strength, is susceptible to liquefaction and undergoes a loss of strength until the excess pore pressures dissipate. In general, loose, saturated sand soil with low silt and clay content is the most susceptible to liquefaction. Silty soil with low plasticity is moderately susceptible to liquefaction under relatively higher levels of ground shaking. As previously summarized, native subsurface conditions generally consist of clay underlain by basaltic andesite bedrock. Accordingly, liquefaction is not a geotechnical design consideration.

4.5.2 Lateral Spreading

Lateral spreading is a liquefaction-related seismic hazard and occurs on gently sloping or flat sites underlain by liquefiable sediment adjacent to an open face, such as a riverbank. Liquefied soil adjacent to an open face can flow toward the open face, resulting in lateral ground displacement. Since liquefaction is not considered a hazard at the site, lateral spreading is also not a geotechnical design consideration.

4.5.3 Fault Rupture

Based on USGS interactive fault mapping, the nearest mapped fault to the site is the Lacamas Lake fault, which is located approximately 3.3 km northeast of the site (USGS 2025). As such, fault rupture is not considered a hazard at the site.

5.0 DESIGN

5.1 FOUNDATION SUPPORT

5.1.1 General

Based on the results of our explorations and analysis, the proposed residential structures can be supported by spread footings bearing on firm, native soil or engineered structural fill.

Foundations should not be supported by unsuitable fill, soft soil, deleterious material, or disturbed soil. Although not observed in our test pits, undocumented fill may be present near NW 18th Avenue where previous residential and agricultural structures are shown on historical aerial photographs. If encountered during foundation excavation, these materials should be removed and replaced with structural fill. If footing subgrade soil is above its optimum moisture content at the time of subgrade preparation, we recommend placing a sufficient amount of crushed rock (typically 2 to 4 inches) to protect it from foot traffic. The crushed rock should consist of imported granular material as described in Section 6.4 (Materials).

5.1.2 Bearing Capacity

Continuous perimeter wall and isolated spread footings should have minimum widths of 18 and 24 inches, respectively. The bases of exterior footings should be at least 18 inches below the lowest adjacent exterior grade. The bases of interior footings should bear at least 12 inches below the base of the floor.

Footings bearing on subgrade prepared as recommended above should be sized based on an allowable bearing pressure of 1,500 psf. As the allowable bearing pressure is a net bearing pressure, the weight of the footing and associated backfill may be ignored when calculating footing sizes. The recommended allowable bearing pressure applies to the total of dead plus long-term live loads and may be increased by 50 percent for transient lateral forces such as seismic or wind.

5.1.3 Settlement

Foundations designed in accordance with this report are expected to experience post-construction settlement of less than 1 inch. Differential post-construction settlement between comparably loaded footing elements is not expected to exceed 0.5 inch over a distance of 50 feet.

5.1.4 Resistance to Sliding

Lateral loads on building and retaining wall footings can be resisted by passive earth pressure on the sides of structures and by friction on the bases of footings. Our analysis indicates that the available passive earth pressure for footings confined by the on-site soil or planned structural fill is 250 pcf, modeled as an equivalent fluid pressure. Adjacent floor slabs, pavement, or the upper 12-inch depth of unpaved areas should not be considered when calculating passive resistance. An allowable coefficient of friction equal to 0.35 can be used for footings supported on native soil. If a minimum of 6 inches of gravel are placed at the base of a footing, the coefficient of friction can be increased to 0.4.

5.1.5 Subgrade Observation and Preparation

All footing subgrade should be evaluated by a representative of Columbia West to confirm suitable bearing conditions. Observations should also confirm that loose or soft material, organic material, unsuitable fill, prior topsoil zones, and softened subgrade (if present) have been removed. Localized deepening of footing excavations may be required to penetrate any deleterious or soft material, particularly during wet weather conditions. Footing excavations should be backfilled with compacted crushed aggregate.

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5.2 FLOOR SLABS

Floor slabs can be supported on firm, competent, native soil or engineered structural fill prepared as described in this report. Floor slabs with maximum floor loads of 150 psf may be designed assuming a modulus of subgrade reaction, k, of 125 pci.

To provide a capillary break, slabs should be underlain by at least 6 inches of compacted crushed aggregate that contains less than 5 percent fines by dry weight. Geotextile may be used below the crushed aggregate layer to increase subgrade support. Recommendations for floor slab aggregate base and subgrade geotextile are discussed in Section 6.4 (Materials).

All slab subgrade should be evaluated by a member of our geotechnical staff to confirm suitable bearing conditions. Observations should also confirm that loose or soft material, organic material, unsuitable fill, prior topsoil zones, and softened subgrade have been removed and replaced with structural fill. In addition, contaminated base rock for the slabs should be removed and replaced prior to pouring the slab.

5.3 SEISMIC DESIGN CRITERIA

Seismic design for the proposed residential structures is prescribed by ASCE 7-16. Based on the results of subsurface exploration and our experience running ReMi arrays on nearby sites, an appropriate site class for the site is Site Class D. Seismic design parameters for Site Class D are presented in Table 2.

Table 2. Seismic Design Parameters in Accordance with ASCE 7-16[1]

Parameter	Short Period (T_s)	1-Second Period (T_1)
MCE spectral response acceleration, S	S_s = 0.836 g	S_1 = 0.359 g
Site class	D	
Site coefficient, F	F_a = 1.17	F_v = 1.94
Adjusted spectral response acceleration, S_M	S_{MS} = 0.97 g	S_{M1} = 0.70 g
Design spectral response acceleration, S_D	S_{DS} = 0.65 g	S_{D1} = 0.46 g

1. The structural engineer should evaluate ASCE 7-16 code requirements and exceptions to determine if these parameters are valid for design.

Columbia West recommends the project structural engineer evaluate the requirements and exceptions presented in ASCE 7-16 to determine if the parameters for Site Class D provided in Table 2 can be used for design or if a site-specific seismic hazard evaluation is required (not anticipated for typical residential structures).

5.4 RETAINING STRUCTURES

Lateral earth pressures should be considered in design of retaining walls and below-grade structures. Hydrostatic pressure and additional surcharge loading should also be considered. Retaining wall foundation construction and bearing capacity should adhere to the specifications in Section 5.1 (Foundation Support).

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Permanent retaining walls that are not restrained from rotation should be designed for active earth pressures using an equivalent fluid pressure of 35 pcf. Walls that are restrained from rotation should be designed for an at-rest equivalent fluid pressure of 55 pcf. The recommended earth pressures assume a maximum wall height of 10 feet with well-drained, level backfill. These values also assume that adequate drainage is provided behind retaining walls to prevent hydrostatic pressure from developing. Lateral earth pressures induced by surcharge loads may be estimated using the criteria presented on Figure 3.

Seismic forces may be calculated by superimposing a uniform lateral force of $9H^2$ pounds per lineal foot of wall, where H is the total wall height in feet. The force should be applied as a uniformly distributed load with the resultant located at 0.6H from the base of the wall.

5.4.1 Wall Drainage and Backfill

A minimum 6-inch-diameter, perforated collector pipe should be placed at the bases of retaining walls. The pipe should be embedded in a minimum 2-foot-wide zone of angular drain rock that is wrapped in a drainage geotextile fabric and extends up the back of the wall to within 1 foot of finished grade. The drain rock and geotextile drainage fabric should meet the specifications in Section 7.6 (Materials). Perforated collector pipes should discharge at an appropriate location away from the base of the wall. Discharge pipes should not be tied directly into stormwater drainage systems, unless measures are taken to prevent backflow into the drainage system of the wall.

Backfill placed behind walls and extending a horizontal distance of ½H, where H is the height of the retaining wall, should consist of select granular material placed and compacted as described in Section 6.4.1 (Structural Fill).

Settlement of up to 1 percent of the wall height commonly occurs immediately adjacent to the wall as the wall rotates and develops active lateral earth pressures. Consequently, we recommend that construction of flatwork adjacent to retaining walls be delayed at least four weeks after placement of wall backfill, unless survey data indicates that settlement is complete prior to that time.

5.5 PAVEMENT

We understand that public roadways for the subdivision will be constructed in accordance with jurisdictional standards. For dry weather construction, pavement surface sections should bear on competent subgrade consisting of firm, native soil or engineered structural fill. Wet weather construction may require an increased thickness of aggregate base as discussed in Section 6.2 (Construction Traffic and Staging).

In general, AC paving is not recommended during cold weather (temperatures less than 40 degrees Fahrenheit). Compacting under these conditions can result in low compaction and premature pavement distress. Each AC mix design has a recommended compaction temperature range that is specific for the particular AC binder used. In colder temperatures, it is more difficult to maintain the temperature of the AC mix, as it can lose heat while stored in the delivery truck, as it is placed, and in the time between placement and compaction. In Washington, the AC surface temperature during paving should be at least 40 degrees Fahrenheit for lift thicknesses greater

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than 2.5 inches and at least 50 degrees Fahrenheit for lift thicknesses between 2 and 2.5 inches. If AC paving must take place during cold weather construction as defined in this section, the contractor and design team should discuss options for minimizing risk to pavement serviceability.

5.6 DRAINAGE

At a minimum, site drainage should include surface water collection and conveyance to properly designed stormwater management structures and facilities. In general, drainage design should conform to City of Camas regulations. Finished site grading should be conducted with positive drainage away from structures at a minimum 2 percent slope for a distance of at least 10 feet. Depressions or shallow areas that may retain ponding water should be avoided.

Recommendations for foundation drains and subdrains are presented in the following sections. Drain rock and geotextile drainage fabric should meet the requirements in Section 6.4 (Materials). Drains should be closely monitored after construction to assess their effectiveness. If additional surface or shallow subsurface seepage becomes evident, the drainage provisions may require modification or additional drains. We should be consulted to provide appropriate recommendations.

5.6.1 Foundation Drains

Roof drains are recommended for all structures. Perimeter building foundation drains should be considered for shallow foundations constructed below existing site grades but are not necessary for the functionality of the buildings.

Foundation and roof drains, where installed, should consist of separate systems that gravity flow away from foundations to an approved discharge location. Perimeter foundation drains should consist of 4-inch-diameter, perforated PVC pipe surrounded by a minimum 2-foot-wide zone of clean, washed drain rock wrapped with geotextile drainage fabric. The wrapped drain rock zone should extend up the sides of embedded walls to within 12 inches of proposed finished grade. Foundation drains should be constructed with a minimum slope of 0.5 percent. The invert elevation of the drainpipe should be at least 18 inches below the elevation of the floor slab.

5.6.2 Subdrains

Subdrains should be considered if portions of the site are cut below surrounding grades. Shallow groundwater or seepage should be conveyed via a drainage channel or perforated pipe into an approved discharge. Recommendations for design and installation of perforated drainage pipe may be performed on a case-by-case basis by Columbia West during construction. Failure to provide adequate surface and subsurface drainage may result in soil slumping or unanticipated settlement of structures exceeding tolerable limits.

5.6.3 Drainage Mat

Site construction in some areas may occur at or near the groundwater table or in areas of existing preferential pathways for surface and subsurface water flow, particularly if work is conducted during wet weather conditions. A drainage mat is typically required in areas that require structural fill placed on top of a natural drainage swale or known seep or spring area. Dewatering may be necessary, and a drainage mat may be required to achieve sufficient elevation for fill placement. A typical drainage mat is shown on Figure 4. Columbia West should determine drainage mat

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location, extent, and thickness when subsurface conditions are exposed. Drainage mats may need to be constructed in conjunction with subdrains to convey captured water to an approved discharge location.

