GT_002570

LaVIELLE GEOTECHNICAL P.C.

2313 NE Alameda
Portland, Oregon 97212
(503) 287-0511, Fax 282-7671

October 3, 2000

Our ref: 00-1513.001

North Plateau, Inc.
P.O. Box 5173
Bend, Oregon 97708-5173

01-101592 RS

Attention: Bill Whitford

RE: GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED GARAGE AND HOUSE ADDITION
2921 NW FAIRFAX TERRACE
PORTLAND, OREGON

1N1E 32 AB 07900
2925/4

Dear Bill:

LaVielle Geotechnical, P.C. is pleased to present the results of our geotechnical engineering investigation for the new garage and house addition. The property is located at 2921 NW Fairfax, in Portland, Oregon. The approximate location of the site is shown on the Vicinity Map, Figure 1. We have proceeded with this investigation on the basis of your written authorization.

Site Description

The project includes a new two-car garage on the west side and a new addition to the rear (north) of the existing residence. The ground surface slopes downward from elevation 358 feet to 344 feet in approximately 24 feet in the area of the proposed garage.

Subsurface Exploration

The subsurface conditions were investigated on the site on September 25, 2000. We completed 3 borings in the soils on the slope. The borings was drilled with a solid stem 4-inch diameter auger. The approximate locations of the borings are shown on the Site Plan, Figure 2. Bulk soil samples were retrieved from the cuttings of the auger.

Our borings encountered a thin layer of topsoil over the a dense to very dense, light brown, slightly cemented, rounded Sand and Gravel, with some cobbles, conglomerate locally called the Troutdale Formation. Borings B-1, B-2 and B-3, are located as shown on the attached Site Plan, Figure 2. In all 3 borings we encountered 1 foot of soft, brown, Silty

PLEASE ADD TO DB AND FILE

APPL WILL BE IN SOON WITH REVISIONS

Sand Topsoil. Beneath the 1-foot of Topsoil we found Dense to Very Dense Troutdale to a depth of 10 feet where we met refusal.

Groundwater was not encountered at the site. The depth to groundwater and the amount of seepage encountered in excavations on this site are expected to fluctuate with changing seasons and local rainfall.

Geotechnical Engineering Conclusions and Recommendations

In general the site can be developed as planned. The Dense to Very Dense Sand and Gravel, (Troutdale Formation) are suitable for foundation bearing. We recommend that all foundations on this site be supported by conventional concrete foundations. The geotechnical engineering details for foundation design are presented below.

Conventional Spread Foundations

The Dense to Very Dense Sand and Gravel, (Troutdale Formation) found at depths of 2 feet or more is adequate to support structures with shallow conventional isolated or continuous spread footings. Foundations should not be founded on structural fill at this site. Foundations should not be founded in the Topsoil unit. Spread footings should be designed based on the following recommended values.

Maximum Allowable Bearing Pressures:

3,500 psf	Undisturbed Dense Sand & Gravel (Troutdale)
Not Recommended	Compacted Fill
Unsuitable	Topsoil Unit (uppermost 6 to 12 inches of soil onsite)

These values may be increased by 1/3 for short-term wind and seismic loading.

Minimum Setback from Downward Slope Faces:

Foundations shall be setback from the descending slope face to a allow a imaginary line to be drawn from the outside edge of the footing to the base of the slope. The imaginary line shall have an inclination of 2H:1V.

Lateral Load Resistance:

Allowable Passive Resistance:

Dense Sand & Gravel (Troutdale)	200 pcf Equivalent fluid (Includes 77% reduction for slope)
Coefficient of Friction:	0.4 in Sand & Gravel

Note: The values for lateral load resistance do not include any factor of safety. The top foot of depth should be neglected in design computations of the passive capacity unless the soil is confined beneath a pavement or slab.

Estimated Settlement:

Total Settlement:	3/4 inches
Differential Settlement:	1/2 inch

Retaining Walls

Any of the belowgrade walls must be designed as retaining walls. We recommend the belowgrade walls be designed as conventional reinforced concrete retaining walls supported on shallow spread footings. The retaining walls should be designed and constructed to prevent the build-up of hydrostatic pressure behind the wall. The recommended lateral earth pressure presented below is based on a horizontal backfill. Any other loads, such as those imposed by a sloping backfill, vehicles, equipment, materials or excavation spoils should be added to the lateral earth pressures presented here. The wall backfill should be a clean free draining sand and gravel, compacted to a density within a range of 90 to 95 percent of the ASTM D 1557. Greater densities in the compacted fill should be avoided as they may result in increased lateral loads on the wall. Retaining walls should be designed and constructed in accordance with the following recommendations:

