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Technical Memorandum

To: Mark Conan, Plaid Pantries, Inc.
From: Paul Ecker, LHG and Chris Rhea, LG
Date: October 17, 2013

Subject: **Supplemental Site Investigation Work Plan**
Plaid Pantries Store #324
White Center/King County, Washington
Ecology VCP File NW2585
EES Project 1133-02

EES Environmental Consulting, Inc. (EES) has prepared this work plan to describe proposed site investigation activities at former Plaid Pantries (Plaid) Store #324 located at 10645 16th Avenue SW in White Center/King County, Washington (Property, Figure 1). This work plan incorporates data developed through July 2013 as discussed with Plaid and the Washington Department of Ecology (Ecology).

Maps illustrating the Property location and pertinent features are provided as Figures 1 through 7. Soil analytical testing results are summarized in Table 1. The site characterization indicates that Contaminants of Concern are gasoline and related constituents that are limited to shallow soil beneath the Property and adjacent 16th Avenue (the Site). Groundwater has not been encountered at the Site, is not anticipated within 50 feet of ground surface, and is not regarded as an affected medium.

BACKGROUND

The Property is located at the northwest corner of SW 107th Street and 16th Avenue SW in White Center/King County, Washington (Figure 1). The Property is owned by Louise Piacentini and includes a single commercial building occupied by a convenience store and restaurant (Figure 2).

HISTORICAL RETAIL SERVICE STATION OPERATIONS

Plaid operated the Store #324 retail fueling station at the Property between September 1986 and November 30, 1990. Plaid then sub-leased the store building and sold the underground storage tank (UST) system fixtures and equipment to Young Kil Kim and Chae Yop Kim. Fuel storage at the Plaid facility was provided by three gasoline USTs (two 12,000-gallon capacity

USTs and one 10,000 gallon capacity UST) which were decommissioned by the sub-tenants in 2006 (Figure 2). Plaid remained the primary lessee of the Property until August 31, 2006.

During the operations of Plaid and its sub-tenants, only gasoline is known to have been stored and dispensed at the Property. Leaded gasoline may have been dispensed at the site during phase-out of that product in the 1980s. EES understands that neither Plaid nor their sub-tenants stored or dispensed other hydrocarbons such as diesel fuel, bulk motor oil, or bulk solvents at any time during site operations.

Plaid and its sub-tenants operated a leak detection system in accordance with Ecology requirements and no known system leaks were identified or reported to Plaid during the term of Plaid's lease. Tank decommissioning data provided to Plaid in 2007 by the property owner and subsequent investigations by Plaid indicate that gasoline constituents were identified in soil near the former UST system.

SITE CHARACTERIZATION SUMMARY

Based on site characterization findings to date (Figure 3), subsurface conditions include a low-permeability silt unit extending to approximately 14 feet below ground surface, underlain by sand and gravel. Site investigation data indicate fuel impacts are generally limited to the silt unit. Soil contaminated with gasoline and benzene at concentrations exceeding default MTCA Method A cleanup levels is located north and northeast of the former UST cavity and extends east of the Property beneath the adjacent sidewalk and roadway, as shown on Figures 4 through 6. The vertical extent of contaminated soil exceeding MTCA Method A cleanup levels extends to depths between three and 14 feet, which generally corresponds with a change in subsurface soil conditions from fine-grain silt to coarse-grain sand and gravel.

Extensive site characterization efforts indicate soil impacts attributed to historical fueling operations on the Property appear limited to within 14 feet of the ground surface. Groundwater has not been encountered on the Property at maximum drilling depths up to 50 feet, which is consistent with our understanding of local water table conditions. Therefore, based on the limited vertical extent of soil contamination identified, groundwater is unlikely to be impacted by the gasoline release originating at the Property and no further groundwater characterization is anticipated.

REMEDIAL ACTION PILOT STUDIES

Various pilot tests have been performed to evaluate the effectiveness of soil vapor extraction and in-situ chemical oxidation technologies (PNG 2008, 2011; EES 2013). The results of the pilot tests indicate in-place treatment is not likely a feasible option due to subsurface conditions in the targeted soil zone (dense, low permeability silts). The results of recent pilot treatability testing are detailed under separate cover (EES 2013).

RATIONALE FOR ADDITIONAL SITE CHARACTERIZATION

Based on in-situ pilot testing and in view of the complexity of soil excavation near and beneath the adjacent roadway, alternative remedial action objectives using MTCA modified Method B site-specific soil cleanup levels will be evaluated. Published *Guidance for Remediation of Petroleum Contaminated Sites* (Ecology 2011) indicates additional site characterization data are necessary to determine specific MTCA modified Method B cleanup levels for this Site. As per our recent discussion with Ecology's project manager (Maureen Sanchez), EES understands the following information is necessary in order to develop defensible MTCA modified Method B cleanup levels:

- A focused review of local drilling and well records available from Washington Water Resources Department (WRD) is intended to document depth to groundwater in the Site vicinity. The use of MTCA modified Method B cleanup levels may not be appropriate if Site-related contaminants have migrated to groundwater (unlikely based on Site data; see Figure 6).
- Additional soil characterization is necessary to evaluate potential pathways of exposure.
    - Although the magnitude and extent of contamination related to former Plaid fueling operations has been thoroughly characterized, petroleum composition data is needed to calculate site-specific modified Method B TPH cleanup levels. Based on the estimated volume of contaminated soil at the Site (approximately 2,000 cubic yards), a total of five soil samples will be collected from the most highly contaminated zone and analyzed for extractable and volatile petroleum hydrocarbons (EPH/VPH).
    - Physical soil characteristic data (organic carbon content and moisture content) will be collected to provide more accurate risk model input parameters.
    - A Tier I Vapor Intrusion Assessment will be conducted to determine whether vapor intrusion conditions are likely to exist with respect to the Property building. The use of Method B cleanup levels may not be appropriate if unacceptable vapor intrusion risks are present.
- A Terrestrial Ecological Evaluation will be conducted per Ecology requirements.

A summary of the proposed supplemental investigation tasks is presented below.

SCOPE OF WORK

Supplemental investigation activities are proposed to develop data in support of site-specific MTCA modified Method B risk based soil cleanup levels. The proposed scope of work is limited to focused tasks in support of the site characterization, as recently discussed with Ecology and as described below.

FIELD PREPARATION AND RESEARCH TASKS

Obtain WRD records and review published information regarding local depth to water and available well construction information.

- Conduct a Terrestrial Ecological Evaluation for the Property.
- Update the site Health and Safety Plan to guide field safety protocols, in accordance with rules established by the Occupational Safety and Health Administration (OSHA).
- Request utility identification through the public Northwest Utility Notification Center (NUNC) as required before drilling.
- Contract with a local geophysical locating firm in an attempt to identify underground utility features and conduits located at each planned drilling location.

DRILLING AND SAMPLING

- Advance up to five direct-push soil borings (B-37 through B-41) in the area where the most highly contaminated soil has been identified, as shown on Figure 4. Borings will be advanced to terminal depths of up to 20 feet bgs as illustrated on Figure 7 and as described below:
  - At each drilling location, EES will retrieve, examine, and log continuous soil cores in five foot long segments during drilling. Soil samples will be field screened for volatile organic vapors using a photo ionization detector (PID). Soil samples will be collected for laboratory analysis based on field screening results and soil conditions observed (a minimum of one soil sample per boring targeting the most highly contaminated zone (5-10 feet bgs) will be collected and analyzed.
- Advance three shallow soil gas borings (SG-1 through SG-3) on the Property. The soil gas borings will each be advanced to depths of five feet and located near the existing store building on the Property (Figure 7). Soil gas sampling point installation, sampling equipment leak detection testing, field quality control verification, and soil gas sampling methods will be performed in accordance with EES protocols as described in Standard Operating Procedure SOP-SG1 (Attachment A), consistent with published Ecology draft guidance (Ecology 2009).

ANALYTICAL TESTING

SOIL

EES will submit selected bulk soil samples for laboratory analysis using the following analytical methods. A minimum of one soil sample will be submitted from each of the borings (B-37 through B-41) as indicated below. Additional samples may also be analyzed based on field observations and/or preliminary laboratory analytical results.

- EPH/VPH analysis by Method NWTPH.
- Soil characteristic analyses including:
  - Organic carbon content by EPA Method 5310B, and
  - Moisture content by ASTM Method D-2216.

Soil Vapor

At each soil gas sampling location, EES will purge and collect discrete soil gas samples using specially-designed sampling equipment and laboratory-certified Summa canisters (Attachment A).

- Submit vapor samples for laboratory analysis by EPA Method TO-15 (for gasoline and related volatiles).

DEVELOPMENT OF METHOD B CLEANUP LEVELS

As suggested by Ecology, the MTCA modified Method B approach will be used for developing site-specific cleanup levels. The methodology presented in Ecology's 2011 Guidance will provide the framework for calculating the modified MTCA B cleanup values for TPH. MTCA Guidance will be used to calculate applicable exposure point concentrations for the purpose of screening. TPH data will be screened against the modified MTCA B cleanup values. EES will also develop modified MTCA B cleanup values for soil contamination identified beneath the adjacent 16th Avenue right of way.

PROPOSED SCHEDULE AND REPORTING

EES proposes to initiate supplemental site characterization work plan activities within two weeks (subject to Plaid's authorization, Ecology's approval of this work plan, and site access from the property owner).

