

**FINAL REPORT
LIMITED PHASE II
ENVIRONMENTAL SITE ASSESSMENT
FOR 24-INCH WATER LINE REPLACEMENT
ALONG WEST AIRPORT BOULEVARD
FROM FONDREN ROAD TO
NEAR BRAEWICK DRIVE
HOUSTON, TEXAS**

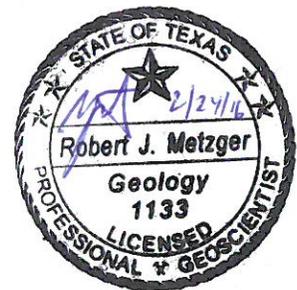
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Along West Airport Boulevard, Houston, Texas**

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1.0 EXECUTIVE SUMMARY

This Phase II Environmental Site Assessment (ESA-II) was performed by Aviles Engineering Corporation (AEC) for the replacement of a 24-inch water line along West Airport Boulevard from Fondren Road to near Braewick Drive in southwestern Houston, Texas (herein referred to as the Subject Right-of-Way).

Aviles Engineering Corporation (AEC) performed a Phase I Environmental Site Assessment (refer to AEC ESA-I report number E104-15 dated October 10, 2015) that identified the following recognized environmental conditions (RECs) in connection with the Subject Right-of-Way:

- REC 1: Quick Shop/Fondren Mini Mart LPST site (current Double Up Amusement) at 12260 Fondren Road.
- REC 2: 24 Seven 4, Stop N Go Market, Handi Plus No. 62, and 24/7 Shell gasoline stations at 6275 West Airport Boulevard.
- REC 3: Exxon, Motiva, Mobil Oil, and Southwest Fondren Shell gasoline stations at 12303 Fondren Road.

A Phase II Environmental Site Assessment was recommended. AEC performed this ESA-II at the request of LAN to investigate and assess if petroleum products from the three RECs contaminated the Subject Right-of-Way.

Nine soil borings were drilled during the investigation to depths up to 20 feet below the street pavement surface. Concrete thickness ranged from 6.75 to 8.5 inches. Cement stabilized sand base with some gravel ranging from 4 to 10.5 inches thick was present beneath the pavement in borings B-1, B-3, B-4, B-6, and B-9. The majority of the soil encountered during drilling was clay. Silt partings were observed in some of the soils. Slickensides were commonly observed in the soils greater than 6 feet deep. PID readings of soil were 4.6 parts per million (ppm) or less. Control PID readings of ambient air and air in new unused sample bags were 0.6 ppm or less. No petroleum or volatile organic compound odors were detected or visual evidence of contamination such as staining was observed in any of the soil cores during the limited ESA-II investigation. A soil sample was collected from each soil boring and each sample was analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX); methyl tertiary butyl ether (MTBE) and total petroleum hydrocarbons (TPH).

Groundwater was only encountered during drilling in borings B-8 and B-9. Encountered groundwater levels in each of these borings were 12 and 14.5 feet respectively. After one half hour, the groundwater levels had risen to 7.4 and 6.8 feet respectively. A temporary monitor well was placed in boring B-8 and a groundwater sample was collected and analyzed for BTEX, MTBE, and TPH.

The following laboratory analysis results (contaminants of concern) of soil samples collected during the ESA-II exceeded the laboratory detection limits used, but were below their respective Texas Conservation on Environmental Quality Texas Risk Reduction Program Tier-1 Residential Protective Concentration Levels:

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- Boring B-1, 17 to 19 feet below pavement surface (bps): MTBE = 0.003 milligrams per Kilogram (mg/Kg),
- Boring B-3, 16 to 17 feet bps: MTBE = 0.008 mg/Kg,
- Boring B-4, 15 to 16 feet bps: MTBE = 0.003 mg/Kg,
- Boring B-7, 10 to 11 feet bps: toluene = 0.0006 mg/Kg,
- Boring B-8, 11 to 13 feet bps: toluene = 0.00052 mg/Kg, o-xylenes = 0.001 mg/Kg, and total xylenes = 0.003 mg/Kg,
- Boring B-9 14 to 15 feet bps: toluene = 0.002 mg/Kg, m- & p-xylenes = 0.005 mg/Kg, o-xylenes = 0.003 mg/Kg, and total xylenes = 0.008 mg/Kg.

The remaining laboratory analysis results for the soil and groundwater samples were below their respective laboratory detection limits.

Based on the City of Houston requirements, the laboratory analysis results, and the field photoionization detector (PID) readings, three Potentially Petroleum Contaminated Areas (PPCAs) were identified:

- PPCA #1: Survey Station 0+00 to Survey Station 1+28 between 1.4 and 19 feet below pavement surface.
- PPCA #2: Survey Station 2+31 to Survey Station 4+62 between 1.5 and 17.5 feet below pavement surface at boring B-3 and 8.3 and 16 feet below pavement surface at boring B-4.
- PPCA #3: Survey Station 25+00 to Survey Station 31+00 between 0.5 and approximately 16 feet below pavement surface at borings B-7 through B-9.

Soil excavated from the PPCA should be continuously monitored (samples collected and analyzed for the contaminants of concern) and the soil excavated from the PPCA should be contained, properly handled, and disposed in accordance with appropriate Federal, State, and Local requirements and guidelines and the City of Houston's Section 02136 – Waste Material Handling, Testing and Disposal of the City of Houston Department of Public Works and Engineering Infrastructure Design Manual (refer to Appendix G). Until proven otherwise, the person responsible for the environmental monitoring should verify and document that contamination does not exist outside of the PPCA.

During construction activities, groundwater encountered in any of the PPCAs should be monitored (sampled and analyzed for the contaminants of concern) and the groundwater should be contained, properly handled and disposed in accordance with appropriate Federal, State, and Local requirements and guidelines and the City of Houston's Section 02136 – Waste Material Handling, Testing and Disposal of the City of Houston Department of Public Works and Engineering Infrastructure Design Manual (COH Section 02136; refer to Appendix G). Until proven otherwise, the person responsible for the environmental monitoring should verify and document that contamination does not exist outside of the PPCA. If groundwater dewatering is necessary, then groundwater should be contained, sampled, and analyzed for the contaminants of concern before discharging or disposing of the water.

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At each of the PPCAs, runoff into the construction site or into areas adjacent to the construction site could be potentially contaminated by contaminants from the adjacent pavement, ground surfaces, or from excavated materials from the anticipated contaminated soil strata stockpiled or stored on the adjacent surfaces. All excavated materials from the anticipated PPCA strata should be contained at all times with a barrier to prevent runoff from entering or leaving the construction site.

Though not anticipated to be a health concern, workers and the general public still should be protected during construction at each of the PPCAs. Of concern is accidental ingestion of contaminated soil and groundwater, inhalation of suspended contaminated soil and groundwater particles, and absorption of contaminants through the skin or eyes. A qualified environmental firm and toxicologist should be hired during the planning of and performance of the construction activities to develop an health and safety plan to among other things determine if PPE is needed and if so what types and a plan for waste material containment during excavation, handling, testing, and disposal practices. The COH Specification Section 02136 should be followed during construction (refer to Appendix G). The construction contractor, environmental firm, and toxicologist should follow the most stringent of Occupational Safety Health Administration (OSHA) standards; and Federal, State, and Local regulations and guidelines.

The construction contractor shall be responsible for following the above guidelines, all Federal, State, and Local regulations and guidelines, and the COH Section 02136. The construction contractor should follow the most stringent of any conflicting guidelines while performing all construction activities. AEC recommends that the construction contractor provide to the COH the name and qualifications of the environmental firm and toxicologist selected, and provide a submittal to the COH describing how the contractor, environmental firm, and toxicologist will handle the environmental problems and situations.

The information and conclusions provided in this report are based on a general knowledge of the Subject Right-of-Way and the proposed water line replacement; and the results of the limited ESA- II investigation. The ESA-II investigation was limited by the number and location of the soil borings and temporary monitor wells, the number of soil and groundwater samples collected, the specific sample analyses, and the cost and time constraints of the project. This report documents the concentrations of petroleum products detected in the respective soil samples and groundwater sample collected and analyzed during the limited ESA-II investigation near the three RECs identified in the ESA-I report. There is a possibility that soil and/or groundwater contaminated by petroleum products or hazardous substances and metals may exist in the Subject Right-of-Way that were not detected during the limited ESA-II investigation and concentrations of contaminants in the soil may be higher than those detected during the ESA-II. In addition, AEC cannot guarantee the accuracy of the PPCA delineation and it is possible that contamination might be found outside the limits of the PPCA.

2.0 INTRODUCTION

2.1 Project Background and Location

The City of Houston plans to replace a 24-inch water line along West Airport Boulevard from just west of Fondren Road to the area south of Braewick Drive (just west of Kirkside Drive) in

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southwestern Houston, Texas (herein referred to as the Subject Right-of-Way). The water line, according to a map provided by LAN, is approximately 3,700 feet long. Figure 1 shows a site vicinity map and Figure 2 shows a map with the project limits which LAN provided Aviles Engineering Corporation (AEC; refer to Appendix A).

AEC performed a Phase I Environmental Site Assessment (refer to AEC ESA-I report number E104-15 dated October 13, 2015) that identified the following recognized environmental conditions (RECs) in connection with the Subject Right-of-Way (refer to attached Figure 3 in Appendix A):

- REC 1: Quick Shop/Fondren Mini Mart LPST site (current Double Up Amusement) at 12260 Fondren Road (refer to Figure 3a in Appendix A).
- REC 2: 24 Seven 4, Stop N Go Market, Handi Plus No. 62, and 24/7 Shell gasoline stations at 6275 West Airport Boulevard (refer to Figure 3b in Appendix A).
- REC 3: Exxon, Motiva, Mobil Oil, and Southwest Fondren Shell gasoline stations at 12303 Fondren Road (refer to Figure 3a in Appendix A).

The ESA-I recommended that a limited Phase II Environmental Site Assessment (ESA-II) investigation be conducted with the installation of soil borings and temporary groundwater monitor wells to investigate and assess if petroleum products contaminated the Subject Right-of-Way adjacent to or near the REC. AEC submitted a proposal on October 20, 2015 to perform the limited ESA-II.

2.2 Authorization

Lockwood, Andrews, and Newnam, Inc. authorized the ESA-II of the Project Alignment in an email dated January 12, 2016.

3.0 ON-SITE INVESTIGATION

AEC has performed this limited ESA-II investigation of the Subject Right-of-Way near the RECs on West Airport Boulevard for the water line replacement along West Airport Boulevard in general accordance with Chapter 11 – Geotechnical and Environmental Requirements of the City of Houston Department of Public Works and Engineering Infrastructure Design Manual and ASTM Standard Practice E1903 (July 2015) and ASTM Standard Practice E1903.

Prior to conducting the limited ESA-II investigation, nine boring locations were marked in the field. Each soil boring was placed in the best practicable location, considering the location of utilities and other site-specific conditions. Figures 3a and 3b in Appendix A shows the locations of the soil borings. City of Houston maps were reviewed to determine the location of water and sewer utilities and the Texas811 utility locate service was contacted to mark other subsurface utilities in the Subject Right-of-Way.

The concrete pavement at each of the nine boring locations was cored on January 29th (refer to Photograph 1 in Appendix B). The pavement thicknesses ranged from 6.75 inches at Boring B-2 to 8.5 inches at Borings B-1, B-3, and B-5. Base material consisting of stabilized sand with minor amounts of gravel was present below the concrete pavement in Borings B-1, B-3, B-4, B-

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6, and B-9. Base thickness ranged from 4 inches in B-9 to 10.5 inches in B-3. Table 1 on the next page summarizes the pavement and base thicknesses.

On February 1 and 2, 2016, a continuous direct-push soil boring machine was used to obtain a soil core to the total depth at each boring location (refer to Photographs 2 and 3 in Appendix B). Each boring was drilled to 5 feet below the excavation depth of the deepest proposed utility near each location as determined from information provided by LAN. The borings were drilled to depths ranging from 15 to 20 feet below pavement surface. The total depth of each soil boring is listed in Table 1 below.

Soil cores were collected in 4-foot long acetate liners within the 2-inch diameter direct push corer. The recovered core was logged. The majority of the soil encountered during drilling was clay (refer to the soil borings in Appendix C and summary of the borings in Table 1). Silt partings were observed in some of the clays. Slickensides were commonly observed in the clays deeper than 6 feet below the pavement surface. A clayey sand was encountered between 12 and 13.2 feet below pavement surface in Boring B-8 and a sand was encountered between 14.5 and 15.0 feet below pavement surface in Boring B-9.

A representative section of soil was cut from each 1-foot section of each 4-foot core (where applicable) and placed in a zip-lock type sandwich bag for approximately 10 minutes for headspace evaluation of volatile organic compound vapors. The remainder of each 1-foot section of each 4-foot soil core was placed in a zip-lock bag in a cooler with ice for possible laboratory analysis. After approximately 10 minutes, the headspace concentration of volatile organic vapors from each bagged section of soil not in the cooler was analyzed by inserting the probe tip of a calibrated photoionization detector (PID) into a narrow opening of the bag seal.

Table 1 – Soil Boring, Sampling and Sample Analysis Information

Boring No.	Pavement and Base	Total Depth, feet*	Soil Sample Interval, feet*	Primary Soil Type	Wet Zones, feet *	Ground-water Sampled	Analyses
B-1	8.5 inches of concrete; 8.5 inches of cement stabilized sand base with small gravel.	19	17 to 19 (total depth of boring**)	Clay	None	Not Applicable	BTEX, MTBE, TPH, and moisture content
B-2	6.75 inches of concrete; no base.	20	1 to 2 (highest PID reading**)	Clay	None	Not Applicable	BTEX, MTBE, TPH, and moisture content
B-3	8.5 inches	20	24 to 25	Clay	None	Not	BTEX,

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Boring No.	Pavement and Base	Total Depth, feet*	Soil Sample Interval, feet*	Primary Soil Type	Wet Zones, feet *	Ground-water Sampled	Analyses
	of concrete; 10.5 inches of cement stabilized sand base with small gravel.		(total depth of boring**)			Applicable	MTBE, TPH, and moisture content
B-4	8 inches of concrete; 8 inches of cement stabilized sand base.	16	15 to 16 (total depth of boring**)	Clay	None	Not Applicable	BTEX, MTBE, TPH, and moisture content
B-5	8.5 inches of concrete; no base.	16	6 to 7 (highest PID reading**)	Clay	None	Not Applicable	BTEX, MTBE, TPH, and moisture content
B-6	7.5 inches of concrete; 6.5 inches of cement stabilized sand and gravel base	18	17 to 18 (total depth of boring**)	Clay	None	Not Applicable	BTEX, MTBE, TPH, and moisture content
B-7	7 inches of concrete; no base.	15	10 to 11 (highest PID reading**)	Clay	None	Not Applicable	BTEX, MTBE, TPH, and moisture content
B-8	7 inches of concrete; no base.	19	11 to 13 (highest PID reading and above water table**)	Clay	12 to 13.2	Yes	BTEX, MTBE, TPH, and moisture content
B-9	7.5 inches of concrete; 4 inches of cement stabilized	16	14 to 15 (total depth of boring**)	Clay	14.5 to 15.0	No	BTEX, MTBE, TPH, and moisture content

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Boring No.	Pavement and Base	Total Depth, feet*	Soil Sample Interval, feet*	Primary Soil Type	Wet Zones, feet *	Ground-water Sampled	Analyses
	sand with gravel base						

*below pavement surface.

**reason for selection on sample interval.

The resultant PID readings are listed on the boring logs in Appendix C. The PID readings ranged from 0.0 parts per million (ppm; in soils from Borings B-1 and B-6) to 4.6 ppm (in soil from 10 to 11 feet in Boring 7). PID readings in background air (control samples) ranged from 0.0 ppm to 0.3 ppm and readings of air in new empty sample bags (control samples) ranged from 0.0 to 0.6 ppm. No petroleum or volatile organic compound odors were detected in any of the soil cores during the limited ESA-II investigation. No visual evidence of soil contamination such as staining was observed in any of the soil cores.

A soil sample for laboratory analysis was collected from the intervals identified in Table 1 and the boring logs of Appendix C. Each soil sample for BTEX, MTBE, and TPH analysis was collected using a new laboratory-provided open bore syringe and clean 40-milliliter vials and following U.S. Environmental Protection Agency SW-846 Method 5035A as modified by the Texas Commission on Environmental Quality (TCEQ). For each soil interval collected for analysis, a sample was also placed in a 4 ounce glass jar for analysis of moisture content. Each vial and glass jar was labeled with the date and time of sample collection, the soil boring number, and the requested analyses. Each of the collected soil samples were preserved on ice and transported to A&B Environmental Services, Inc. commercial analytical laboratory with a completed chain-of-custody form (refer to the analytical laboratory report in Appendix E).

Groundwater was encountered at 12 feet and 14.5 feet below pavement surface in borings B-8 and B-9, respectively. Groundwater was encountered at 12 feet in Boring B-8 and 14.5 feet in Boring B-9. The groundwater did not have any petroleum odor. After one half hour the groundwater level was at 7.4 feet and 6.8 feet below pavement surface in Borings B-8 and B-9 respectively (refer to soil borings logs in Appendix C). Boring B-8 was converted to a temporary groundwater monitor well. The well consisted of 15 feet of new 1-inch diameter polyvinyl chloride (PVC) screen and the rest of new 1-inch diameter PVC solid-wall casing. Three well volumes (1.4 quarts) of groundwater were removed from the temporary groundwater monitor well prior to sampling. The water in the well was allowed to equilibrate and then a groundwater sample was collected for analysis. The groundwater sample was placed into clean, laboratory-provided sample containers, labeled with the date and time of sample collection, the well number, the requested analyses, and the initials of the sample collector. The containers containing the groundwater sample were preserved on ice and transported to A&B Environmental Services, Inc. with a completed chain-of-custody form (refer to the analytical laboratory report in Appendix E).