Lateral Earth Pressure:

Walls Free to Rotate at the Top:	35 pcf	equivalent fluid
Walls Fixed at the Top: (Walls designed to move less than 0.001 of their height)	55 pcf	equivalent fluid

Seismic Design

The Uniform Building Code (UBC) rating for this area is seismic zone 3 with the design earthquake magnitude of 6.5 to 7 and peak bedrock accelerations of 0.22g. The design earthquake is based on event with a 10 percent chance of being exceeded in 50 years (recurrence interval of 475 years). The thin layer of soft sediments is not expected to dampen the bedrock accelerations. We recommend a UBC a site coefficient of S1, a seismic zone factor Z = 0.3 and a site coefficient S_D.

Liquefaction

Liquefaction can be defined as the sudden loss of shear strength in a soil due to excessive buildup of pore water pressure during a seismic event. Liquefied layers densify as excess pore pressures dissipate, which can result in surface settlement, sand boils or ejections, and/or lateral spreading.

Our liquefaction analysis, based on the test boring data indicates a portion of the silts and fine sands on this site are not susceptible to liquefaction. We conservatively estimate that up to 1 to 2 inches of lateral spreading induced site settlements could occur during the design earthquake. This estimate of settlement is based on a worst case scenario. In our opinion the risk is relatively low that liquefaction induced settlements will exceed 1/2 inches.

Earthworks

In general the soils onsite well suited for use in structural fills. Filling on this site is not recommended. If Fills are planned we recommend they be supported by a retaining wall.

If fill material is imported to the site we recommend the import material should be a clean sand and gravel that contains less than 5% passing the No. 200 sieve, based on the minus 3/4 inch fraction. This type of material can typically be placed and compacted in wet weather conditions.

Any fill placed should be placed in maximum 8 inch loose lifts and compacted to at least 95% of the ASTM D 1557 laboratory standard. We recommend a vibratory roller be used to compact the imported granular fills. If density tests taken in the fills indicate compaction is not be being achieved, the fill should be scarified, moisture conditioned and recompacted.

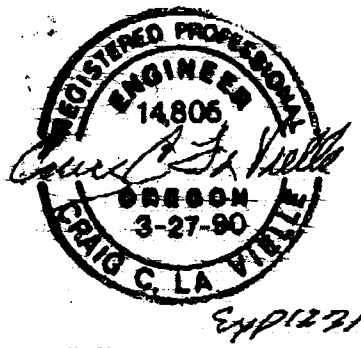
Closure

This report has been prepared exclusively for the use of North Plateau, Inc. for specific application to this project. This exploration was performed in general accordance with locally accepted geotechnical engineering practice to provide information for the area explored.

We are available to discuss any questions you may have concerning this report.

Sincerely,

LaVIELLE GEOTECHNICAL, P.C.



Craig C. LaVielle, P.E.
Principal

Vicinity Map, Figure 1

LaVIELLE GEOTECHNICAL, P.C.

