

**PHASE V ENVIRONMENTAL SOIL REPORT
HOYT STREET YARDS, PORTLAND, OREGON**

Prepared for

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1 INTRODUCTION

This report summarizes soil characterization and laboratory data that relates to the subsurface conditions in the Phase V area of the Hoyt Street Yards development. Figure 1 shows the Phase V area in relation to the entire Hoyt Street Yards development. The data included in this report was collected during two subsurface test pit investigations that were conducted by EMCON, Inc. (EMCON) in 1998 and Anchor Environmental, L.L.C. (Anchor) in 2005. The test pit locations from each of these investigations are shown on Figure 2.

2 SUBSURFACE WOODWASTE

Observations recorded while excavating the thirty-two test pits completed in 1998, indicate that Phase V is underlain by a surface layer of soil fill, which is comprised of a heterogeneous mixture of silt, sand, and gravel. The soil fill unit overlies a layer of sawdust mixed with wood debris. The sawdust/wood layer overlies a clayey-silt unit. The clayey-silt unit may represent the original ground surface prior to industrial development. Historic records indicate that there was a lumber mill located in the area, and the sawdust/wood debris from the mill was likely used as fill, prior to placement of the overlying soil fill.

Anchor Environmental, LLC (Anchor) completed additional test pit subsurface characterization of the fill materials in June, 2005. The depth and thickness of the woodwaste vary greatly across the Phase V area. Subsurface profiles AA' through GG' are shown on Figures 3 through 9. The profiles show the estimated depth and thickness of the woodwaste across key sections of the Phase V area. Figure 2 identifies the location of each of these sections.

The test pit logs from the two investigations indicate that the woodwaste varies in thickness from 1.0 to 10.0 feet. The test pit logs indicate that the upper contact between the overlying fill (sand, silt, and gravel) and the woodwaste varies from 3.0 to 14.0 feet below ground surface (bgs). The test pit logs indicate that the contact between the woodwaste and the underlying clayey-silt varies in depth from 8.0 to 17.0 feet bgs. It must be noted that the 1998 test pits were completed to a maximum depth of 15.0 feet bgs; therefore, the lower extent of the woodwaste was not identified in all test pit locations.

3 SOIL FILL AND WOODWASTE LAB TEST RESULTS

Soil fill and woodwaste samples were collected and submitted for laboratory analysis from the 2005 Anchor test pits and the 1998 EMCON test pits. This section provides a brief summary of the data from each of these investigations.

3.1 2005 Anchor Test Pit Investigation

On June 24, 2005 Anchor collected samples from five test pits with a backhoe and operator provided by Westech Construction. Two samples were collected from both the soil fill and the woodwaste layers, for a total of four samples from each test pit. The samples were analyzed for total lead, PAHs, and diesel and oil range hydrocarbons. Table 1 summarizes the analytical data for the samples. The locations of these five test pits are shown on Figure 2.

3.1.1 Soil Results

Composite soil samples collected from 0-5 feet bgs at test pit locations AB-3, AB-4, AB-5, and AB-7 exceed the ON-1 criteria and are classified ON-2. Composite soil samples collected from 5-8 feet bgs at test pit locations AB-2 and AB-7 are also classified ON-2.

3.1.2 Woodwaste Results

A review of the test pit data indicates that PAHs were not detected in the samples collected from the subsurface woodwaste. Diesel, oil range hydrocarbons, and lead were detected in selected woodwaste samples; however, the concentrations were low and woodwaste was classified ON-1.

3.2 1998 EMCON Test Pit Investigation

In October 1998, EMCON collected samples from thirty-two test pits in the Phase V area of the site. The samples were submitted for laboratory analysis of total lead, PAHs, and semi-volatile petroleum hydrocarbons.

Laboratory detection limits for selected PAHs in the 1998 data were higher than the current site criteria for ON-1 soils; therefore, samples that were reported as non-detect may have exceeded the ON-1 criteria.

4 SUMMARY OF SOIL CLASSIFICATION FINDINGS

Figure 10 shows which test pits contained soil samples that are classified ON-2 at the depth intervals of 0 to 5, 5 to 10, and 10 to 15 ft bgs. The ON-2 designations on Figure 10 are based on exceedences of the petroleum hydrocarbon, PAH, and/or lead criteria. The information on Figure 10 is intended to give a general indication of the widespread occurrence of ON-2 soil in Phase V, and cannot be relied upon between boring locations. A detailed assessment of the volume of ON-2 soil in the Phase V area would require additional sampling and laboratory testing. Much of the data used to develop Figure 10 is based on the results of the 1998 field investigation, during which different laboratory testing methods were used than for the 2005 investigation. Therefore the data from the 1998 investigation are not as reliable as the data from the 2005 investigation. However, the total database is useful for providing the general conclusion that ON-2 soil will be encountered in pockets throughout the Phase V area, especially in the zone from the surface down to five feet below ground.

5 OTHER FINDINGS THAT IMPACT DESIGN AND CONSTRUCTION

The 1998 investigation report also described the observation of free-phase petroleum floating on the water table in test pit EB 23F, located in block 23. The oil was encountered on the water table at a depth of approximately 12 feet bgs.

The presence of free petroleum on the water table, or the presence of dissolved petroleum in the groundwater will likely require treatment of construction dewatering discharges during installation of building foundations and subsurface utilities in some areas. Subsurface excavations should be scheduled for late summer or fall whenever possible, to minimize the volume of water produced during dewatering operations.