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Following the sampling, the temporary groundwater monitor well was removed from the borehole. Each of the nine boreholes were then grouted from the total depth to near the base of the pavement. The remainder of each boring was patched with quick dry cement.

4.0 LABORATORY ANALYSES

Each of the nine soil samples was analyzed by A&B Environmental Services, Inc. laboratory for benzene, toluene, ethylbenzene, and xylenes (BTEX); and methyl tertiary butyl ether (MTBE) using analytical method SW-846 8021B and total petroleum hydrocarbons (TPH) concentrations by TCEQ TX Method 1005. The moisture content of each of the soil samples was also determined as required for the analyses. The results of the soil sample analyses are summarized in Table 2 in Appendix D. Appendix E contains the laboratory analysis report, quality control certificate, and chain-of-custody.

As shown in Table 2 in Appendix D, the following laboratory analysis results exceeded the laboratory detection limits used:

- Boring B-1, 17 to 19 feet below pavement surface (bps): MTBE = 0.003 milligrams per Kilogram (mg/Kg),
- Boring B-3, 16 to 17 feet bps: MTBE = 0.008 mg/Kg,
- Boring B-4, 15 to 16 feet bps: MTBE = 0.003 mg/Kg,
- Boring B-7, 10 to 11 feet bps: toluene = 0.0006 mg/Kg,
- Boring B-8, 11 to 13 feet bps: toluene = 0.00052 mg/Kg, o-xylenes = 0.001 mg/Kg, and total xylenes = 0.003 mg/Kg,
- Boring B-9 14 to 15 feet bps: toluene = 0.002 mg/Kg, m- & p-xylenes = 0.005 mg/Kg, o-xylenes = 0.003 mg/Kg, and total xylenes = 0.008 mg/Kg.

Each of the laboratory analysis results are compared to their TCEQ Texas Risk Reduction Program (TRRP) Tier -1 Residential Soil Protective Concentration Levels (PCLS). The appropriate PCLs are listed in the last line of the body of Table 2 in Appendix D. None of the above contaminants which exceeded laboratory detection limits exceeded their respective TCEQ TRRP Tier-1 Residential PCLs.

The concentrations of contamination detected were very low. The following list indicates how many times below the appropriate TCEQ PCL each contaminant was.

- Boring B-1, MTBE = 207 times below PCL,
- Boring B-3, MTBE = 78 times below PCL,
- Boring B-4, MTBE = 207 times below PCL,
- Boring B-7, toluene = 13,666 times below PCL,
- Boring B-8, toluene = 15,769 times below PCL, o-xylenes = 71,000 times below PCL, and total xylenes = 40,000 times below PCL,
- Boring B-9, toluene = 4,100 times below PCL, m- & p-xylenes = between 22,000 and 30,000 times below PCL, o-xylenes = 10,024 times below PCL, and total xylenes = 15,000 times below PCL.

The groundwater sample collected from the temporary monitor well set in boring B-8 was

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analyzed by A&B Environmental Services, Inc. laboratory for BTEX and MTBE using analytical method SW-846 8021B and TPH concentrations by TCEQ TX Method 1005. The results of the groundwater sample analyses are summarized in Table 3 in Appendix D. Appendix E contains the laboratory analysis report, quality control certificate, and chain-of-custody. The laboratory analysis results for each constituent tested from the groundwater were below laboratory sample detection limits.

5.0 WASTE DISPOSAL

Waste soil and wastewater generated during the limited ESA-II on-site investigation were placed in 5-gallon plastic buckets and capped with a lid manufactured to fit the container. Each bucket of waste was transported to and stored at AEC's property at 5790 Windfern in Houston until sample analyses were completed. Since the laboratory analysis report indicated that the soil and groundwater concentrations did not exceed the applicable TCEQ TRRP PCLs, the waste soil and wastewater were disposed of as solid waste.

6.0 SUMMARY

AEC performed the limited ESA-II in general accordance with Chapter 11 – Geotechnical and Environmental Requirements of the City of Houston Department of Public Works and Engineering Infrastructure Design Manual and ASTM Standard Practice E 1903 (July 2015) to investigate and assess if petroleum products from the three RECs contaminated the Subject Right-of-Way.

During the investigation, nine soil borings were drilled to depths up to 20 feet below the pavement surface using 4-foot pushes by a continuous direct-push soil boring machine. The majority of the soil encountered during drilling was clay. Silt partings were observed in some of the clays and slickensides were commonly observed in clay deeper than 6 feet. A clayey sand and sand were encountered between 12 and 13.2 feet in Boring B-8 and 14.5 to 15 feet in Boring B-9 respectively. PID readings of soil removed from each one foot interval of each 4-foot soil core were 4.6 ppm or less. Control readings from ambient air and air within new unused sample bags were 0.6 ppm or less. No petroleum or volatile organic compound odors were detected or visual evidence of contamination such as staining was observed in any of the soil cores during the limited ESA-II investigation. A soil sample was collected from each soil boring and each sample was analyzed for BTEX, MTBE, TPH, and soil moisture content.

Groundwater was encountered at 12 feet and 14.5 feet below pavement surface in Borings B-8 and B-9 respectively. The groundwater level in each of the two borings approximately one half hour after drilling was 7.4 feet and 6.8 feet below the pavement surface, respectively. A temporary groundwater monitor well was set in boring B-8 and a groundwater sample was collected from there and analyzed for BTEX, MTBE, and TPH.

Concentrations of MTBE in each of the soil samples collected from Borings B-1, B-3, and B-4; toluene in each of the soil samples collected from Borings B7, B-8, and B-9; o-xylenes in each of the soil samples from Borings B-8 and B-9; m- & p-xylenes in each of the soil samples collected from Boring B-9; and total xylenes in each of the soil samples collected from Borings B-8 and B-9 exceeded their laboratory detection limits, but were each below their respective TCEQ

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TRRP Tier-1 PCLs. The remaining laboratory analysis results for the soil and groundwater samples were below their respective laboratory detection limits.

7.0 CONCLUSION AND RECOMMENDATIONS

According to the City of Houston's (COH) requirements as specified in Section 11.28 of Chapter 11 of the City of Houston Department of Public Works and Engineering Infrastructure Design Manual for conducting ESA-IIs (July 2015) and a telephone conversation with Mr. Maher Tanbouz, P.E. of the COH Geo-Environmental Services Branch of the Public Works and Engineering Department the City of Houston on February 8, 2015, the ESA-II report should define a Potentially Petroleum Contaminated Area (PPCA; a general term used by the COH to include all types of contamination) based on professional judgment and the results of the ESA-II investigation. Mr. Tanbouz indicated that even though the levels of contamination are low, a PPCA is needed for water line pipe selection. During an earlier telephone conversation on December 17, 2014, Mr. Tanbouz indicated that PPCA should extend 100 to 150 feet outward from the contaminated boring/s or temporary monitor well. If there is an uncontaminated boring within that distance, then the PPCA should extend to the midpoint between the contaminated and uncontaminated boring. A vertical extent of contamination should be identified.

In addition, this ESA-I report should, in accordance with COH specifications, address the potential for contaminated runoff entering the work area and the potential for migration of contamination into the construction area due to construction dewatering; and should provide recommendations for construction phase monitoring which should take into account:

- The vertical and horizontal extent of the PPCA and action plan,
- Worker protection and general health and safety;
- Potential contaminated media screening, testing, handling, and disposal consistent with Federal, State, and City Regulations and Specifications.

Based on the guidelines provided by Mr. Tanbouz above, the laboratory analysis results and the field PID readings, AEC has identified the following areas along the West Airport Boulevard Subject Right-of-Way as PPCAs (refer to Figures 4a and 4b in Appendix A):

- PPCA #1: Survey Station 0+00 to Survey Station 1+28 between 1.4 and 19 feet below pavement surface.
- PPCA #2: Survey Station 2+31 to Survey Station 4+62 between 1.5 and 17.5 feet below pavement surface at Boring B-3 and 8.3 and 16 feet below pavement surface at Boring B-4.
- PPCA #3: Survey Station 25+00 to Survey Station 31+00 between 0.5 and approximately 16 feet below pavement surface at Borings B-7 through B-9.

Soil excavated from the PPCA should be continuously monitored (samples and analyzed for the contaminants of concern) and the soil excavated from the PPCA should be contained, properly handled, and disposed in accordance with appropriate Federal, State, and Local requirements and guidelines and the City of Houston Specifications Section 02136 – Waste Material Handling, Testing and Disposal of the City of Houston Department of Public Works and Engineering Infrastructure Design Manual (refer to Appendix G). Until proven otherwise, the person responsible for the environmental monitoring should verify and document that contamination does not exist outside of the PPCA.

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During construction activities, groundwater encountered in any of the PPCAs should be monitored (sampled and analyzed for the contaminants of concern) and the groundwater should be contained, properly handled and disposed in accordance with appropriate Federal, State, and Local requirements and guidelines and the City of Houston Specifications, Section 02136 – Waste Material Handling, Testing and Disposal of the City of Houston Department of Public Works and Engineering Infrastructure Design Manual (COH Section 02136; refer to Appendix G). If groundwater dewatering is necessary, then groundwater should be contained, sampled, and analyzed for the contaminants of concern before discharging or disposing of the water. Until proven otherwise the person responsible for the environmental monitoring should verify and document that contamination does not exist outside of the PPCA

At each of the PPCAs, runoff into or from the construction site or into areas adjacent to the construction site could be potentially contaminated by contaminants from the adjacent pavement, ground surfaces, or from excavated materials from the anticipated contaminated soil strata stockpiled or stored on the adjacent surfaces. All excavated materials from the anticipated PPCA strata should be contained at all times and a barrier to prevent runoff from entering or leaving the construction site is also recommended.

Though not anticipated to be a health concern, workers and the general public still should be protected during excavation and construction activities at each of the PPCAs. Of concern is accidental ingestion of contaminated soil and groundwater, inhalation of suspended contaminated soil and groundwater particles, and absorption of contaminants through the skin or eyes. A qualified environmental firm and toxicologist should be hired during the planning of and performance of the construction activities to develop a health and safety plan to among other things determine if PPE is needed and if so what types and a plan for waste material containment during excavation, handling, testing, and disposal practices. The COH Specification Section 02136 should be followed during construction (refer to Appendix G). The construction contractor, environmental firm, and toxicologist should follow the most stringent of Occupational Safety Health Administration (OSHA) standards; and Federal, State, and Local regulations and guidelines.

The construction contractor shall be responsible for following the above guidelines, all Federal, State, and Local regulations and guidelines, and the COH Section 02136 (refer to Appendix G). The construction contractor should follow the most stringent of any conflicting guidelines while performing all construction activities. AEC recommends that the construction contractor provide to the COH the name and qualifications of the environmental firm and toxicologist selected, and provide a submittal to the COH describing how the contractor, environmental firm, and toxicologist will handle the environmental problems and situations.

8.0 LIMITATIONS

The information and conclusions provided in this report are based on a general knowledge of the Subject Right-of-Way and the results of the limited ESA-II investigation. This report documents the concentrations of petroleum products detected in the respective soil and groundwater samples collected and analyzed during the limited ESA-II investigation. There is a possibility that soil and/or groundwater contaminated by petroleum products, or hazardous substances may exist in

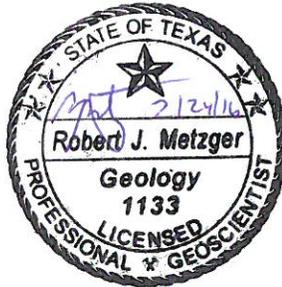
**Limited Phase II Environmental Site Assessment for 24-Inch Water Line Replacement
Along West Airport Boulevard, Houston, Texas**

the Subject Right-of-Way that were not detected during the limited ESA-II investigation due to the limited number and location of the soil borings, samples collected, contaminants analyzed, and the cost and time constraints of the project. It is also possible that concentrations of contaminants in the soil may be higher than those detected. In addition, AEC cannot guarantee the accuracy of the PPCA delineation and it is possible that contamination might be found outside the limits of the PPCA.

This investigation was performed using the standard level of care and diligence normally practiced by recognized professional environmental and engineering firms in this area, presently performing similar services under similar circumstances. This report has been prepared specifically to investigate potential contamination of the Subject Right-of-Way near the three RECs and is intended to be used in its entirety. The conclusions presented in this report should not be relied upon for other sites without additional evaluation and/or investigation. This document is not intended to constitute or substitute for legal counsel or guidance in connection with contamination in the Subject Right-of-Way, nor does it constitute a toxicological report on health effects from potential exposure to contamination during construction in the Subject Right-of-Way.

9.0 QUALIFICATIONS OF ENVIRONMENTAL PROFESSIONAL

Robert J. Metzger, CAPM, P.G., AEC Senior Geologist, conducted the limited ESA-II investigations in general accordance with in general accordance with Chapter 11 – Geotechnical and Environmental Requirements of the City of Houston Department of Public Works and Engineering Design Manual (07-01-2015) and ASTM Standard Practice E1903 and prepared this report. He has conducted ESA-II's for numerous City of Houston Department of Public Works and Engineering and other engineering projects. His qualifications are further described in his resume in Appendix G.

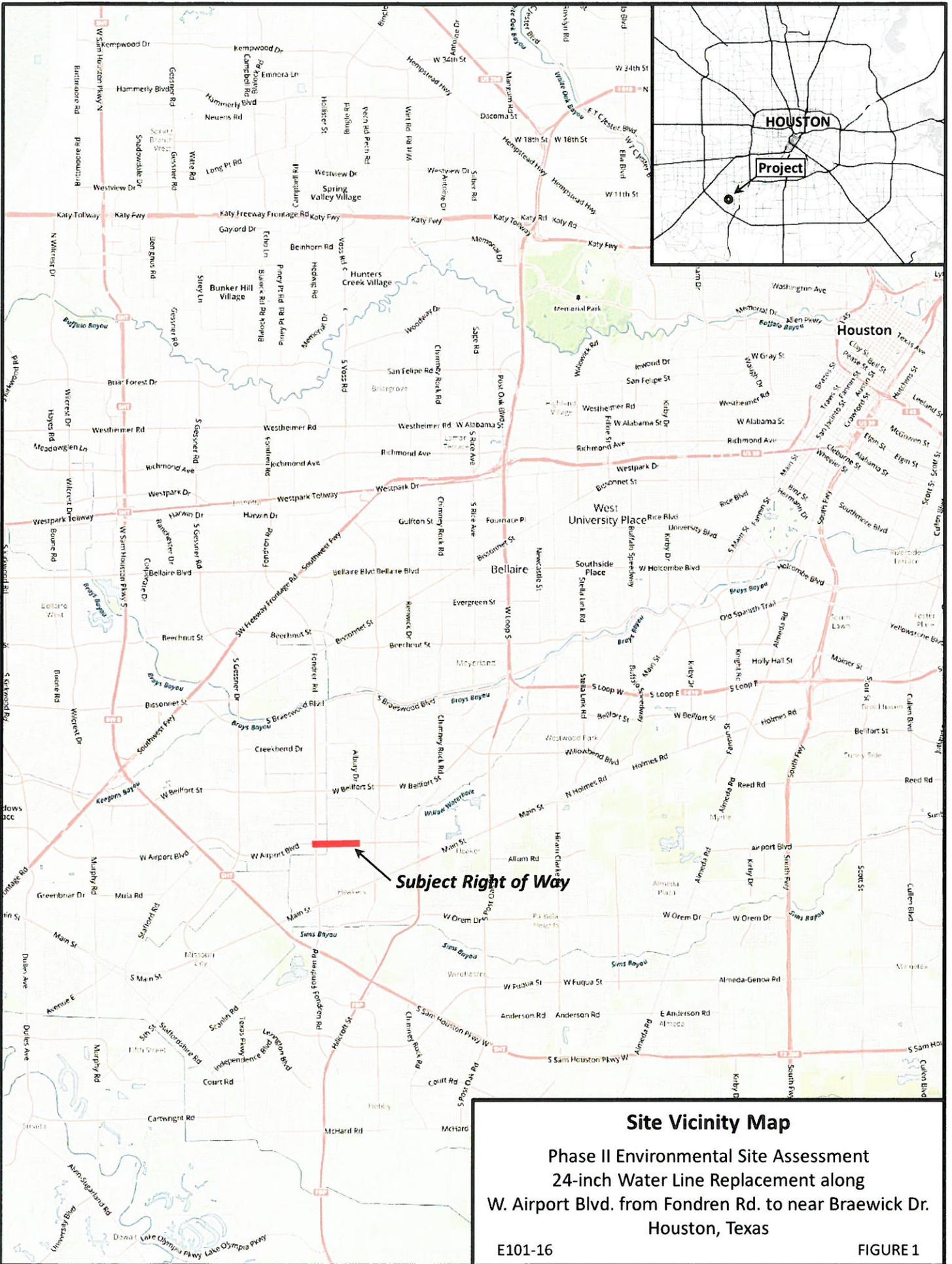


Prepared by:
Robert J. Metzger, CAPM, P.G.