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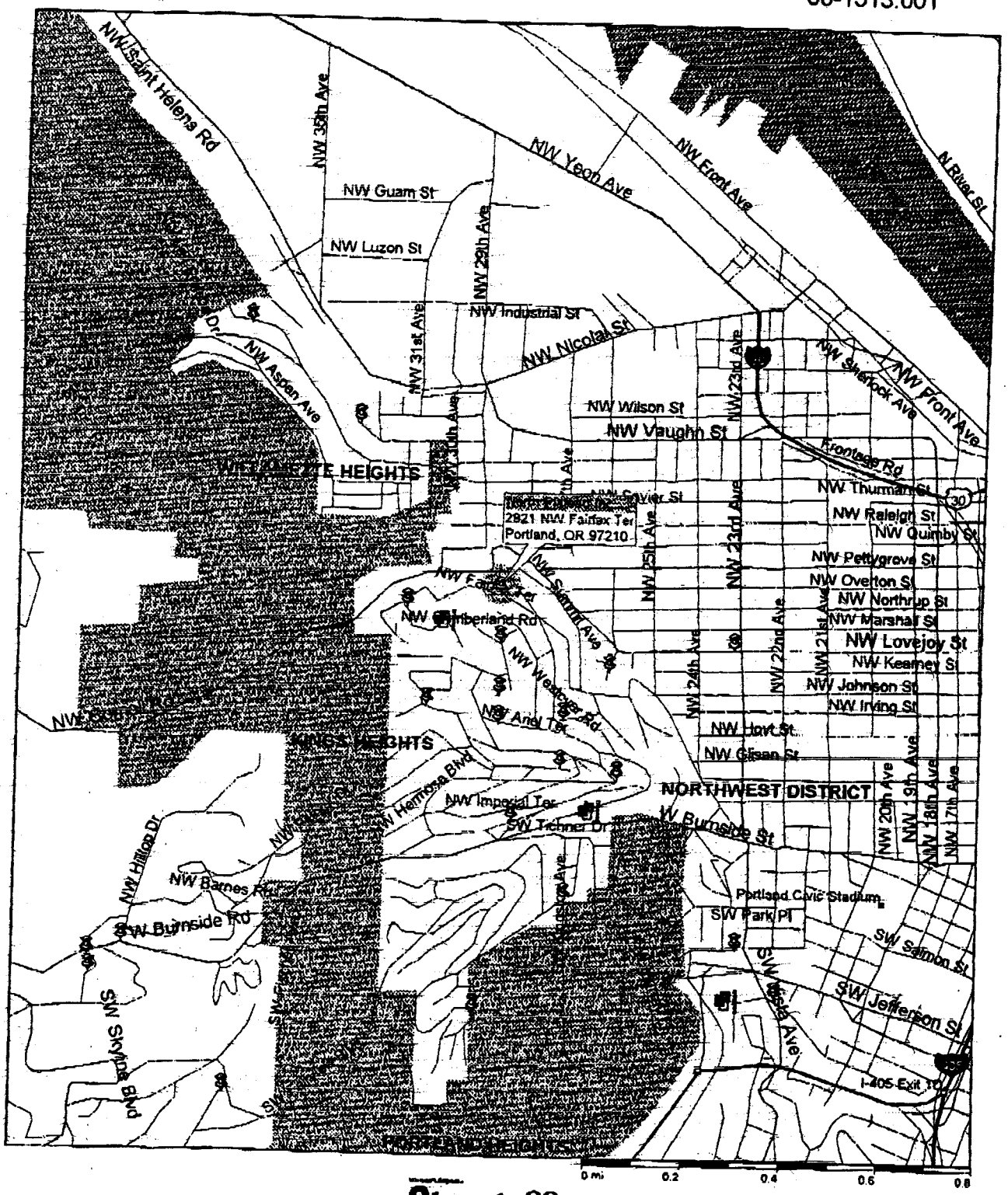
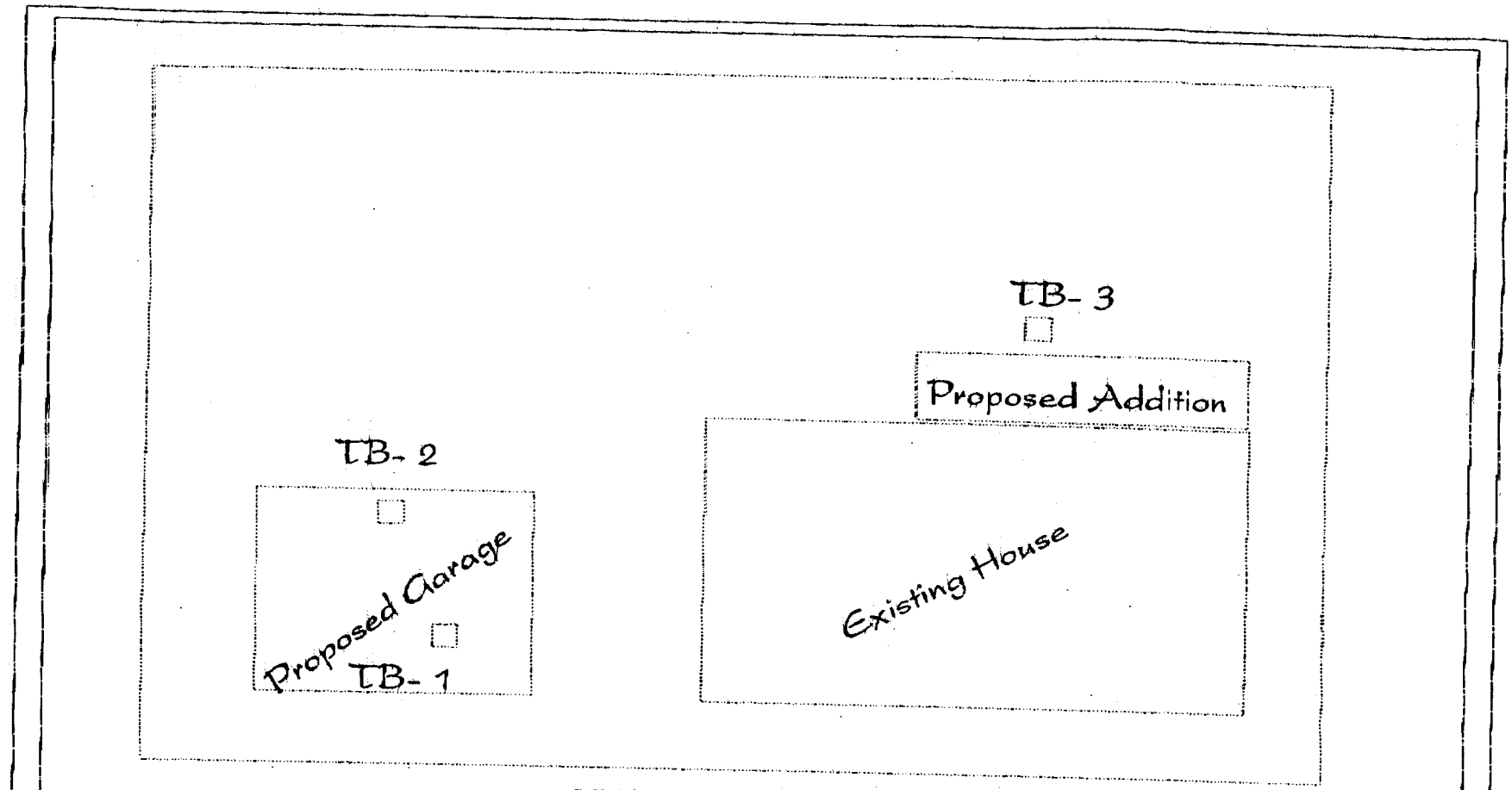