5.7 PERMANENT SLOPES

Fill slopes should consist of structural fill material as discussed in Section 6.4.1 (Structural Fill). Fill placed on existing grades steeper than 5H:1V should be horizontally benched at least 10 feet into the slope. Fill slopes greater than 6 feet in height should be vertically keyed into existing subsurface soil. Drainage implementations, including subdrains or perforated drainpipe trenches, may also be necessary in proximity to cut and fill slopes if seeps or springs are encountered. Drainage design may be performed on a case-by-case basis. The extent, depth, and location of drainage may be determined in the field by Columbia West during construction when soil conditions are exposed. Failure to provide adequate drainage may result in soil sloughing, settlement, or erosion.

Final cut or fill slopes at the site should not exceed 2H:1V or 10 feet in height without individual slope stability analysis. The values above assume a minimum horizontal setback for loads of 10 feet from the top of the cut or fill slope face or overall slope height divided by three (H/3), whichever is greater.

Concentrated drainage or water flow over the face of slopes should be prohibited, and adequate protection against erosion is required. Fill slopes should be overbuilt, compacted, and trimmed at least 2 feet horizontally to provide adequate compaction of the outer slope face. Proper cut and fill slope construction is critical to overall project stability and should be observed and documented by Columbia West.

6.0 CONSTRUCTION

6.1 SITE PREPARATION

Vegetation, organic material, remnant pavement, unsuitable fill, and deleterious material should be cleared from areas identified for structures and grading. Vegetation, root zones, organic material, and debris should be removed from the site. Stripped topsoil should also be removed or used only as landscape fill in non-structural areas with slopes less than 25 percent. The post-construction maximum depth of landscape fill placed or spread at any location onsite should not exceed 1 foot. Actual stripping depths should be determined based on visual observations made during construction when soil conditions are exposed.

6.1.1 Subgrade Evaluation

Upon completion of stripping and prior to the placement of structural fill, exposed subgrade soil should be evaluated by proof rolling with a fully loaded dump truck or similar heavy, rubber-tired construction equipment. When the subgrade is too wet for proof rolling or inaccessible to a loaded dump truck, a foundation probe may be used to identify areas of soft, loose, or unsuitable soil. Subgrade evaluation should be performed by Columbia West. If soft or yielding subgrade areas are identified during evaluation, we recommend the subgrade be over excavated and backfilled with compacted imported granular fill.

6.1.2 Test Pit Locations

Test pits excavated during our explorations were backfilled loosely with on-site soil. These excavations should be located and properly backfilled with structural fill during site improvement construction. Trees, stumps, and associated roots should also be removed from structural areas, individually and carefully. Resulting cavities and excavation areas should be backfilled with engineered structural fill.

6.2 CONSTRUCTION TRAFFIC AND STAGING

Near-surface, clay soil will be easily disturbed during construction. If not carefully executed, site preparation, excavation, and grading can create extensive soft areas, resulting in significant repair costs. Earthwork planning should include considerations for minimizing subgrade disturbance, particularly during wet weather conditions.

If construction occurs during wet weather conditions or if the moisture content of the surficial soil is more than a few percentage points above optimum, site stripping and cutting may need to be accomplished using track-mounted equipment. Under these conditions, granular access pads and staging areas will also be necessary to provide a firm support base and sustain construction equipment.

Based on our experience, between 12 and 18 inches of imported granular material are generally required in staging areas and between 18 and 24 inches in areas supporting construction traffic. In areas of heavy construction traffic, geotextile separation fabric may be placed between the subgrade soil and imported granular material to increase subgrade support and minimize fines migration into the aggregate base layer.

Project stakeholders should understand that wet weather construction is risky and costly. Proper construction methods and techniques are critical to overall project integrity and should be observed and documented by Columbia West.

6.3 EXCAVATION

Conventional earthmoving equipment in proper working condition should be capable of making necessary site excavations to the depths of our test pit explorations. Gravel, cobbles, and boulders representing weathered basaltic andesite were encountered in the west portion of the site at depths as shallow as 4 feet BGS. In these locations, refusal of the excavator was observed as shallow as 5.5 feet BGS. Difficult excavation conditions should be anticipated in areas underlain by shallow bedrock. If utility or grading design requires excavations beyond the depths explored during our test pit explorations, a location-specific exploration is recommended to determine if specialized equipment or blasting of intact bedrock may be required.

Temporary excavation sidewalls should maintain a vertical cut to a depth of approximately 4 feet BGS in near-surface clay, provided groundwater seepage is not present in the sidewalls. In sandy soil, excavations will likely slough and cave, even at shallow depths. Open-cut excavation techniques may be used to excavate trenches between 4 and 8 feet deep, provided the walls of the excavation are cut at a maximum slope of 1.5H:1V and groundwater seepage does not occur. Excavation side slopes should be reduced to a stable inclination if excessive sloughing or raveling occurs.

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Groundwater seepage was observed in our test pits at depths between 5.5 and 8 feet BGS. Recommendations as described in Section 6.3.1 (Construction Dewatering) should be considered where subsurface construction activities intersect the shallow groundwater table.

Shoring may be required if open-cut excavations are not feasible. As a wide variety of shoring and dewatering systems are available, we recommend that the contractor be responsible for selecting the appropriate shoring and dewatering systems. If box shoring is used, the contractor should understand it is a safety feature used to protect workers and does not prevent caving. If excavations are left open, caving of the sidewalls may occur. The presence of caved material will limit the ability to properly backfill and compact trenches. The contractor should be prepared to fill voids between the box shoring and the sidewalls of the trenches with sand or gravel before caving occurs.

All excavations should be made in accordance with applicable OSHA requirements and regulations of the state, county, and local jurisdiction. While this report describes certain approaches to excavation and dewatering, the contract documents should specify that the contractor is responsible for selecting the excavation and dewatering methods, monitoring the excavations for safety, and providing shoring (as required) to protect personnel and adjacent structural elements.

6.3.1 Construction Dewatering

The contractor should be responsible for temporary drainage of surface water, perched water, and groundwater, if encountered. Dewatering should be performed to the extent necessary to prevent standing water and/or erosion of the exposed site soil. During rough and finished grading of building pad areas, the contractor should keep all footing excavations and slab subgrade soil free of standing water.

The contractor's proposed dewatering plan should be capable of maintaining groundwater levels at least 2 feet below the bases of proposed trench excavations. Without adequate trench dewatering, running soil, caving, and sloughing will increase backfill volumes and may result in damage to adjacent structures or utilities. Significant pumping and dewatering may be required to temporarily reduce the groundwater elevation to the recommended depth. Dewatering via a sump within excavation zones may be insufficient to control groundwater and provide excavation side slope stability. Dewatering may be more feasibly conducted by installing a system of temporary well points and pumps around proposed excavation areas or utility trenches.

If groundwater is present at the bases of utility excavations, we recommend placing 18 to 24 inches of stabilization material at the bases of the excavation. Subgrade geotextile placed directly over trench subgrade soil may reduce the required thickness of the stabilization material. The actual thickness of stabilization material should be determined at the time of construction based on observed field conditions. Trench stabilization material should be placed in one lift and compacted until well keyed. Stabilization material and geotextile fabric should meet the requirements in Section 6.4 (Materials).

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We note that these recommendations are for guidance only. Dewatering of excavations is the sole responsibility of the contractor, as the contractor is in the best position to select these systems based on their means and methods.

6.4 MATERIALS

6.4.1 Structural Fill

6.4.1.1 General

Areas proposed for fill placement should be appropriately prepared as described in Section 6.1 (Site Preparation). Engineered fill placement should be observed by Columbia West. Compaction of engineered structural fill should be verified by nuclear gauge field compaction testing performed in accordance with ASTM D6938. Field compaction testing should be performed for each vertical foot of engineered fill placed.

Various materials may be acceptable for use as structural fill. Structural fill should be free of organic material or other unsuitable material and meet the specifications provided in the following sections. Representative samples of proposed engineered structural fill should be submitted for laboratory testing and approval by Columbia West prior to placement.

6.4.1.2 On-Site Soil

The on-site clay will be suitable for use as structural fill if adequately dried and moisture conditioned to achieve recommended compaction specifications. Native clay soil with a plasticity index greater than 25 should be evaluated at the time of construction and approved by Columbia West prior to use as structural fill. We note that clay meeting this criteria was observed in test pit TP-1 at a depth of 5 feet BGS. The high plasticity clay will likely require blending with non-plastic or low plasticity soil prior to use as structural fill.

Laboratory testing indicates that the moisture content of the native soil was above optimum at the time of exploration. Moisture conditioning will likely be necessary to dry the soil prior to applying compaction effort. In addition, near-surface clay soil will be moisture sensitive and difficult, if not impossible, to compact during wet weather conditions. Therefore, structural fill placement using on-site soil should be performed during dry summer months if possible.

If excavated or blasted bedrock is proposed for use as engineered fill, individual fragment size should not exceed 6 inches. Larger fragments should either be removed or crushed into acceptable sizes. Rock fragments should be well dispersed within the fill to prevent nesting. Crushing and mixing processes should be observed by Columbia West.

On-site soil used as structural fill should be placed in loose lifts not exceeding 8 inches in thickness and compacted using standard conventional compaction equipment. The soil moisture content should be within a few percentage points of optimum conditions. The soil should be compacted to at least 95 percent of maximum dry density, as determined by ASTM D698. Compacted on-site fill soil should be covered shortly after placement.

The on-site soil will likely expand during excavation and transport and consolidate during compaction. Development of site-specific expansion and consolidation factors is beyond the scope of this study. We can provide site-specific factors upon request.

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6.4.1.3 Imported Granular Material
Imported granular material should consist of pit- or quarry-run rock, crushed rock, or crushed gravel and sand. The imported granular material should also be durable, angular, and fairly well graded between coarse and fine material; should have less than 5 percent fines by dry weight; and should have at least two mechanically fractured faces. Imported granular material should be placed in loose lifts not exceeding 12 inches in thickness and compacted to at least 95 percent of maximum dry density as determined by ASTM D1557. During wet weather conditions or where wet subgrade conditions are present, the initial loose lift of granular fill should be approximately 18 inches thick and should be compacted with a smooth-drum roller operating in static mode.

6.4.1.4 Trench Backfill
Trench backfill placed below, adjacent to, and up to at least 12 inches above utility lines (i.e., the pipe zone) should consist of well-graded granular material meeting WSS 9-03.12(3) – Gravel Backfill for Pipe Zone Bedding. Pipe zone backfill should be compacted to at least 90 percent of maximum dry density as determined by ASTM D1557 or as required by the local jurisdictional agency or pipe manufacturer.

Within structural areas (below pavement and building pads), trench backfill above the pipe zone should consist of WSS 9-03.19 – Bank Run Gravel for Trench Backfill or WSS 9 03.14(2) – Select Borrow with a maximum particle size of 2½ inches. Trench backfill material within 18 inches of the top of utility pipes should be hand compacted (i.e., no heavy compaction equipment). Remaining trench backfill should be compacted to at least 95 percent of maximum dry density as determined by ASTM D1557 or as required by the local jurisdictional agency or pipe manufacturer.