The presence of petroleum in the groundwater will also require treatment of groundwater produced from permanent subgrade foundation drains in the Phase V area. Even in the absence of petroleum hydrocarbons it is possible that the presence of other constituents, such as dissolved iron, could require treatment of subgrade drainage, with discharge under an NPDES permit. This would require a permitting effort similar to the ones currently underway for the buildings on blocks 9 and 16.

Anchor has also done a preliminary assessment of possible ways to cheaply dispose of the woodwaste material when it is excavated during future construction in Phase V. We have looked for possible markets to recycle the woodwaste as landscaping material, or as a possible supplementary boiler fuel for industrial use. We also evaluated the possibility of using the woodwaste as intermittent cover at a local landfill.

Those evaluations did not reveal any simple cost effective disposal option for the woodwaste. This is mainly because the woodwaste rapidly decomposes after it is excavated and exposed to the atmosphere. Therefore it would have poor value as landscaping material and the BTU value would be too low to use as boiler fuel.

Therefore, the cheapest feasible disposal option will likely be landfill disposal.

6 REFERENCE

Emcon, Inc. December 18, 1998. "Results of Phase 2 Supplemental Soil Investigation". Prepared for Hoyt Street Developments, Portland, Oregon.

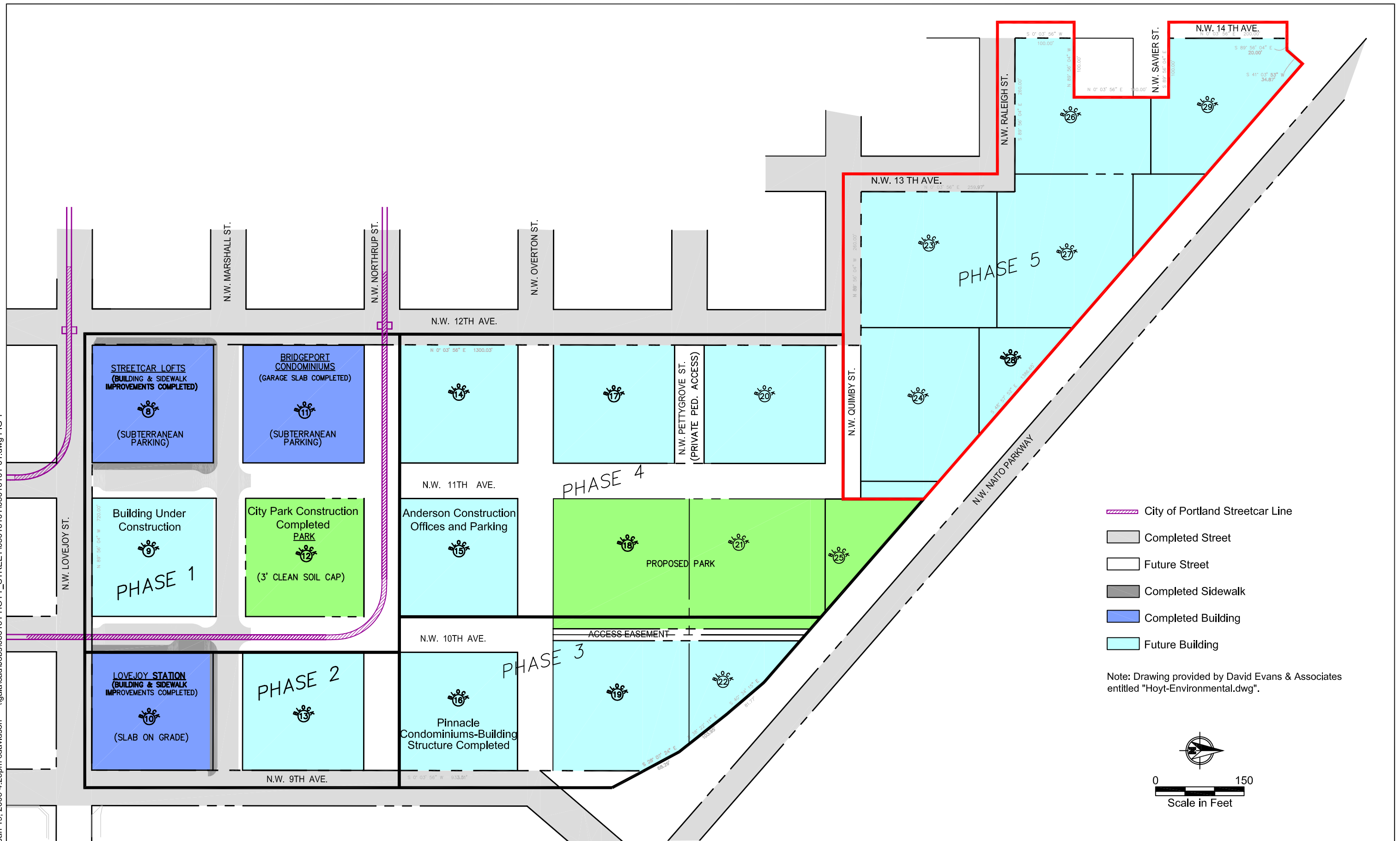
TABLES

TABLE 1
SOIL ANALYTICAL RESULTS
2005 TEST PITS
HOYT STREET PROPERTIES PHASE V
PORTLAND, OREGON

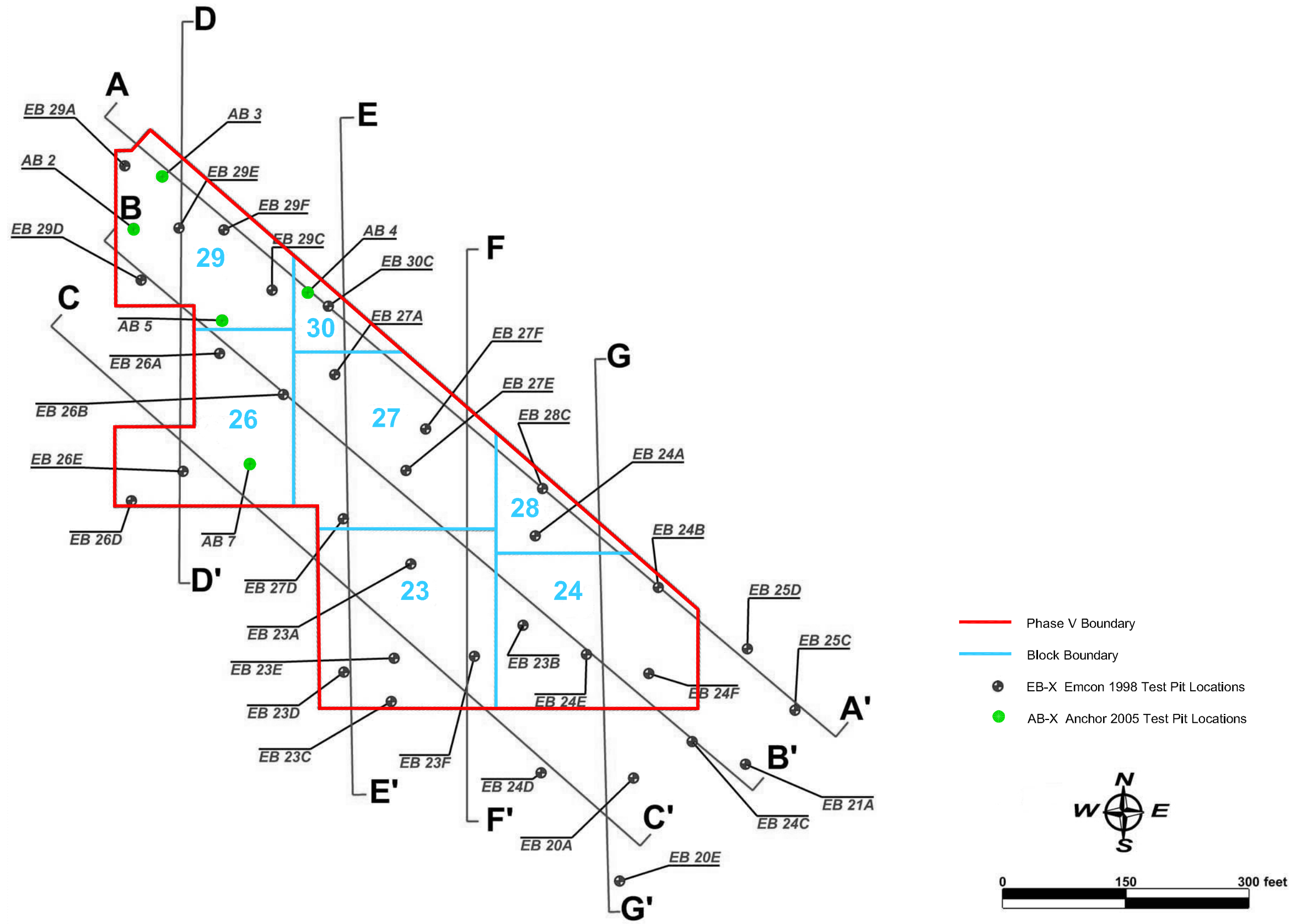
Contaminant of Concern (units)				Lead (mg/kg)	Benzo(a)anthracene (µg/kg)	Chrysene (µg/kg)	Benzo(b)fluoranthene (µg/kg)	Benzo(k)fluoranthene (µg/kg)	Benzo(a)pyrene (µg/kg)	Dibenzo(a,h)anthracene (µg/kg)	Indeno(1,2,3-cd)pyrene (µg/kg)	Total Petroleum Hydrocarbons (mg/kg)
ON-1 Criteria				< 400	< 390	<38,700	<390	<3870	<40	<50	<390	<700