Upon completion of all specified field and analytical testing activities, EES will prepare a written report to include a discussion of the field work, an evaluation of the testing results, site maps depicting sampling locations, tabulated analytical results, copies of all analytical reports, chain of custody documentation, development of site-specific cleanup levels and recommendations for additional work (if warranted).

ASSUMPTIONS

The proposed work is recommended in accordance with Ecology's published environmental cleanup rules and EES's experience at similar sites as well as recent discussions with Plaid and Ecology. Additional investigation or remedial actions may be required to fully address areas of concern, if identified.

ATTACHMENTS

Tables Table 1: Soil Analytical Results - Fuels and Related Constituents

Figures Figure 1: Vicinity Map
Figure 2: Site Plan
Figure 3: Historic Sample Locations
Figure 4: Approximate Extents of Petroleum Impacts in Soil
Figure 5: Cross Section A-A' Location
Figure 6: West-East Cross Section A-A'
Figure 7: Proposed Sample Locations

Attachment A: Soil Gas Sampling SOP-SG1

REFERENCES

EES, 2013. *ISCO Pilot Test Results and Status of Remedial Action Planning.* EES Environmental Consulting, Inc. September 10, 2013.

Ecology, October 2009. *Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action*. State of Washington Department of Ecology, Toxics Cleanup Program. October 2009.

Ecology, 2011. *Guidance for Remediation of Petroleum Contaminated Sites.* State of Washington Department of Ecology, Toxics Cleanup Program. September 2011.

PNG, 2008. *Site Characterization and SVE Pilot Test Report.* PNG Environmental, Inc. October 1, 2013.

PNG, 2011. *Former Plaid #324 Site Remediation Planning Status Update.* PNG Environmental, Inc. June 28, 2011.

TABLES

TABLE 1
Soil Analytical Results - Gasoline and Related Constituents (mg/Kg)
Plaid Pantry #324
Seattle, Washington

Sample Identification	Sample Depth (feet bgs)	Date Sampled	Gasoline Range Organics (GRO)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Methyl t-butyl ether	1,2-Dibromoethane	1,2-Dichloroethane	Naphthalene	Hexane	Total Lead
S-1	16	05/04/2006	2 U	0.02 U	0.02 U	0.02 U	0.06 U	-	-	-	-	-	-
S-2	16	05/04/2006	2 U	0.02 U	0.02 U	0.02 U	0.06 U	-	-	-	-	-	-
S-3	16	05/04/2006	2 U	0.02 U	0.02 U	0.02 U	0.06 U	-	-	-	-	-	-
S-4	8	05/04/2006	2 U	0.02 U	0.02 U	0.02 U	0.06 U	-	-	-	-	-	-
S-5	8	05/04/2006	2 U	0.02 U	0.02 U	0.02 U	0.06 U	-	-	-	-	-	-
S-6	8	05/04/2006	2 U	0.02 U	0.02 U	0.02 U	0.06 U	-	-	-	-	-	-
S-7	8	05/04/2006	2 U	0.02 U	0.02 U	0.02 U	0.06 U	-	-	-	-	-	-
S-8	8	05/04/2006	2 U	0.02 U	0.02 U	0.02 U	0.06 U	-	-	-	-	-	-
S-9	8	05/04/2006	2 U	0.02 U	0.02 U	0.02 U	0.06 U	-	-	-	-	-	-
S-10	4	05/04/2006	**310**	**0.23**	0.85	2.0	**16**	-	-	-	-	-	-
B1-5	5	11/12/2007	**1,400**	**4.8**	**92**	**55**	**580**	0.05 U	0.05 U	0.05 U	**13**	-	7.95
B1-8	8	11/12/2007	11	0.03 U	0.05 U	0.05 U	0.21	0.05 U	0.05 U	0.05 U	0.05 U	-	2.38
B1-23	23	11/12/2007	**50**	**0.29**	6.2	3.8	**60**	0.05 U	0.05 U	0.05 U	3.2	-	-
B2-9	9	11/12/2007	2 U	0.03 U	0.05 U	0.05 U	0.15 U	0.05 U	0.05 U	0.05 U	0.05 U	-	2.46
B3-8	8	11/12/2007	**390**	**0.86**	**28**	**21**	**136**	0.05 U	0.05 U	0.05 U	5 U	-	4.11
B4-5	5	11/12/2007	2	0.03 U	0.065	0.059	0.303	0.05 U	0.05 U	0.05 U	0.057	-	2.61
B4-8	8	11/12/2007	2 U	0.03 U	0.05 U	0.05 U	0.15 U	0.05 U	0.05 U	0.05 U	0.05 U	-	-
B-5@4	4	07/16/2008	**1,300**	0.8 U	4.2	**12**	**120**	-	-	-	-	-	-
B-5@7	7	07/16/2008	2 U	0.02 U	0.02 U	0.02 U	0.06 U	-	-	-	-	-	-
B-5@12	12	07/16/2008	2 U	0.02 U	0.02 U	0.02 U	0.06 U	-	-	-	-	-	-
B-5@17	17	07/16/2008	2 U	-	-	-	-	-	-	-	-	-	-
B-5@22	22	07/16/2008	2 U	0.02 U	0.02 U	0.02 U	0.06 U	-	-	-	-	-	-
B-5@28	28	07/16/2008	2 U	-	-	-	-	-	-	-	-	-	-
B-5@34	34	07/16/2008	2 U	0.02 U	0.02 U	0.02 U	0.06 U	-	-	-	-	-	-
B-5@39	39	07/16/2008	2 U	-	-	-	-	-	-	-	-	-	-
B6@4	4	07/17/2008	**1,500**	**1.5**	**65**	**12**	**250**	-	-	-	-	-	-
B6@9	4	07/17/2008	2 U	0.02 U	0.02 U	0.02 U	0.06 U	-	-	-	-	-	-
B7@4	4	07/16/2008	2 U	0.02 U	0.02 U	0.02 U	0.06 U	-	-	-	-	-	-
B-7@8	8	07/16/2008	**580** U	**0.50**	6.1	**9.2**	**38**	-	-	-	-	-	-
B-7@11	11	07/16/2008	2 U	0.02 U	0.02 U	0.02 U	0.06 U	-	-	-	-	-	-
B-7@19	19	07/16/2008	2 U	-	-	-	-	-	-	-	-	-	-
B-7@21	21	07/16/2008	2 U	0.02 U	0.02 U	0.02 U	0.06 U	-	-	-	-	-	-
B-7@26	26	07/16/2008	2 U	0.02 U	0.02 U	0.02 U	0.06 U	-	-	-	-	-	-
B-7@34	34	07/16/2008	2 U	0.02 U	0.02 U	0.02 U	0.06 U	-	-	-	-	-	-
B-7@39	39	07/16/2008	2 U	-	-	-	-	-	-	-	-	-	-
B-8@6	6	07/17/2008	**1,200**	**0.73**	**16**	**17**	**150**	-	-	-	-	-	-
B-8@9	9	07/17/2008	18	**0.03**	1	0.5	0.78	-	-	-	-	-	-
B-9@5	5	07/17/2008	**950**	**1.5**	**42**	**14**	**120**	-	-	-	-	-	-
B-9@10	10	07/17/2008	**2,100**	**9.9**	**99**	**31**	**200**	-	-	-	-	-	-
B-9@12	12	07/17/2008	2 U	0.02 U	0.03	0.02 U	0.06 U	-	-	-	-	-	-
B-10@4	4	07/15/2008	8	**0.06**	0.22	0.17	0.92	-	-	-	-	-	-
B10@6	6	07/15/2008	6	**0.07**	0.4	0.24	0.74	-	-	-	-	-	-
B-10@10	10	07/15/2008	**76**	0.02 U	0.45	0.57	3.9	-	-	-	-	-	-
B-10@14.5	14.5	07/15/2008	19	0.02 U	0.17	0.15	0.97	-	-	-	-	-	-
B-10@19	19	07/15/2008	2 U	0.02 U	0.02 U	0.02 U	0.06 U	-	-	-	-	-	-
B-10@20-30	20-30	07/15/2008	2 U	0.02 U	0.02 U	0.02 U	0.06 U	-	-	-	-	-	-
B-10@31	31	07/16/2008	2 U	0.02 U	0.02 U	0.02 U	0.06 U	-	-	-	-	-	-
B-10@39.5	39.5	07/16/2008	2 U	-	-	-	-	-	-	-	-	-	-
B-12@4	4	07/17/2008	**150**	0.02 U	0.27	0.02 U	3.6	-	-	-	-	-	-
B-12@8	8	07/17/2008	2 U	0.02 U	0.02 U	0.02 U	0.06 U	-	-	-	-	-	-
B-13@5	5	07/17/2008	**140**	0.02 U	1.8	1.6	**11**	-	-	-	-	-	-
B-13@12	12	07/17/2008	3	**0.12**	0.26	0.06	0.3	-	-	-	-	-	-
B-15/4	4	04/22/2009	2 U	0.03 U	0.05 U	0.05 U	0.15 U	0.05 U	0.05 U	0.05 U	0.05 U	0.25 U	-
B-15/8	8	04/22/2009	2 U	0.03 U	0.05 U	0.05 U	0.15 U	0.05 U	0.05 U	0.05 U	0.05 U	0.25 U	-
B-15/12	12	04/22/2009	2 U	0.03 U	0.05 U	0.05 U	0.15 U	0.05 U	0.05 U	0.05 U	0.05 U	0.25 U	-
B-16/4	4	04/22/2009	2 U	0.03 U	0.05 U	0.05 U	0.15 U	-	-	-	0.05 U	0.25 U	-
B-16/8	8	04/22/2009	**120**	0.03 U	0.05 U	0.33	0.98	-	-	-	1.0	0.25 U	-
B-16/11	11	04/22/2009	2 U	0.03 U	0.05 U	0.05 U	0.15 U	-	-	-	0.05 U	0.25 U	-
B-17/4	4	04/22/2009	2 U	0.03 U	0.05 U	0.05 U	0.15 U	-	-	-	0.05 U	0.25 U	-
B-17/7	7	04/22/2009	**46**	0.03 U	0.05 U	0.06	0.15 U	-	-	-	0.32	0.25 U	-
B-17/10	10	04/22/2009	**90**	0.03 U	0.05 U	0.05 U	0.15 U	-	-	-	0.05 U	0.25 U	-
B-17/13	13	04/22/2009	2 U	0.03 U	0.05 U	0.05 U	0.15 U	-	-	-	0.05 U	0.25 U	-