Outside of structural areas, trench backfill placed above the pipe zone should be compacted to at least 90 percent of maximum dry density as determined by ASTM D1557 or as required by the local jurisdictional agency or pipe manufacturer.

6.4.1.5 Stabilization Material
Stabilization material used to create haul roads for construction traffic or at the base of unstable trench subgrade should consist of pit- or quarry-run rock or crushed rock. The material should have a maximum particle size of 6 inches and less than 5 percent by dry weight passing the U.S. Standard No. 4 sieve, should have at least two mechanically fractured faces, and should be free of organic material and other deleterious material. Material meeting the specifications in WSS 9-27.3(6) – Stone is generally acceptable for use. Stabilization material should be placed in lifts between 12 and 18 inches thick and compacted to a firm condition with a smooth-drum roller without using vibratory action.

6.4.1.6 Drain Rock
Drain rock should consist of angular, granular material with a maximum particle size of 2 inches and less than 2 percent fines by dry weight. Drain rock should be free of roots, organic material, and other unsuitable material and should have at least two mechanically fractured faces. Drain rock should be compacted to a firm, unyielding condition. Drain rock should be completely wrapped in a geotextile drainage fabric meeting the requirements presented below.

6.4.1.7 Retaining Wall Backfill
Backfill placed behind retaining walls and extending a horizontal distance of ½H, where H is the height of the retaining wall, should consist of imported granular material as described above and should have less than 7 percent fines by dry weight. We recommend the wall backfill be separated from general fill, native soil, and/or topsoil using a geotextile fabric that meets the specifications provided below for drainage geotextiles.

The wall backfill should be compacted to a minimum of 95 percent of maximum dry density as determined by ASTM D1557. However, backfill located within a horizontal distance of 3 feet from a retaining wall should only be compacted to approximately 90 percent of maximum dry density as determined by ASTM D1557. Backfill placed within 3 feet of the wall should be compacted in lifts less than 6 inches thick using hand-operated tamping equipment (such as a jumping jack or vibratory plate compactor). If flatwork (sidewalks or pavement) will be placed atop the wall backfill, we recommend that the upper 2 feet of material be compacted to 95 percent of maximum dry density as determined by ASTM D1557.

6.4.1.8 Retaining Wall Leveling Pad
Imported granular material placed at the bases of retaining wall footings should consist of select granular material. The granular material should be ¾- to 1-inch-minus aggregate size and should have at least two mechanically fractured faces. The leveling pad material should be placed in a 6- to 12-inch-thick lift and compacted to not less than 95 percent of maximum dry density as determined by ASTM D1557.

6.4.1.9 Floor Slab Aggregate Base
Aggregate base for building floor slabs should consist of 1¼-inch-minus crushed aggregate meeting WSS 9-03.9(3) – Crushed Surfacing. Slab aggregate base should be compacted to at least 95 percent of maximum dry density as determined by ASTM D1557.

6.4.2 Geotextile Fabric
6.4.2.1 Subgrade Geotextile
Subgrade geotextile should meet the specifications in WSS 9-33.2(1), Table 3, Geotextile for Separation or Soil Stabilization. The geotextile should be installed in accordance with the manufacturer's recommendations. A minimum initial aggregate base lift of 6 inches is required over geotextiles. All stabilization material should be underlain by a subgrade geotextile.

6.4.2.2 Drainage Geotextile
Subgrade geotextile should meet the specifications in WSS 9-33.2(1), Table 2, Geotextile for Underground Drainage Filtration Properties. The AOS should be between U.S. Standard No. 70 and No. 100 sieves. The water permittivity should be greater than 1.5/sec. The geotextile should be installed in accordance with the manufacturer's recommendations. A minimum initial aggregate base lift of 6 inches is required over geotextiles.

6.5 EROSION CONTROL
Soil at this site is susceptible to erosion by wind and water; therefore, erosion control measures should be carefully planned and installed before construction begins. Surface water runoff should be collected and directed away from sloped areas to prevent water from running down the slope

Exhibit 4 SUB25-1009

face. Measures that can be employed to reduce erosion include the use of silt fences, hay bales, buffer zones of natural growth, sedimentation ponds, and granular haul roads. All erosion control methods should be in accordance with local jurisdiction standards.

7.0 OBSERVATION OF CONSTRUCTION

Satisfactory pavement, earthwork, and foundation performance depends to a large degree on the quality of construction. Sufficient observation of the contractor's activities is a key part of determining that the work is completed in accordance with the construction drawings and specifications. Columbia West should be retained to observe subgrade preparation, fill placement, foundation excavations, drainage system installation, and pavement placement and to review laboratory compaction and field moisture-density information.

Subsurface conditions observed during construction should be compared with those encountered during the subsurface explorations. Recognition of changed conditions requires experience; therefore, qualified personnel should visit the site with sufficient frequency to detect whether subsurface conditions change significantly from those anticipated.

8.0 LIMITATIONS

We have prepared this report for use by the addressee and members of the design and construction team for the proposed project. This report is subject to the limitations expressed in Appendix C.

♦ ♦ ♦

We appreciate the opportunity to be of service to you. Please call if you have questions concerning this report or if we can provide additional services.

Sincerely,

Greg L. Williamson, PE
Senior Geotechnical Engineer

Daniel E. Lehto, PE, GE
Principal Engineer

Exhibit 4 SUB25-1009

REFERENCES

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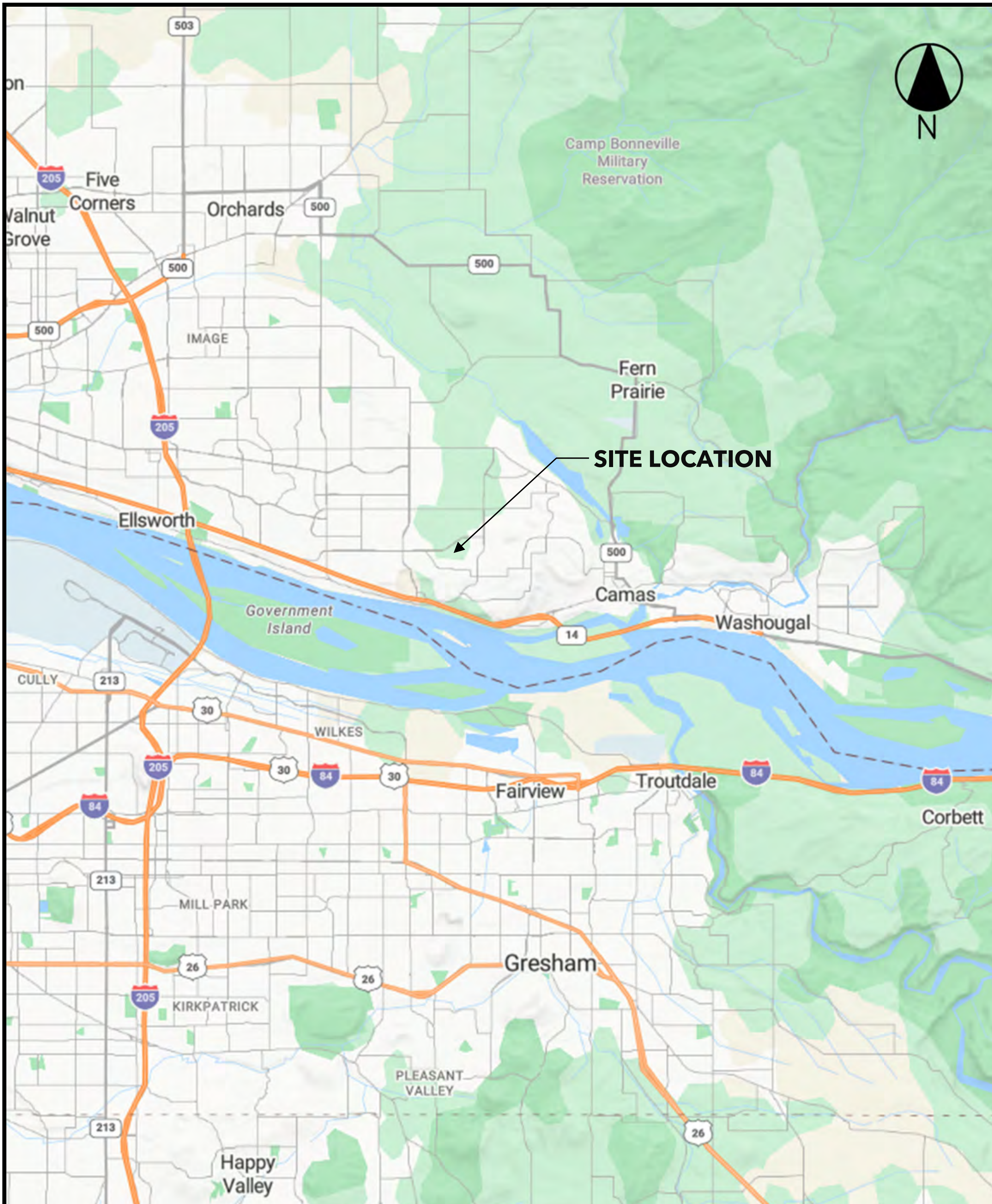
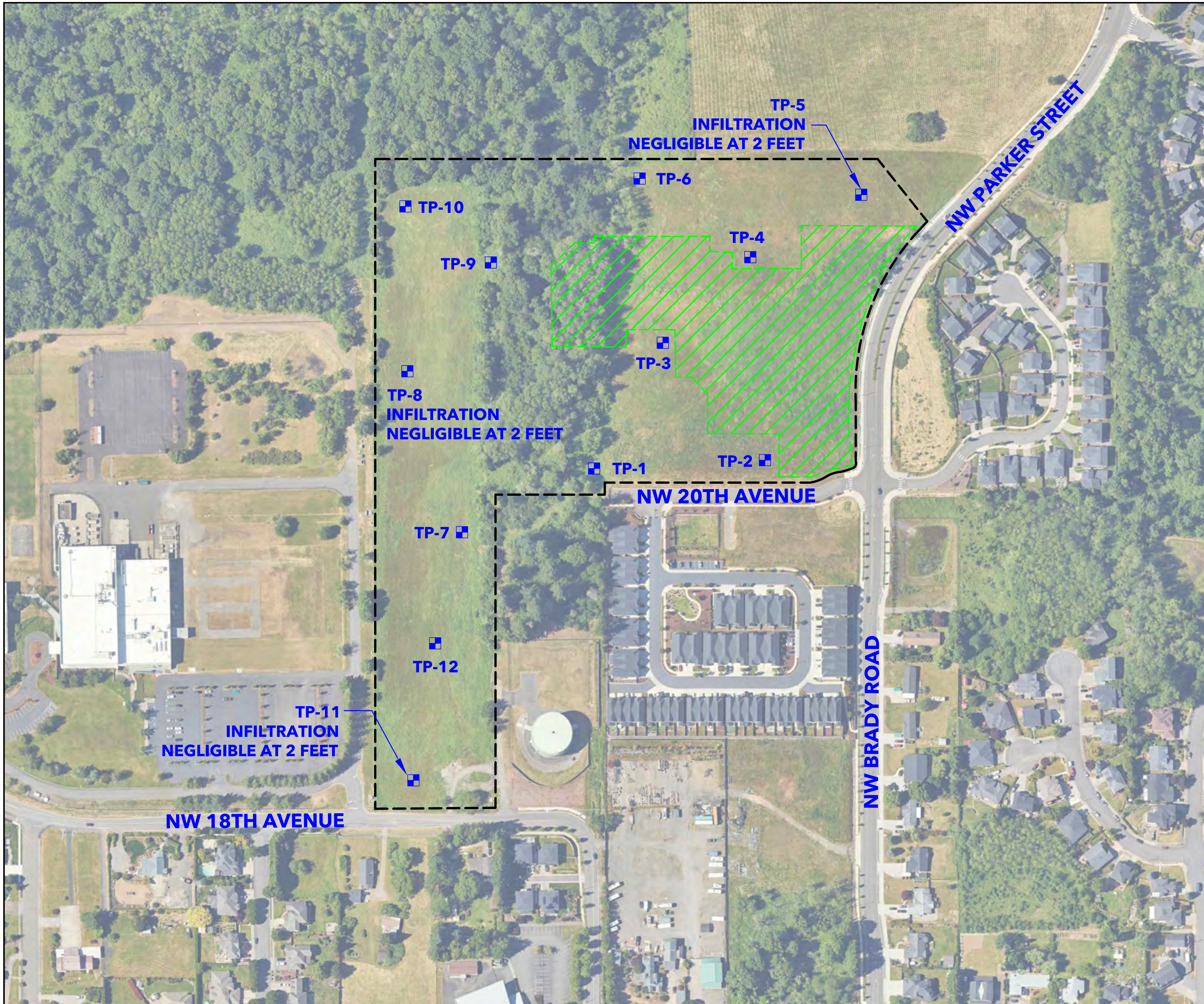
FIGURES