ON-2 Criteria				400 - 2000	390-11,000	38,700-1,106,000	390-11,000	3,870-110,000	40-1100	50-1900	390-11,100	700-41,000
Test Pit Identification	Depth Interval (feet bgs)	Description	Sample Date									
AB-2	0-5	Soil	06/24/05	43.2	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	86.1 U
AB-2	5-8	Soil	06/24/05	39.5	82	111	88.7	30	102	16	40	82.6 U
AB-2	9-13	Woodwaste	06/24/05	1.96 U	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	257.3 U
AB-2	13-14.5	Woodwaste	06/24/05	5.19	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	254.8 U
AB-3	0-5	Soil	06/24/05	204	37.3	49.3	52.7	15.3	39.3	13.3	30	1056
AB-3	5-8	Soil	06/24/05	26.9	6.67 U	6.67 U	9.33	6.67 U	6.67 U	6.67 U	6.67 U	228.3
AB-3	8-10	Woodwaste	06/24/05	2.42	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	375.7 U
AB-3	14-16	Woodwaste	06/24/05	3.99	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	230.2 U
AB-4	0-5	Soil	06/24/05	89.8	131	125	327	94	257	74.7	230	362.4
AB-4	5-6	Soil	06/24/05	27.2	28.7	27.3	32	10.7	26.7	6.67 U	12	130.5
AB-4	6-8	Woodwaste	06/24/05	3.57	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	379.7 U
AB-4	11-13	Woodwaste	06/24/05	1.82 U	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	243.2 U
AB-5	0-5	Soil	06/24/05	129	67.3	78.7	172	46	149	29.3	84.7	378.9
AB-5	5-10	Soil	06/24/05	53.6	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	85.5 U
AB-5	11-13	Woodwaste	06/24/05	7.82	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	314.5 U
AB-5	15-17	Woodwaste	06/24/05	1.69 U	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	244.3
AB-7	0-5	Soil	06/24/05	155	109	107	127	42	115	22	52.7	368.3
AB-7	5-8	Soil	06/24/05	78.8	107	96.7	129	42	113	18.7	50	86.9 U
AB-7	8-10	Woodwaste	06/24/05	1.96 U	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	398.8
AB-7	12-14	Woodwaste	06/24/05	1.54 U	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	6.67 U	257.5 U
Notes: U = not detected at method reporting limit. Non-shaded cells indicate ON-1 Classification. Shaded cells indicate ON-2 Classification												