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B-18/4	4	04/22/2009	**54**	0.03 U	0.05 U	0.05 U	0.15 U	0.05 U	0.005 U	0.05 U	0.092	0.25 U	-
B-18/8	8	04/22/2009	2 U	0.03 U	0.05 U	0.05 U	0.15 U	0.05 U	0.05 U	0.05 U	0.05 U	0.25 U	-
B-18/12	12	04/22/2009	2 U	0.03 U	0.05 U	0.05 U	0.15 U	0.05 U	0.05 U	0.05 U	0.05 U	0.25 U	-
B-19/4	4	04/22/2009	2 U	0.03 U	0.05 U	0.05 U	0.15 U	0.05 U	0.05 U	0.05 U	0.05 U	0.25 U	-
B-19/8	8	04/22/2009	2 U	0.03 U	0.05 U	0.05 U	0.15 U	0.05 U	0.05 U	0.05 U	0.05 U	0.25 U	-
B-19/12	12	04/22/2009	2 U	0.03 U	0.05 U	0.05 U	0.15 U	0.05 U	0.05 U	0.05 U	0.05 U	0.25 U	-
B-20/4	4	04/22/2009	2 U	0.03 U	0.05 U	0.05 U	0.15 U	0.05 U	0.05 U	0.05 U	0.05 U	0.25 U	-
B-20/6	6	04/22/2009	**93**	0.03 U	0.05 U	0.05 U	0.15 U	0.05 U	0.005 U	0.05 U	0.05 U	0.25 U	-
B-20/10	10	04/22/2009	2 U	0.03 U	0.05 U	0.05 U	0.15 U	0.05 U	0.05 U	0.05 U	0.05 U	0.25 U	-
B-21/4	4	04/22/2009	2 U	0.03 U	0.05 U	0.05 U	0.15 U	0.05 U	0.05 U	0.05 U	0.05 U	0.25 U	-
B-21/9	9	04/22/2009	2 U	0.03 U	0.05 U	0.05 U	0.15 U	0.05 U	0.05 U	0.05 U	0.05 U	0.25 U	-
B-22/4	4	04/22/2009	2 U	0.03 U	0.05 U	0.05 U	0.15 U	-	-	-	0.05 U	0.25 U	-
B-22/7	7	04/22/2009	**93**	0.03 U	0.05 U	0.12	0.1	-	-	-	0.32	0.25 U	-
B-23/5	5	04/22/2009	2 U	0.03 U	0.05 U	0.05 U	0.15 U	0.05 U	0.05 U	0.05 U	0.05 U	0.25 U	-
B-23/10	10	04/22/2009	2 U	0.03 U	0.05 U	0.05 U	0.15 U	0.05 U	0.05 U	0.05 U	0.05 U	0.25 U	-
B-24/4	4	11/10/2009	2	0.02 U	0.02	0.02 U	0.06 U	-	-	-	-	-	-
B-24/8	8	11/10/2009	**990**	**0.5**	15	17	96	-	-	-	-	-	-
B25/4	4	11/10/2009	2	0.02 U	0.02	0.02 U	0.06 U	-	-	-	-	-	-
B-25/8	8	11/10/2009	2 U	0.02 U	0.02 U	0.02 U	0.06 U	-	-	-	-	-	-
B-26/4	4	11/10/2009	27	**0.23**	0.15	0.76	3.8	-	-	-	-	-	-
B-26/8	8	11/10/2009	**130**	**0.25**	4.4	2.0	13	-	-	-	-	-	-
B-26/12	12	11/10/2009	17	**0.60**	0.99	0.37	2.0	-	-	-	-	-	-
B-27/4	4	11/11/2009	**1,000**	**0.90**	24	20	100	-	-	-	-	-	-
B-27/8	8	11/11/2009	12	0.02 U	0.21	0.17	1.1	-	-	-	-	-	-
B-27/12	12	11/11/2009	5.0	0.02 U	0.26	0.08	0.45	-	-	-	-	-	-
B-28/8	8	05/18/2011	**1,420**	**3.4** J	51	21	126	-	-	-	-	-	-
B-28/13	13	05/18/2011	14	**0.88** J	1.3	0.23	1.4	-	-	-	-	-	-
B-29/8	8	05/18/2011	**1,420**	**0.57**	32	27	147	-	-	-	-	-	-
B-29/16	16	05/18/2011	4 U	0.01 UJ	0.08	0.03	0.20	-	-	-	-	-	-
ROW-1/3	3	08/22/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-1/9	9	08/22/2012	**67**	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-1/10	10	08/22/2012	**780**	0.02 U	0.05 U	1.6	3.9	-	-	-	-	-	-
ROW-1/15	15	08/22/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-2/3	3	08/22/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-2/3 (duplicate)	3	08/22/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-2/10	10	08/22/2012	**200**	0.02 U	0.05 U	0.24	0.28	-	-	-	-	-	-
ROW-2/16	16	08/22/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-2/18	18	08/22/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-3/3	3	08/22/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-3/9	9	08/22/2012	**35**	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-3/12	12	08/22/2012	**300**	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-3/18	18	08/22/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-4/3	3	08/23/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-4/10	10	08/23/2012	**260**	0.02 U	0.05 U	0.07	0.15 U	-	-	-	-	-	-
ROW-4/11	11	08/23/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-4/15	15	08/23/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-5/3	3	08/23/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-5/10	10	08/23/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-5/15	15	08/23/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-5/15 (duplicate)	15	08/23/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-6/3	3	08/23/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-6/8.5	8.5	08/23/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-6/10	10	08/23/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-6/16	16	08/23/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-7/3	3	08/24/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-7/8	8	08/24/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-7/10	10	08/24/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-7/14	14	08/24/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-8/3	3	08/24/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-8/7	7	08/24/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-8/10	10	08/24/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-8/14	14	08/24/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-

TABLE 1

Soil Analytical Results - Gasoline and Related Constituents (mg/Kg)

Plaid Pantry #324

Seattle, Washington

Sample Identification	Sample Depth (feet bgs)	Date Sampled	Gasoline Range Organics (GRO)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Methyl t-butyl ether	1,2-Dibromoethane	1,2-Dichloroethane	Naphthalene	Hexane	Total Lead
ROW-8/14 (duplicate)	14	08/24/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-8/16	16	08/24/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-9/3	3	08/24/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-9/7	7	08/24/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-9/10	10	08/24/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-9/15	15	08/24/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-10/3	3	08/24/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-10/8	8	08/25/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-10/10	10	08/25/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-10/15	15	08/25/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
ROW-10/15 (duplicate)	15	08/25/2012	10 U	0.02 U	0.05 U	0.05 U	0.15 U	-	-	-	-	-	-
B-32/CS-1 (5-5.5)	5-5.5	07/11/2013	5.88 U	0.01 U	0.06 U	0.03 U	0.09 U	-	-	-	-	-	-
B-32/CS-1 (7-7.5)	7-7.5	07/11/2013	**4,210**	0.29 U	**20.0**	**61.8**	**318**	-	-	-	-	-	-
B-32/CS-1 (9-9.5)	9-9.5	07/11/2013	10.6	0.01	1.02	0.28	1.34	-	-	-	-	-	-
B-32/CS-1 (11-11.5)	11-11.5	07/11/2013	10.2	0.02	1.29	0.43	0.61	-	-	-	-	-	-
B-33/CS-1 (5-5.5)	5-5.5	07/11/2013	5.01 U	0.01 U	0.05 U	0.03 U	0.08 U	-	-	-	-	-	-
B-33/CS-1 (7-7.5)	7-7.5	07/11/2013	**1,700**	**1.01**	**21.3**	**26.0**	**117**	-	-	-	-	-	-
B-33/CS-1 (9-9.5)	9-9.5	07/11/2013	**42.0**	**0.48**	3.96	0.67	4.00	-	-	-	-	-	-
B-33/CS-1 (11-11.5)	11-11.5	07/11/2013	23.4	**0.61**	3.69	0.33	2.04	-	-	-	-	-	-
B-34/CS-1 (5-5.5)	5-5.5	07/11/2013	**2,660**	**1.09**	**50.5**	**44.8**	**282**	-	-	-	-	-	-
B-34/CS-1 (7-7.5)	7-7.5	07/11/2013	**2,900**	**6.46**	**146**	**48.7**	**295**	-	-	-	-	-	-
B-34/CS-1 (9-9.5)	9-9.5	07/11/2013	12.9	**0.80**	1.44	0.21	1.25	-	-	-	-	-	-
B-34/CS-1 (11-11.5)	11-11.5	07/11/2013	**36.3**	**2.57**	4.24	0.70	3.37	-	-	-	-	-	-
B-35/CS-1 (5-5.5)	5-5.5	07/11/2013	**5,960**	**6.32**	**170**	**108**	**623**	-	-	-	-	-	-
B-35/CS-1 (7-7.5)	7-7.5	07/11/2013	**3,700**	**8.33**	**159**	**57.2**	**332**	-	-	-	-	-	-
B-35/CS-1 (9-9.5)	9-9.5	07/11/2013	29.0	**1.66**	3.59	0.53	3.05	-	-	-	-	-	-
B-35/CS-1 (11-11.5)	11-11.5	07/11/2013	**327**	**2.16**	0.70	4.35	1.96	-	-	-	-	-	-
MTCA Method A Cleanup Level [a]			100,30 [b]	**0.03**	**7**	**6**	**9**	**0.1**	**0.005**	**NA**	**5**	**NA**	**250**