Geotechnical ▪ Environmental ▪ Special Inspections Columbia West Engineering, Inc	PROJECT NO.: ALLIEDDEV-1-01-1 MAY 2025	VICINITY MAP NW 18TH AVENUE SUBDIVISION CAMAS, WASHINGTON	FIGURE 1



LEGEND

SITE BOUNDARY

TEST PIT

PROPOSED OPEN SPACE

N

0 100 200 300 400

NOTES:
1. AERIAL PHOTO SOURCED FROM GOOGLE EARTH.
2. EXPLORATION LOCATIONS ARE APPROXIMATE AND NOT SURVEYED.
3. REFER TO REPORT TEXT FOR EXPLORATION DESCRIPTIONS.

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NW 18TH AVENUE SUBDIVISION
CAMAS, WASHINGTON
4511 NW 18TH AVENUE

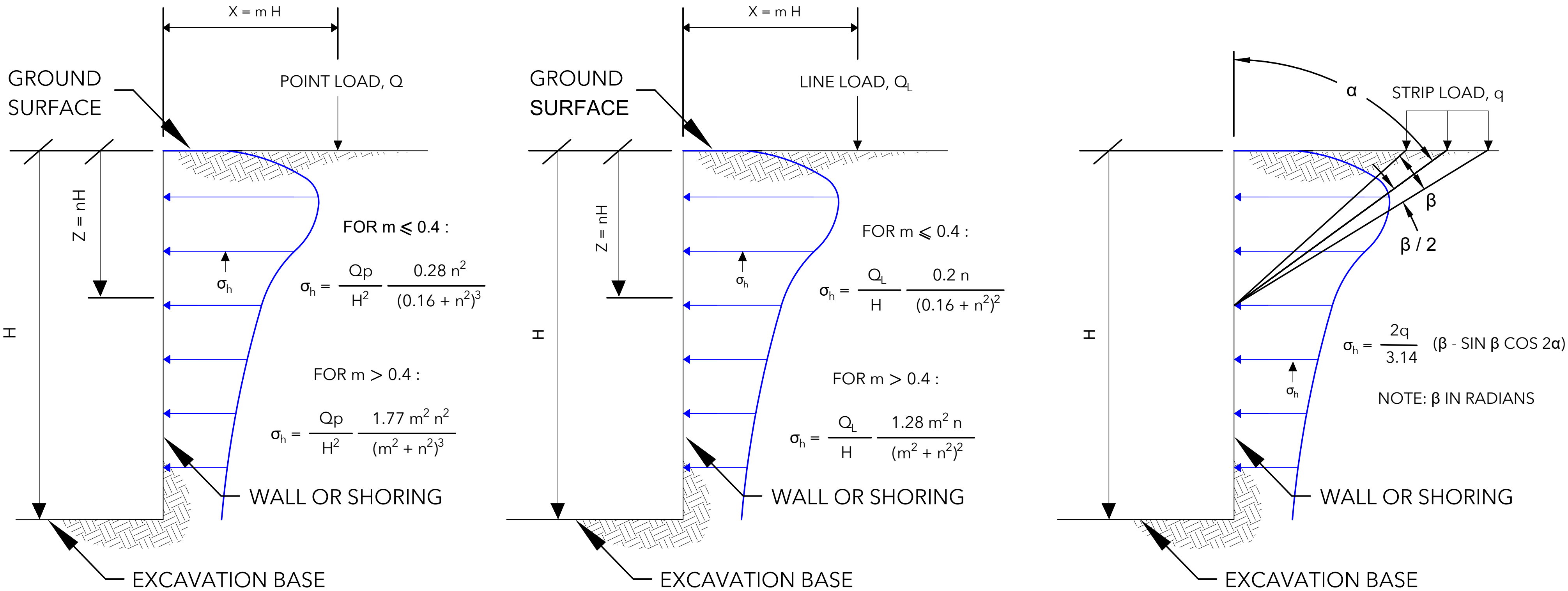
SITE PLAN

PROJECT NO:
ALLIEDDEV-1-01-1

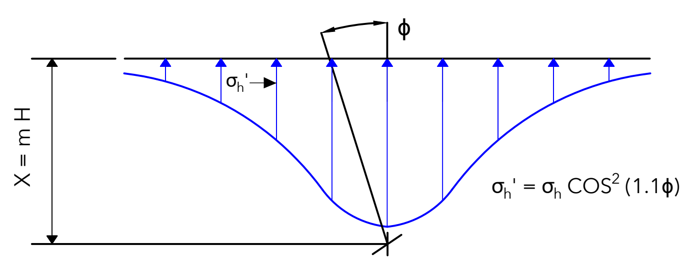
MAY 2025

FIGURE
2

VERTICAL POINT LOAD | LINE LOAD PARALLEL TO WALL | STRIP LOAD PARALLEL TO WALL



VERTICAL POINT LOAD
HORIZONTAL PRESSURE DISTRIBUTION



NOTES:
1. FIGURE SHOULD BE USED JOINTLY WITH RECOMMENDATIONS PRESENTED IN THE REPORT TEXT.
2. LATERAL EARTH PRESSURES ASSUME RIGID WALLS WITH BACKFILL MATERIALS HAVING A POISSON'S RATIO OF 0.5.
3. TOTAL LATERAL EARTH PRESSURES RESULTING FROM COMBINED LOADS MAY BE CALCULATED USING SUPERPOSITION.
4. DRAWING IS NOT TO SCALE.

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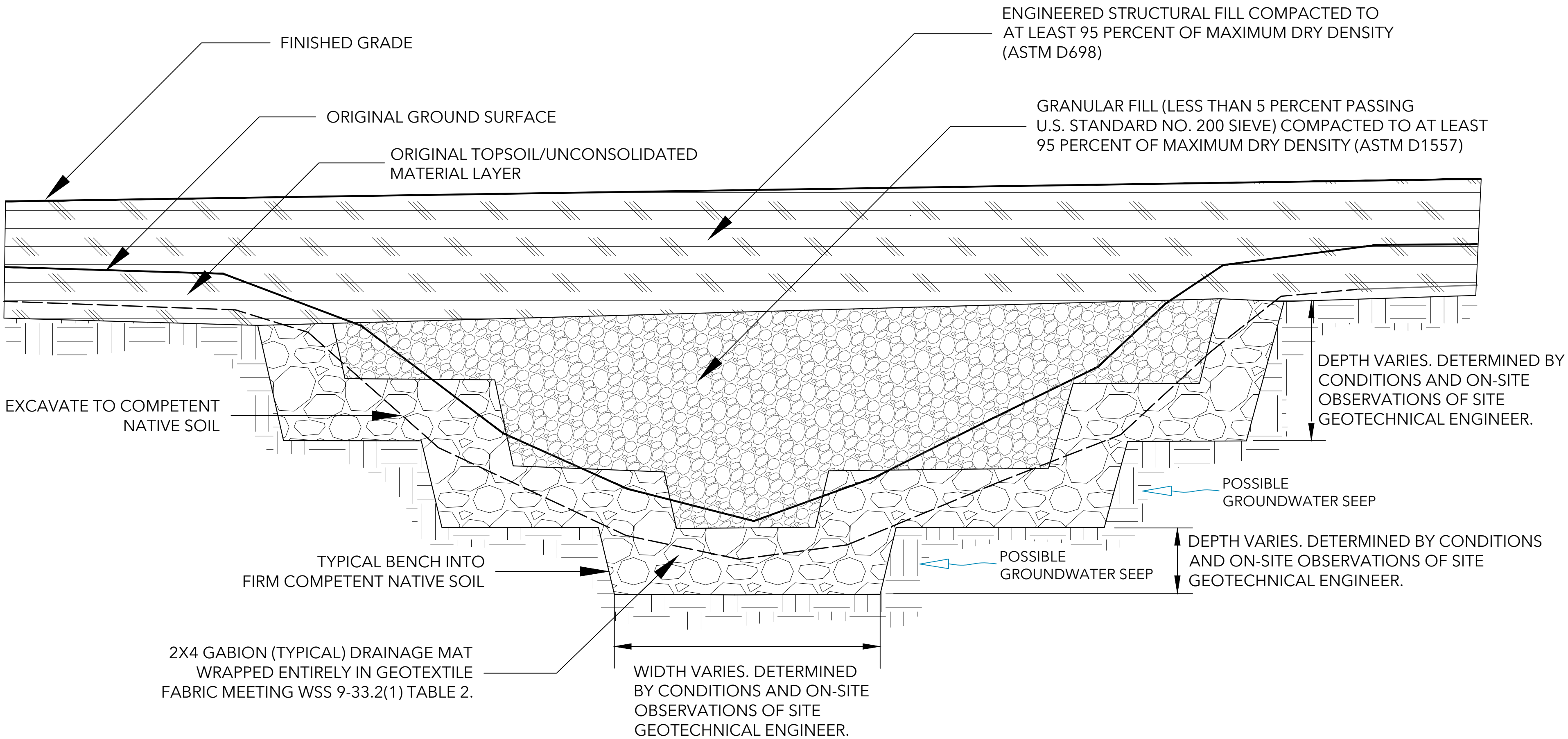
SURCHARGE-INDUCED LATERAL EARTH PRESSURES

FIGURE 3



Geotechnical ▪ Environmental ▪ Special Inspections Columbia West Engineering, Inc	TYPICAL DRAINAGE MAT CROSS SECTION	NOTES: 1. DRAWING IS NOT TO SCALE. 2. DRAWING REPRESENTS TYPICAL DRAINAGE MAT SECTION AND MAY NOT BE SITE-SPECIFIC.	FIGURE 4

APPENDIX A

APPENDIX A
FIELD EXPLORATIONS

GENERAL

We explored subsurface conditions at the site by excavating 12 test pits (TP-1 through TP-12) to depths between 5.5 and 15 feet BGS. Excavation services were provided by L&S Contractors of Yacolt, Washington, on April 29, 2025, using a track-mounted excavator. The explorations were logged on a full-time basis by Columbia West personnel. The exploration logs are presented in this appendix.