**Limited Phase II Environmental Site Assessment for 24-Inch Water Line Replacement
Along West Airport Boulevard, Houston, Texas**

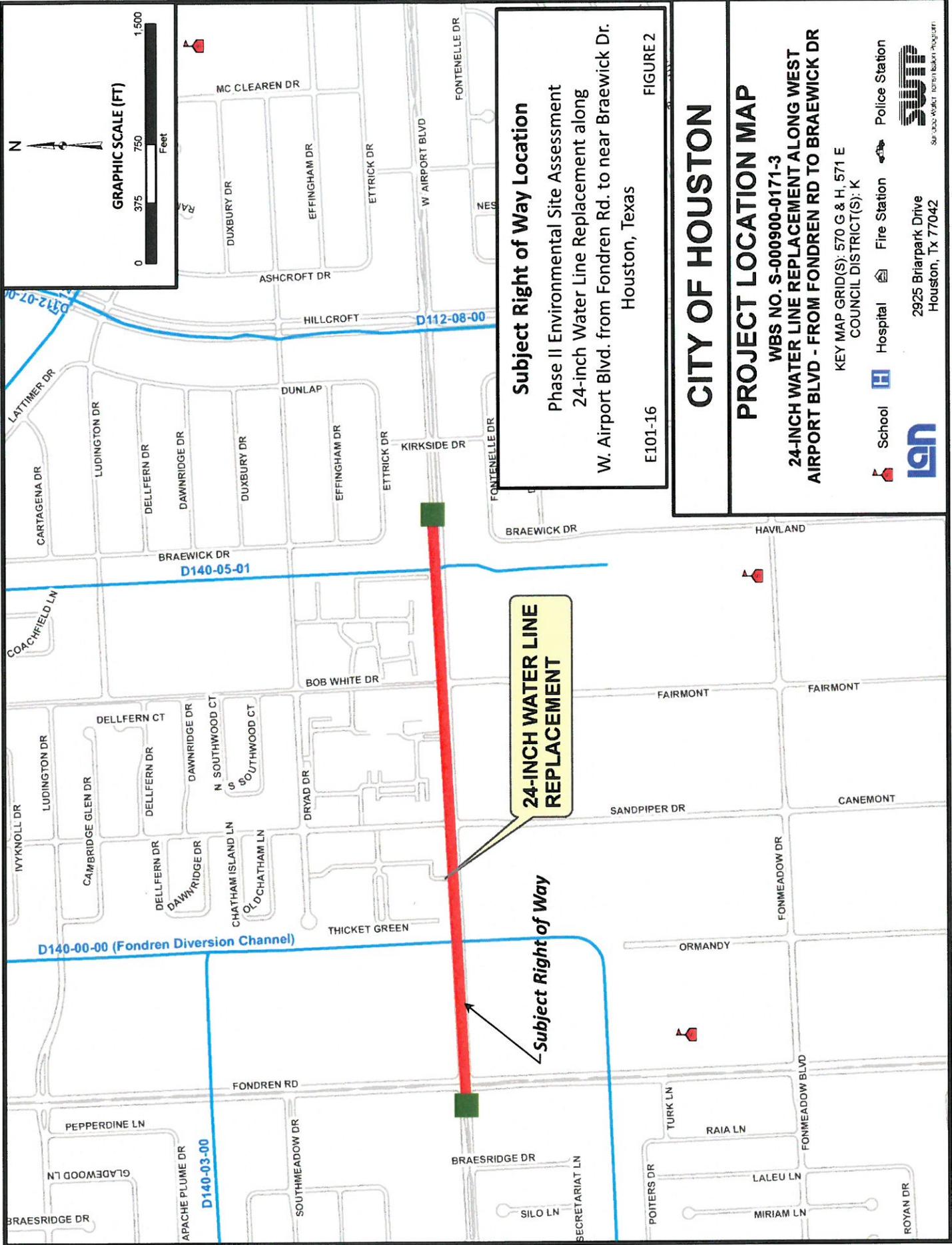
APPENDIX A

FIGURES



Subject Right of Way

Site Vicinity Map
 Phase II Environmental Site Assessment
 24-inch Water Line Replacement along
 W. Airport Blvd. from Fondren Rd. to near Braewick Dr.
 Houston, Texas
 E101-16 FIGURE 1

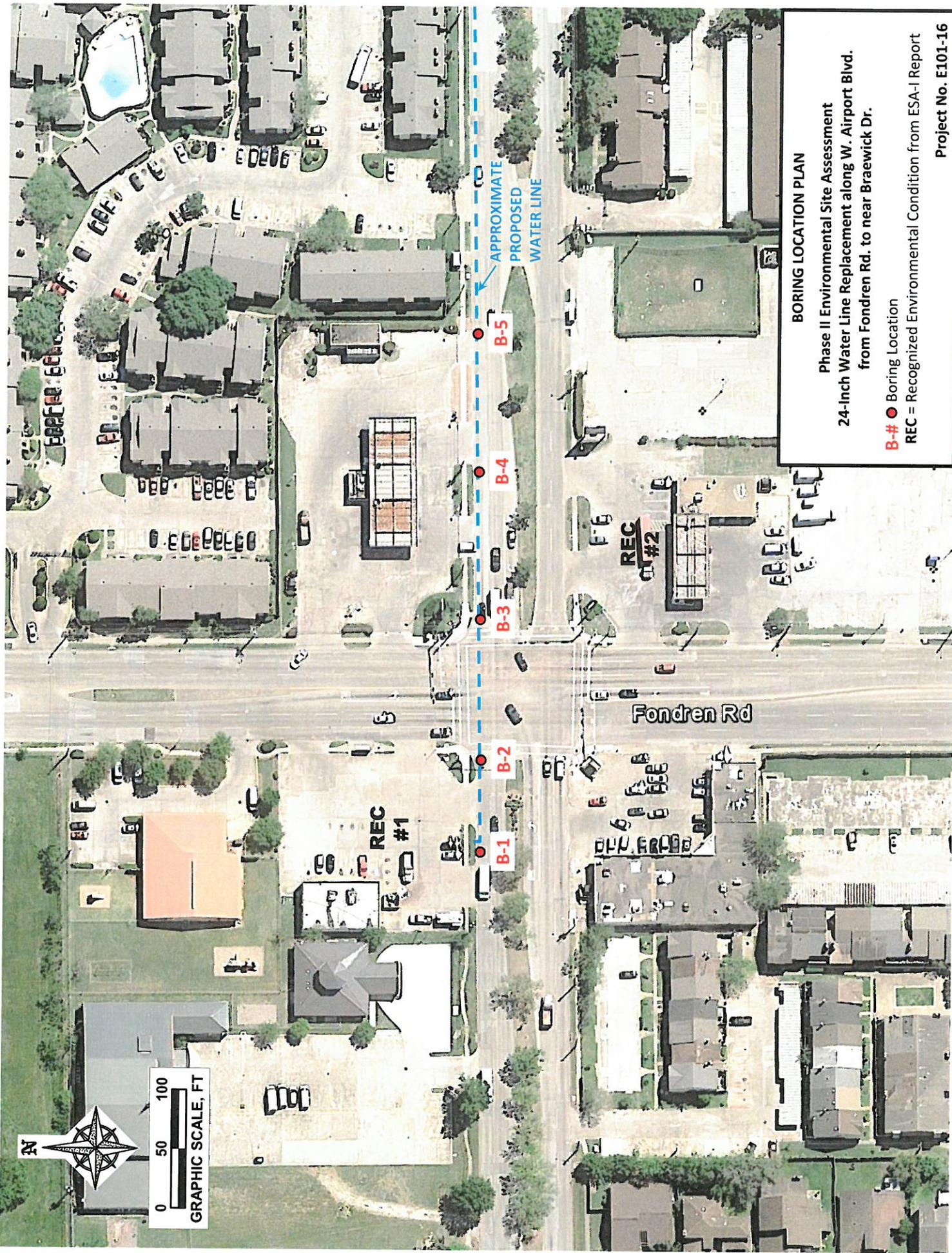


Subject Right of Way Location
 Phase II Environmental Site Assessment
 24-inch Water Line Replacement along
 W. Airport Blvd. from Fondren Rd. to near Braewick Dr.
 Houston, Texas
 E101-16
 FIGURE 2

CITY OF HOUSTON
PROJECT LOCATION MAP
 WBS NO. S-000900-0171-3
24-INCH WATER LINE REPLACEMENT ALONG WEST AIRPORT BLVD - FROM FONDREN RD TO BRAEWICK DR
 KEY MAP GRID(S): 570 G & H, 571 E
 COUNCIL DISTRICT(S): K
 School Hospital Fire Station Police Station
SWP
 2925 Briarpark Drive
 Houston, Tx 77042

24-INCH WATER LINE REPLACEMENT

Subject Right of Way



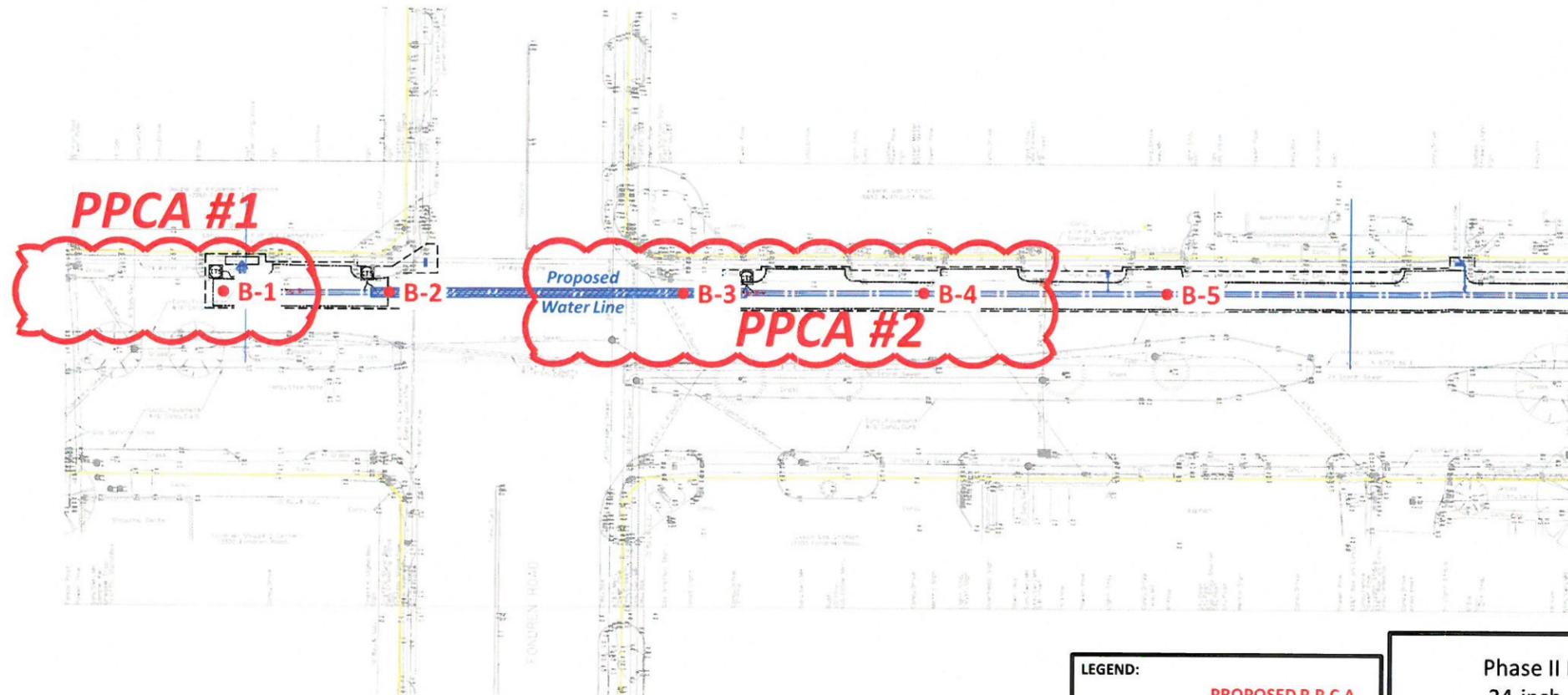
BORING LOCATION PLAN

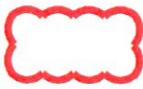
Phase II Environmental Site Assessment
24-Inch Water Line Replacement along W. Airport Blvd.
from Fondren Rd. to near Braewick Dr.

B-# ● Boring Location

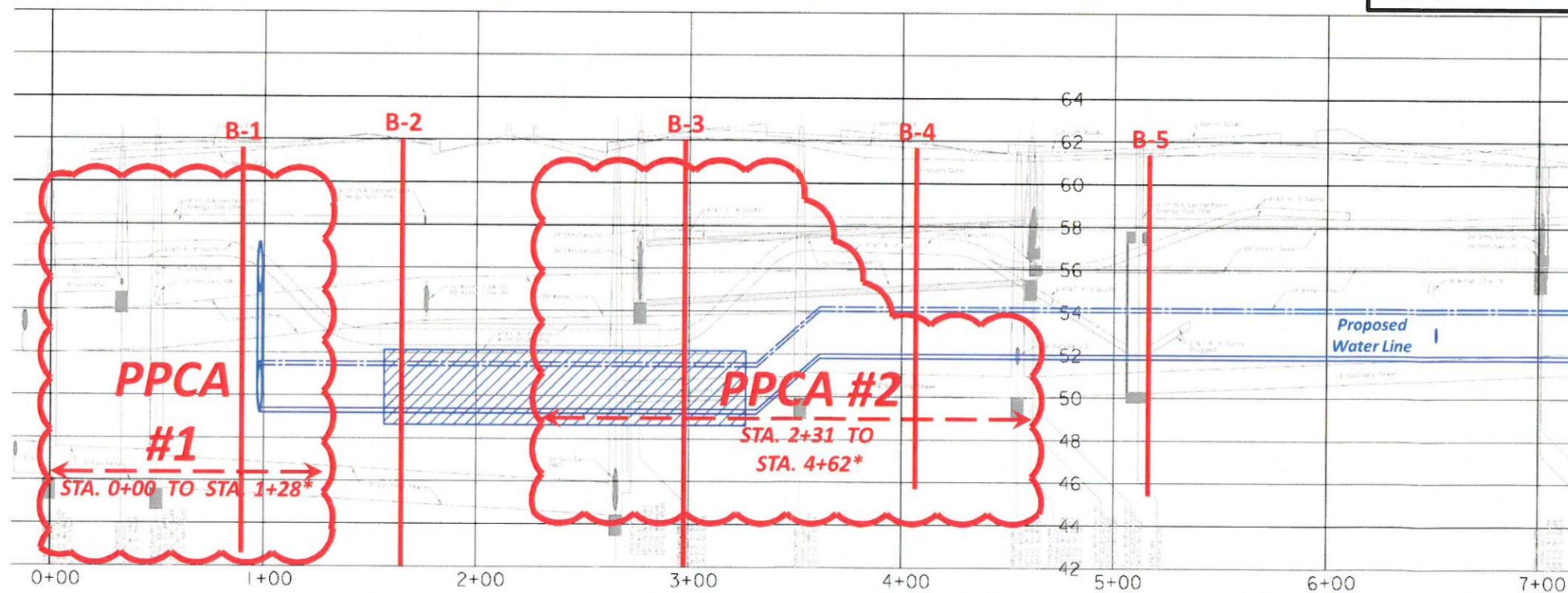
REC = Recognized Environmental Condition from ESA-I Report

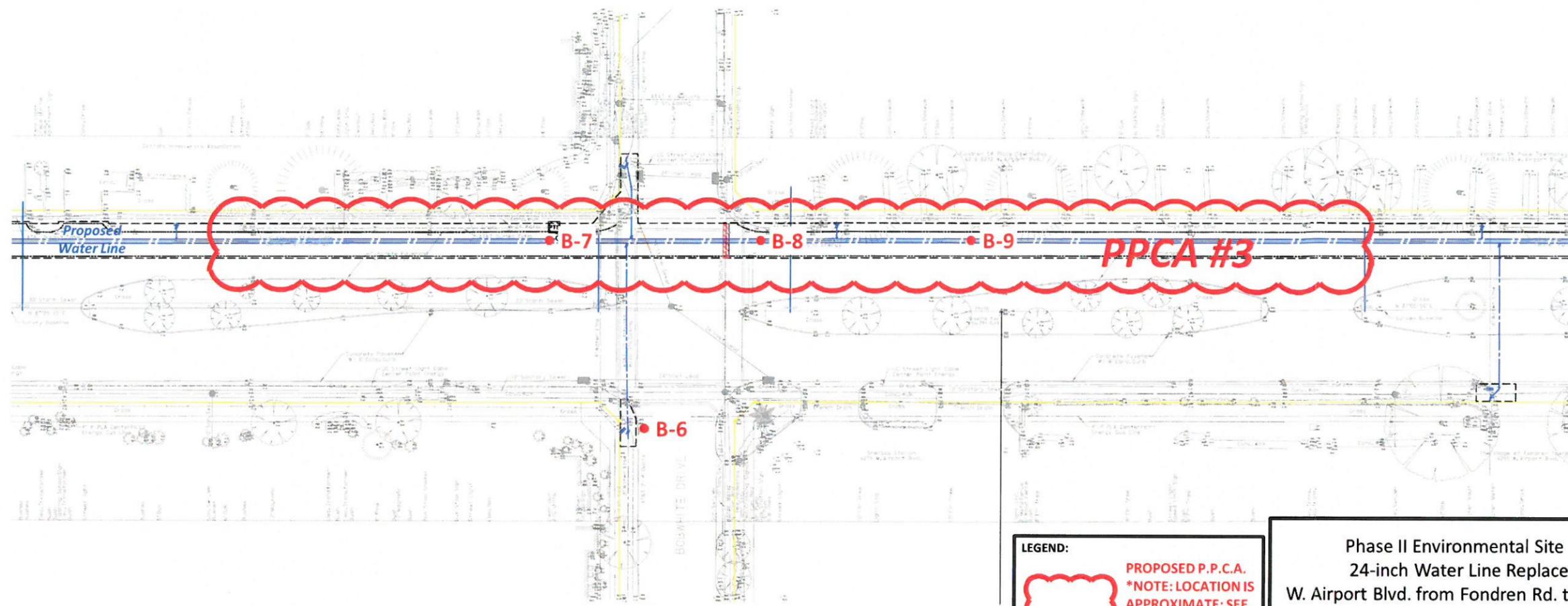
Project No. E101-16

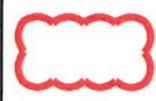


LEGEND:
 **PROPOSED P.P.C.A.**
 *NOTE: LOCATION IS APPROXIMATE; SEE TEXT FOR DETAILS.