Notes:

[a] Model Toxics Control Act (MTCA) Cleanup Amendments, Method A Soil Cleanup Levels For Unrestricted Land Use (WDOE, October 12, 2007)

[b] Per MTCA, the cleanup value for gasoline is 30 mg/kg if benzene is detected and/or if the sum of the toluene, ethylbenzene, and xylenes is greater than one percent of the gasoline concentration, and 100 mg/kg for all other gasoline mixtures.

Volatile organic compounds (VOCs) by EPA Method 8260B

Gasoline range organics (GRO) by Method NWTPH-Gx

Total lead by EPA Method 6010

mg/Kg = Milligrams per kilogram (parts per million)

bgs = Below ground surface

U = Not detected at method reporting limit shown

UJ = Data Validation Qualifier. The analyte was analyzed for, but not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise. See corresponding data validation report for further explanation.

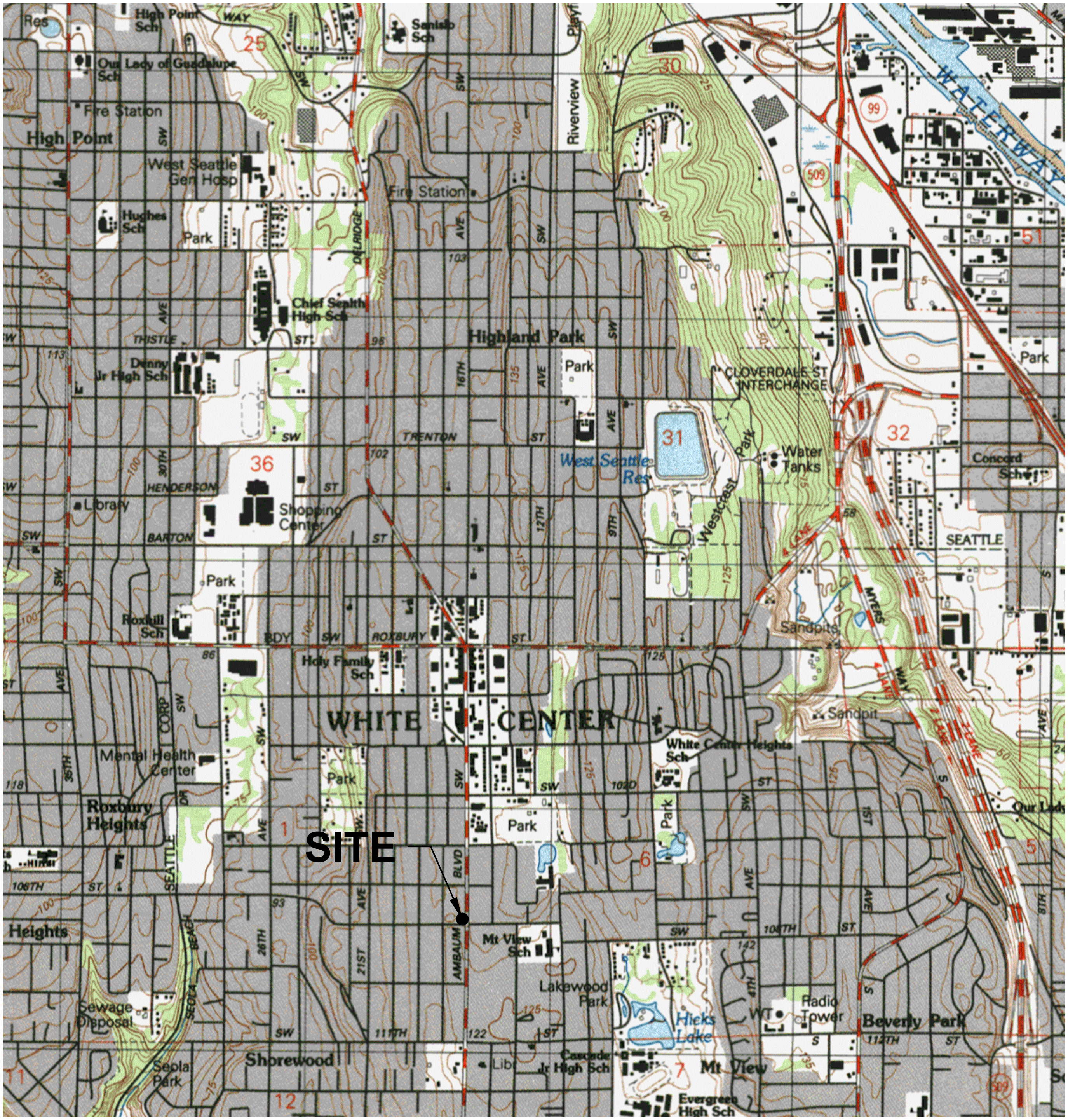
J = Data Validation Qualifier. The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample. See corresponding data validation report for further explanation.

- = Not measured

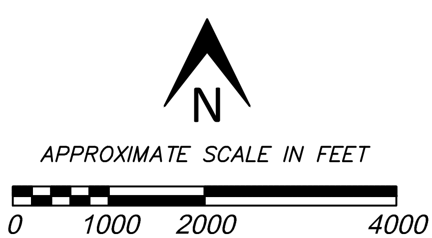
NA = Not applicable

Values in **bold** indicate the compound concentration exceeds the MTCA Method A Cleanup Level

FIGURES



SOURCE:
USGS, SEATTLE SOUTH QUADRANGLE
WASHINGTON – SNOHOMISH CO.
7.5 X 15 MINUTE SERIES (TOPOGRAPHIC) 1983



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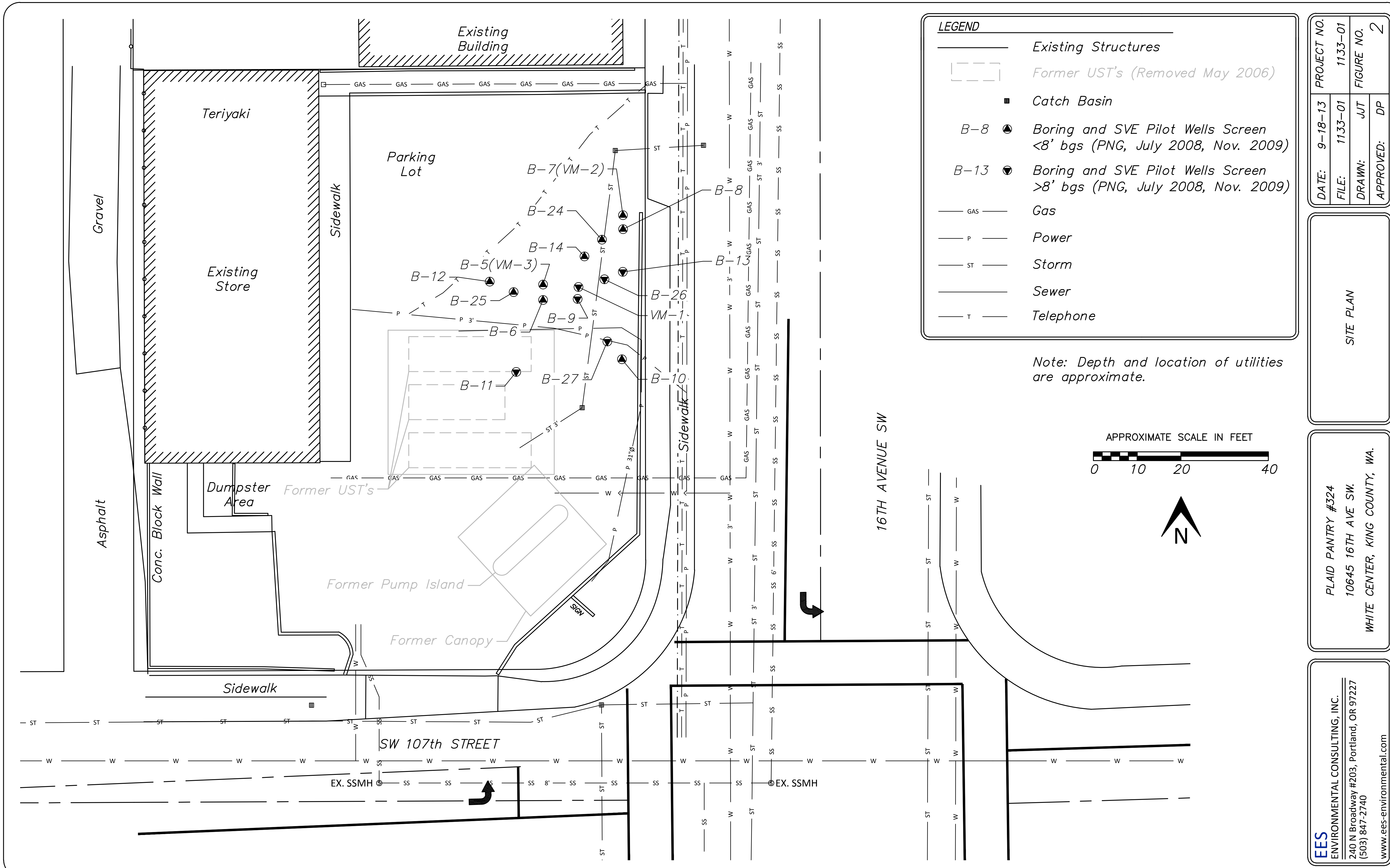
VICINITY MAP

PLAID PANTRY #324
10645 16TH AVE SW.
WHITE CENTER, KING CO., WA.