The exploration locations are shown on Figure 2. The exploration locations were determined in the field by pacing or measuring from existing site features. This information should be considered accurate only to the degree implied by the methods used.

SOIL SAMPLING

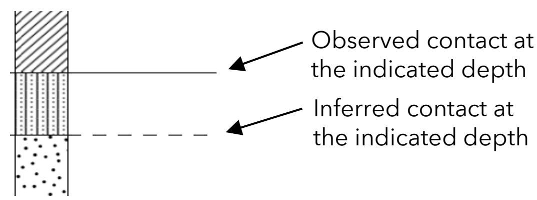
Representative disturbed samples of soil observed in the test pit explorations were collected from the test pit walls and base using the excavator bucket. Sampling methods and intervals are shown on the exploration logs.

SOIL CLASSIFICATION

The soil samples were classified in the field in accordance with the "Exploration Legend" and "Soil Classification System," which are presented in this appendix. The exploration logs indicate the depths at which the soil characteristics change, although the change could be gradual. If the change occurred between sample locations, the depth was interpreted. Classifications are shown on the exploration logs.

EXPLORATION LEGEND

SAMPLER TYPE	DESCRIPTION
SPT	Sample collected from the indicated depth in general accordance with ASTM D1586, *Standard Test Method Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils,* using an SPT sampler and 140-pound hammer
SH	Sample collected from the indicated depth in general accordance with ASTM D1587, *Standard Practice for Thin-Walled Tube Sampling of Fine-Grained Soils for Geotechnical Purposes,* using a thin-walled Shelby tube, or in general accordance with ASTM D6519, *Standard Practice for Sampling of Soil Using the Hydraulically Operated Stationary Piston Sampler,* using a thin-walled tube
D&M	Sample collected from the indicated depth in general accordance with ASTM D3550, *Standard Practice for Thick Wall, Ring-Lined, Split Barrel, Drive Sampling of Soils,* using a Dames & Moore sampler and 140-pound hammer or pushed
CSS	Sample collected from the indicated depth in general accordance with ASTM D3550, *Standard Practice for Thick Wall, Ring-Lined, Split Barrel, Drive Sampling of Soils,* using a 3-inch-outside diameter California split-spoon sampler and 140-pound hammer
DP	Sample collected from the indicated depth in general accordance with ASTM D6282, *Standard Guide for Direct Push Soil Sampling for Environmental Site Characterizations,* using a direct-push soil sampler
GRAB	Grab sample collected from the indicated depth
CORE	Pavement or rock core interval at the indicated depth



GEOTECHNICAL ABBREVIATIONS			
ATT	Atterberg limits	PP	Pocket penetrometer
CBR	California bearing ratio	P200	Percent passing No. 200 sieve
CON	Consolidation test	RES	Resilient modulus
DD	Dry density	SIEV	Sieve analysis
DS	Direct shear	TS	Torvane shear
HYD	Hydrometer	tsf	Tons per square foot
MC	Moisture content	UC	Unconfined compressive strength
MD	Moisture-density relationship	UU	Unconsolidated undrained triaxial test
NP	Non-plastic	VS	Vane shear
OC	Organic content	WD	Wet density

ENVIRONMENTAL ABBREVIATIONS			
CA	Sample submitted for chemical analysis	ND	Not detected
		NS	No sheen
PID	Photoionization detector headspace analysis	SS	Slight sheen
		MS	Moderate sheen
ppm	Parts per million	HS	Heavy sheen

SOIL CLASSIFICATION SYSTEM

PARTICLE-SIZE CLASSIFICATION

COMPONENT	ASTM / USCS		AASHTO	
	Size Range	Sieve Size Range	Size Range	Sieve Size Range
Boulders	Greater than 300 mm	Greater than 12 inches	--	--
Cobbles	75 mm to 300 mm	3 inches to 12 inches	Greater than 75 mm	Greater than 3 inches
Gravel	75 mm to 4.75 mm	3 inches to No. 4 sieve	75 mm to 2.00 mm	3 inches to No. 10 sieve
Coarse	75 mm to 19.0 mm	3 inches to 3/4-inch sieve	--	--
Fine	19.0 mm to 4.75 mm	3/4-inch to No. 4 sieve	--	--
Sand	4.75 mm to 0.075 mm	No. 4 to No. 200 sieve	2.00 mm to 0.075 mm	No. 10 to No. 200 sieve
Coarse	4.75 mm to 2.00 mm	No. 4 to No. 10 sieve	2.00 mm to 0.425 mm	No. 10 to No. 40 sieve
Medium	2.00 mm to 0.425 mm	No. 10 to No. 40 sieve	--	--
Fine	0.425 mm to 0.075 mm	No. 40 to No. 200 sieve	0.425 mm to 0.075 mm	No. 40 to No. 200 sieve
Fines (Silt and Clay)	Less than 0.075 mm	Passing No. 200 sieve	Less than 0.075 mm	Passing No. 200 sieve

CONSISTENCY FOR COHESIVE SOIL

CONSISTENCY	SPT N-VALUE (blows per foot)	D&M N-VALUE (blows per foot)	POCKET PENETROMETER (unconfined compressive strength [tsf])
Very soft	0 to 2	0 to 3	Less than 0.25
Soft	2 to 4	3 to 6	0.25 to 0.5
Medium stiff	4 to 8	6 to 12	0.5 to 1.0
Stiff	8 to 15	12 to 25	1.0 to 2.0
Very stiff	15 to 30	25 to 65	2.0 to 4.0
Hard	Greater than 30	Greater than 30	Greater than 4.0

RELATIVE DENSITY FOR GRANULAR SOIL

RELATIVE DENSITY	SPT N-VALUE (blows per foot)	D&M N-VALUE (blows per foot)
Very loose	0 to 4	0 to 11
Loose	4 to 10	11 to 26
Medium dense	10 to 30	26 to 74
Dense	30 to 50	74 to 120
Very dense	Greater than 50	Greater than 120

MOISTURE DESIGNATIONS

TERM	FIELD IDENTIFICATION
Dry	Very low moisture, dry to touch
Moist	Damp, color appears darkened, without visible moisture, cohesive soil will clump, sand will bulk
Wet	Visible free water, usually saturated

ADDITIONAL CONSTITUENTS

Percent	SILT AND CLAY IN		Percent	SAND AND GRAVEL IN		Percent	SECONDARY MATERIAL
	Fine-Grained Soil	Coarse-Grained Soil		Fine-Grained Soil	Coarse-Grained Soil		Organics and Man-Made Debris
< 5	trace	trace	< 5	trace	trace	< 4	trace
5 - 12	minor	with	5 - 15	minor	minor	4 - 12	some
> 12	some	silty/clayey	15 - 30	with	with		
			> 30	sandy/gravelly	with		

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TEST PIT NUMBER: TP-1

PROJECT NAME NW 18th Avenue Subdivision
CLIENT Allied Development
PROJECT NO. AlliedDev-1-01-1
PROJECT CITY, STATE Camas, Washington
CONTRACTOR L&S Contractors
DATE COMPLETED 04/29/2025
EQUIPMENT CAT 307E2
TIME STARTED 8:15 AM
LOGGED BY S. Chandra
TIME COMPLETED 8:43 AM

DEPTH (ft)	SAMPLE TYPE	SAMPLE ID	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION	POCKET PEN (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS (LL-PL-PI)	FINES (%)	REMARKS
0 – 1.2					Medium stiff, dark brown sandy CLAY, trace organics, moist, medium plasticity (14-inch-thick tilled zone, 3-inch-thick root zone). 1.2					
1.2 – 14.0			CH		Medium stiff, brown with orange mottled CLAY, minor sand, moist, high plasticity, sand is fine.					
5	Grab	TP1.1					31	62-25-37	89	
					Brown with orange-gray mottles, wet at 8 feet.					
	Grab	TP1.2					29			
14.0					14.0					
					Exploration completed at 14 feet.					
15										

GROUNDWATER: Slow seepage at 8 feet

CAVING: Not observed

BoreDM Template: Test Pit Template - New

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TEST PIT NUMBER: TP-2

PROJECT NAME	NW 18th Avenue Subdivision	**CLIENT**	Allied Development
PROJECT NO.	AlliedDev-1-01-1	**PROJECT CITY, STATE**	Camas, Washington
CONTRACTOR	L&S Contractors	**DATE COMPLETED**	04/29/2025
EQUIPMENT	CAT 307E2	**TIME STARTED**	8:50 AM
LOGGED BY	S. Chandra	**TIME COMPLETED**	9:27 AM

DEPTH (ft)	SAMPLE TYPE	SAMPLE ID	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION	POCKET PEN (tsf)	MOISTURE CONTENT (%)	REMARKS
0–1.5	Grab	TP2.1			Medium stiff, dark brown sandy CLAY, trace organics and gravel, moist, medium plasticity (18-inch-thick tilled zone, 3-inch-thick root zone). 1.5			
1.5–14.0	Grab	TP2.2	CL		Medium stiff, brown with orange mottled CLAY, minor sand, moist, medium plasticity, sand is fine. 14.0		27	
					Exploration completed at 14 feet.			

GROUNDWATER: Not observed

CAVING: Not observed

BoreDM Template: Test Pit Template - New

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TEST PIT NUMBER: TP-3

PROJECT NAME	NW 18th Avenue Subdivision	**CLIENT**	Allied Development
PROJECT NO.	AlliedDev-1-01-1	**PROJECT CITY, STATE**	Camas, Washington
CONTRACTOR	L&S Contractors	**DATE COMPLETED**	04/29/2025
EQUIPMENT	CAT 307E2	**TIME STARTED**	9:30 AM
LOGGED BY	S. Chandra	**TIME COMPLETED**	9:55 AM

DEPTH (ft)	SAMPLE TYPE	SAMPLE ID	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION	POCKET PEN (tsf)	MOISTURE CONTENT (%)	FINES (%)	REMARKS
0–1.5					Medium stiff, dark brown sandy CLAY, trace organics, moist, medium plasticity (18-inch-thick tilled zone, 4-inch-thick root zone). 1.5				
1.5–14.0			CL		Medium stiff, brown with orange mottled CLAY, minor sand, moist, medium plasticity, sand is fine.				
	Grab	TP3.1					29		
	Grab	TP3.2			Wet at 7 feet.		29	90	
14.0					14.0				
					Exploration completed at 14 feet.				

Depth scale: 5, 10, 15

GROUNDWATER: Moderate seepage at 7 feet

CAVING: Not observed

BoreDM Template: Test Pit Template - New

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TEST PIT NUMBER: TP-4

PROJECT NAME NW 18th Avenue Subdivision
CLIENT Allied Development
PROJECT NO. AlliedDev-1-01-1
PROJECT CITY, STATE Camas, Washington
CONTRACTOR L&S Contractors
DATE COMPLETED 04/29/2025
EQUIPMENT CAT 307E2
TIME STARTED 9:58 AM
LOGGED BY S. Chandra
TIME COMPLETED 10:18 AM

DEPTH (ft)	SAMPLE TYPE	SAMPLE ID	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION	POCKET PEN (tsf)	MOISTURE CONTENT (%)	REMARKS
0–1.5	Grab	TP4.1			Medium stiff, dark brown sandy CLAY, trace organics, moist, medium plasticity (18-inch-thick tilled zone, 4-inch-thick root zone). 1.5			
1.5–14.0	Grab	TP4.2	CL		Medium stiff, brown with orange mottled CLAY, minor sand, moist, medium plasticity, sand is fine. 14.0			
					Exploration completed at 14 feet.			