FIGURES

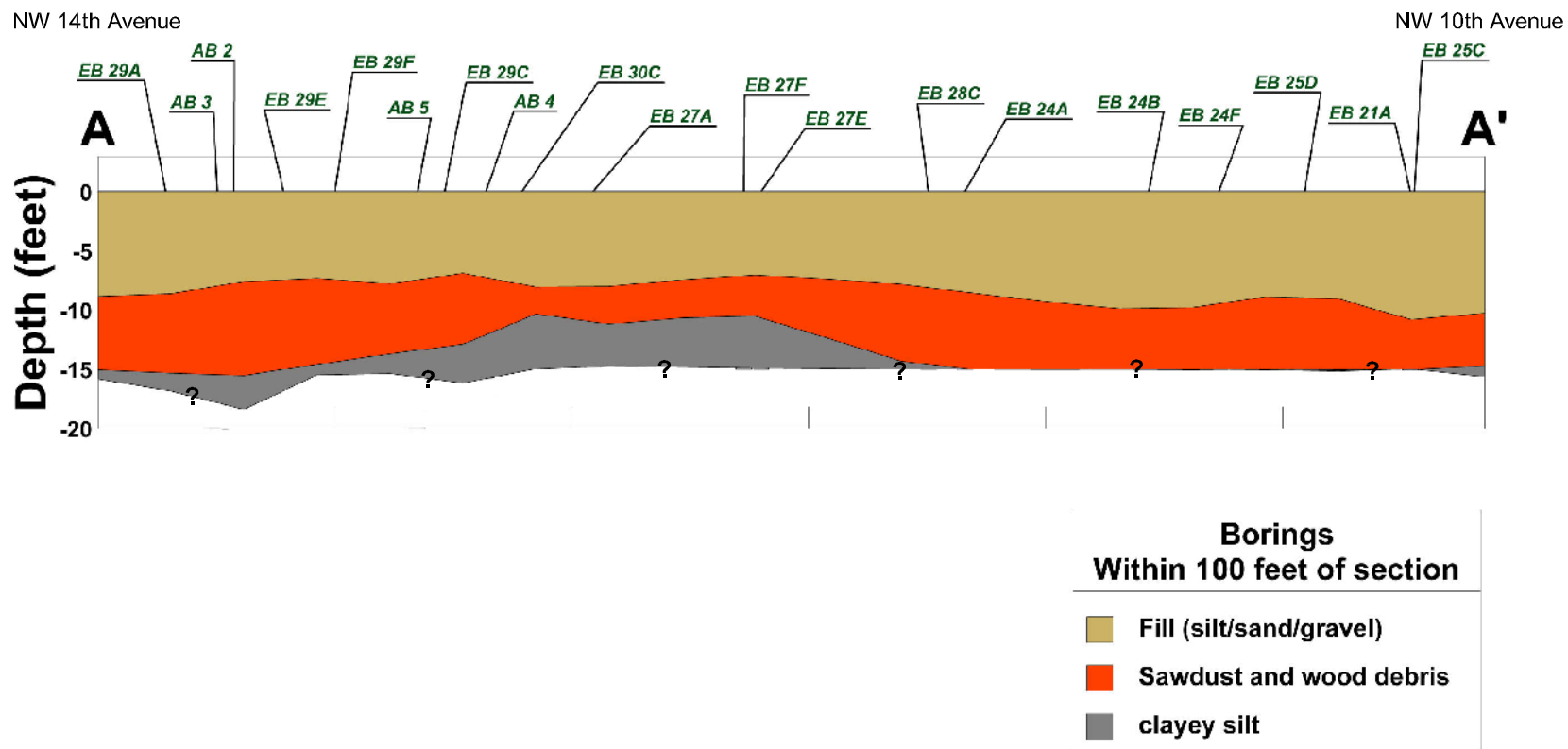
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Feb 02, 2006 10:09am cdavidson K:\Jobs\050161-HOYT_STREET\05016101\05016101-02.dwg FIG 2