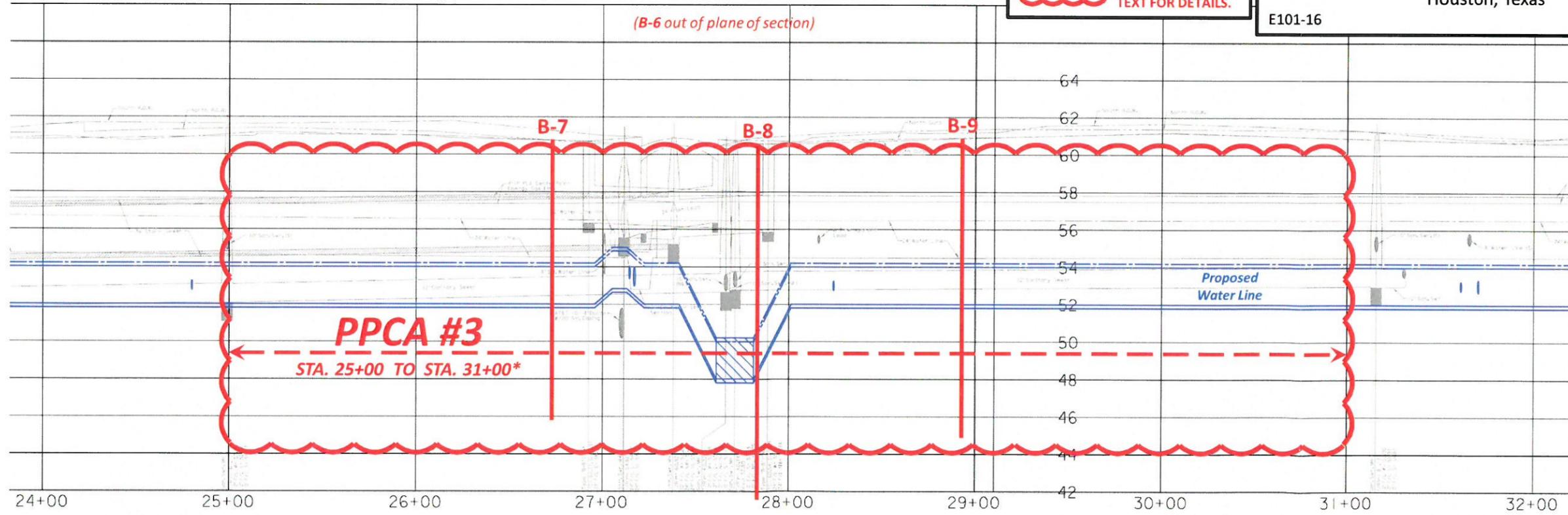
Phase II Environmental Site Assessment
 24-inch Water Line Replacement along
 W. Airport Blvd. from Fondren Rd. to near Braewick Dr.
 Houston, Texas
 E101-16 FIGURE 4a





LEGEND:
 **PROPOSED P.P.C.A.**
 *NOTE: LOCATION IS APPROXIMATE; SEE TEXT FOR DETAILS.

Phase II Environmental Site Assessment
 24-inch Water Line Replacement along
 W. Airport Blvd. from Fondren Rd. to near Braewick Dr.
 Houston, Texas
 E101-16 FIGURE 4b



**Limited Phase II Environmental Site Assessment for 24-Inch Water Line Replacement
Along West Airport Boulevard, Houston, Texas**

**APPENDIX B
PHOTOGRAPHS**

Phase II Environmental Site Assessment
24-Inch Water Line Replacement along West Airport Boulevard ESA-II



Photograph 1: View to the west along West Airport Boulevard of pavement coring at boring location B-1.



Photograph 2: View of cored pavement at boring location B-9.

Phase II Environmental Site Assessment
24-Inch Water Line Replacement along West Airport Boulevard ESA-II



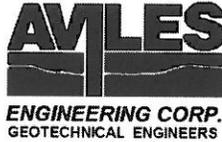
Photograph 3: View to the west along West Airport Boulevard of the drilling of Boring B-9. The Shell service station at left of photograph is an REC.



Photograph 4: View of patched Boring B-6 on Bob White Drive, a typical plugged borehole.

**Limited Phase II Environmental Site Assessment for 24-Inch Water Line Replacement
along West Airport Boulevard, Houston, Texas**

**APPENDIX C
SOIL BORING LOGS**



COH WBS No. **S-000900-0171-3**

BORING **B-1**

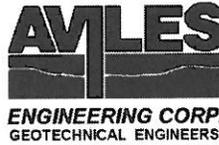
PROJECT: **24-IN WATER LINE REPLACEMENT ALONG W AIRPORT BLVD**

DATE **2/1/2016**

DEPTH IN FEET	SYMBOL	PUSHED INTERVAL (IN.) PUSH RECOVERY (IN.) SAMPLE INTERVAL	SOIL DESCRIPTION	P.I.D. READING (PPM) PARTS PER MILLION	DEPTH IN FEET
0			Pavement: 8-1/2" Concrete		0
2		15" + 17"	Base: red-brown cement-stabilized sand with small gravel	0.0	2
4		48"	Gray Clay (CH), with ferrous nodules	0.0	4
6		48"	Gray and tan Clay (CH), with ferrous nodules and stains	0.0	6
8		48"	Tan and gray Clay (CH), with ferrous nodules and stains - small calcareous nodules 5'-6' - clear platy minerals 5'-6' - calcareous nodules 7'-8'	0.0	8
10		45.5"	Red-brown Clay (CH), with slickensides and ferrous stains	0.0	10
12		48"		0.0	12
14		46.5"		0.0	14
16		48"	Gray Clay (CH)	0.0	16
18		25"		0.0	18
20		36"	Termination depth = 19'	0.0	20
22					22
24					24

BORING DRILLED TO 19 FEET WITHOUT DRILLING FLUID
 WATER ENCOUNTERED AT N/A FEET WHILE DRILLING
 WATER LEVEL AT N/A FEET AFTER 1/2-HR
 DRILLED BY EnviroTech CHECKED BY RJM

LOGGED BY RJM



COH WBS No. S-000900-0171-3

BORING B-2

PROJECT: 24-IN WATER LINE REPLACEMENT ALONG W AIRPORT BLVD

DATE 2/1/2016

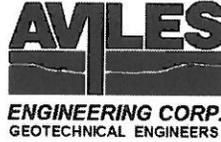
DEPTH IN FEET	SYMBOL	PUSHED INTERVAL (IN.)	PUSH RECOVERY (IN.)	SAMPLE INTERVAL	SOIL DESCRIPTION	P.I.D. READING (PPM) PARTS PER MILLION	DEPTH IN FEET
0					Pavement: 6-3/4" Concrete		0
0					Dark gray Clay (CH), with ferrous stains	0.3	0
2		35"	48"	6.75"		0.1	2
4					Gray and tan Clay (CH), with ferrous nodules and stains	0.1	4
6		45.5"	48"		Light gray and tan Clay (CH), with ferrous stains and nodules	0.1	6
8					Tan and light gray Clay (CH), with ferrous stains and nodules - calcareous nodules 8'-9' - with some red-brown and slickensides 9'-10'	0.0	8
10		46.5"	48"		Red-brown Clay (CH)	0.0	10
12					Tan and gray Clay (CH), with calcareous nodules	0.0	12
14		45.5"	48"		Red-brown Clay (CH), with slickensides	0.1	14
16						0.0	16
18		45"	48"		Light gray Clay (CH), with calcareous nodules and some slickensides	0.1	18
20					Termination depth = 20'	0.0	20
22							22
24							24

BORING DRILLED TO 20 FEET WITHOUT DRILLING FLUID

WATER ENCOUNTERED AT N/A FEET WHILE DRILLING

WATER LEVEL AT N/A FEET AFTER 1/2-HR

DRILLED BY EnviroTech CHECKED BY RJM LOGGED BY RJM



COH WBS No. **S-000900-0171-3**

BORING **B-3**

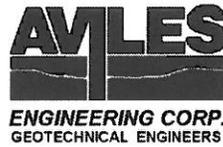
PROJECT: **24-IN WATER LINE REPLACEMENT ALONG W AIRPORT BLVD**

DATE **2/1/2016**

DEPTH IN FEET	SYMBOL	PUSHED INTERVAL (IN.) PUSH RECOVERY (IN.) SAMPLE INTERVAL	SOIL DESCRIPTION	P.I.D. READING (PPM) PARTS PER MILLION	DEPTH IN FEET
0			Pavement: 8-1/2" Concrete		0
			Base: light gray cement-stabilized sand with small gravel		
2		26.5" + 19"	Gray Clay (CH), with ferrous nodules	0.1	2
		48"	- sand partings 3'-4'	0.3	
4			Gray and tan Clay (CH), with calcareous nodules, and ferrous nodules and stains	1.2	4
		46.5"		1.0	
6		48"	Tan and gray Clay (CH), with calcareous nodules, and ferrous nodules and stains	0.7	6
		48"		1.3	
8			Orange-brown and gray Clay (CH), with slickensides and ferrous stains	1.2	8
		45"		1.4	
10		48"	Red-brown and gray Clay (CH), with slickensides, calcareous nodules, and ferrous stains	0.9	10
		48"		1.4	
12				1.4	12
		44"		0.9	
14		48"	- silt partings 14'-15'	1.4	14
		not recorded		1.3	
16				0.9	16
				1.9	
18		48"	Light gray Clay (CH), with slickensides	1.1	18
				1.3	
20			Termination depth = 20'	0.0	20
22			Note: Air PID inside empty sample bag = 0.4ppm		22
24					24

BORING DRILLED TO 20 FEET WITHOUT DRILLING FLUID
 WATER ENCOUNTERED AT N/A FEET WHILE DRILLING
 WATER LEVEL AT N/A FEET AFTER 1/2-HR

DRILLED BY EnviroTech CHECKED BY RJM LOGGED BY RJM



COH WBS No. S-000900-0171-3

BORING B-4

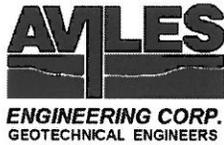
PROJECT: 24-IN WATER LINE REPLACEMENT ALONG W AIRPORT BLVD

DATE 2/1/2016

DEPTH IN FEET	SYMBOL	PUSHED INTERVAL (IN.)	PUSH RECOVERY (IN.)	SAMPLE INTERVAL	SOIL DESCRIPTION	P.I.D. READING (PPM) PARTS PER MILLION	DEPTH IN FEET
0					Pavement: 8" Concrete		0
2		48"		5" + 16"	Base: yellow-brown and gray stabilized sand	0.0	2
4		48"			Gray Clay (CH), with ferrous stains		4
6		48"		46"	Dark brown Clay (CH), with ferrous nodules and stains	0.0	6
8		48"			Gray and tan Clay (CH), with ferrous nodules and stains	0.0	8
10		48"		44.5"	Red-brown and gray Clay (CH), with calcareous nodules, and ferrous nodules and stains	0.0	10
12		48"			- tan and gray, with slickensides 8'-9'	0.0	12
14		48"		46.5"		0.0	14
16					Light gray and orange-brown Clay (CH)	0.4	16
18					Termination depth = 16'		18
20							20
22							22
24							24

BORING DRILLED TO 16 FEET WITHOUT DRILLING FLUID
 WATER ENCOUNTERED AT N/A FEET WHILE DRILLING ∇
 WATER LEVEL AT N/A FEET AFTER 1/2-HR ∇
 DRILLED BY EnviroTech CHECKED BY RJM

LOGGED BY RJM



COH WBS No. S-000900-0171-3

BORING B-5

PROJECT: 24-IN WATER LINE REPLACEMENT ALONG W AIRPORT BLVD

DATE 2/1/2016

DEPTH IN FEET	SYMBOL	PUSHED INTERVAL (IN.)	PUSH RECOVERY (IN.)	SAMPLE INTERVAL	SOIL DESCRIPTION	P.I.D. READING (PPM) PARTS PER MILLION	DEPTH IN FEET
0					Pavement: 8-1/2" Concrete		0
2		48"	19" + 8.5"		Dark gray Clay (CH), with ferrous nodules and organic material	0.1 0.1	2
4						0.1	4
6		48"	46"		Tan and gray Clay (CL), with ferrous nodules and stains	0.0	6
8					- calcareous nodules 7'-8'	0.1 0.0	8
10		48"	45.5"		Red-brown and gray Clay (CH), with slickensides and ferrous stains	0.0	10
12						0.0	12
14		48"	44"		Tan and gray Clay (CH), with slickensides, and ferrous nodules and stains	0.0	14
16					Red-brown and light gray Clay (CH), with slickensides and ferrous stains	0.0	16
18					Termination depth = 16'	0.0	18
20					Note: Background Air PID = 0.0ppm-0.2ppm		20
22							22
24							24

BORING DRILLED TO 16 FEET WITHOUT DRILLING FLUID
 WATER ENCOUNTERED AT N/A FEET WHILE DRILLING ∇
 WATER LEVEL AT N/A FEET AFTER 1/2-HR ∇
 DRILLED BY EnviroTech CHECKED BY RJM LOGGED BY RJM



COH WBS No. S-000900-0171-3

BORING B-6

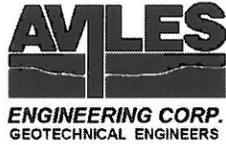
PROJECT: 24-IN WATER LINE REPLACEMENT ALONG W AIRPORT BLVD

DATE 2/1/2016

DEPTH IN FEET	SYMBOL	PUSHED INTERVAL (IN.)	PUSH RECOVERY (IN.)	SAMPLE INTERVAL	SOIL DESCRIPTION	P.I.D. READING (PPM) PARTS PER MILLION	DEPTH IN FEET
0					Pavement: 7-1/2" Concrete		0
0					Base: medium gray and light brown stabilized sand and gravel		
2		33" + 14"	48"		Dark gray Clay (CH), with ferrous nodules and stains	0.0	2
4						0.0	4
6		43"	48"		Tan and gray Clay (CH), with ferrous nodules and stains	0.0	6
8					- calcareous nodules 7'-8'	0.0	8
10		25"	48"		Gray and red-brown Clay (CH)	0.0	10
12					Tan and gray Clay (CH), with ferrous nodules	0.0	12
14		45.5"	48"		Red-brown Clay (CH), with slickensides and ferrous stains	0.0	14
16						0.0	16
18		24"	24"		Termination depth = 18'	0.0	18
20							20
22							22
24							24

BORING DRILLED TO 18 FEET WITHOUT DRILLING FLUID
 WATER ENCOUNTERED AT N/A FEET WHILE DRILLING
 WATER LEVEL AT N/A FEET AFTER 1/2-HR
 DRILLED BY EnviroTech CHECKED BY _____

LOGGED BY RJM



COH WBS No. **S-000900-0171-3**

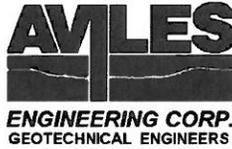
BORING **B-7**

PROJECT: **24-IN WATER LINE REPLACEMENT ALONG W AIRPORT BLVD** DATE **2/2/2016**

DEPTH IN FEET	SYMBOL	PUSHED INTERVAL (IN.)	PUSH RECOVERY (IN.)	SAMPLE INTERVAL	SOIL DESCRIPTION	P.I.D. READING (PPM) PARTS PER MILLION	DEPTH IN FEET
0					Pavement: 7" Concrete *(water under pavement)		0
2		48"	0"		Black Clay (CH), soft, with ferrous stains - no recovery 0'-4' [soil collected from sides of borehole for description]	1.0	2
4						1.5	4
6		48"	38.5"		Gray and tan Clay (CH), with ferrous nodules and stains, and slickensides	2.9	6
8					Tan and gray Clay (CH), with calcareous nodules, ferrous nodules and stains, and slickensides	2.6	8
10		48"	46"		Red-brown and gray Clay (CH), with calcareous nodules, ferrous stains, and slickensides	3.8	10
12					Tan Clay (CH), with calcareous nodules	4.6	12
14		36"	36"		Red-brown Clay (CH), with slickensides	3.5	14
16					Termination depth = 15'	3.9	16
18						2.9	18
20						3.8	20
22							22
24							24

BORING DRILLED TO 15 FEET WITHOUT DRILLING FLUID
 WATER ENCOUNTERED AT N/A* FEET WHILE DRILLING ∇
 WATER LEVEL AT N/A FEET AFTER 1/2-HR ∇
 DRILLED BY EnviroTech CHECKED BY RJM