Depth scale marks: 5, 10, 15

GROUNDWATER: Not observed

CAVING: Not observed

BoreDM Template: Test Pit Template - New

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TEST PIT NUMBER: TP-5

PROJECT NAME NW 18th Avenue Subdivision
CLIENT Allied Development
PROJECT NO. AlliedDev-1-01-1
PROJECT CITY, STATE Camas, Washington
CONTRACTOR L&S Contractors
DATE COMPLETED 04/29/2025
EQUIPMENT CAT 307E2
TIME STARTED 10:21 AM
LOGGED BY S. Chandra
TIME COMPLETED 11:30 AM

DEPTH (ft)	SAMPLE TYPE	SAMPLE ID	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION	POCKET PEN (tsf)	MOISTURE CONTENT (%)	FINES (%)	REMARKS
0–1.5					Medium stiff, dark brown sandy CLAY, trace organics, moist, medium plasticity (18-inch-thick tilled zone, 4-inch-thick root zone). 1.5				
2	SH	TP5.1	CL		Medium stiff, brown with orange mottled CLAY, minor sand, moist, low to medium plasticity, sand is fine.	2.5	24	86	Infiltration test at 2 feet.
6	Grab	TP5.2							
14.0					14.0				
					Exploration completed at 14 feet.				

Depth scale: 5, 10, 15

GROUNDWATER: Not observed

CAVING: Not observed

BoreDM Template: Test Pit Template - New

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

TEST PIT NUMBER: TP-6

PROJECT NAME NW 18th Avenue Subdivision
CLIENT Allied Development
PROJECT NO. AlliedDev-1-01-1
PROJECT CITY, STATE Camas, Washington
CONTRACTOR L&S Contractors
DATE COMPLETED 04/29/2025
EQUIPMENT CAT 307E2
TIME STARTED 10:52 AM
LOGGED BY S. Chandra
TIME COMPLETED 11:15 AM

DEPTH (ft)	SAMPLE TYPE	SAMPLE ID	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION	POCKET PEN (tsf)	MOISTURE CONTENT (%)	REMARKS
0–1.5					Medium stiff, dark brown sandy CLAY, trace organics, moist, medium plasticity (18-inch-thick tilled zone, 4-inch-thick root zone). 1.5	1.0		
1.5–15.0			CL		Medium stiff, brown with orange mottled CLAY, minor sand, moist, medium plasticity, sand is fine.			
	Grab	TP6.1					27	
	Grab	TP6.2						
10					With cobbles, cobbles are subrounded and up to 12 inches in diameter at 10 feet. 15.0			Very stiff, difficult excavation at 10 feet.
15					Exploration completed at 15 feet.			

GROUNDWATER: Not observed

CAVING: Not observed

BoreDM Template: Test Pit Template - New

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

TEST PIT NUMBER: TP-7

PROJECT NAME NW 18th Avenue Subdivision
CLIENT Allied Development
PROJECT NO. AlliedDev-1-01-1
PROJECT CITY, STATE Camas, Washington
CONTRACTOR L&S Contractors
DATE COMPLETED 04/29/2025
EQUIPMENT CAT 307E2
TIME STARTED 11:40 AM
LOGGED BY S. Chandra
TIME COMPLETED 12:05 PM

DEPTH (ft)	SAMPLE TYPE	SAMPLE ID	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION	POCKET PEN (tsf)	MOISTURE CONTENT (%)	REMARKS
0–1.5					Medium stiff, dark brown sandy CLAY, trace organics, moist, medium plasticity (18-inch-thick tilled zone, 4-inch-thick root zone). 1.5			
1.5–14.0			CL		Medium stiff, brown with orange mottled CLAY, minor sand, moist, medium plasticity, sand is fine. 14.0			
~2	Grab	TP7.1					28	
~4	Grab	TP7.2						
~12	Grab	TP7.3						

Exploration completed at 14 feet.

GROUNDWATER: Not observed

CAVING: Not observed

BoreDM Template: Test Pit Template - New

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

TEST PIT NUMBER: TP-8

PROJECT NAME	NW 18th Avenue Subdivision	**CLIENT**	Allied Development
PROJECT NO.	AlliedDev-1-01-1	**PROJECT CITY, STATE**	Camas, Washington
CONTRACTOR	L&S Contractors	**DATE COMPLETED**	04/29/2025
EQUIPMENT	CAT 307E2	**TIME STARTED**	12:07 PM
LOGGED BY	S. Chandra	**TIME COMPLETED**	12:24 PM

DEPTH (ft)	SAMPLE TYPE	SAMPLE ID	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION	POCKET PEN (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS (LL-PL-PI)	FINES (%)	REMARKS
0–1.5					Medium stiff, dark brown sandy CLAY, trace organics, moist, medium plasticity (18-inch-thick tilled zone, 4-inch-thick root zone). 1.5					
1.5–5.5	SH	TP8.1	CL		Medium stiff, brown with orange mottled CLAY, minor sand, moist, medium plasticity.		20	32-20-12	86	Infiltration test at 2 feet.
5	Grab	TP8.2			With cobbles and boulders, cobbles are subrounded and up to 12 inches in diameter, boulders are subrounded and up to 36 inches in diameter at 4 feet. Wet at 5.5 feet. 5.5					

Exploration terminated at 5.5 feet due to refusal on boulders.

Depth scale: 5, 10, 15

GROUNDWATER: Perched at 5.5 feet

CAVING: Not observed

BoreDM Template: Test Pit Template - New

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TEST PIT NUMBER: TP-9

PROJECT NAME NW 18th Avenue Subdivision
CLIENT Allied Development
PROJECT NO. AlliedDev-1-01-1
PROJECT CITY, STATE Camas, Washington
CONTRACTOR L&S Contractors
DATE COMPLETED 04/29/2025
EQUIPMENT CAT 307E2
TIME STARTED 12:26 PM
LOGGED BY S. Chandra
TIME COMPLETED 12:40 PM

DEPTH (ft)	SAMPLE TYPE	SAMPLE ID	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION	POCKET PEN (tsf)	MOISTURE CONTENT (%)	FINES (%)	REMARKS
0–1.2					Medium stiff, brown sandy CLAY, trace organics, moist, low plasticity (14 inches of topsoil, 4-inch-thick root zone). 1.2				
1.2–5.5			CL		Medium stiff to stiff, brown with orange mottled CLAY with sand, moist, medium plasticity, sand is fine.				
	Grab	TP9.1				3	24	82	
5					With cobbles and boulders, cobbles are subrounded and up to 12 inches in diameter, boulders are subrounded and up to 24 inches in diameter at 4 feet. 5.5				
	Grab	TP9.1							
					Exploration terminated at 5.5 feet due to refusal on basalt.				
10									
15									

GROUNDWATER: Not observed

CAVING: Not observed

BoreDM Template: Test Pit Template - New

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Columbia West Engineering, Inc

TEST PIT NUMBER: TP-10

PROJECT NAME	NW 18th Avenue Subdivision	**CLIENT**	Allied Development
PROJECT NO.	AlliedDev-1-01-1	**PROJECT CITY, STATE**	Camas, Washington
CONTRACTOR	L&S Contractors	**DATE COMPLETED**	04/29/2025
EQUIPMENT	CAT 307E2	**TIME STARTED**	12:46 PM
LOGGED BY	S. Chandra	**TIME COMPLETED**	1:05 PM

DEPTH (ft)	SAMPLE TYPE	SAMPLE ID	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION	POCKET PEN (tsf)	MOISTURE CONTENT (%)	REMARKS
	Grab	TP10.1			Medium stiff, dark brown sandy CLAY, trace organics, moist, medium plasticity (18-inch-thick tilled zone, 4-inch-thick root zone). 1.5			
			CL		Medium stiff to stiff, brown with orange mottled CLAY, minor sand, moist, medium plasticity.			
5	Grab	TP10.2					29	
					With gravel, cobbles, and boulders, gravel is rounded, cobbles are rounded and up to 12 inches in diameter, boulders are rounded and up to 24 inches in diameter at 6 feet. 7.0			
					Exploration terminated at 7 feet due to refusal on basalt.			
10								
15								

GROUNDWATER: Not observed

CAVING: Not observed

BoreDM Template: Test Pit Template - New

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TEST PIT NUMBER: TP-11

PROJECT NAME NW 18th Avenue Subdivision
CLIENT Allied Development
PROJECT NO. AlliedDev-1-01-1
PROJECT CITY, STATE Camas, Washington
CONTRACTOR L&S Contractors
DATE COMPLETED 04/29/2025
EQUIPMENT CAT 307E2
TIME STARTED 1:10 PM
LOGGED BY S. Chandra
TIME COMPLETED 1:58 PM

DEPTH (ft)	SAMPLE TYPE	SAMPLE ID	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION	POCKET PEN (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS (LL-PL-PI)	FINES (%)	REMARKS
	Grab	TP11.1			Medium stiff, dark brown sandy CLAY, trace organics, moist, medium plasticity (18-inch-thick tilled zone, 4-inch-thick root zone). 1.5					
	SH	TP11.2	CL		Medium stiff to stiff, brown with orange mottled CLAY, minor sand, moist, low plasticity.		26	31-23-8	87	Infiltration test at 2 feet.
	Grab	TP11.3								
5										
	Grab	TP11.4								
10					Very stiff at 10 feet. 12.0					
					Exploration completed at 12 feet.					
15										

GROUNDWATER: Not observed

CAVING: Not observed

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TEST PIT NUMBER: TP-12

PROJECT NAME NW 18th Avenue Subdivision
CLIENT Allied Development
PROJECT NO. AlliedDev-1-01-1
PROJECT CITY, STATE Camas, Washington
CONTRACTOR L&S Contractors
DATE COMPLETED 04/29/2025
EQUIPMENT CAT 307E2
TIME STARTED 2:00 PM
LOGGED BY S. Chandra
TIME COMPLETED 2:15 PM

DEPTH (ft)	SAMPLE TYPE	SAMPLE ID	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION	POCKET PEN (tsf)	MOISTURE CONTENT (%)	REMARKS
0–1.5					Medium stiff, dark brown sandy CLAY, trace organics, moist, medium plasticity (18-inch-thick tilled zone, 4-inch-thick root zone). 1.5			
1.5–5.5			CL		Medium stiff to stiff, brown with orange mottled CLAY, minor sand, moist, medium plasticity, sand is fine.			
5	Grab	TP12.1			With cobbles and boulders, cobbles are rounded and up to 12 inches in diameter, boulders are rounded and up to 24 inches in diameter at 5.5 feet. 5.5			
					Exploration terminated at 5.5 feet due to refusal.			

Depth scale: 5, 10, 15

GROUNDWATER: Not observed

CAVING: Not observed

BoreDM Template: Test Pit Template - New

APPENDIX B

Exhibit 4 SUB25-1009

APPENDIX B
LABORATORY TESTING

GENERAL

Laboratory testing was conducted on select soil samples to confirm field classifications and determine the index engineering properties. The laboratory classifications are shown on the exploration logs if those classifications differed from the field classifications. The locations of the tested samples are shown on the exploration logs. Descriptions of the tests are presented below, and results of the testing are presented in this appendix.