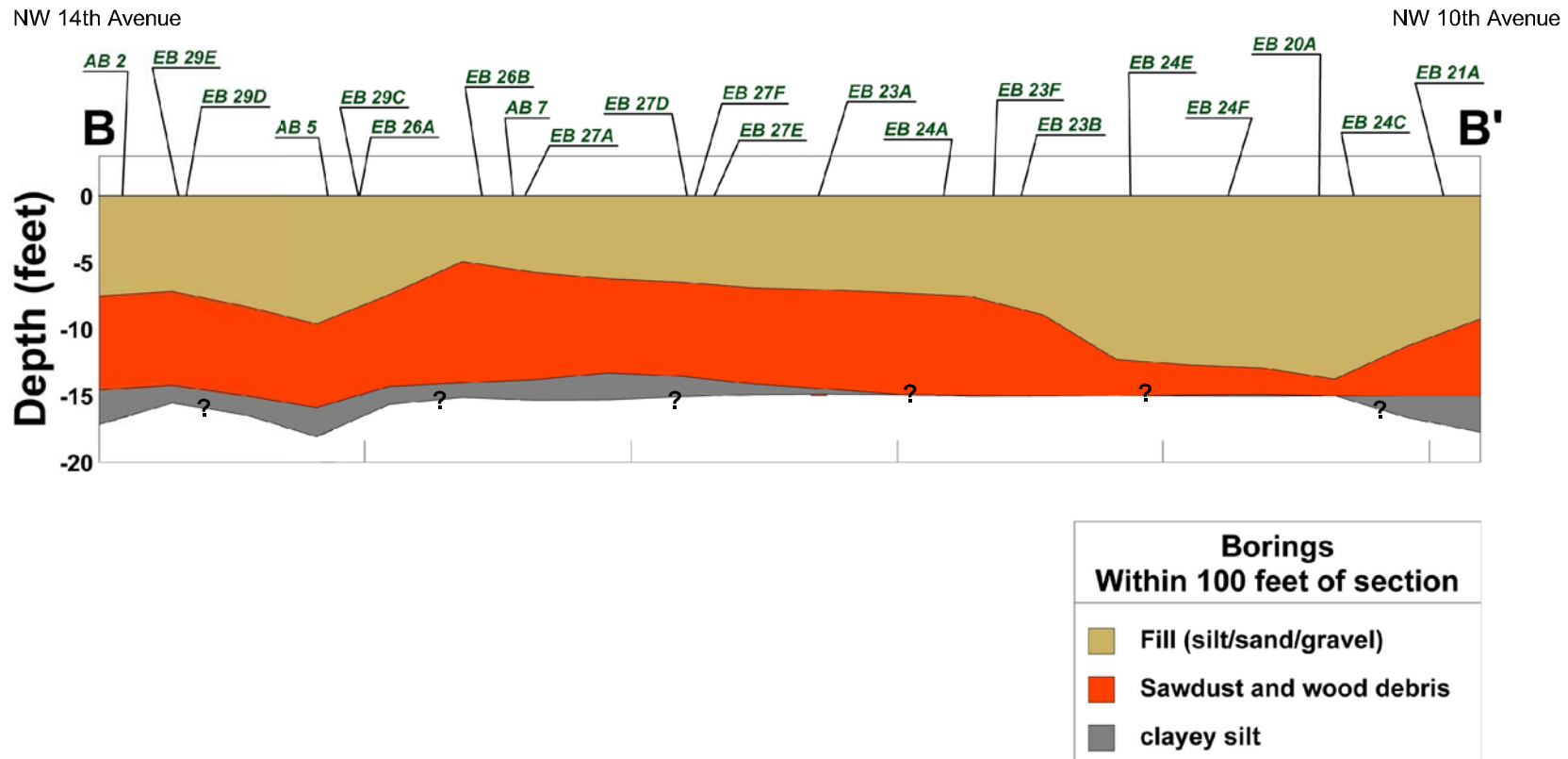


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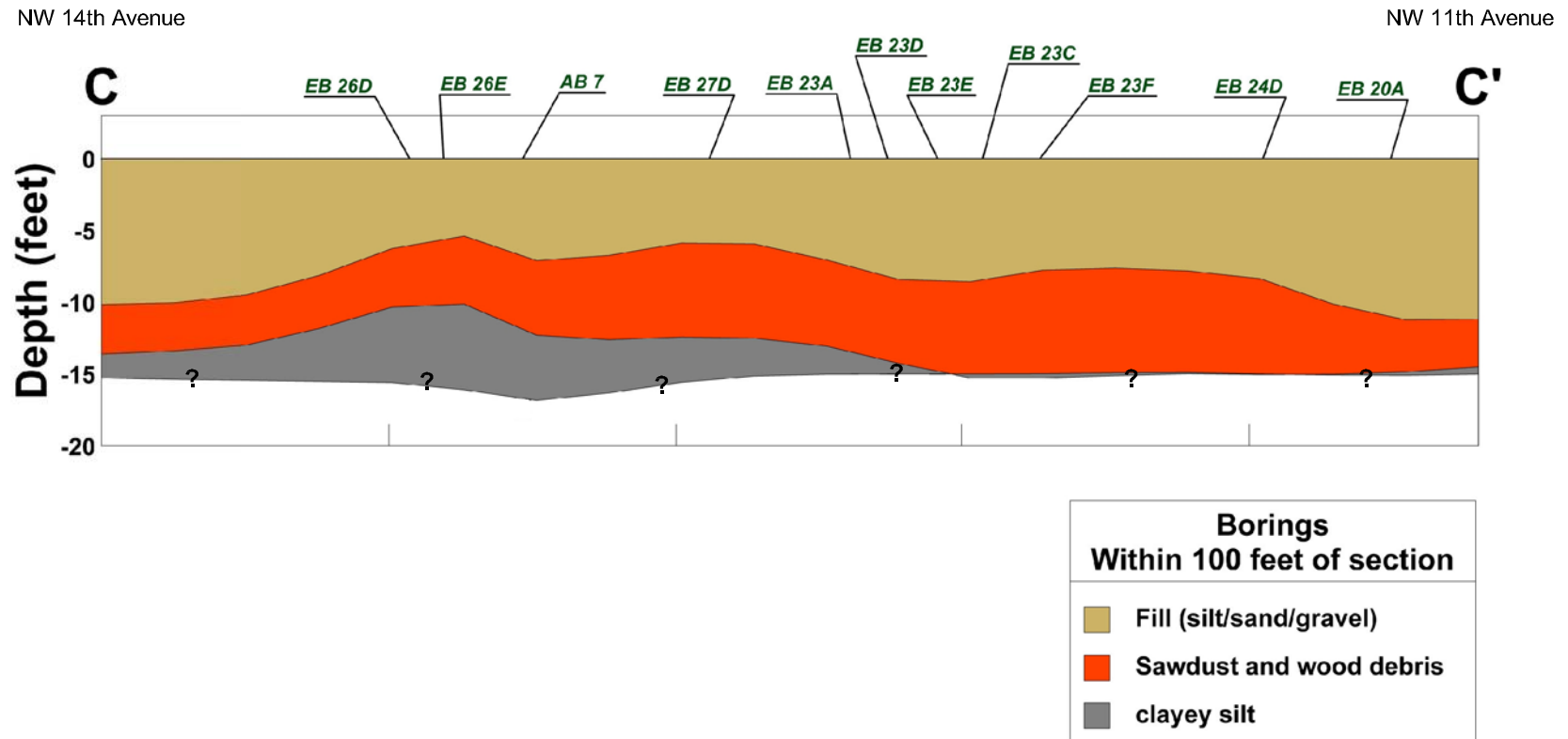
Notes:

1. Depth of unit contacts are estimated between test pit locations (interpolated by Kriging) .
2. Vertical Exageration= 1:10
3. See Map Figure 2 for section location .



Notes:

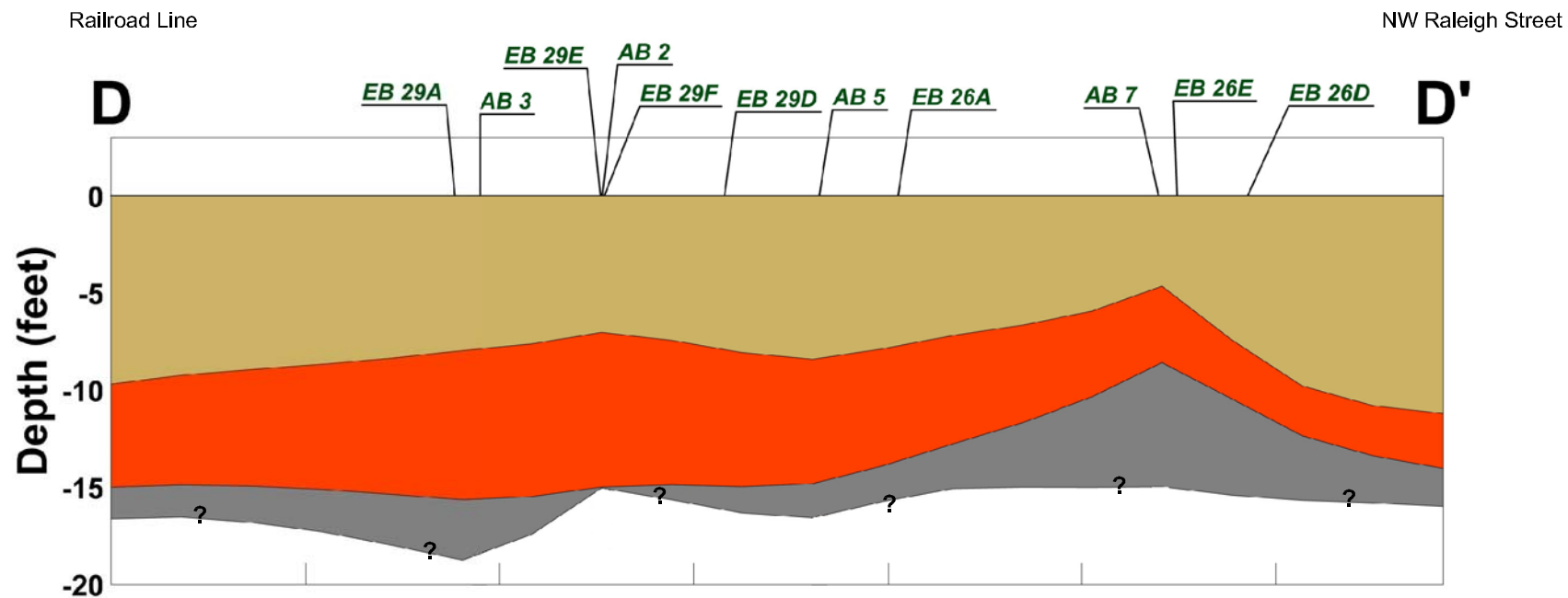
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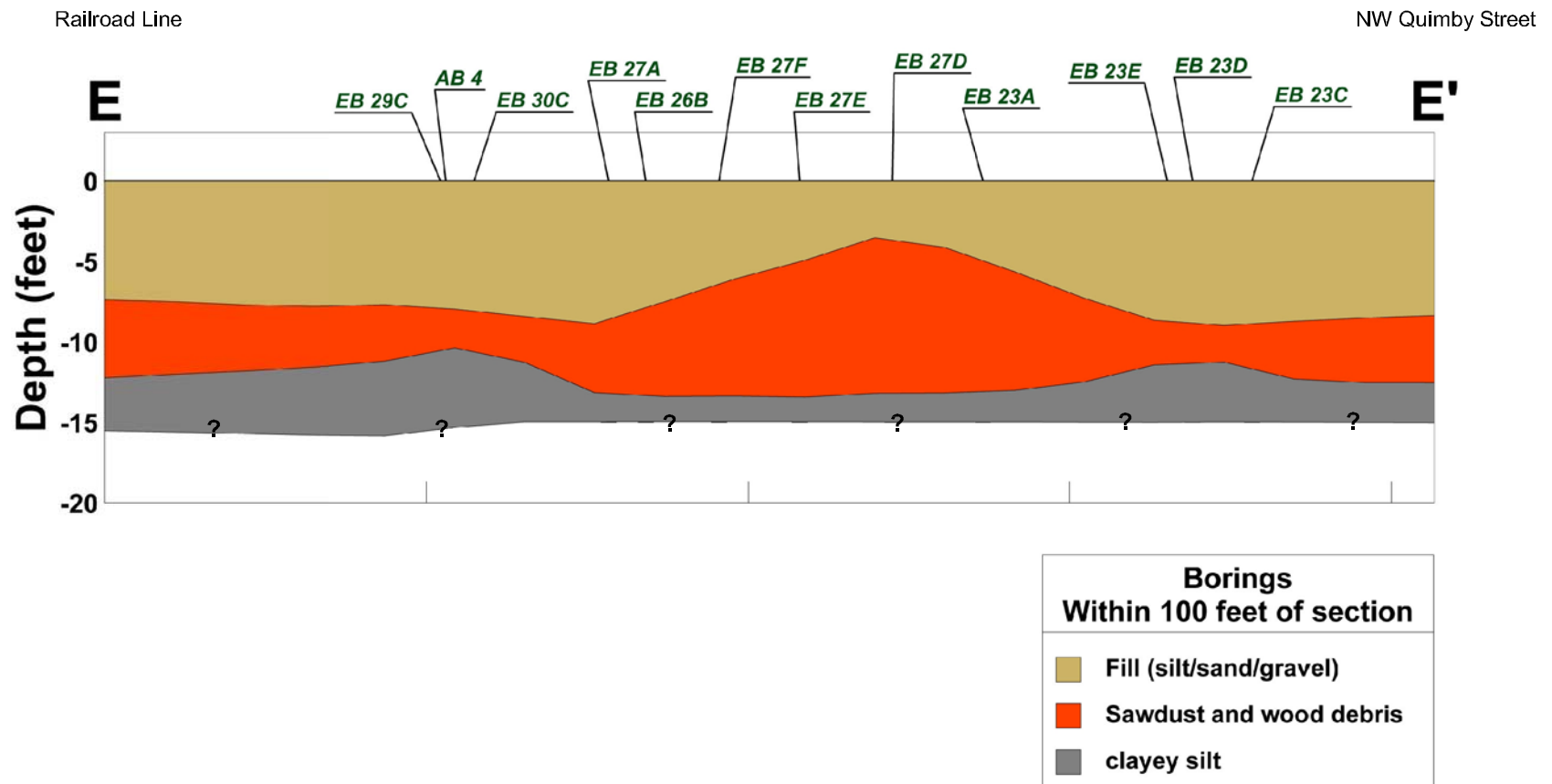
K:\Jobs\050161-HOYT STREET\050161-HOYT STREET\050161-03.dwg FIG 6
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Borings Within 100 feet of section	
	Fill (silt/sand/gravel)
	Sawdust and wood debris
	clayey silt