LOGGED BY RJM



COH WBS No. **S-000900-0171-3**

BORING **B-8**

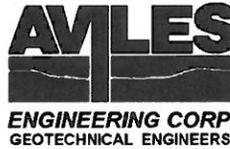
PROJECT: **24-IN WATER LINE REPLACEMENT ALONG W AIRPORT BLVD**

DATE **2/2/2016**

DEPTH IN FEET	SYMBOL	PUSHED INTERVAL (IN.) PUSH RECOVERY (IN.) SAMPLE INTERVAL	SOIL DESCRIPTION	P.I.D. READING (PPM) PARTS PER MILLION	DEPTH IN FEET
0			Pavement: 7" Concrete		0
2		6" + 7"	Dark gray Clay (CH), soft, with ferrous stains	1.9	2
4		48"		1.1	4
6		45.5"	Gray and tan Clay (CH), with ferrous nodules and stains	2.6	6
8		48"	Tan and gray Clay (CH), with ferrous nodules and stains - calcareous nodules 6.8'-8'	1.9	8
10		45.5"	Red-brown Clay (CH), with slickensides and ferrous stains	1.6	10
12		48"	- silt partings 11'-12'	1.6	12
14		45.5"	Red-brown Clayey Sand and Silt (SC-SM), wet	1.2	14
16		36.5"	Red-brown Clay (CH)	1.0	16
18		48"	Red-brown Silty Clay (CL-ML)	1.3	18
20		NR	Red-brown Clay (CH), with ferrous stains	2.8	20
22		36"	Termination depth = 19'	1.6	22
24			Note: Installed Temporary Monitor Well with 15' of 0.010" slot screen.	2.4	24
				2.3	
				1.9	

BORING DRILLED TO 19 FEET WITHOUT DRILLING FLUID
 WATER ENCOUNTERED AT 12 FEET WHILE DRILLING
 WATER LEVEL AT 7.4 FEET AFTER 1/2-HR
 DRILLED BY EnviroTech CHECKED BY _____

LOGGED BY RJM



COH WBS No. **S-000900-0171-3**

BORING **B-9**

PROJECT: **24-IN WATER LINE REPLACEMENT ALONG W AIRPORT BLVD**

DATE **2/2/2016**

DEPTH IN FEET	SYMBOL	PUSHED INTERVAL (IN.)	(IN.) PUSH RECOVERY SAMPLE INTERVAL	SOIL DESCRIPTION	P.I.D. READING (PPM) PARTS PER MILLION	DEPTH IN FEET
0				Pavement: 7-1/2" Concrete		0
2		6" + 11.5"		Base: medium gray stabilized sand with gravel	0.5	2
4		48"		Brown Clay (CH), soft, with roots		
6		44"		Gray and tan Clay (CH), with calcareous nodules, and ferrous nodules and stains	1.0	4
8		48"		Tan and gray Clay (CH), with ferrous nodules and stains, and slickensides	1.2	6
10		45.5"		Red-brown Clay (CH), with ferrous stains and slickensides, some calcareous nodules	1.3	8
12		48"		- sand partings 11'-12'	1.1	10
14		46"		Tan Clay (CH), with ferrous stains	1.2	12
16		48"		Red-brown and gray Clay (CH), with ferrous stains	1.7	14
18				Orange-brown Sand (SP), damp	2.0	16
20				Red-brown Clay (CH)	2.1	18
22				Termination depth = 16'		20
24				Note: Background Air PID = 0.0ppm-0.3ppm; Air PID inside empty sample bag = 0.6ppm		22

BORING DRILLED TO 16 FEET WITHOUT DRILLING FLUID
 WATER ENCOUNTERED AT 14.5 FEET WHILE DRILLING
 WATER LEVEL AT 6.8 FEET AFTER 1/2-HR
 DRILLED BY EnviroTech CHECKED BY _____

LOGGED BY RJM

**Limited Phase II Environmental Site Assessment for 24-Inch Water Line Replacement
Along West Airport Boulevard, Houston, Texas**

APPENDIX D

SUMMARY OF LABORATORY SAMPLE ANALYSIS RESULTS

TABLE 2
Summary of Soil Laboratory Analysis Results

SOIL BORING	Sample Interval (feet bps ¹)	CONTAMINANT CONCENTRATIONS IN SOIL SAMPLES										
		BENZENE mg/Kg ²	TOLUENE mg/Kg	ETHYL-BENZENE mg/Kg	m- & p-Xylenes mg/Kg	o- Xylenes mg/Kg	TOTAL XYLENES mg/Kg	MTBE mg/Kg	TPH C6-C12 mg/Kg	TPH >C12-C28 mg/Kg	TPH >C28-C35 mg/Kg	
B-1	17 to 19	U ³ , <0.00052	U ³ , <0.00052	U ³ , <0.003	<0.003	U ³ , <0.001	U ³ , <0.001	U ³ , 0.003	U ³ , <32.7	U ³ , <28	U ³ , <24.4	
B-2	1 to 2	U ³ , <0.00053	U ³ , <0.00053	U ³ , <0.003	<0.003	U ³ , <0.001	U ³ , <0.001	U ³ , <0.00053	U ³ , <36.5	U ³ , <31.2	U ³ , <27.2	
B-3	16 to 17	U ³ , <0.00053	U ³ , <0.00053	U ³ , <0.003	<0.003	U ³ , <0.001	U ³ , <0.001	0.008	U ³ , <33.1	U ³ , <28.4	U ³ , <24.7	
B-4	15 to 16	U ³ , <0.00049	U ³ , <0.00049	U ³ , <0.002	<0.002	U ³ , <0.00098	U ³ , <0.00098	0.003	U ³ , <29.8	U ³ , <25.5	U ³ , <22.2	
B-5	6 to 7	U ³ , <0.00055	U ³ , <0.00055	U ³ , <0.003	<0.003	U ³ , <0.001	U ³ , <0.001	U ³ , <0.00055	U ³ , <33.9	U ³ , <29.1	U ³ , <25.4	
B-6	17 to 18	U ³ , <0.00051	U ³ , <0.00051	U ³ , <0.003	<0.003	U ³ , <0.001	U ³ , <0.001	U ³ , <0.00051	U ³ , <31.6	U ³ , <27.1	U ³ , <23.6	
B-7	10 to 11	U ³ , <0.00054	0.0006	U ³ , <0.003	<0.003	U ³ , <0.001	U ³ , <0.001	U ³ , <0.00054	U ³ , <33	U ³ , <28.3	U ³ , <24.6	
B-8	11 to 13	U ³ , <0.00052	0.00052	U ³ , <0.003	<0.003	0.001	0.003	U ³ , <0.00052	U ³ , <30	U ³ , <25.7	U ³ , <22.4	
B-9	14 to 15	U ³ , <0.00048	0.002	U ³ , <0.002	0.005	0.003	0.008	U ³ , <0.00048	U ³ , <28.3	U ³ , <24.2	U ³ , <21.1	
TCEQ TRRP Tier-1 Residential Soil PCLs ⁴ GWSoil _{ing}		0.026	8.2	7.6	110/150	71	120	0.62	65	200	200	

¹bps = below pavement surface.

²mg/Kg = milligrams per Kilograms.

³ U = Undetected at laboratory detection limit shown.

⁴TCEQ TRRP Tier-1 Residential Soil PCLs = Texas Commission on Environmental Quality Texas Risk Reduction Program Tier-1 Residential Soil Protective Concentration Levels.

0.003 = Greater than laboratory detection limit but less than TCEQ TRRP Tier-1 Residential Soil PCLs.

TABLE 2
Summary of Groundwater Laboratory Analysis Results

GROUND-WATER SAMPLE	CONTAMINANT CONCENTRATIONS IN GROUNDWATER SAMPLES									
	BENZENE mg/L	TOLUENE mg/L	ETHYL- BENZENE mg/L	m- & p- Xylenes mg/L	o- Xylenes mg/L	TOTAL XYLENES mg/L	MTBE mg/L	TPH C6-C12 mg/L	TPH >C12-C28 mg/L	TPH >C28- C35 mg/L
B-8 water	U ³ , <0.0008	U ³ , <0.001	U ³ , <0.0008	U ³ , <0.002	U ³ , <0.001	U ³ , <0.003	U ³ , <0.001	U ³ , <0.636	U ³ , <0.829	U ³ , <0.723
TCEQ TRRP Tier-1 Residential Soil PCLs ⁴ GW ^{ing}	0.005	1.0	0.7	10	10	10	0.24	0.98	0.98	0.98

¹Refer to Boring Location Plan, Figure 3

²mg/L = milligrams per Liter.

³U = Undetected at laboratory detection limit shown.

⁴TCEQ TRRP Tier-1 Residential Ground Water PCLs = Texas Commission on Environmental Quality Texas Risk Reduction Program Tier-1 Residential Ground Water Ingestion Protective Concentration Levels.

**Limited Phase II Environmental Site Assessment for 24-Inch Water Line Replacement
Along West Airport Boulevard, Houston, Texas**

APPENDIX E

**ANALYTICAL LABORATORY REPORTS AND QUALITY ASSURANCE AND
QUALITY CONTROL DOCUMENTATION**

Laboratory Analysis Report

Total Number of Pages: 25

Job ID : 16020082



10100 East Freeway, Suite 100, Houston, TX 77029 tel: 713-453-6060, fax: 713-453-6091, <http://www.ablabs.com>

Client Project Name :

E101-16 / W. Airport Blvd., Houston, TX

Report To : Client Name: Aviles Engineering
Attn: Robert J. Metzger
Client Address: 5790 Windfern
City, State, Zip: Houston, Texas, 77041

P.O.#.:
Sample Collected By: Robert J. Metzger
Date Collected: 02/01/16

A&B Labs has analyzed the following samples...

Client Sample ID	Matrix	A&B Sample ID
B-5 6'-7'	Soil	16020082.01
B-4 15'-16'	Soil	16020082.02
B-3 16'-17'	Soil	16020082.03
B-2 1'-2'	Soil	16020082.04
B-1 17'-19'	Soil	16020082.05
B-6 17'-18'	Soil	16020082.06

Shantall Carpenter

Released By: Shantall Carpenter
Title: Senior Project Manager
Date: 2/5/2016



This Laboratory is NELAP (T104704213-15-13) accredited. Effective: 04/01/2015; Expires: 03/31/2016

Scope: Non-Potable Water, Drinking Water, Air, Solid, Biological Tissue, Hazardous Waste

I am the laboratory manager, or his/her designee, and I am responsible for the release of this data package. This laboratory data package has been reviewed and is complete and technically compliant with the requirements of the methods used, except where noted in the attached exception reports. I affirm, to the best of my knowledge that all problems/anomalies observed by this laboratory (and if applicable, any and all laboratories subcontracted through this laboratory) that might affect the quality of the data, have been identified in the Laboratory Review Checklist, and that no information or data have been knowingly withheld that would affect the quality of the data.

This report cannot be reproduced, except in full, without prior written permission of A&B Labs. Results shown relate only to the items tested. Samples are assumed to be in acceptable condition unless otherwise noted. Blank correction is not made unless otherwise noted. Air concentrations reported are based on field sampling information provided by client. Soil samples are reported on a wet weight basis unless otherwise noted. Uncertainty estimates are available on request.

Date Received : 02/01/2016 16:44



LABORATORY TEST RESULTS

Client Sample ID: B-5 6'-7'
A&B Job Sample ID: 16020082.01

Date: 2/5/2016

Client Name: Aviles Engineering
Project Name: E101-16 / W. Airport Blvd., Houston, TX

Attn: Robert J. Metzger

Test Description: **% Moisture**
Analytical Method: SM 2540G
QC Batch ID: Qb16020281
Prep Method: SM 2540G
Prepared By: MMaldonado
Prep Batch ID: PB16020253

Sample Matrix: Soil
Date Collected: 02/01/2016 09:35
Date Received: 02/01/2016 16:44
Date Prepared: 02/02/2016 15:45

Analyst Initial: MAM

% Moisture: 26.7

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
	% Moisture ¹	26.7					----	----	%	1	02/02/16 15:50

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-5 6'-7'
A&B Job Sample ID: 16020082.01

Date: 2/5/2016

Client Name: Aviles Engineering
Project Name: E101-16 / W. Airport Blvd., Houston, TX

Attn: Robert J. Metzger

Test Description: Purgeable Aromatics

Sample Matrix: Soil

Analytical Method: SW-846 8021B

Date Collected: 02/01/2016 09:35

QC Batch ID: Qb16020440

Date Received: 02/01/2016 16:44

Prep Method: SW-846 5035A

Date Prepared: 02/03/2016 16:00

Prepared By: GLQuick

Prep Batch ID: PB16020419

Analyst Initial: GLQ

% Moisture: 26.7

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
1634-04-4	MTBE	< 0.00055	U	0.00055	0.003	0.001	0.005	0.5	mg/Kg	0.40	02/04/16 02:25
71-43-2	Benzene	< 0.00055	U	0.00055	0.003	0.001	0.005	0.5	mg/Kg	0.40	02/04/16 02:25
108-88-3	Toluene	< 0.00055	U	0.00055	0.003	0.001	0.005	0.5	mg/Kg	0.40	02/04/16 02:25
100-41-4	Ethylbenzene	< 0.003	U	0.003	0.003	0.005	0.005	0.5	mg/Kg	0.40	02/04/16 02:25
108-38-3&106-4	m- & p-Xylenes	< 0.003	U	0.003	0.005	0.005	0.01	1.0	mg/Kg	0.40	02/04/16 02:25
95-47-6	o-Xylene	< 0.001	U	0.001	0.003	0.002	0.005	0.5	mg/Kg	0.40	02/04/16 02:25
1330-20-7	Xylenes	< 0.001	U	0.001	0.003	0.002	0.005	1.5	mg/Kg	0.40	02/04/16 02:25
98-08-8	Trifluorotoluene(surr)	97.7					81	111	%	0.40	02/04/16 02:25

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-5 6'-7'
A&B Job Sample ID: 16020082.01

Date: 2/5/2016

Client Name: Aviles Engineering
Project Name: E101-16 / W. Airport Blvd., Houston, TX

Attn: Robert J. Metzger

Test Description: Total Petroleum Hydrocarbons

Sample Matrix: Soil

Analytical Method: TX 1005

Date Collected: 02/01/2016 09:35

QC Batch ID: Qb16020314

Date Received: 02/01/2016 16:44

Prep Method: SW-846 5035A

Date Prepared: 02/02/2016 15:00

Prepared By: SGautam

Prep Batch ID: PB16020307

Analyst Initial: SuG

% Moisture: 26.7

Table with 12 columns: CAS Number, Parameter, Result, Flag, SDL, SQL, MDL, MQL, UQL, Units, DF, Date/Time. Rows include TPH-1005-1 (C6-C12), TPH-1005-2 (>C12-C28), TPH-1005-4 (>C28-C35), Total C6-C35, 111-85-3 (1-Chlorooctane), and 3386-33-2 (Chlorooctadecane).

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-4 15'-16'
A&B Job Sample ID: 16020082.02

Date: 2/5/2016

Client Name: Aviles Engineering
Project Name: E101-16 / W. Airport Blvd., Houston, TX

Attn: Robert J. Metzger

Test Description: **% Moisture**
Analytical Method: SM 2540G
QC Batch ID: Qb16020281
Prep Method: SM 2540G
Prepared By: MMaldonado
Prep Batch ID: PB16020253
Analyst Initial: MAM

Sample Matrix: Soil
Date Collected: 02/01/2016 10:15
Date Received: 02/01/2016 16:44
Date Prepared: 02/02/2016 15:45

% Moisture: 18.6

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
	% Moisture ¹	18.6					----	----	%	1	02/02/16 15:50

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-4 15'-16'
A&B Job Sample ID: 16020082.02

Date: 2/5/2016

Client Name: Aviles Engineering
Project Name: E101-16 / W. Airport Blvd., Houston, TX

Attn: Robert J. Metzger

Test Description: Purgeable Aromatics

Sample Matrix: Soil

Analytical Method: SW-846 8021B

Date Collected: 02/01/2016 10:15

QC Batch ID: Qb16020440

Date Received: 02/01/2016 16:44

Prep Method: SW-846 5035A

Date Prepared: 02/03/2016 16:00

Prepared By: GLQuick

Prep Batch ID: PB16020419

Analyst Initial: GLQ

% Moisture: 18.6

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
1634-04-4	MTBE	0.003		0.00049	0.002	0.001	0.005	0.5	mg/Kg	0.4	02/04/16 02:51
71-43-2	Benzene	< 0.00049	U	0.00049	0.002	0.001	0.005	0.5	mg/Kg	0.4	02/04/16 02:51
108-88-3	Toluene	< 0.00049	U	0.00049	0.002	0.001	0.005	0.5	mg/Kg	0.4	02/04/16 02:51
100-41-4	Ethylbenzene	< 0.002	U	0.002	0.002	0.005	0.005	0.5	mg/Kg	0.4	02/04/16 02:51
108-38-3&106-4	m- & p-Xylenes	< 0.002	U	0.002	0.005	0.005	0.01	1.0	mg/Kg	0.4	02/04/16 02:51
95-47-6	o-Xylene	< 0.00098	U	0.00098	0.002	0.002	0.005	0.5	mg/Kg	0.4	02/04/16 02:51
1330-20-7	Xylenes	< 0.00098	U	0.00098	0.002	0.002	0.005	1.5	mg/Kg	0.4	02/04/16 02:51
98-08-8	Trifluorotoluene(surr)	97.5					81	111	%	0.40	02/04/16 02:51

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-4 15'-16'
A&B Job Sample ID: 16020082.02

Date: 2/5/2016

Client Name: Aviles Engineering
Project Name: E101-16 / W. Airport Blvd., Houston, TX

Attn: Robert J. Metzger

Test Description: Total Petroleum Hydrocarbons

Sample Matrix: Soil

Analytical Method: TX 1005

Date Collected: 02/01/2016 10:15

QC Batch ID: Qb16020314

Date Received: 02/01/2016 16:44

Prep Method: SW-846 5035A

Date Prepared: 02/02/2016 15:00

Prepared By: SGautam

Prep Batch ID: PB16020307

Analyst Initial: SuG

% Moisture: 18.6

Table with 12 columns: CAS Number, Parameter, Result, Flag, SDL, SQL, MDL, MQL, UQL, Units, DF, Date/Time. Rows include TPH-1005-1, TPH-1005-2, TPH-1005-4, Total C6-C35, 111-85-3, and 3386-33-2.