DATE:	9–23–13	PROJECT NO.	1133–01
FILE:	1133–01		
DRAWN:	JJT	FIGURE NO.	1
APPROVED:	DP		



LEGEND
Existing Structures
Former UST's (Removed May 2006)
Catch Basin
B-8 Boring and SVE Pilot Wells Screen <8' bgs (PNG, July 2008, Nov. 2009)
B-13 Boring and SVE Pilot Wells Screen >8' bgs (PNG, July 2008, Nov. 2009)
GAS Gas
P Power
ST Storm
Sewer
T Telephone
Note: Depth and location of utilities are approximate.
APPROXIMATE SCALE IN FEET
0 10 20 40
N
Existing Building
Teriyaki
Existing Store
Parking Lot
Sidewalk
Gravel
Asphalt
Conc. Block Wall
Dumpster Area
Former UST's
Former Pump Island
Former Canopy
SIGN
B-7(VM-2)
B-8
B-24
B-14
B-13
B-5(VM-3)
B-12
B-25
B-26
VM-1
B-9
B-6
B-27
B-10
B-11
16TH AVENUE SW
SW 107th STREET
EX. SSMH
EX. SSMH
DATE: 9-18-13
FILE: 1133-01
DRAWN: JJT
APPROVED: DP
PROJECT NO. 1133-01
FIGURE NO. 2
SITE PLAN
PLAID PANTRY #324
10645 16TH AVE SW.
WHITE CENTER, KING COUNTY, WA.
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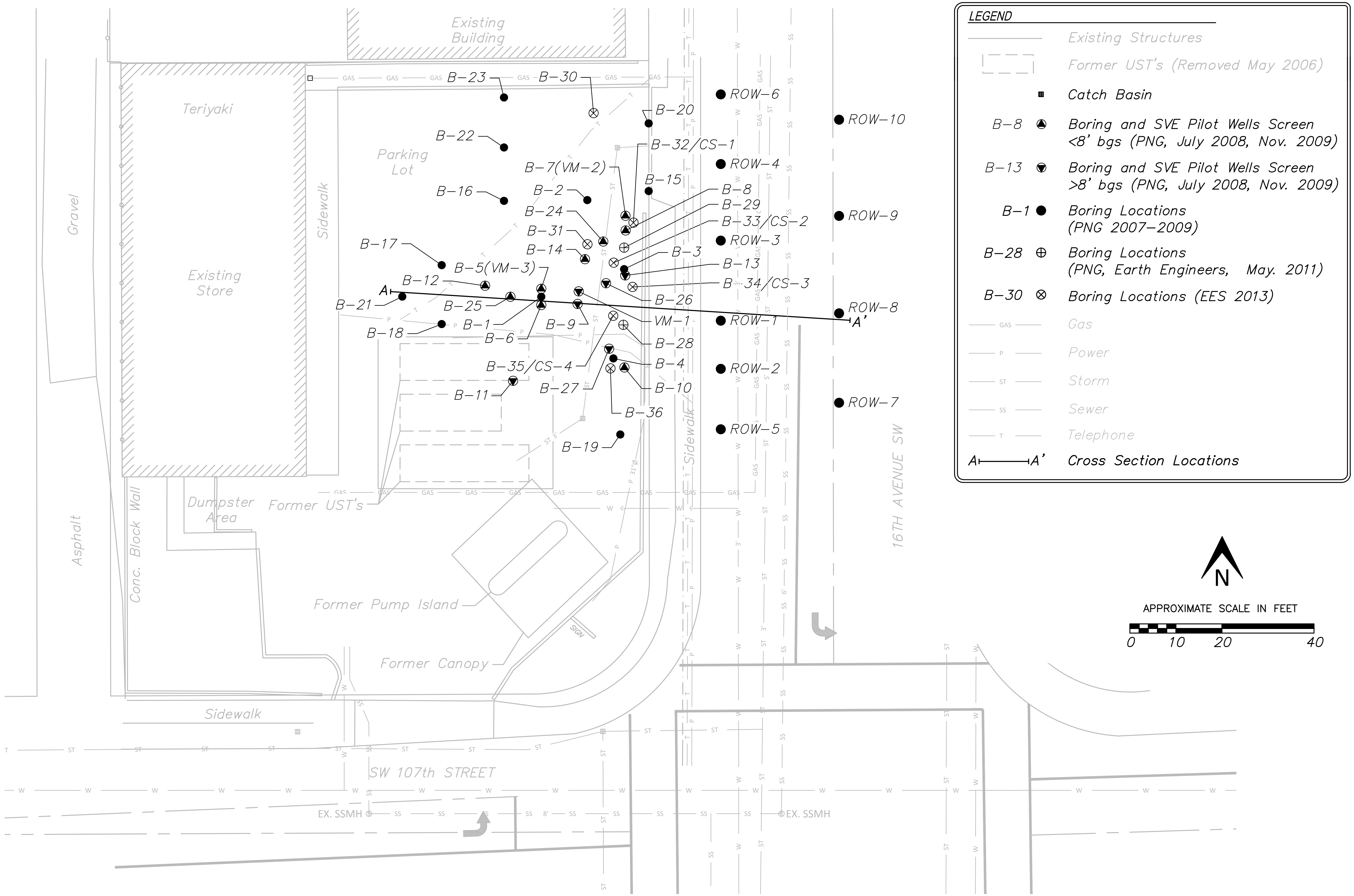

DATE: 9-24-13
FILE: 1133-01
DRAWN: JJT
APPROVED: DP
PROJECT NO. 1133-01
FIGURE NO. 3

HISTORIC SAMPLE LOCATIONS

PLAID PANTRY #324
10645 16TH AVE SW.
WHITE CENTER, KING COUNTY, WA.

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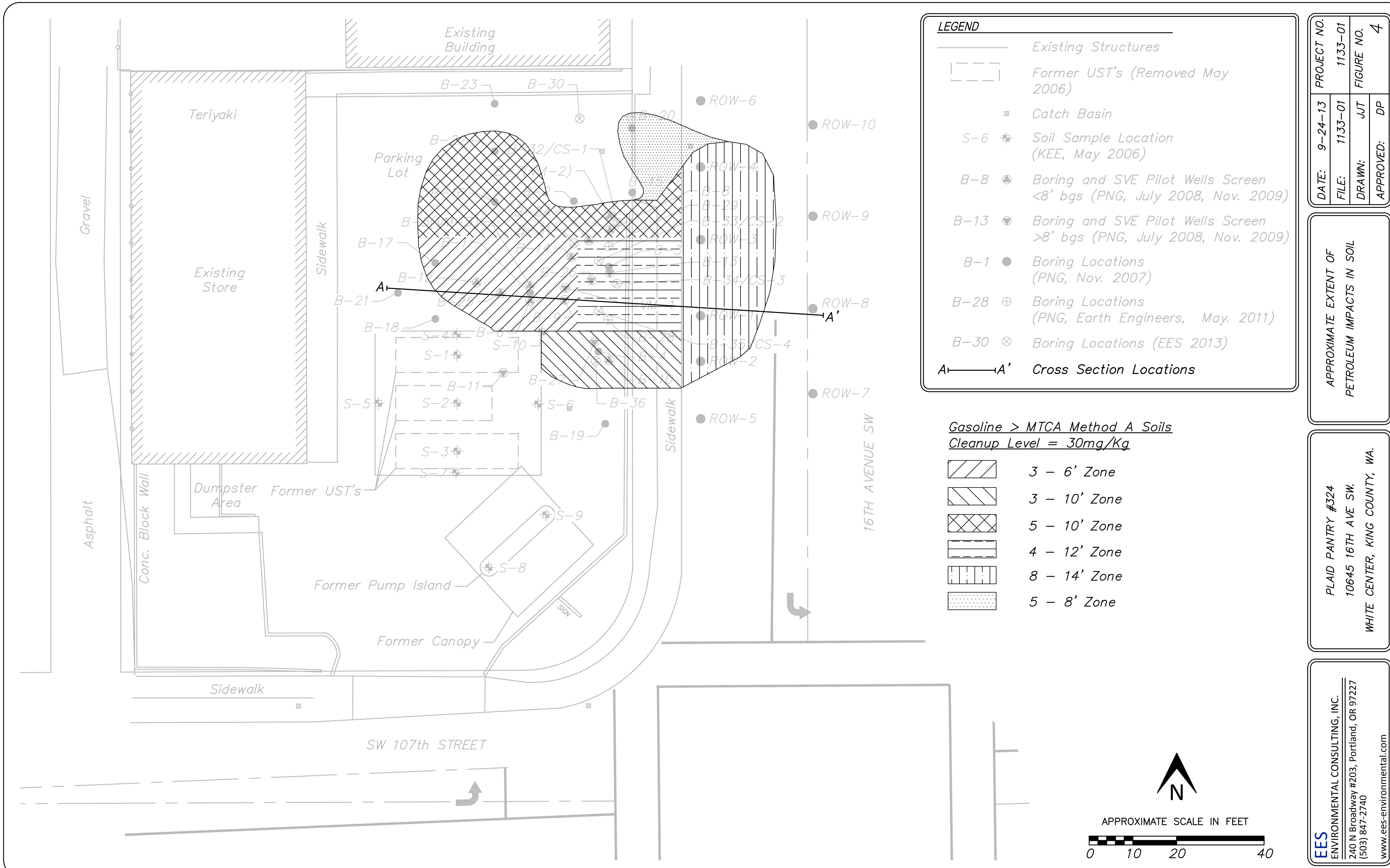