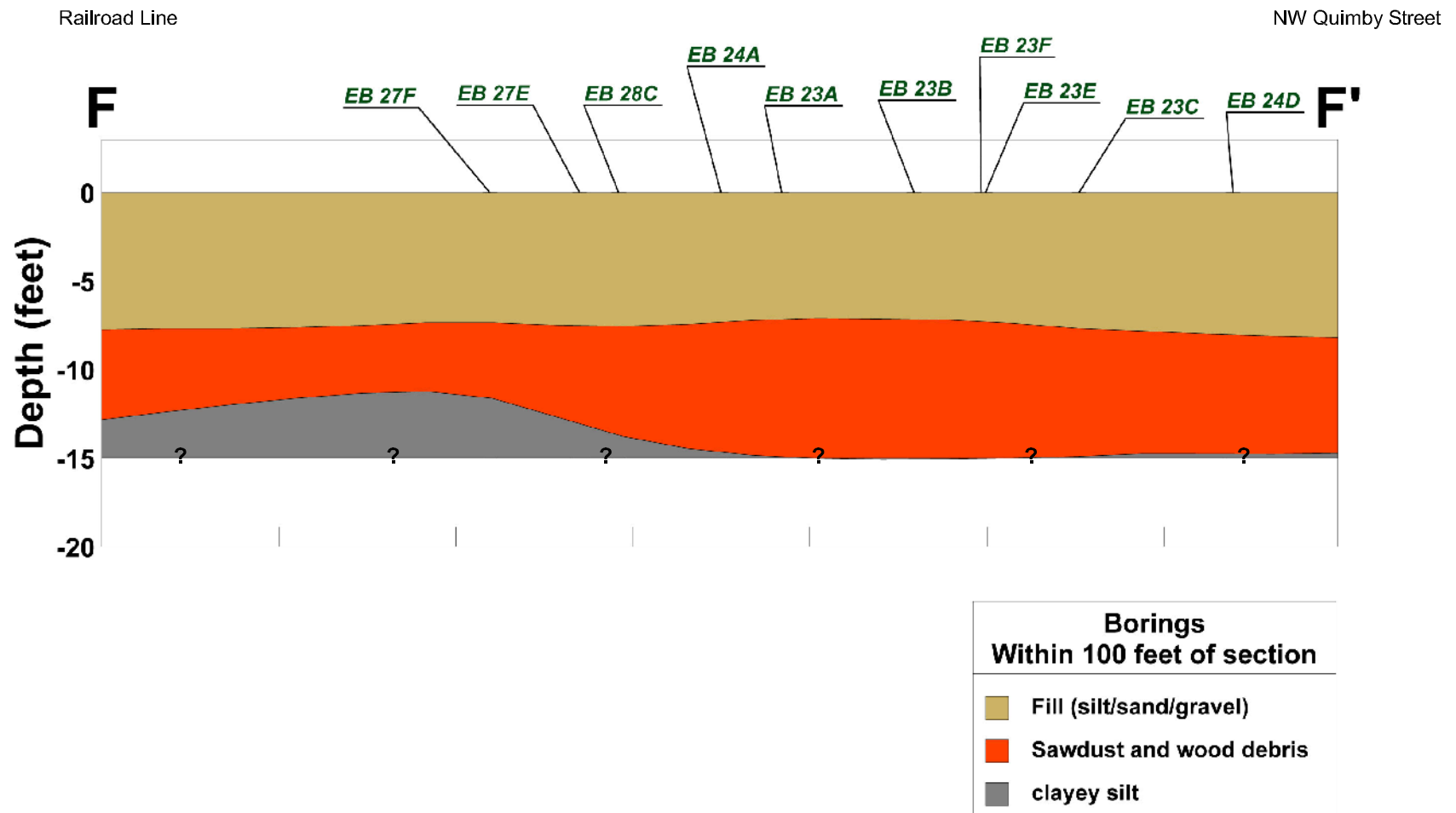
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