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-3 16'-17'
A&B Job Sample ID: 16020082.03

Date: 2/5/2016

Client Name: Aviles Engineering
Project Name: E101-16 / W. Airport Blvd., Houston, TX

Attn: Robert J. Metzger

Test Description: **% Moisture**
Analytical Method: SM 2540G
QC Batch ID: Qb16020281
Prep Method: SM 2540G
Prepared By: MMaldonado
Prep Batch ID: PB16020253

Sample Matrix: Soil
Date Collected: 02/01/2016 11:12
Date Received: 02/01/2016 16:44
Date Prepared: 02/02/2016 15:45

Analyst Initial: MAM

% Moisture: 24.4

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
	% Moisture ¹	24.4					----	----	%	1	02/02/16 15:50

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-3 16'-17'
A&B Job Sample ID: 16020082.03

Date: 2/5/2016

Client Name: Aviles Engineering
Project Name: E101-16 / W. Airport Blvd., Houston, TX

Attn: Robert J. Metzger

Test Description: Purgeable Aromatics

Sample Matrix: Soil

Analytical Method: SW-846 8021B

Date Collected: 02/01/2016 11:12

QC Batch ID: Qb16020440

Date Received: 02/01/2016 16:44

Prep Method: SW-846 5035A

Date Prepared: 02/03/2016 16:00

Prepared By: GLQuick

Prep Batch ID: PB16020419

Analyst Initial: GLQ

% Moisture: 24.4

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
1634-04-4	MTBE	0.008	J	0.00053	0.003	0.001	0.005	0.5	mg/Kg	0.4	02/04/16 03:18
71-43-2	Benzene	< 0.00053	U	0.00053	0.003	0.001	0.005	0.5	mg/Kg	0.4	02/04/16 03:18
108-88-3	Toluene	< 0.00053	U	0.00053	0.003	0.001	0.005	0.5	mg/Kg	0.4	02/04/16 03:18
100-41-4	Ethylbenzene	< 0.003	U	0.003	0.003	0.005	0.005	0.5	mg/Kg	0.4	02/04/16 03:18
108-38-3&106-4	m- & p-Xylenes	< 0.003	U	0.003	0.005	0.005	0.01	1.0	mg/Kg	0.4	02/04/16 03:18
95-47-6	o-Xylene	< 0.001	U	0.001	0.003	0.002	0.005	0.5	mg/Kg	0.4	02/04/16 03:18
1330-20-7	Xylenes	< 0.001	U	0.001	0.003	0.002	0.005	1.5	mg/Kg	0.4	02/04/16 03:18
98-08-8	Trifluorotoluene(surr)	93.8					81	111	%	0.40	02/04/16 03:18

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-3 16'-17'
A&B Job Sample ID: 16020082.03

Date: 2/5/2016

Client Name: Aviles Engineering
Project Name: E101-16 / W. Airport Blvd., Houston, TX

Attn: Robert J. Metzger

Test Description: Total Petroleum Hydrocarbons

Sample Matrix: Soil

Analytical Method: TX 1005

Date Collected: 02/01/2016 11:12

QC Batch ID: Qb16020314

Date Received: 02/01/2016 16:44

Prep Method: SW-846 5035A

Date Prepared: 02/02/2016 15:00

Prepared By: SGautam

Prep Batch ID: PB16020307

Analyst Initial: SuG

% Moisture: 24.4

Table with 12 columns: CAS Number, Parameter, Result, Flag, SDL, SQL, MDL, MQL, UQL, Units, DF, Date/Time. Rows include TPH-1005-1 through TPH-1005-4, 111-85-3, and 3386-33-2.

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-2 1'-2'
A&B Job Sample ID: 16020082.04

Date: 2/5/2016

Client Name: Aviles Engineering
Project Name: E101-16 / W. Airport Blvd., Houston, TX

Attn: Robert J. Metzger

Test Description:	% Moisture	Sample Matrix	Soil
Analytical Method:	SM 2540G	Date Collected	02/01/2016 13:09
QC Batch ID:	Qb16020281	Date Received	02/01/2016 16:44
Prep Method:	SM 2540G	Date Prepared	02/02/2016 15:45
Prepared By:	MMaldonado		
Prep Batch ID	PB16020253		
Analyst Initial	MAM	% Moisture	25.1

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	ML	UQL	Units	DF	Date/Time
	% Moisture ¹	25.1							%	1	02/02/16 15:50

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-2 1'-2'
A&B Job Sample ID: 16020082.04

Date: 2/5/2016

Client Name: Aviles Engineering
Project Name: E101-16 / W. Airport Blvd., Houston, TX

Attn: Robert J. Metzger

Test Description: Purgeable Aromatics

Sample Matrix: Soil

Analytical Method: SW-846 8021B

Date Collected: 02/01/2016 13:09

QC Batch ID: Qb16020440

Date Received: 02/01/2016 16:44

Prep Method: SW-846 5035A

Date Prepared: 02/03/2016 16:00

Prepared By: GLQuick

Prep Batch ID: PB16020419

Analyst Initial: GLQ

% Moisture: 25.1

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
1634-04-4	MTBE	< 0.00053	U	0.00053	0.003	0.001	0.005	0.5	mg/Kg	0.40	02/04/16 03:44
71-43-2	Benzene	< 0.00053	U	0.00053	0.003	0.001	0.005	0.5	mg/Kg	0.40	02/04/16 03:44
108-88-3	Toluene	< 0.00053	U	0.00053	0.003	0.001	0.005	0.5	mg/Kg	0.40	02/04/16 03:44
100-41-4	Ethylbenzene	< 0.003	U	0.003	0.003	0.005	0.005	0.5	mg/Kg	0.40	02/04/16 03:44
108-38-3&106-4	m- & p-Xylenes	< 0.003	U	0.003	0.005	0.005	0.01	1.0	mg/Kg	0.40	02/04/16 03:44
95-47-6	o-Xylene	< 0.001	U	0.001	0.003	0.002	0.005	0.5	mg/Kg	0.40	02/04/16 03:44
1330-20-7	Xylenes	< 0.001	U	0.001	0.003	0.002	0.005	1.5	mg/Kg	0.40	02/04/16 03:44
98-08-8	Trifluorotoluene(surr)	101					81	111	%	0.40	02/04/16 03:44

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-2 1'-2'
 A&B Job Sample ID: 16020082.04

Date: 2/5/2016

Client Name: Aviles Engineering
 Project Name: E101-16 / W. Airport Blvd., Houston, TX

Attn: Robert J. Metzger

Test Description: **Total Petroleum Hydrocarbons**

Sample Matrix: Soil

Analytical Method: TX 1005

Date Collected: 02/01/2016 13:09

QC Batch ID: Qb16020314

Date Received: 02/01/2016 16:44

Prep Method: SW-846 5035A

Date Prepared: 02/02/2016 15:00

Prepared By: SGautam

Prep Batch ID: PB16020307

Analyst Initial: SuG

% Moisture: 25.1

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
TPH-1005-1	C6-C12 ¹	< 36.5	U	36.5	38.5	23.7	25	1000	mg/Kg	1.152	02/02/16 23:10
TPH-1005-2	>C12-C28 ¹	< 31.2	U	31.2	38.5	20.3	25	1000	mg/Kg	1.152	02/02/16 23:10
TPH-1005-4	>C28-C35 ¹	< 27.2	U	27.2	38.5	17.7	25	1000	mg/Kg	1.152	02/02/16 23:10
	Total C6-C35	<					----	----	mg/Kg	1.152	02/02/16 23:10
111-85-3	1-Chlorooctane(surr)	97.9					60	143	%	1.152	02/02/16 23:10
3386-33-2	Chlorooctadecane(sur	107					60	150	%	1.152	02/02/16 23:10

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-1 17'-19'
A&B Job Sample ID: 16020082.05

Date: 2/5/2016

Client Name: Aviles Engineering
Project Name: E101-16 / W. Airport Blvd., Houston, TX

Attn: Robert J. Metzger

Test Description: **% Moisture**
Analytical Method: SM 2540G
QC Batch ID: Qb16020281
Prep Method: SM 2540G
Prepared By: MMaldonado
Prep Batch ID: PB16020253

Sample Matrix: Soil
Date Collected: 02/01/2016 14:17
Date Received: 02/01/2016 16:44
Date Prepared: 02/02/2016 15:45

Analyst Initial: MAM

% Moisture: 22.6

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
	% Moisture ¹	22.6					----	----	%	1	02/02/16 15:50

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-1 17'-19'
A&B Job Sample ID: 16020082.05

Date: 2/5/2016

Client Name: Aviles Engineering
Project Name: E101-16 / W. Airport Blvd., Houston, TX

Attn: Robert J. Metzger

Test Description: Purgeable Aromatics

Sample Matrix: Soil

Analytical Method: SW-846 8021B

Date Collected: 02/01/2016 14:17

QC Batch ID: Qb16020440

Date Received: 02/01/2016 16:44

Prep Method: SW-846 5035A

Date Prepared: 02/03/2016 16:00

Prepared By: GLQuick

Prep Batch ID: PB16020419

Analyst Initial: GLQ

% Moisture: 22.6

Table with 12 columns: CAS Number, Parameter, Result, Flag, SDL, SQL, MDL, MQL, UQL, Units, DF, Date/Time. Rows include MTBE, Benzene, Toluene, Ethylbenzene, m- & p-Xylenes, o-Xylene, Xylenes, and Trifluorotoluene(surr).

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-1 17'-19'
A&B Job Sample ID: 16020082.05

Date: 2/5/2016

Client Name: Aviles Engineering
Project Name: E101-16 / W. Airport Blvd., Houston, TX

Attn: Robert J. Metzger

Test Description: Total Petroleum Hydrocarbons

Sample Matrix: Soil

Analytical Method: TX 1005

Date Collected: 02/01/2016 14:17

QC Batch ID: Qb16020314

Date Received: 02/01/2016 16:44

Prep Method: SW-846 5035A

Date Prepared: 02/02/2016 15:00

Prepared By: SGautam

Prep Batch ID: PB16020307

Analyst Initial: SuG

% Moisture: 22.6

Table with 12 columns: CAS Number, Parameter, Result, Flag, SDL, SQL, MDL, MQL, UQL, Units, DF, Date/Time. Rows include TPH-1005-1 (C6-C12), TPH-1005-2 (>C12-C28), TPH-1005-4 (>C28-C35), 111-85-3 (1-Chlorooctane), and 3386-33-2 (Chlorooctadecane).

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-6 17'-18'
A&B Job Sample ID: 16020082.06

Date: 2/5/2016

Client Name: Aviles Engineering
Project Name: E101-16 / W. Airport Blvd., Houston, TX

Attn: Robert J. Metzger

Test Description: **% Moisture**
Analytical Method: SM 2540G
QC Batch ID: Qb16020281
Prep Method: SM 2540G
Prepared By: MMaldonado
Prep Batch ID: PB16020253

Sample Matrix: Soil
Date Collected: 02/01/2016 15:23
Date Received: 02/01/2016 16:44
Date Prepared: 02/02/2016 15:45

Analyst Initial: MAM

% Moisture: 21.1

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
	% Moisture ¹	21.1					----	----	%	1	02/02/16 15:50

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-6 17'-18'
A&B Job Sample ID: 16020082.06

Date: 2/5/2016

Client Name: Aviles Engineering
Project Name: E101-16 / W. Airport Blvd., Houston, TX

Attn: Robert J. Metzger

Test Description: Purgeable Aromatics

Sample Matrix: Soil

Analytical Method: SW-846 8021B

Date Collected: 02/01/2016 15:23

QC Batch ID: Qb16020440

Date Received: 02/01/2016 16:44

Prep Method: SW-846 5035A

Date Prepared: 02/03/2016 16:00

Prepared By: GLQuick

Prep Batch ID: PB16020419

Analyst Initial: GLQ

% Moisture: 21.1

Table with 12 columns: CAS Number, Parameter, Result, Flag, SDL, SQL, MDL, MQL, UQL, Units, DF, Date/Time. Rows include MTBE, Benzene, Toluene, Ethylbenzene, m- & p-Xylenes, o-Xylene, Xylenes, and Trifluorotoluene(surr).

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-6 17'-18'
A&B Job Sample ID: 16020082.06

Date: 2/5/2016

Client Name: Aviles Engineering
Project Name: E101-16 / W. Airport Blvd., Houston, TX

Attn: Robert J. Metzger

Test Description: Total Petroleum Hydrocarbons
Analytical Method: TX 1005
QC Batch ID: Qb16020314
Prep Method: SW-846 5035A
Prepared By: SGautam
Prep Batch ID: PB16020307

Sample Matrix: Soil
Date Collected: 02/01/2016 15:23
Date Received: 02/01/2016 16:44
Date Prepared: 02/02/2016 15:00

Analyst Initial: SuG % Moisture: 21.1

Table with 12 columns: CAS Number, Parameter, Result, Flag, SDL, SQL, MDL, MQL, UQL, Units, DF, Date/Time. Rows include TPH-1005-1, TPH-1005-2, TPH-1005-4, Total C6-C35, 111-85-3, and 3386-33-2.

Soil results reported on dry weight basis
¹-Parameter not available for accreditation

QUALITY CONTROL CERTIFICATE



Job ID : 16020082

Date : 2/5/2016

Analysis : Total Petroleum Hydrocarbons **Method :** TX 1005 **Reporting Units :** mg/Kg

QC Batch ID : Qb16020314 **Created Date :** 02/03/16 **Created By :** SGautam

Samples in This QC Batch : 16020082.01,02,03,04,05,06

Sample Preparation : PB16020307 **Prep Method :** SW-846 5035A **Prep Date :** 02/02/16 15:00 **Prep By :** SGautam

QC Type: Method Blank

Parameter	CAS #	Result	Units	D.F.	MQL	MDL		Qual
C6-C12	TPH-1005-1	< MDL	mg/Kg	1	25	23.7		
>C12-C28	TPH-1005-2	< MDL	mg/Kg	1	25	20.3		
>C28-C35	TPH-1005-4	< MDL	mg/Kg	1	25	17.7		
Total C6-C35		< MDL	mg/Kg	1	---			
Chlorooctadecane(surr)	3386-33-2	107	%	1				
1-Chlorooctane(surr)	111-85-3	104	%	1				

QC Type: LCS and LCSD

Parameter	LCS Spk Added	LCS Result	LCS % Rec	LCSD Spk Added	LCSD Result	LCSD % Rec	RPD	RPD CtrlLimit	%Recovery CtrlLimit	Qual
C6-C12	500	479	95.8	500	474	94.8	1	20	75-125	
>C12-C28	500	540	108	500	562	112	4	20	75-125	
>C28-C35	500	560	112	500	523	105	6.8	20	75-125	

QC Type: MS and MSD

QC Sample ID: 16020087.01

Parameter	Sample Result	MS Spk Added	MS Result	MS % Rec	MSD Spk Added	MSD Result	MSD % Rec	RPD	RPD CtrlLimit	%Rec CtrlLimit	Qual
C6-C12	0.326	500	468	93.5	500	466	93.1	0.4	20	75-125	
>C12-C28	1.3	500	565	113	500	563	112	0.4	20	75-125	
>C28-C35	0.45	500	525	105	500	567	113	7.7	20	75-125	

Refer to the Definition page for terms.

QUALITY CONTROL CERTIFICATE



Job ID : 16020082

Date : 2/5/2016

Analysis : Purgeable Aromatics **Method :** SW-846 8021B **Reporting Units :** mg/Kg

QC Batch ID : Qb16020440 **Created Date :** 02/04/16 **Created By :** GLQuick

Samples in This QC Batch : 16020082.01,02,03,04,05,06

Sample Preparation : PB16020419 **Prep Method :** SW-846 5035A **Prep Date :** 02/03/16 16:00 **Prep By :** GLQuick

QC Type: Method Blank								
Parameter	CAS #	Result	Units	D.F.	MQL	MDL		Qual
MTBE	1634-04-4	< MDL	mg/Kg	1	0.005	0.001		
Benzene	71-43-2	< MDL	mg/Kg	1	0.005	0.001		
Toluene	108-88-3	< MDL	mg/Kg	1	0.005	0.001		
Ethylbenzene	100-41-4	< MDL	mg/Kg	1	0.005	0.005		
m- & p-Xylenes	108-38-3&106-42-3	< MDL	mg/Kg	1	0.01	0.005		
o-Xylene	95-47-6	< MDL	mg/Kg	1	0.005	0.002		
Xylenes	1330-20-7	< MDL	mg/Kg	1	0.005	0.002		
Trifluorotoluene(surr)	98-08-8	107	%	1				

QC Type: LCS and LCSD										
Parameter	LCS Spk Added	LCS Result	LCS % Rec	LCSD Spk Added	LCSD Result	LCSD % Rec	RPD	RPD CtrlLimit	%Recovery CtrlLimit	Qual
MTBE	0.05	0.052	104	0.05	0.053	106	1.9	20	67.2-132	
Benzene	0.05	0.051	102	0.05	0.052	104	1.9	20	76.2-128	
Toluene	0.05	0.047	94	0.05	0.047	94	0	20	74.2-126	
Ethylbenzene	0.05	0.044	88	0.05	0.045	90	2.2	20	79.4-125	
m- & p-Xylenes	0.1	0.08	80	0.1	0.082	82	2.5	20	76.3-126	
o-Xylene	0.05	0.041	82	0.05	0.043	86	4.8	20	77.1-123	
Xylenes	0.15	0.121	80.7	0.15	0.125	83.3	3.2	20	77.2-125	

QC Type: MS and MSD											
QC Sample ID: 16020082.06											
Parameter	Sample Result	MS Spk Added	MS Result	MS % Rec	MSD Spk Added	MSD Result	MSD % Rec	RPD	RPD CtrlLimit	%Rec CtrlLimit	Qual
MTBE	BRL	0.02	0.0071	35.5	0.02	0.0071	35.5	0	26	76-134	M2
Benzene	BRL	0.02	0.01	50	0.02	0.0095	47.5	5.1	19	68-138	M2
Toluene	BRL	0.02	0.009	45	0.02	0.0083	41.5	8.1	19	67-135	M2
Ethylbenzene	BRL	0.02	0.0088	44	0.02	0.008	40	9.5	20	71-127	M2
m- & p-Xylenes	BRL	0.04	0.016	40	0.04	0.014	35	13.3	27	56-135	M2
o-Xylene	BRL	0.02	0.008	40	0.02	0.007	35	13.3	24	56-134	M2
Xylenes	BRL	0.06	0.024	40	0.06	0.021	35	13.3	25	59-134	M2

Refer to the Definition page for terms.