LEGEND
Existing Structures
Former UST's (Removed May 2006)
Catch Basin
S-6 Soil Sample Location (KEE, May 2006)
B-8 Boring and SVE Pilot Wells Screen <8' bgs (PNG, July 2008, Nov. 2009)
B-13 Boring and SVE Pilot Wells Screen >8' bgs (PNG, July 2008, Nov. 2009)
B-1 Boring Locations (PNG, Nov. 2007)
B-28 Boring Locations (PNG, Earth Engineers, May. 2011)
B-30 Boring Locations (EES 2013)
A—A' Cross Section Locations
Gasoline > MTCA Method A Soils Cleanup Level = 30mg/Kg
3 – 6' Zone
3 – 10' Zone
5 – 10' Zone
4 – 12' Zone
8 – 14' Zone
5 – 8' Zone
Existing Building
Teriyaki
Existing Store
Parking Lot
Sidewalk
Gravel
Asphalt
Conc. Block Wall
Dumpster Area
Former UST's
Former Pump Island
Former Canopy
SIGN
SW 107th STREET
16TH AVENUE SW
B-23
B-30
B-17
B-21
B-18
B-19
B-36
S-1
S-2
S-3
S-4
S-5
S-6
S-7
S-8
S-9
S-10
B-11
ROW-1
ROW-2
ROW-3
ROW-4
ROW-5
ROW-6
ROW-7
ROW-8
ROW-9
ROW-10
A
A'
N
APPROXIMATE SCALE IN FEET
0 10 20 40
DATE: 9-24-13
FILE: 1133-01
DRAWN: JJT
APPROVED: DP
PROJECT NO. 1133-01
FIGURE NO. 4
APPROXIMATE EXTENT OF PETROLEUM IMPACTS IN SOIL
PLAID PANTRY #324
10645 16TH AVE SW.
WHITE CENTER, KING COUNTY, WA.
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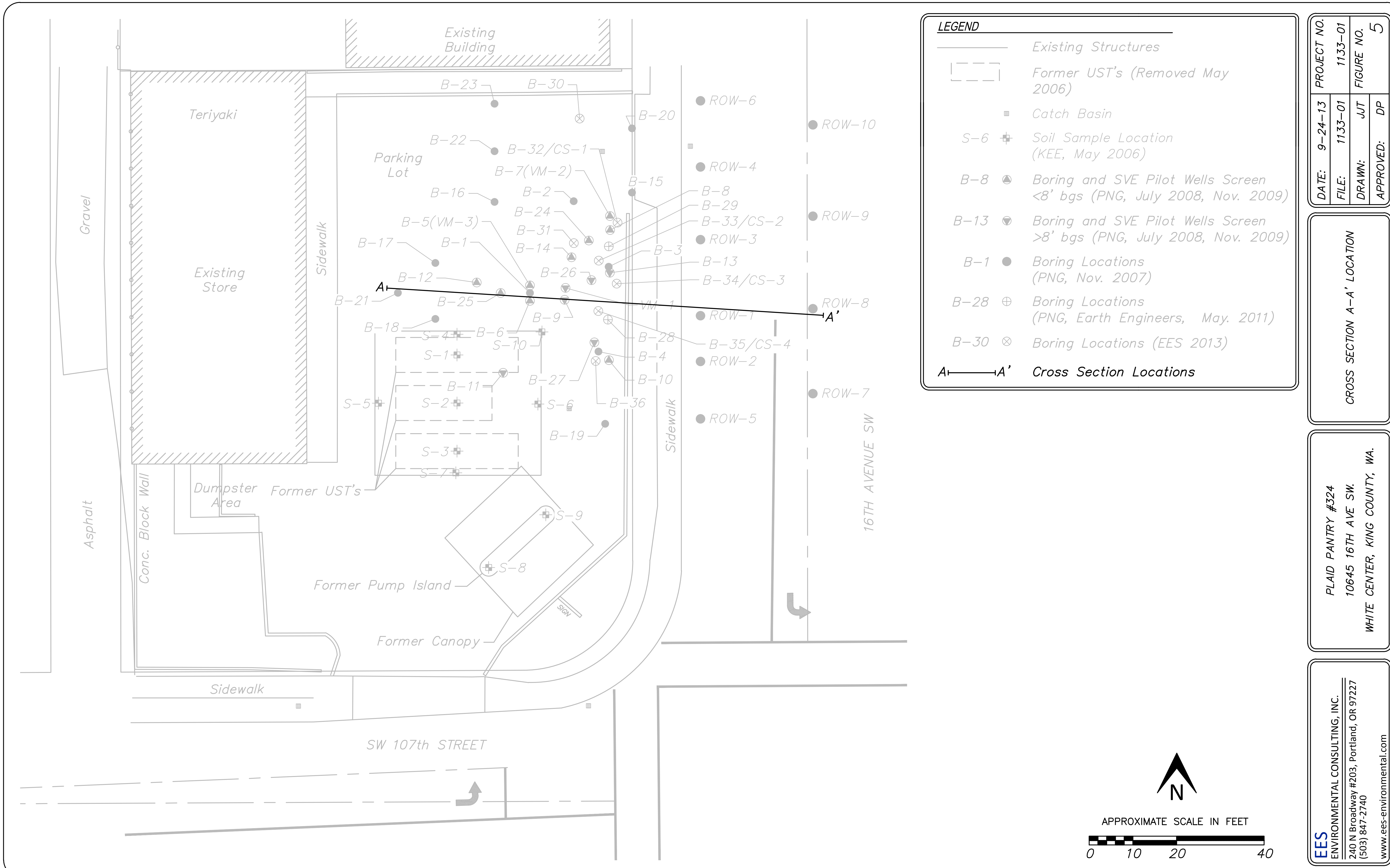
Existing Building
Teriyaki
Existing Store
Parking Lot
Sidewalk
Gravel
Asphalt
Conc. Block Wall
Dumpster Area
Former UST's
Former Pump Island
Former Canopy
SW 107th STREET
16TH AVENUE SW
B-23
B-30
B-20
B-22
B-32/CS-1
B-7(VM-2)
B-15
B-16
B-2
B-24
B-5(VM-3)
B-31
B-17
B-1
B-14
B-26
B-12
B-21
B-25
B-9
B-18
B-6
S-10
S-4
S-1
B-11
S-2
S-5
S-6
S-3
S-7
S-9
S-8
B-27
B-19
B-8
B-29
B-33/CS-2
B-3
B-13
B-34/CS-3
VM-1
B-28
B-35/CS-4
B-4
B-10
B-36
ROW-6
ROW-4
ROW-3
ROW-1
ROW-2
ROW-5
ROW-10
ROW-9
ROW-8
ROW-7
A
A'
SIGN
LEGEND
Existing Structures
Former UST's (Removed May 2006)
Catch Basin
S-6 Soil Sample Location (KEE, May 2006)
B-8 Boring and SVE Pilot Wells Screen <8' bgs (PNG, July 2008, Nov. 2009)
B-13 Boring and SVE Pilot Wells Screen >8' bgs (PNG, July 2008, Nov. 2009)
B-1 Boring Locations (PNG, Nov. 2007)
B-28 Boring Locations (PNG, Earth Engineers, May. 2011)
B-30 Boring Locations (EES 2013)
A—A' Cross Section Locations
N
APPROXIMATE SCALE IN FEET
0 10 20 40
DATE: 9-24-13
FILE: 1133-01
DRAWN: JJT
APPROVED: DP
PROJECT NO. 1133-01
FIGURE NO. 5
CROSS SECTION A-A' LOCATION
PLAID PANTRY #324
10645 16TH AVE SW.
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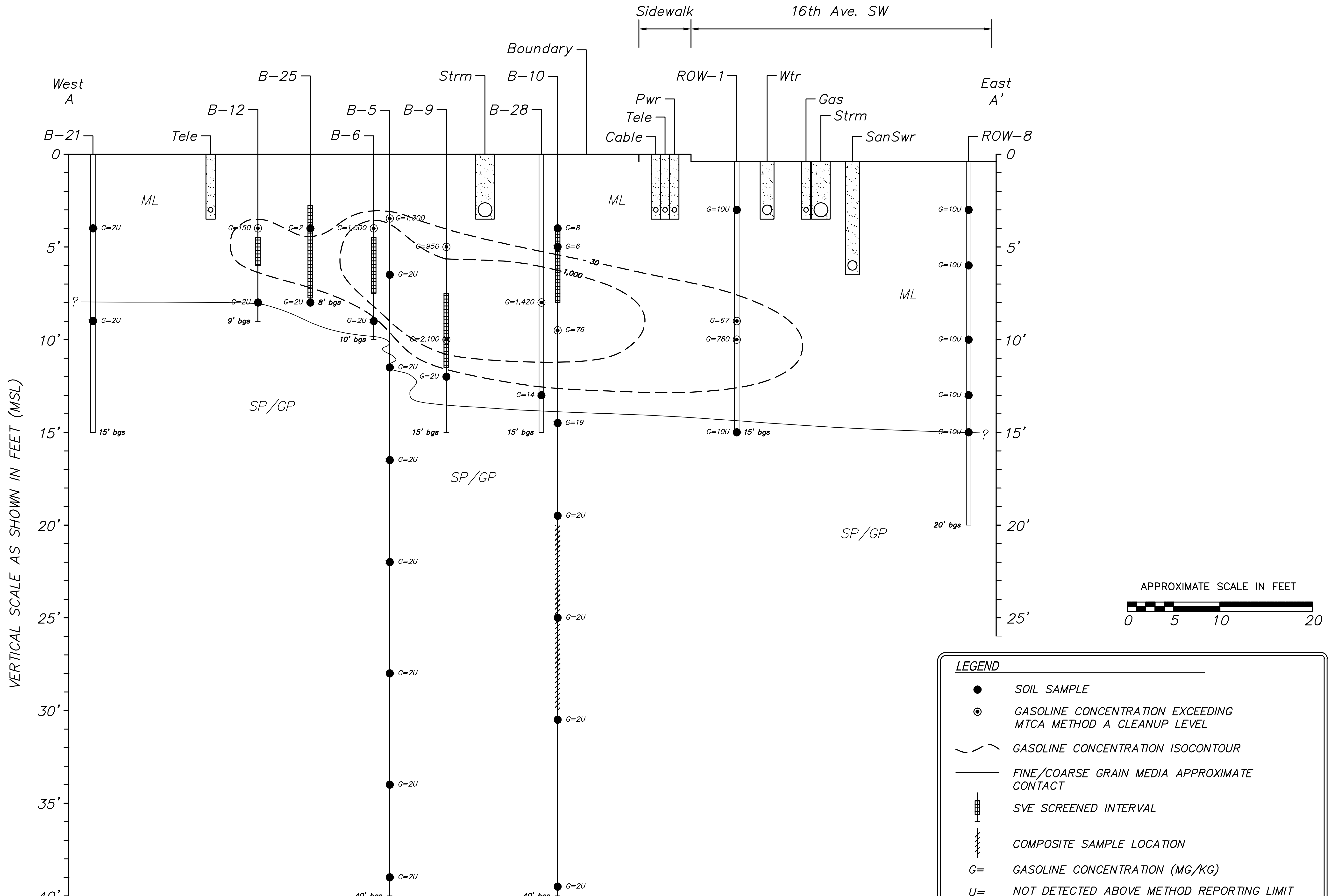