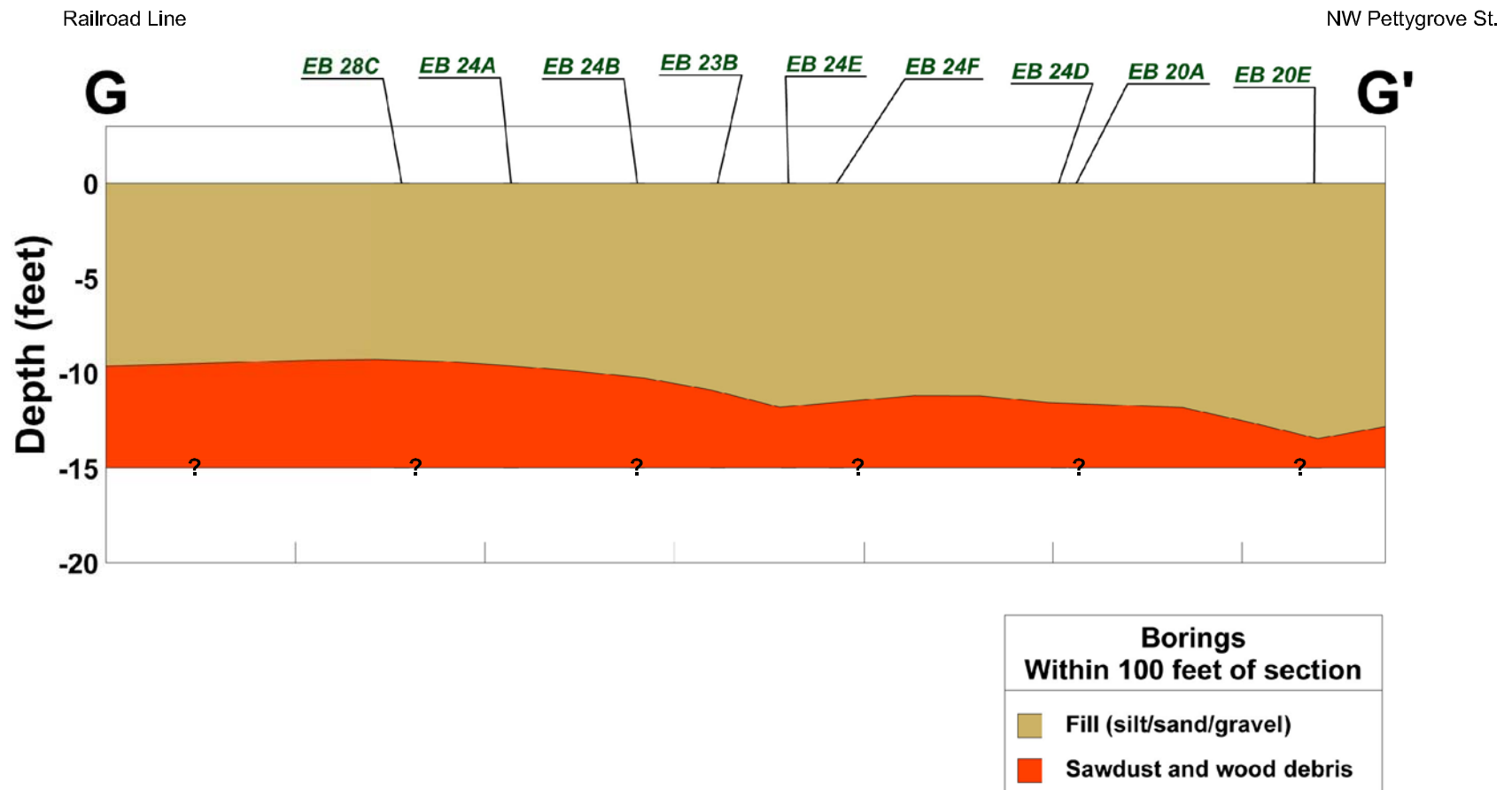
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