LABORATORY TERM AND QUALIFIER DEFINITION REPORT



Job ID : 16020082

Date: 2/5/2016

General Term Definition

Back-Wt	Back Weight	Post-Wt	Post Weight
BRL	Below Reporting Limit	ppm	parts per million
cfu	colony-forming units	Pre-Wt	Previous Weight
Conc.	Concentration	Q	Qualifier
D.F.	Dilution Factor	RegLimit	Regulatory Limit
Front-Wt	Front Weight	RPD	Relative Percent Difference
LCS	Laboratory Check Standard	RptLimit	Reporting Limit
LCSD	Laboratory Check Standard Duplicate	SDL	Sample Detection Limit
MS	Matrix Spike	surr	Surrogate
MSD	Matrix Spike Duplicate	T	Time
MW	Molecular Weight	TNTC	Too numerous to count

Qualifier Definition

J	Estimation. Below calibration range but above MDL.
M2	Matrix Spike and/or Matrix Spike Duplicate recovery is below laboratory control limits due to matrix interference.
U	Undetected at SDL (Sample Detection Limit).



Sample Condition Checklist

A&B JobID : 16020082		Date Received : 02/01/2016			Time Received : 4:44PM																									
Client Name : Aviles Engineering																														
Temperature : 3.4+0.7cf=4.1°C		Sample pH : n/a																												
Thermometer ID : 140539697		pH Paper ID : n/a																												
Check Points																														
		Yes	No	N/A																										
1.	Cooler seal present and signed.	X																												
2.	Sample(s) in a cooler.	X																												
3.	If yes, ice in cooler.	X																												
4.	Sample(s) received with chain-of-custody.	X																												
5.	C-O-C signed and dated.	X																												
6.	Sample(s) received with signed sample custody seal.		X																											
7.	Sample containers arrived intact. (If no comment).	X																												
8.	<table style="width: 100%; border: none;"> <tr> <td style="width: 10%;">Matrix</td> <td style="width: 10%;">Water</td> <td style="width: 10%;">Soil</td> <td style="width: 10%;">Liquid</td> <td style="width: 10%;">Sludge</td> <td style="width: 10%;">Solid</td> <td style="width: 10%;">Cassette</td> <td style="width: 10%;">Tube</td> <td style="width: 10%;">Bulk</td> <td style="width: 10%;">Badge</td> <td style="width: 10%;">Food</td> <td style="width: 10%;">Other</td> </tr> <tr> <td>:</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table>	Matrix	Water	Soil	Liquid	Sludge	Solid	Cassette	Tube	Bulk	Badge	Food	Other	:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>													
Matrix	Water	Soil	Liquid	Sludge	Solid	Cassette	Tube	Bulk	Badge	Food	Other																			
:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																			
9.	Sample(s) were received in appropriate container(s).	X																												
10.	Sample(s) were received with proper preservative			X																										
11.	All samples were logged or labeled.	X																												
12.	Sample ID labels match C-O-C ID's	X																												
13.	Bottle count on C-O-C matches bottles found.	X																												
14.	Sample volume is sufficient for analyses requested.	X																												
15.	Samples were received within the hold time.	X																												
16.	VOA vials completely filled.			X																										
17.	Sample accepted.	X																												
18.	Has client been contacted about sub-out			X																										
Comments : Include actions taken to resolve discrepancies/problem:																														

Received by : AReyes

Check in by/date : AReyes / 02/01/2016

Laboratory Analysis Report

Total Number of Pages: 20

Job ID : 16020130



10100 East Freeway, Suite 100, Houston, TX 77029 tel: 713-453-6060, fax: 713-453-6091, <http://www.ablabs.com>

Client Project Name :

E101-16 / W. Airport Blvd., Houston, TX

Report To : Client Name: Aviles Engineering
Attn: Robert J. Metzger
Client Address: 5790 Windfern
City, State, Zip: Houston, Texas, 77041

P.O.#.:
Sample Collected By: Robert J. Metzger
Date Collected: 02/02/16

A&B Labs has analyzed the following samples...

Client Sample ID	Matrix	A&B Sample ID
B-9 (14-15)	Soil	16020130.01
B-8 (11-13)	Soil	16020130.02
B-8 Water	Water	16020130.03
B-7 (10-11)	Soil	16020130.04

Shantall Carpenter

Released By: Shantall Carpenter
Title: Senior Project Manager
Date: 2/5/2016



This Laboratory is NELAP (T104704213-15-13) accredited. Effective: 04/01/2015; Expires: 03/31/2016

Scope: Non-Potable Water, Drinking Water, Air, Solid, Biological Tissue, Hazardous Waste

I am the laboratory manager, or his/her designee, and I am responsible for the release of this data package. This laboratory data package has been reviewed and is complete and technically compliant with the requirements of the methods used, except where noted in the attached exception reports. I affirm, to the best of my knowledge that all problems/anomalies observed by this laboratory (and if applicable, any and all laboratories subcontracted through this laboratory) that might affect the quality of the data, have been identified in the Laboratory Review Checklist, and that no information or data have been knowingly withheld that would affect the quality of the data.

This report cannot be reproduced, except in full, without prior written permission of A&B Labs. Results shown relate only to the items tested. Samples are assumed to be in acceptable condition unless otherwise noted. Blank correction is not made unless otherwise noted. Air concentrations reported are based on field sampling information provided by client. Soil samples are reported on a wet weight basis unless otherwise noted. Uncertainty estimates are available on request.

Date Received : 02/02/2016 14:06



LABORATORY TEST RESULTS

Client Sample ID: B-9 (14-15)
A&B Job Sample ID: 16020130.01

Date: 2/5/2016

Client Name: Aviles Engineering
Project Name: E101-16 / W. Airport Blvd., Houston, TX

Attn: Robert J. Metzger

Test Description:	% Moisture	Sample Matrix	Soil
Analytical Method:	SM 2540G	Date Collected	02/02/2016 09:42
QC Batch ID:	Qb16020281	Date Received	02/02/2016 14:06
Prep Method:	SM 2540G	Date Prepared	02/02/2016 15:45
Prepared By:	MMaldonado		
Prep Batch ID	PB16020253		
Analyst Initial	MAM	% Moisture	17.3

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
	% Moisture ¹	17.3					----	----	%	1	02/02/16 15:50

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-9 (14-15)
A&B Job Sample ID: 16020130.01

Date: 2/5/2016

Client Name: Aviles Engineering
Project Name: E101-16 / W. Airport Blvd., Houston, TX

Attn: Robert J. Metzger

Test Description: Purgeable Aromatics

Sample Matrix: Soil

Analytical Method: SW-846 8021B

Date Collected: 02/02/2016 09:42

QC Batch ID: Qb16020567

Date Received: 02/02/2016 14:06

Prep Method: SW-846 5035A

Date Prepared: 02/04/2016 16:00

Prepared By: GLQuick

Prep Batch ID: PB16020549

Analyst Initial: GLQ

% Moisture: 17.3

Table with 12 columns: CAS Number, Parameter, Result, Flag, SDL, SQL, MDL, MQL, UQL, Units, DF, Date/Time. Rows include MTBE, Benzene, Toluene, Ethylbenzene, m- & p-Xylenes, o-Xylene, Xylenes, and Trifluorotoluene(surr).

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-9 (14-15)
A&B Job Sample ID: 16020130.01

Date: 2/5/2016

Client Name: Aviles Engineering
Project Name: E101-16 / W. Airport Blvd., Houston, TX

Attn: Robert J. Metzger

Test Description: Total Petroleum Hydrocarbons
Analytical Method: TX 1005
QC Batch ID: Qb16020314
Prep Method: SW-846 5035A
Prepared By: SGautam
Prep Batch ID: PB16020307

Sample Matrix: Soil
Date Collected: 02/02/2016 09:42
Date Received: 02/02/2016 14:06
Date Prepared: 02/02/2016 15:00

Analyst Initial: SuG % Moisture: 17.3

Table with 12 columns: CAS Number, Parameter, Result, Flag, SDL, SQL, MDL, MQL, UQL, Units, DF, Date/Time. Rows include TPH-1005-1, TPH-1005-2, TPH-1005-4, 111-85-3, and 3386-33-2.



LABORATORY TEST RESULTS

Client Sample ID: B-8 (11-13)
A&B Job Sample ID: 16020130.02

Date: 2/5/2016

Client Name: Aviles Engineering
Project Name: E101-16 / W. Airport Blvd., Houston, TX

Attn: Robert J. Metzger

Test Description: % Moisture
Analytical Method: SM 2540G
QC Batch ID: Qb16020281
Prep Method: SM 2540G
Prepared By: MMaldonado
Prep Batch ID: PB16020253
Analyst Initial: MAM
Sample Matrix: Soil
Date Collected: 02/02/2016 10:41
Date Received: 02/02/2016 14:06
Date Prepared: 02/02/2016 15:45
% Moisture: 23.0

Table with 12 columns: CAS Number, Parameter, Result, Flag, SDL, SQL, MDL, MQL, UQL, Units, DF, Date/Time. Row 1: % Moisture1, 23, ----, ----, %, 1, 02/02/16 15:50



LABORATORY TEST RESULTS

Client Sample ID: B-8 (11-13)
A&B Job Sample ID: 16020130.02

Date: 2/5/2016

Client Name: Aviles Engineering
Project Name: E101-16 / W. Airport Blvd., Houston, TX

Attn: Robert J. Metzger

Test Description: Purgeable Aromatics
Analytical Method: SW-846 8021B
QC Batch ID: Qb16020567
Prep Method: SW-846 5035A
Prepared By: GLQuick
Prep Batch ID: PB16020549
Analyst Initial: GLQ
Sample Matrix: Soil
Date Collected: 02/02/2016 10:41
Date Received: 02/02/2016 14:06
Date Prepared: 02/04/2016 16:00
% Moisture: 23.0

Table with 12 columns: CAS Number, Parameter, Result, Flag, SDL, SQL, MDL, MQL, UQL, Units, DF, Date/Time. Rows include MTBE, Benzene, Toluene, Ethylbenzene, m- & p-Xylenes, o-Xylene, Xylenes, and Trifluorotoluene(surr).

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-8 (11-13)
A&B Job Sample ID: 16020130.02

Date: 2/5/2016

Client Name: Aviles Engineering
Project Name: E101-16 / W. Airport Blvd., Houston, TX

Attn: Robert J. Metzger

Test Description: Total Petroleum Hydrocarbons
Analytical Method: TX 1005
QC Batch ID: Qb16020314
Prep Method: SW-846 5035A
Prepared By: SGautam
Prep Batch ID: PB16020307

Sample Matrix: Soil
Date Collected: 02/02/2016 10:41
Date Received: 02/02/2016 14:06
Date Prepared: 02/02/2016 15:00

Analyst Initial: SuG % Moisture: 23.0

Table with 12 columns: CAS Number, Parameter, Result, Flag, SDL, SQL, MDL, MQL, UQL, Units, DF, Date/Time. Rows include TPH-1005-1, TPH-1005-2, TPH-1005-4, 111-85-3, and 3386-33-2.

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-8 Water
A&B Job Sample ID: 16020130.03

Date: 2/5/2016

Client Name: Aviles Engineering
Project Name: E101-16 / W. Airport Blvd., Houston, TX

Attn: Robert J. Metzger

Test Description: Purgeable Aromatics
Analytical Method: SW-846 8021B
QC Batch ID: Qb16020559
Prep Method: SW-846 5030C
Prepared By: GLQuick
Prep Batch ID: PB16020545
Analyst Initial: GLQ

Sample Matrix: Water
Date Collected: 02/02/2016 11:15
Date Received: 02/02/2016 14:06
Date Prepared: 02/04/2016 11:30

% Moisture

Table with 12 columns: CAS Number, Parameter, Result, Flag, SDL, SQL, MDL, MQL, UQL, Units, DF, Date/Time. Rows include MTBE, Benzene, Toluene, Ethylbenzene, m- & p-Xylenes, o-Xylene, Xylenes, and Trifluorotoluene(surr).



LABORATORY TEST RESULTS

Client Sample ID: B-8 Water
A&B Job Sample ID: 16020130.03

Date: 2/5/2016

Client Name: Aviles Engineering
Project Name: E101-16 / W. Airport Blvd., Houston, TX

Attn: Robert J. Metzger

Test Description: Total Petroleum Hydrocarbons
Analytical Method: TX 1005
QC Batch ID: Qb16020552
Prep Method: TX 1005
Prepared By: SGautam
Prep Batch ID: PB16020535
Analyst Initial: SuG

Sample Matrix: Water
Date Collected: 02/02/2016 11:15
Date Received: 02/02/2016 14:06
Date Prepared: 02/03/2016 15:00

% Moisture

Table with 12 columns: CAS Number, Parameter, Result, Flag, SDL, SQL, MDL, MQL, UQL, Units, DF, Date/Time. Rows include TPH-1005-1 through TPH-1005-4, 111-85-3, and 3386-33-2.



LABORATORY TEST RESULTS

Client Sample ID: B-7 (10-11)
A&B Job Sample ID: 16020130.04

Date: 2/5/2016

Client Name: Aviles Engineering
Project Name: E101-16 / W. Airport Blvd., Houston, TX

Attn: Robert J. Metzger

Test Description:	% Moisture	Sample Matrix	Soil
Analytical Method:	SM 2540G	Date Collected	02/02/2016 12:04
QC Batch ID:	Qb16020281	Date Received	02/02/2016 14:06
Prep Method:	SM 2540G	Date Prepared	02/02/2016 15:45
Prepared By:	MMaldonado		
Prep Batch ID	PB16020253		
Analyst Initial	MAM	% Moisture	25.5

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
	% Moisture ¹	25.5					----	----	%	1	02/02/16 15:50

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-7 (10-11)
A&B Job Sample ID: 16020130.04

Date: 2/5/2016

Client Name: Aviles Engineering
Project Name: E101-16 / W. Airport Blvd., Houston, TX

Attn: Robert J. Metzger

Test Description: Purgeable Aromatics
Analytical Method: SW-846 8021B
QC Batch ID: Qb16020567
Prep Method: SW-846 5035A
Prepared By: GLQuick
Prep Batch ID: PB16020549

Sample Matrix: Soil
Date Collected: 02/02/2016 12:04
Date Received: 02/02/2016 14:06
Date Prepared: 02/04/2016 16:00

Analyst Initial: GLQ % Moisture: 25.5

Table with 12 columns: CAS Number, Parameter, Result, Flag, SDL, SQL, MDL, MQL, UQL, Units, DF, Date/Time. Rows include MTBE, Benzene, Toluene, Ethylbenzene, m- & p-Xylenes, o-Xylene, Xylenes, and Trifluorotoluene(surr).

Soil results reported on dry weight basis

QUALITY CONTROL CERTIFICATE



Job ID : 16020130

Date : 2/5/2016

Analysis : Total Petroleum Hydrocarbons **Method :** TX 1005 **Reporting Units :** mg/Kg

QC Batch ID : Qb16020314 **Created Date :** 02/03/16 **Created By :** SGautam

Samples in This QC Batch : 16020130.01,02,04

Sample Preparation : PB16020307 **Prep Method :** SW-846 5035A **Prep Date :** 02/02/16 15:00 **Prep By :** SGautam

QC Type: Method Blank

Parameter	CAS #	Result	Units	D.F.	MQL	MDL	Qual
C6-C12	TPH-1005-1	< MDL	mg/Kg	1	25	23.7	
>C12-C28	TPH-1005-2	< MDL	mg/Kg	1	25	20.3	
>C28-C35	TPH-1005-4	< MDL	mg/Kg	1	25	17.7	
Total C6-C35		< MDL	mg/Kg	1	----		
Chlorooctadecane(surr)	3386-33-2	107	%	1			
1-Chlorooctane(surr)	111-85-3	104	%	1			

QC Type: LCS and LCSD

Parameter	LCS Spk Added	LCS Result	LCS % Rec	LCSD Spk Added	LCSD Result	LCSD % Rec	RPD	RPD CtrlLimit	%Recovery CtrlLimit	Qual
C6-C12	500	479	95.8	500	474	94.8	1	20	75-125	
>C12-C28	500	540	108	500	562	112	4	20	75-125	
>C28-C35	500	560	112	500	523	105	6.8	20	75-125	

QC Type: MS and MSD

QC Sample ID: 16020087.01

Parameter	Sample Result	MS Spk Added	MS Result	MS % Rec	MSD Spk Added	MSD Result	MSD % Rec	RPD	RPD CtrlLimit	%Rec CtrlLimit	Qual
C6-C12	0.326	500	468	93.5	500	466	93.1	0.4	20	75-125	
>C12-C28	1.3	500	565	113	500	563	112	0.4	20	75-125	
>C28-C35	0.45	500	525	105	500	567	113	7.7	20	75-125	

Refer to the Definition page for terms.