PROJECT NO.	1133-01
FIGURE NO.	6
DATE:	9-24-13
FILE:	1133-01
DRAWN:	JJT
APPROVED:	DP

WEST - EAST
CROSS SECTION A-A'

PLAID PANTRY #324
10645 16TH AVE SW.
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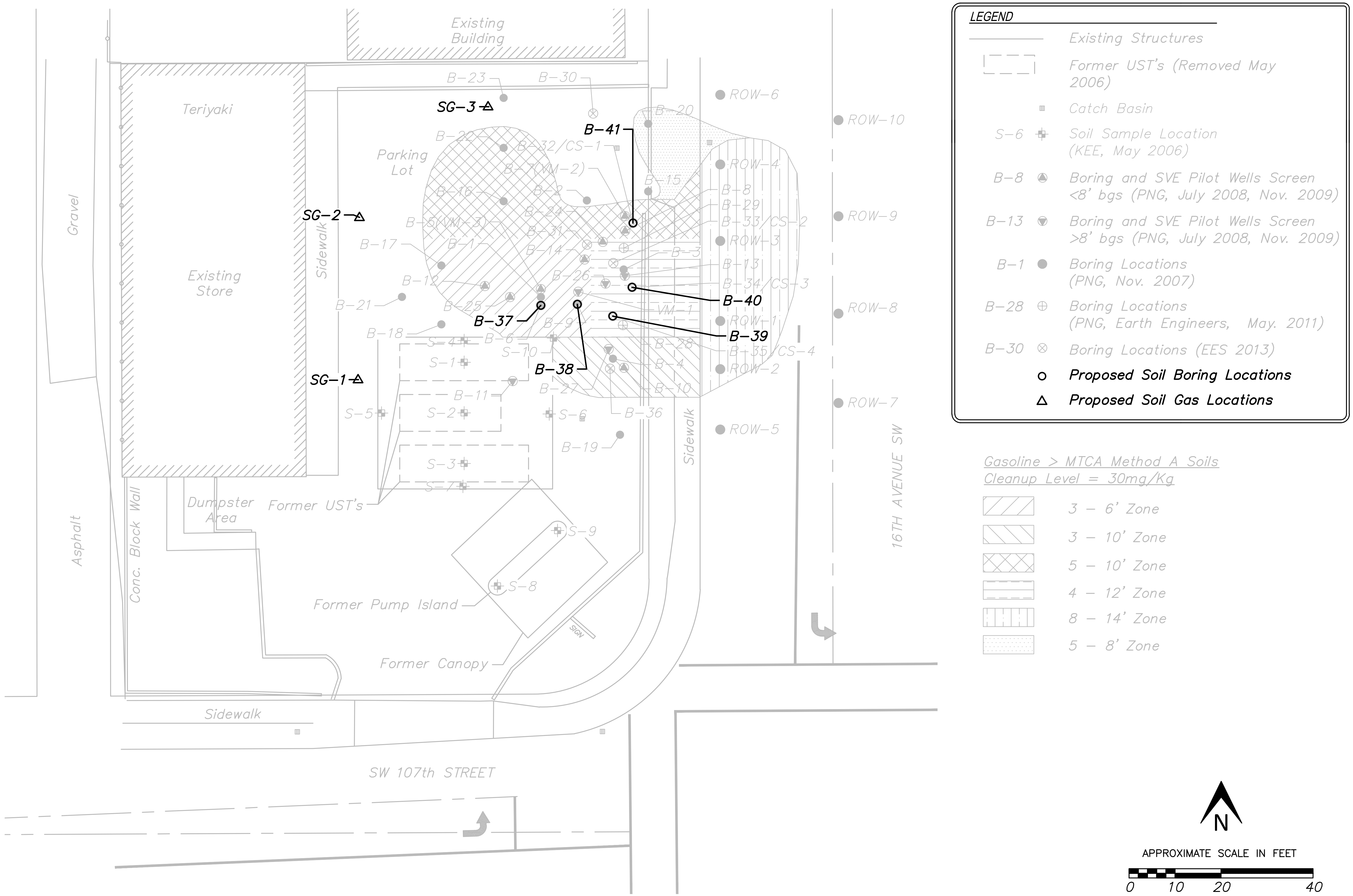

PROJECT NO. 1133-01

FIGURE NO. 7

DATE: 9-24-13

FILE: 1133-01

DRAWN: JJT

APPROVED: DP

PROPOSED SAMPLE LOCATIONS

PLAID PANTRY #324
10645 16TH AVE SW.
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Z:\EES-Autocad\1133-01 Plaid Pantry #324\2013\July 2013\1133-01_BM-080813.dwg, Sample Locs-PR (2)

ATTACHMENT A

Standard Operating Procedures

Soil Gas (Vapor) Monitoring and Sampling

SOP-SG1

This standard operating procedure (SOP) describes procedures for performing soil gas (vapor) monitoring and sampling using direct-push drilling technology. Because each site is unique, these procedures should be viewed as guidelines and will likely require modification based on site and subsurface conditions present.

Personnel performing the soil gas monitoring and sampling will follow site safety procedures as specified in the site-specific Health and Safety Plan.

EQUIPMENT

Soil gas monitoring and sampling will be performed using direct push sampling equipment. The direct push probe will be advanced using either a truck- or track-mounted Geoprobe rig, or for limited access areas, using portable methods such as rotary hammer drill (rotohammer).

Coring/probe installation equipment which may be used includes the following: a rotohammer or truck-mounted Geoprobe rig, ½-inch to 2-inch diameter concrete coring drill bit, cloth (for dust suppression during drilling), Geoprobe drill rods, ¼-inch diameter tubing (nylon, stainless steel, or Teflon®), fine-grained (20-40) silica sand, granular bentonite grout or alternative, and possibly cement in cases where the formation has a very low permeability.

Leak check equipment using helium or other pre-approved non-reactive tracer gas may include: helium tank, piping, three-way valve, leak check enclosure (shroud), helium detector, paper towels or rags, and nitrile gloves.

Monitoring/sampling equipment which may be used includes the following: Summa canister (may be a one-liter or six-liter Summa canister with valve), certified flow controller, steel filter, three-way valve, extra miscellaneous valves, photo ionization detector (PID), low flow vacuum pump, vacuum gauge, barometer/thermometer/wind speed indicator.