2821 NW Fairfax Ter
Portland, OR 97210

Streets98



Site Plan, Figure 2
2921 NW Fairfax Terrace
Portland, Oregon

LaVielle Geotechnical P.C.

PROJECT: Fairfax Property
LOCATION: 7921 NW Fairfax
Portland, Oregon
PENETRATION TEST HAMMER: 140 LBS.

RECORD OF BOREHOLE B-1

BORING DATE: 9/6/00

SHEET 1 OF 1
DATUM: MSL

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft.)	SAMPLES: NUMBER	TYPE	BLOWS	DYNAMIC PENETRATION RESISTANCE, BLOWS/ft. (10 20 30 40)	WATER CONTENT, PERCENT (Wp — Wc — Wl)	ADDITIONAL LAB TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0.0	4-inch Solid Stem Auger	Very Soft, Dark Brown, Silty Sand, with forest litter (TOPSOIL)		0.0							
1.0		Dense to Very Dense, Lt. Brown, Sand and Gravel, with some Cobbles (Troutdale Formation)		1.0							
9.0		Boring Terminated Due to Refusal at Depth of 8.5 feet		8.5							

DEPTH SCALE
1 inch to 2.5 feet

LaVIELLE GEOTECHNICAL, P.C.

PROJECT: Fairfax Property

LOCATION: 2921 NW Fairfax
Portland, Oregon

RECORD OF BOREHOLE B-2

SHEET 1 OF 1

PENETRATION TEST HAMMER: 140 LBS. BORING DATE: 7/31/00 DATUM: MSL

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft.)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS	DYNAMIC PENETRATION RESISTANCE, BLOWS/ft. (10 20 30 40)	WATER CONTENT, PERCENT (WP — Wc — WL)	ADDITIONAL LAB TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0.0	4-Inch solid stem Auger	Very Soft, Dark Brown, Silty Sand, with forest litter (TOPSOIL)		0.0							
1.0		Dense to Very Dense, Lt. Brown, Sand and Gravel, with some Cobbles (Troutdale Formation)		1.0							
9.0		Boring Terminated Due To Refusal at Depth of 8.5 feet		8.5							

DEPTH SCALE
1 inch to 2.5 feet

LaVIELLE GEOTECHNICAL, P.C.

PROJECT: Fairfax Property
LOCATION: 2921 NW Fairfax, Portland, Oregon
PENETRATION TEST HAMMER: 140 LBS.