MOISTURE CONTENT

The natural moisture content of select soil samples was determined in general accordance with ASTM D 2216. The natural moisture content is a ratio of the weight of the water to dry soil in a test sample and is expressed as a percentage.

PARTICLE-SIZE ANALYSIS

Particle-size analysis was completed on select soil samples in general accordance with ASTM D1140 (P200). This test is a quantitative determination of the percent passing the U.S. Standard No. 200 sieve by dry weight.

ATTERBERG LIMITS TESTING

Atterberg limits (plastic and liquid limits) testing was performed on select soil samples in general accordance with ASTM D4318. The plastic limit is defined as the moisture content where the soil becomes brittle. The liquid limit is defined as the moisture content where the soil begins to act similar to a liquid. The plasticity index is the difference between the liquid and plastic limits.

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MOISTURE CONTENT, PERCENT PASSING NO. 200 SIEVE BY WASHING

PROJECT	CLIENT	PROJECT NO.	
NW 18th Avenue Subdivision 4511 NW 18th Avenue Camas, Washington	Allied Development 16430 N Scottsdale Road, Suite 210 Scottsdale, AZ 85254	AlliedDev-1-01-1	
		ISSUE DATE: 05/21/25	PAGE: 1 of 1
		DATE SAMPLED: 04/29/25	SAMPLED BY: S. Chandra

LABORATORY TEST DATA

TEST PROCEDURE
ASTM D2216 - Method A, ASTM D1140

LAB ID	CONTAINER MASS (g)	MOIST MASS + CONTAINER (g)	DRY MASS + CONTAINER (g)	AFTER WASH DRY MASS + CONTAINER (g)	FIELD ID	SAMPLE DEPTH (ft)	PERCENT MOISTURE CONTENT	PERCENT PASSING NO. 200 SIEVE
S25-1005	579.10	842.98	781.03	600.63	TP1.1	5	31%	89%
S25-1006	86.86	273.12	230.87	-	TP1.2	12	29%	-
S25-1007	86.63	265.27	227.54	-	TP2.2	3	27%	-
S25-1008	86.51	283.20	239.17	-	TP3.1	4	29%	-
S25-1009	541.75	852.67	782.05	565.74	TP3.2	7	29%	90%
S25-1010	561.52	863.57	805.51	595.62	TP5.1	2	24%	86%
S25-1011	87.29	313.81	265.73	-	TP6.1	3	27%	-
S25-1012	87.75	297.67	251.72	-	TP7.1	2	28%	-
S25-1013	574.83	854.33	807.67	608.39	TP8.1	2	20%	86%
S25-1014	547.98	822.00	769.65	588.87	TP9.1	3	24%	82%
S25-1015	87.15	377.78	311.97	-	TP10.2	4	29%	-
S25-1016	550.38	884.13	816.10	585.65	TP11.2	2	26%	87%

NOTES:	DATE TESTED	TESTED BY
	05/15/25	M. Scherette

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ATTERBERG LIMITS REPORT

PROJECT	CLIENT	PROJECT NO.	
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		ISSUE DATE: 05/21/25	PAGE: 1 of 1
		LAB ID: S25-1005	FIELD ID: TP1.1
		DATE SAMPLED: 04/29/25	SAMPLED BY: S. Chandra

MATERIAL DATA

MATERIAL SAMPLED	MATERIAL SOURCE	USCS SOIL TYPE
CLAY	Test Pit TP-1 depth = 5 feet	no data provided

LABORATORY TEST DATA

LABORATORY EQUIPMENT	TEST PROCEDURE
Liquid Limit Machine, Hand Rolled	ASTM D4318 - Method A

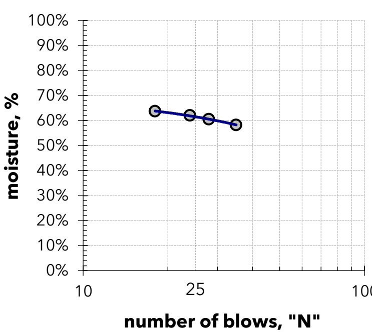
ATTERBERG LIMITS

liquid limit = 62
plastic limit = 25
plasticity index = 37

LIQUID LIMIT DETERMINATION

	❶	❷	❸	❹
wet soil + pan weight, g =	32.15	32.13	31.74	33.38
dry soil + pan weight, g =	27.84	27.76	27.50	28.48
pan weight, g =	20.43	20.54	20.67	20.78
N (blows) =	35	28	24	18
moisture, % =	58.2 %	60.5 %	62.1 %	63.6 %

LIQUID LIMIT



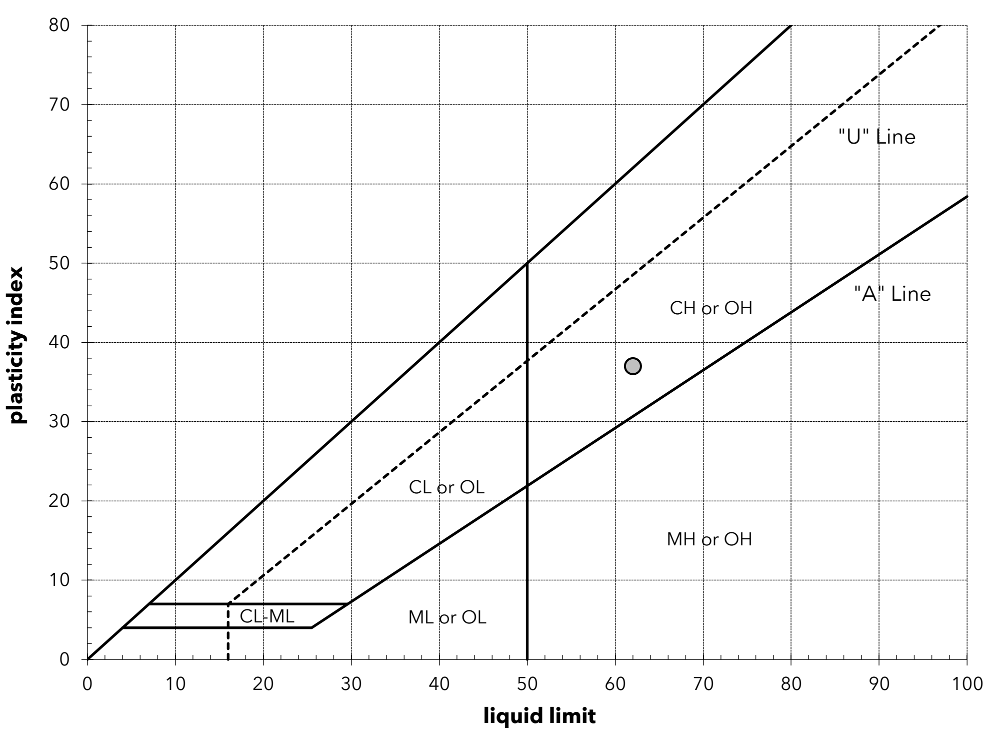
SHRINKAGE

shrinkage limit = n/a
shrinkage ratio = n/a

PLASTIC LIMIT DETERMINATION

	❶	❷	❸	❹
wet soil + pan weight, g =	27.63	27.61		
dry soil + pan weight, g =	26.28	26.16		
pan weight, g =	20.93	20.42		
moisture, % =	25.2 %	25.3 %		

PLASTICITY CHART



ADDITIONAL DATA

% gravel = n/a
% sand = n/a
% silt and clay = n/a
% silt = n/a
% clay = n/a
moisture content = 31%

DATE TESTED	TESTED BY
05/19/25	M. Scherette

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ATTERBERG LIMITS REPORT

PROJECT	CLIENT	PROJECT NO.	
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		ISSUE DATE: 05/21/25	PAGE: 1 of 1
		LAB ID: S25-1013	FIELD ID: TP8.1
		DATE SAMPLED: 04/29/25	SAMPLED BY: S. Chandra

MATERIAL DATA

MATERIAL SAMPLED	MATERIAL SOURCE	USCS SOIL TYPE
CLAY	Test Pit TP-8 depth = 2 feet	no data provided

LABORATORY TEST DATA

LABORATORY EQUIPMENT	TEST PROCEDURE
Liquid Limit Machine, Hand Rolled	ASTM D4318 - Method A

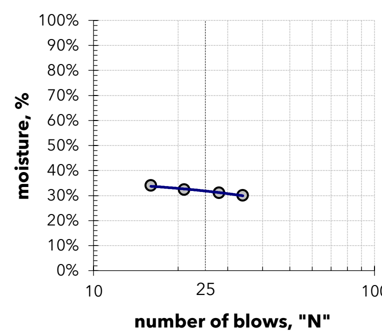
ATTERBERG LIMITS

liquid limit =	32
plastic limit =	20
plasticity index =	12

LIQUID LIMIT DETERMINATION

	❶	❷	❸	❹
wet soil + pan weight, g =	31.49	31.41	33.51	30.55
dry soil + pan weight, g =	29.02	28.81	30.44	28.13
pan weight, g =	20.82	20.43	20.96	21.01
N (blows) =	34	28	21	16
moisture, % =	30.1 %	31.0 %	32.4 %	34.0 %

LIQUID LIMIT



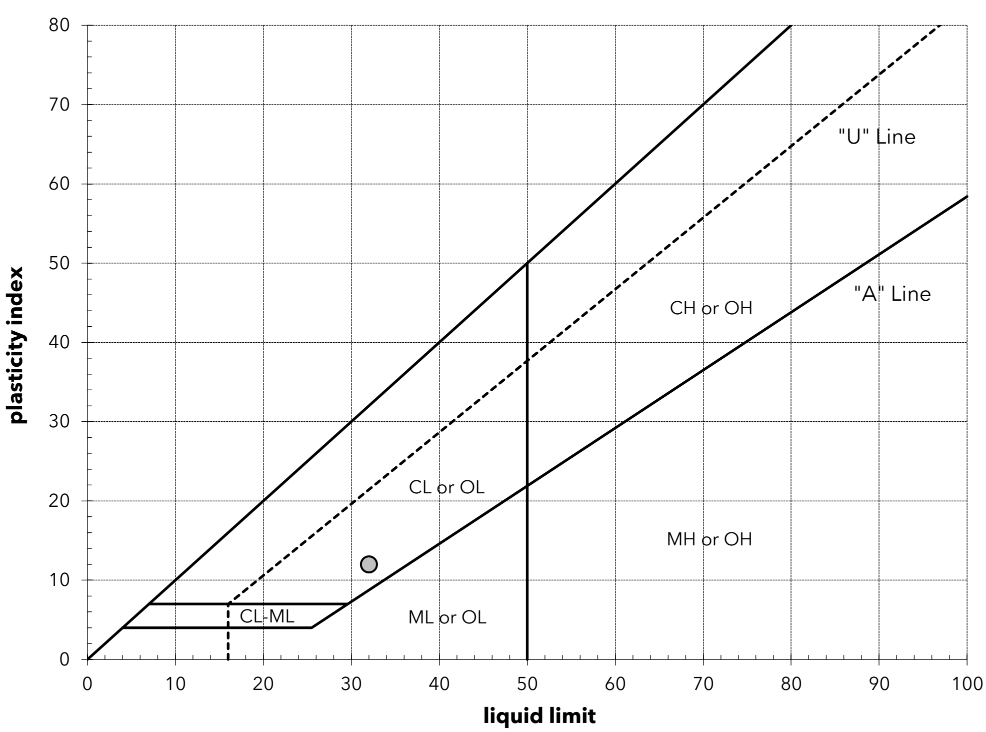
SHRINKAGE

shrinkage limit =	n/a
shrinkage ratio =	n/a

PLASTIC LIMIT DETERMINATION

	❶	❷	❸	❹
wet soil + pan weight, g =	27.24	27.78		
dry soil + pan weight, g =	26.17	26.65		
pan weight, g =	20.87	21.02		
moisture, % =	20.2 %	20.1 %		