CORING/PROBE INSTALLATION PROCEDURES

Prior to drilling or coring, an attempt will be made to locate utility lines and if inside a building, to determine whether or not the building has an existing vapor barrier or a tensioned slab.

When samples are collected beneath buildings, a minimum of one sample will be collected from beneath each building. In addition, one duplicate sample will be collected. If possible, the samples will be located in the central portion of the slab, away from the floor slab/perimeter foundation junction, where dilution is more likely to occur.

In each sample location, a small diameter (½-inch to one-inch) hole will be drilled in the foundation using a rotohammer, truck-mounted Geoprobe rig, or concrete corer. When drilling the hole, no water should be used and care should be taken not to puncture the surface of soil underneath. If dust prevention is necessary, cover the location with a cloth or towel and drill through a pre-cut small hole in the cloth.

The probes are typically advanced to a depth of five feet below ground surface (bgs), however, other site-specific depths or multiple depths for vertical soil gas profiling may be targeted by the work plan. At target depth, the probe rod will be withdrawn approximately three to six inches to disengage the expendable probe tip and minimize the terminal void space volume. New, dedicated disposable nylon, stainless steel, or Teflon® tubing would then be fitted with a barbed steel end nut, pushed into the base of the probe rod, and threaded onto a downhole terminal fitting sealed with an o-ring to prevent vapor short-circuiting to the surface through the rod annulus.

The area immediately around the probe rods shall be grouted using hydrated bentonite grout (if temporary installation) or cement (if permanent installation). Wait 30 minutes prior to sampling for bentonite or cement to congeal. VOC-free modeling clay may also be used to seal around the probe rods to prevent vapor short-circuiting to the surface.

Procedures for leak checking, soil gas purging, and sampling are described in the section below.

Following the completion of sampling, the soil boreholes will be filled with hydrated granular or powdered bentonite grout. If a building slab or pavement is present, the hole(s) will be patched with cement and finished flush with the surface.

SYSTEM SETUP

Inspect the laboratory-provided Summa canister for damage prior to use. Do not use a canister that has visible damage.

Using a wrench, remove the brass cap above the valve on the top of the Summa canister. Measure and record the initial vacuum of Summa canister. If using an external vacuum gauge, cap the gauge and attach it to the canister using a wrench. Open the canister valve only after verifying the gauge is properly capped.

Verify that the vacuum pressure of the canister is equal to that indicated on the laboratory supplied tag. If the vacuum does not match, the canister has likely leaked and should not be used. Record the vacuum pressure on the sample collection form.

The canister will then be fitted with the laboratory-provided steel filter. The sampling train (steel-filter, flow-controller (if used), and Summa canister) will be attached to a T connector with an in-line vacuum gauge and vacuum tight flow valves (Swagelok) at each end. All valves should be closed on the T-connector at this time. The valve connected to the sampling train is referred to as the sampling valve. The vacuum pump (truck-mounted or otherwise) is then attached to the second end of the T with the valve closed (referred to as the purge valve).

Lastly, the sample tubing is threaded through the leak-check shroud and connected to the soil gas sampling point and the third closed valve on the T-connector. The leak check shroud should then be sealed against the surface (see "Leak Check – Probe Point Surface Seal" below).

LEAK CHECKING

APPARATUS

The method described below shall be used to check for leaks in the lines and fittings of the above-ground sampling apparatus:

After the sampling system is set up, make sure all valves are closed.

Open the purge valve (the valve connecting the purge pump to the apparatus, all other valves remain closed), turn on the purge pump, and apply approximately ten inches of vacuum into the T-connector and valves. Close the purge valve and check to verify that there is no loss of vacuum within the sampling apparatus (T-connector and valves) over a one minute period of time. If there is a loss of vacuum, this indicates a leak in the purge/sample system train that must be remedied.

If necessary, recheck the system to verify that there is no leakage as described above.

Document the date and time the leak check(s) were performed. Close all valves.

PROBE POINT SURFACE SEAL

In addition checking for leaks in the apparatus, the probe point surface seal also needs to be checked for leakage. The preferred method uses helium gas as a tracer and permits checking for and correcting potential leaks in the field prior to sampling. Other tracer gases may be used but approval of their use should be verified prior to the start of the work. The helium tracer gas method is listed in ITRC's "Technical and Regulatory Guidance, Vapor Intrusion Pathway: A Practical Guideline" dated January 2007 (ITRC 2007), and as described below. The ITRC guidance from which the text below is derived is consistent with California Environmental Protection Agency and Oregon Department of Environmental Quality guidance (CalEPA 2005 and 2010; DEQ 2010).

HELIUM LEAK CHECK METHOD

- Insert sample tubing through the leak check enclosure (also referred to as a shroud) and complete sample tubing connections to the other apparatus (previously described above).
- Place the enclosure flush with the ground surface, placing hydrated bentonite around the shroud to seal the shroud around the sample point.
- Attach helium tubing from the helium tank regulator to the enclosure (the "helium in" tubing).
- Attach the exhaust tubing ("helium out") to the enclosure and locate the discharge end of the tubing as far as possible from the helium detector.
- Attach the helium detector on the exhaust line from the sample pump.
- Make sure the sample valve (from the sampling probe point) is closed.
- Open the helium tank valve and set the flow to approximately 200 milliliters/minute (ml/min); let it flow for about one minute to fill the leak check enclosure.
- Do an initial check to make sure the helium detector is not detecting any helium.
- Begin purging of soil gas as described in the section on purging below. During purging, continue monitoring helium detector, record readings. If helium is detected at over 5%, this indicates leakage; check/tighten all seals and fittings and repeat procedure. The helium exhaust line should also be monitored so that additional helium can be added to the shroud during sampling if needed.
- Close valves from the probe sampling point and purge pump lines, and turn pump off.
- If the helium detector reading is less than 5%, the system is considered leak free and sampling can be performed (see sampling section below).
- If the helium detector reading continues to be above 5%, leakage is indicated and the probe hole abandoned.
- Record helium monitoring measurements in field notes.

SOIL GAS PURGING PROCEDURES

Purging and sampling will be accomplished at a low flow rate (100 to 200 ml/min) to minimize the potential for inducing leakage. Flow rates should not exceed 200 ml/min. Purge vapors will be monitored using a PID for the presence of volatile organic compounds.

Slowly open the vacuum pump purge valve and purge three tubing volumes of vapor from the line, then close the purge valve. Based on a volume of approximately 0.044 liters per foot of ¼-inch ID tubing, and assuming five feet of tubing above ground, this would yield a total purge volume of 1.32 liters for a five-foot probe depth (ten total feet of tubing), and a total purge volume of 1.98 liters for a ten-foot probe depth (15 total feet of tubing).

During purging, check for leaks as described in the section on leak checks above. Record PID measurements of purge vapors on the field form. Oxygen and carbon dioxide concentrations may be monitored in the soil gas stream if desired by the work plan. At the conclusion of purging, immediately close the purge valve and then shut off the purge pump.

SOIL GAS SAMPLING PROCEDURES

Atmospheric conditions (barometric pressure, temperature, wind speed and direction) will be recorded prior to and after sampling. A portable weather station equipped with a data logger is preferred to log site-specific conditions over the duration of sampling. However, if a weather station cannot be set-up on site, record atmospheric data from the closest weather station.

After leak testing and soil gas purging, soil gas sampling may be performed.

After purging, the purge valve will be closed prior to opening the sampling valve. The sample valve will then be opened followed by slowly opening the Summa canister valve. The canister's valve should be closed when the vacuum gauge shows a vacuum of 5 inches of mercury (in Hg) (pressure of -5 in Hg). The sample valve should then be closed.

Ensure the canister valve is tightly closed. The sample train should be immediately disassembled by removing the steel particulate filter, flow controller, and the Summa canister. Immediately cap the Summa canister fitting. The final vacuum reading from the canister should be recorded on the chain of custody, sample collection form, and canister identification tag. If the final canister vacuum is less than 0.1 in Hg (more than 0.1 in Hg of pressure, or is a positive pressure), then the sample should be disregarded and a new sample collected.

Soil vapor samples will be shipped to a certified laboratory for analysis.

FIELD RECORDS

The field technician maintains a log sheet summarizing:

- Sample Location.
- Sample Identification.
- Date and time of sample collection.
- Sampling depth.
- Tubing type, length, and volume.
- Purge Data (i.e. pump used, volume, PID screening information, purge start and stop time, purge vacuum reading).
- Weather conditions.
- Sampling methods and devices.
- Volume of sampling device.
- Sampling start and end date/time.
- Vacuum of canisters before and after samples collected.
- Apparent moisture content (dry, moist, or saturated, etc.) of the sampling zone.
- Chain of custody protocols and records used to track samples from sampling point to analysis.
- Other notes as applicable to site specific observations, sampling issues and mitigation of problems encountered.

REFERENCES

Cal EPA. 2005 (February 7 rev.). Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air. Department of Toxic Substances Control, Interim Final. California Environmental Protection Agency.

Cal EPA. 2010 (March). Advisory – Active Soil Gas Investigation (Draft). California Environmental Protection Agency.

DEQ. 2010 (March 25). Guidance for Assessing and Remediating Vapor Intrusion in Buildings. Oregon Department of Environmental Quality.

ITRC, 2007 (January). Technical and Regulatory Guidance, Vapor Intrusion Pathway: A Practical Guideline, Interstate Technology & Regulatory Council