RECORD OF BOREHOLE B-3

BORING DATE: 9/8/00
SHEET 1 OF 1
DATUM: MSL

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft.)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS	DYNAMIC PENETRATION RESISTANCE, BLOWS/ft. 10 20 30 40	WATER CONTENT, PERCENT Wp Wc Wl	ADDITIONAL LAB TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0.0	4-inch Solid Stem Auger	Very Soft, Dark Brown, Silty Sand, with forest litter (TOPSOIL)		0.0							
1.0		Dense to Very Dense, Lt. Brown, Sand and Gravel, with some Cobbles (Troutdale Formation)		1.0							
4.5		Boring Terminated Due to Refusal at Depth of 4.5 feet		4.5							

DEPTH SCALE
1 inch to 2.5 feet

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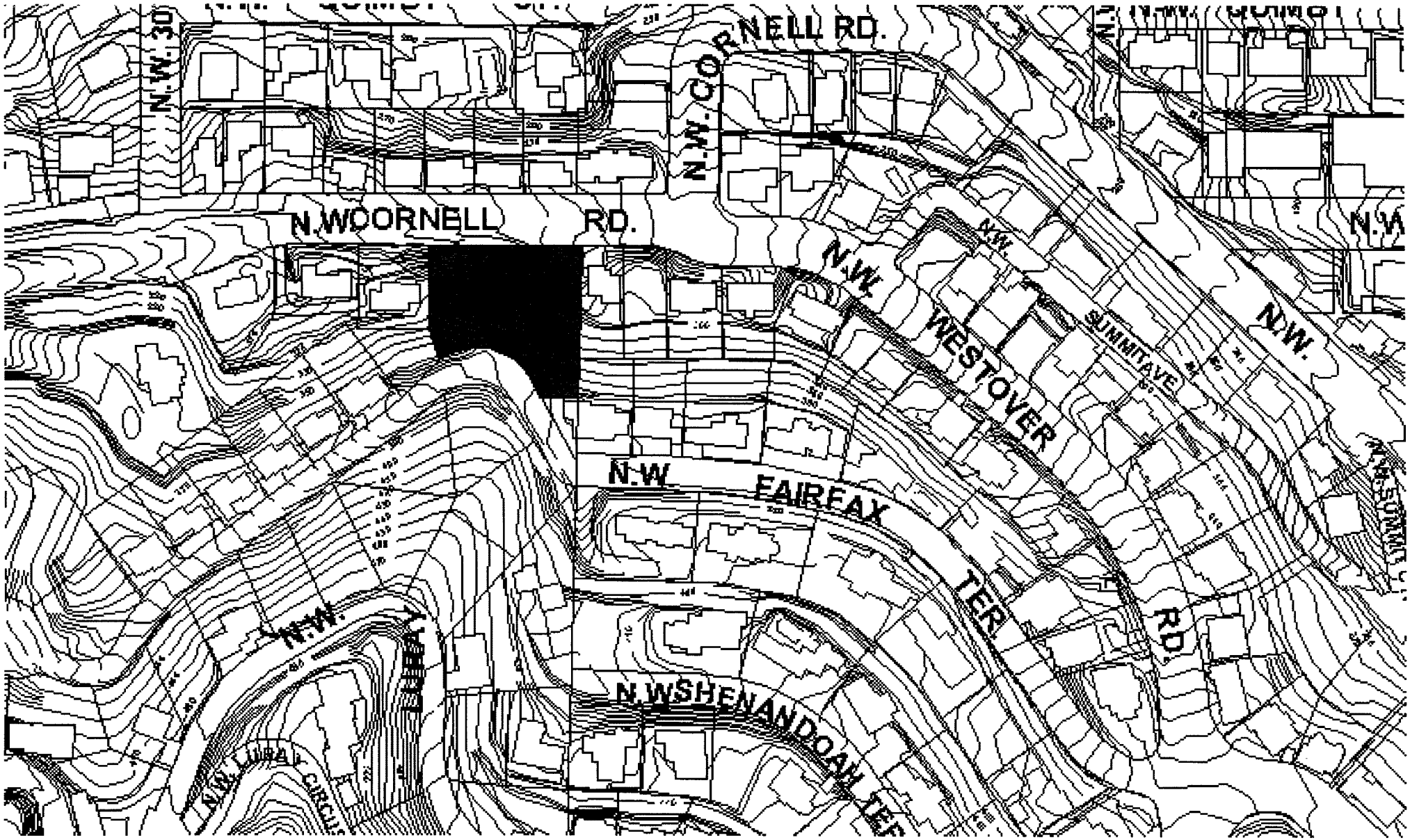
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SUMMIT AVE
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