PLASTICITY CHART



ADDITIONAL DATA

% gravel =	n/a
% sand =	n/a
% silt and clay =	n/a
% silt =	n/a
% clay =	n/a
moisture content =	20%

DATE TESTED	TESTED BY
05/16/25	G. Hausmann

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ATTERBERG LIMITS REPORT

PROJECT	CLIENT	PROJECT NO.	
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		ISSUE DATE: 05/21/25	PAGE: 1 of 1
		LAB ID: S25-1016	FIELD ID: TP11.2
		DATE SAMPLED: 04/29/25	SAMPLED BY: S. Chandra

MATERIAL DATA

MATERIAL SAMPLED	MATERIAL SOURCE	USCS SOIL TYPE
CLAY	Test Pit TP-11 depth = 2 feet	no data provided

LABORATORY TEST DATA

LABORATORY EQUIPMENT	TEST PROCEDURE
Liquid Limit Machine, Hand Rolled	ASTM D4318 - Method A

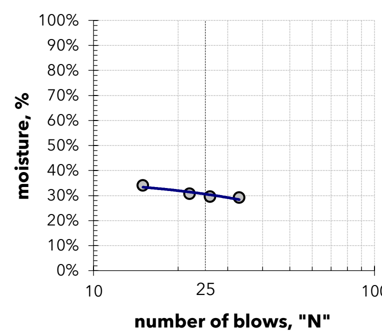
ATTERBERG LIMITS

liquid limit =	31
plastic limit =	23
plasticity index =	8

LIQUID LIMIT DETERMINATION

	❶	❷	❸	❹
wet soil + pan weight, g =	30.63	35.01	31.06	32.49
dry soil + pan weight, g =	28.33	31.77	28.70	29.56
pan weight, g =	20.43	20.81	21.02	20.96
N (blows) =	33	26	22	15
moisture, % =	29.1 %	29.6 %	30.7 %	34.1 %

LIQUID LIMIT



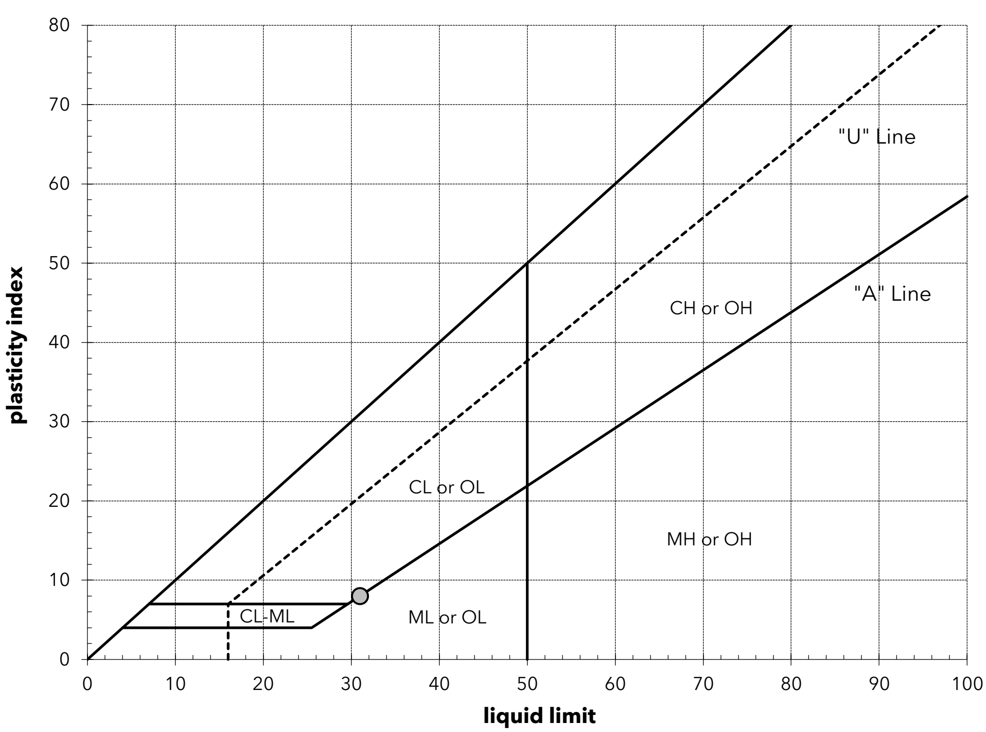
SHRINKAGE

shrinkage limit =	n/a
shrinkage ratio =	n/a

PLASTIC LIMIT DETERMINATION

	❶	❷	❸	❹
wet soil + pan weight, g =	28.99	29.48		
dry soil + pan weight, g =	27.46	27.90		
pan weight, g =	20.87	21.02		
moisture, % =	23.2 %	23.0 %		

PLASTICITY CHART



ADDITIONAL DATA

% gravel =	n/a
% sand =	n/a
% silt and clay =	n/a
% silt =	n/a
% clay =	n/a
moisture content =	26%

DATE TESTED	TESTED BY
05/19/25	G. Hausmann

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APPENDIX C

APPENDIX C
REPORT LIMITATIONS AND IMPORTANT INFORMATION

Report Purpose, Use, and Standard of Care

This report has been prepared in accordance with standard fundamental principles and practices of geotechnical engineering and/or environmental consulting, and in a manner consistent with the level of care and skill typical of currently practicing local engineers and consultants. This report has been prepared to meet the specific needs of specific individuals for the indicated site. It may not be adequate for use by other consultants, contractors, or engineers, or if change in project ownership has occurred. It should not be used for any other reason than its stated purpose without prior consultation with Columbia West Engineering, Inc. (Columbia West). It is a unique report and not applicable for any other site or project. If site conditions are altered, or if modifications to the project description or proposed plans are made after the date of this report, it may not be valid. Columbia West cannot accept responsibility for use of this report by other individuals for unauthorized purposes, or if problems occur resulting from changes in site conditions for which Columbia West was not aware or informed.

Report Conclusions and Preliminary Nature

This geotechnical or environmental report should be considered preliminary and summary in nature. The recommendations contained herein have been established by engineering interpretations of subsurface soils based upon conditions observed during site exploration. The exploration and associated laboratory analysis of collected representative samples identifies soil conditions at specific discreet locations. It is assumed that these conditions are indicative of actual conditions throughout the subject property. However, soil conditions may differ between tested locations at different seasonal times of the year, either by natural causes or human activity. Distinction between soil types may be more abrupt or gradual than indicated on the soil logs. This report is not intended to stand alone without understanding of concomitant instructions, correspondence, communication, or potential supplemental reports that may have been provided to the client.

Because this report is based upon observations obtained at the time of exploration, its adequacy may be compromised with time. This is particularly relevant in the case of natural disasters, earthquakes, floods, or other significant events. Report conclusions or interpretations may also be subject to revision if significant development or other manmade impacts occur within or in proximity to the subject property. Groundwater conditions, if presented in this report, reflect observed conditions at the time of investigation. These conditions may change annually, seasonally or as a result of adjacent development.

Additional Investigation and Construction Observation

Columbia West should be consulted prior to construction to assess whether additional investigation above and beyond that presented in this report is necessary. Even slight variations in soil or site conditions may produce impacts to the performance of structural facilities if not adequately addressed. This underscores the importance of diligent construction observation and testing to verify soil conditions do not differ materially or significantly from the interpreted conditions utilized for preparation of this report.

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Therefore, this report contains several recommendations for field observation and testing by Columbia West personnel during construction activities. Actual subsurface conditions are more readily observed and discerned during the earthwork phase of construction when soils are exposed. Columbia West cannot accept responsibility for deviations from recommendations described in this report or future performance of structural facilities if another consultant is retained during the construction phase or Columbia West is not engaged to provide construction observation to the full extent recommended.

Collected Samples

Uncontaminated samples of soil or rock collected in connection with this report will be retained for thirty days. Retention of such samples beyond thirty days will occur only at client's request and in return for payment of storage charges incurred. All contaminated or environmentally impacted materials or samples are the sole property of the client. Client maintains responsibility for proper disposal.

Report Contents

This geotechnical or environmental report should not be copied or duplicated unless in full, and even then only under prior written consent by Columbia West, as indicated in further detail in the following text section entitled Report Ownership. The recommendations, interpretations, and suggestions presented in this report are only understandable in context of reference to the whole report. Under no circumstances should the soil boring or test pit excavation logs, monitor well logs, or laboratory analytical reports be separated from the remainder of the report. The logs or reports should not be redrawn or summarized by other entities for inclusion in architectural or civil drawings, or other relevant applications.

Report Limitations for Contractors

Geotechnical or environmental reports, unless otherwise specifically noted, are not prepared for the purpose of developing cost estimates or bids by contractors. The extent of exploration or investigation conducted as part of this report is usually less than that necessary for contractor's needs. Contractors should be advised of these report limitations, particularly as they relate to development of cost estimates. Contractors may gain valuable information from this report, but should rely upon their own interpretations as to how subsurface conditions may affect cost, feasibility, accessibility and other components of the project work. If believed necessary or relevant, contractors should conduct additional exploratory investigation to obtain satisfactory data for the purposes of developing adequate cost estimates. Clients or developers cannot insulate themselves from attendant liability by disclaiming accuracy for subsurface ground conditions without advising contractors appropriately and providing the best information possible to limit potential for cost overruns, construction problems, or misunderstandings.

Report Ownership

Columbia West retains the ownership and copyright property rights to this entire report and its contents, which may include, but may not be limited to, figures, text, logs, electronic media, drawings, laboratory reports, and appendices. This report was prepared solely for the client, and other relevant approved users or parties, and its distribution must be contingent upon prior express written consent by Columbia West. Furthermore, client or approved users may not use, lend, sell, copy, or distribute this document without express written consent by Columbia West.

Exhibit 4 SUB25-1009

Client does not own nor have rights to electronic media files that constitute this report, and under no circumstances should said electronic files be distributed or copied. Electronic media is susceptible to unauthorized manipulation or modification, and may not be reliable.

Consultant Responsibility

Geotechnical and environmental engineering and consulting is much less exact than other scientific or engineering disciplines, and relies heavily upon experience, judgment, interpretation, and opinion often based upon media (soils) that are variable, anisotropic, and non-homogenous. This often results in unrealistic expectations, unwarranted claims, and uninformed disputes against a geotechnical or environmental consultant. To reduce potential for these problems and assist relevant parties in better understanding of risk, liability, and responsibility, geotechnical and environmental reports often provide definitive statements or clauses defining and outlining consultant responsibility. The client is encouraged to read these statements carefully and request additional information from Columbia West if necessary.