QUALITY CONTROL CERTIFICATE



Job ID : 16020130

Date : 2/5/2016

Analysis : Total Petroleum Hydrocarbons **Method :** TX 1005 **Reporting Units :** mg/L

QC Batch ID : Qb16020552 **Created Date :** 02/05/16 **Created By :** SGautam

Samples in This QC Batch : 16020130.03

Sample Preparation : PB16020535 **Prep Method :** TX 1005 **Prep Date :** 02/03/16 15:00 **Prep By :** SGautam

QC Type: Method Blank

Parameter	CAS #	Result	Units	D.F.	MQL	MDL	Qual
C6-C12	TPH-1005-1	< MDL	mg/L	1	1.5	0.66	
>C12-C28	TPH-1005-2	< MDL	mg/L	1	1.5	0.86	
>C28-C35	TPH-1005-4	< MDL	mg/L	1	1.5	0.75	
Total C6-C35		< MDL	mg/L	1	----		
1-Chlorooctane(surr)	111-85-3	83.1	%	1			
Chlorooctadecane(surr)	3386-33-2	85.7	%	1			

QC Type: LCS and LCSD

Parameter	LCS Spk Added	LCS Result	LCS % Rec	LCSD Spk Added	LCSD Result	LCSD % Rec	RPD	RPD CtrLimit	%Recovery CtrLimit	Qual
C6-C12	30	28.7	95.7	30	27.2	90.7	5.4	20	75-125	
>C12-C28	30	31.6	105	30	29.6	98.7	6.5	20	75-125	
>C28-C35	30	33.5	112	30	31.3	104	6.8	20	75-125	

QC Type: MS and MSD

QC Sample ID: 16020117.01

Parameter	Sample Result	MS Spk Added	MS Result	MS % Rec	MSD Spk Added	MSD Result	MSD % Rec	RPD	RPD CtrLimit	%Rec CtrLimit	Qual
C6-C12	BRL	27.6	23.3	82.6	27.6	24.1	85.5	3.5	20	75-125	
>C12-C28	BRL	27.6	27.8	100	27.6	28.2	102	1.4	20	75-125	
>C28-C35	BRL	27.6	30.3	110	27.6	30	109	1	20	75-125	

Refer to the Definition page for terms.

QUALITY CONTROL CERTIFICATE



Job ID : 16020130

Date : 2/5/2016

Analysis : Purgeable Aromatics **Method :** SW-846 8021B **Reporting Units :** mg/L

QC Batch ID : Qb16020559 **Created Date :** 02/05/16 **Created By :** GLQuick

Samples in This QC Batch : 16020130.03

Sample Preparation : PB16020545 **Prep Method :** SW-846 5030C **Prep Date :** 02/04/16 11:30 **Prep By :** GLQuick

QC Type: Method Blank

Parameter	CAS #	Result	Units	D.F.	MQL	MDL		Qual
MTBE	1634-04-4	< MDL	mg/L	1	0.002	.0014		
Benzene	71-43-2	< MDL	mg/L	1	0.002	.0008		
Toluene	108-88-3	< MDL	mg/L	1	0.002	.0010		
Ethylbenzene	100-41-4	< MDL	mg/L	1	0.002	.0008		
m- & p-Xylenes	108-38-3&106-42-3	< MDL	mg/L	1	0.004	.0016		
o-Xylene	95-47-6	< MDL	mg/L	1	0.002	.0010		
Xylenes	1330-20-7	< MDL	mg/L	1	0.002	.0025		
Trifluorotoluene(surr)	98-08-8	106	%	1				

QC Type: LCS and LCSD

Parameter	LCS Spk Added	LCS Result	LCS % Rec	LCSD Spk Added	LCSD Result	LCSD % Rec	RPD	RPD CtrlLimit	%Recovery CtrlLimit	Qual
MTBE	0.02	0.021	105	0.02	0.021	105	0	30	69.4-124	
Benzene	0.02	0.022	110	0.02	0.02	100	9.5	30	79.1-123	
Toluene	0.02	0.02	100	0.02	0.019	95	5.1	30	72.3-117	
Ethylbenzene	0.02	0.02	100	0.02	0.019	95	5.1	30	77.4-119	
m- & p-Xylenes	0.04	0.036	90	0.04	0.034	85	5.7	30	77.2-127	
o-Xylene	0.02	0.018	90	0.02	0.017	85	5.7	30	71-114	
Xylenes	0.06	0.054	90	0.06	0.051	85	5.7	30	75.8-121	

QC Type: MS and MSD

QC Sample ID: 16020130.03

Parameter	Sample Result	MS Spk Added	MS Result	MS % Rec	MSD Spk Added	MSD Result	MSD % Rec	RPD	RPD CtrlLimit	%Rec CtrlLimit	Qual
MTBE	BRL	0.02	0.02	96.5	0.02	0.021	102	5	21	68-117	
Benzene	BRL	0.02	0.021	102	0.02	0.02	97	5	17	65-143	
Toluene	BRL	0.02	0.019	91.3	0.02	0.019	91.3	0	29	67-136	
Ethylbenzene	BRL	0.02	0.019	95	0.02	0.019	95	0	30	80-134	
m- & p-Xylenes	BRL	0.04	0.034	85	0.04	0.034	85	0	22	81-131	
o-Xylene	BRL	0.02	0.017	85	0.02	0.018	90	5.7	21	74-134	
Xylenes	BRL	0.06	0.051	85	0.06	0.052	86.7	1.9	21	80-136	

Refer to the Definition page for terms.

QUALITY CONTROL CERTIFICATE



Job ID : 16020130

Date : 2/5/2016

Analysis : Purgeable Aromatics

Method : SW-846 8021B

Reporting Units : mg/Kg

QC Batch ID : Qb16020567

Created Date : 02/05/16

Created By : GLQuick

Samples in This QC Batch : 16020130.01,02,04

Sample Preparation : PB16020549

Prep Method : SW-846 5035A

Prep Date : 02/04/16 16:00

Prep By : GLQuick

QC Type: Method Blank

Parameter	CAS #	Result	Units	D.F.	MQL	MDL	Qual
MTBE	1634-04-4	< MDL	mg/Kg	1	0.005	0.001	
Benzene	71-43-2	< MDL	mg/Kg	1	0.005	0.001	
Toluene	108-88-3	< MDL	mg/Kg	1	0.005	0.001	
Ethylbenzene	100-41-4	< MDL	mg/Kg	1	0.005	0.005	
m- & p-Xylenes	108-38-38,106-42-3	< MDL	mg/Kg	1	0.01	0.005	
o-Xylene	95-47-6	< MDL	mg/Kg	1	0.005	0.002	
Xylenes	1330-20-7	< MDL	mg/Kg	1	0.005	0.002	
Trifluorotoluene(surr)	98-08-8	105	%	1			

QC Type: LCS and LCSD

Parameter	LCS Spk Added	LCS Result	LCS % Rec	LCSD Spk Added	LCSD Result	LCSD % Rec	RPD	RPD CtrlLimit	%Recovery CtrlLimit	Qual
MTBE	0.05	0.056	112	0.05	0.049	98	13.3	20	67.2-132	
Benzene	0.05	0.049	98	0.05	0.049	98	0.0	20	76.2-128	
Toluene	0.05	0.045	90	0.05	0.045	90	0.0	20	74.2-126	
Ethylbenzene	0.05	0.045	90	0.05	0.043	86	4.5	20	79.4-125	
m- & p-Xylenes	0.1	0.082	82	0.1	0.079	79	3.7	20	76.3-126	
o-Xylene	0.05	0.042	84	0.05	0.041	82	2.4	20	77.1-123	
Xylenes	0.15	0.124	82.7	0.15	0.12	80	3.3	20	77.2-125	

QC Type: MS and MSD

QC Sample ID: 16011426.02

Parameter	Sample Result	MS Spk Added	MS Result	MS % Rec	MSD Spk Added	MSD Result	MSD % Rec	RPD	RPD CtrlLimit	%Rec CtrlLimit	Qual
MTBE	BRL	0.05	0.045	90	0.05	0.046	92	2.2	26	76-134	
Benzene	BRL	0.05	0.042	84	0.05	0.042	84	0.0	19	68-138	
Toluene	BRL	0.05	0.036	72	0.05	0.035	70	2.8	19	67-135	
Ethylbenzene	BRL	0.05	0.032	64	0.05	0.029	58	9.8	20	71-127	M2
m- & p-Xylenes	BRL	0.1	0.053	53	0.1	0.05	50	5.8	27	56-135	M2
o-Xylene	BRL	0.05	0.033	66	0.05	0.03	60	9.5	24	56-134	
Xylenes	BRL	0.15	0.086	57.3	0.149	0.08	53.7	7.2	25	59-134	M2

Refer to the Definition page for terms.

LABORATORY TERM AND QUALIFIER DEFINITION REPORT



Job ID : 16020130

Date: 2/5/2016

General Term Definition

Back-Wt	Back Weight	Post-Wt	Post Weight
BRL	Below Reporting Limit	ppm	parts per million
cfu	colony-forming units	Pre-Wt	Previous Weight
Conc.	Concentration	Q	Qualifier
D.F.	Dilution Factor	RegLimit	Regulatory Limit
Front-Wt	Front Weight	RPD	Relative Percent Difference
LCS	Laboratory Check Standard	RptLimit	Reporting Limit
LCSD	Laboratory Check Standard Duplicate	SDL	Sample Detection Limit
MS	Matrix Spike	surr	Surrogate
MSD	Matrix Spike Duplicate	T	Time
MW	Molecular Weight	TNTC	Too numerous to count

Qualifier Definition

J	Estimation. Below calibration range but above MDL.
M2	Matrix Spike and/or Matrix Spike Duplicate recovery is below laboratory control limits due to matrix interference."The sample randomly selected as QC for this batch was not part of your project. Therefore, this sample matrix is not applicable to your project samples."
U	Undetected at SDL (Sample Detection Limit).

10100 East Fwy (I-10)
Suite 100
Houston, TX 77029
713-453-6060
1-877-478-6060 Toll Free
713-453-6091 Fax
ablabs.com



A&B JOB ID # 14020130

5. Project # E101-16

6. Project Name/Location
W. Airport Blvd Houston, TX

7. Reporting Requirement:
 TRRP Limits only TRRP Rpt. Package See Attached Standard Level II PST MDL EDD

8. Sampler's Name & Company (PLEASE PRINT)
Robert J Metzger AEC

Sampler's Signature & Date
[Signature] 2/2/16

9. Sample ID and Description

LAB USE ONLY	10. Sampling		11. 12. Matrix										
	Date	Time 24 Hr	Comp	Grab	Water	Soil	Sludge	Oil	Drinking Water	Air	Other	18. REMARKS	
PA-ER-9	2/2/16	9:42	✓	✓	✓	✓							Soil Samples moisture
PA-ER-8	2/2/16	10:41	✓	✓	✓	✓						analyzed within 48hrs from time of collection - 05 to extend the hold time to 14 days preserve samples by freezing + storing samples at -70C	
PA-ER-7	2/2/16	12:49	✓	✓	✓	✓						Determine levels < T200 TIER I Residential PCLs	

1. REPORT TO:
Company: Aviles Engineering Corp.
Address: 5790 W. Alford Houston, TX 77041
Contact: Robert J Metzger
Phone: 281-793-8352
Fax:
E-mail: rmetzger@avileseng.com

2. INVOICE TO:
Company: As in Box #1
Address: [Arrow]
Contact: [Arrow]
Phone: [Arrow]
Fax:
E-mail:

3. PO #
3a. A&B Quote #
4. Turnaround Time (Business Days)
 1 Day* Other:
 2 Days* Surcharge applies
 3 Days* Surcharge applies
 7 Days - Standard (see remarks)

13. Containers*
14. Containers**
15. Preservatives**
16. PH-Lab Only

Vol							
C	C	C	C	C	C	C	C
H	H	H	H	H	H	H	H

17. Analyses/Methods

MTX							
Method 3035A							
Meq/L contact							

21. KNOWN HAZARDS/COMMENTS
16/01
Temperature: 0.310.7 = 0.197
Thermometer ID 140539697
Intact N Initials AR
A&B cannot accept verbal changes
Please FAX written changes to 713-453-6091
Samples will be disposed of after 30 days
A&B reserves the right to return samples

19. RELINQUISHED BY: [Signature] DATE: 2/2/16 TIME: 14:06 RECEIVED BY: Ashley Reynolds DATE: 2/2/16 TIME: 14:06

*Containers: VOA - 40 ml vial A/G - Amber/Glass 1 Liter
4 oz/8 oz - glass wide mouth P/O - Plastic/other

**Preservatives: C - Cool H - HCl N - HNO₃ S - H₂SO₄
OH - NaOH T - Na₂S₂O₃ X - Other

METHOD OF SHIPMENT: RENTAL P/U



Sample Condition Checklist

A&B JobID : 16020130	Date Received : 02/02/2016	Time Received : 2:06PM																										
Client Name : Aviles Engineering																												
Temperature : .3+.7cf=1.0°C	Sample pH : na																											
Thermometer ID : 140539697	pH Paper ID : na																											
Check Points																												
		Yes	No	N/A																								
1.	Cooler seal present and signed.	X																										
2.	Sample(s) in a cooler.	X																										
3.	If yes, ice in cooler.	X																										
4.	Sample(s) received with chain-of-custody.	X																										
5.	C-O-C signed and dated.	X																										
6.	Sample(s) received with signed sample custody seal.		X																									
7.	Sample containers arrived intact. (If no comment).	X																										
8.	<table style="width: 100%; border: none;"> <tr> <td style="width: 10%;">Matrix</td> <td style="width: 10%;">Water</td> <td style="width: 10%;">Soil</td> <td style="width: 10%;">Liquid</td> <td style="width: 10%;">Sludge</td> <td style="width: 10%;">Solid</td> <td style="width: 10%;">Cassette</td> <td style="width: 10%;">Tube</td> <td style="width: 10%;">Bulk</td> <td style="width: 10%;">Badge</td> <td style="width: 10%;">Food</td> <td style="width: 10%;">Other</td> </tr> <tr> <td>:</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table>	Matrix	Water	Soil	Liquid	Sludge	Solid	Cassette	Tube	Bulk	Badge	Food	Other	:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>											
Matrix	Water	Soil	Liquid	Sludge	Solid	Cassette	Tube	Bulk	Badge	Food	Other																	
:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>																									
9.	Sample(s) were received in appropriate container(s).	X																										
10.	Sample(s) were received with proper preservative	X																										
11.	All samples were logged or labeled.	X																										
12.	Sample ID labels match C-O-C ID's	X																										
13.	Bottle count on C-O-C matches bottles found.		X																									
14.	Sample volume is sufficient for analyses requested.	X																										
15.	Samples were received within the hold time.	X																										
16.	VOA vials completely filled.	X																										
17.	Sample accepted.	X																										
18.	Has client been contacted about sub-out			X																								
Comments : Include actions taken to resolve discrepancies/problem:																												
Rec 4 containers for sample ID .01,.02,.04 - COC states only 1. (terra core samples with only 4 voas and 1-4oz jar).																												

Received by : AREyes

Check in by/date : TKellar / 02/02/2016

**Limited Phase II Environmental Site Assessment for 24-Inch Water Line Replacement
Along West Airport Boulevard, Houston, Texas**

APPENDIX F

CITY OF HOUSTON STANDARD SPECIFICATION SECTION 02136

SECTION 02136

WASTE MATERIAL HANDLING, TESTING AND DISPOSAL

PART 1 GENERAL

1.01 SECTION INCLUDES

Handling, testing and disposal of hazardous and non-hazardous waste material.

- A. Material present inside of existing tanks to be repaired or demolished, i.e., silt, sludge and other residue deposits generated by normal water production usage of the tanks.
- B. Existing coatings removed from existing tanks.
- C. Spent abrasives used and debris generated in the execution of the work.
- D. All spent thinners, coating materials or other products brought on site for execution of work that require disposal as a hazardous or non-hazardous waste.
- E. Soil that may be contaminated due to the execution of the work.
- F. Petroleum soaked sand foundation material removed from demolished tank sites.

1.02 MEASUREMENT AND PAYMENT

- A. No separate measurement and payment will be made for handling, testing or disposal of non-hazardous or hazardous material, debris or material identified as contaminated material on the site prior to the bid date except as indicated in section 1.02 B and 1.02 C. The Contractor shall include the cost for this work in the Contract bid price for work of which this is a component part.
- B. Payment for hazardous waste material handling, removal, testing, transporting and disposal of material identified as hazardous after the bid date will be paid for at the unit price bid for "Hazardous Waste Handling, Removal, Transporting" if such an item is provided in the contract.
- C. Removal and disposal of potentially petroleum soaked sand foundation material will be measured per cubic yard which shall include testing, removing, storing, transporting and disposing of material and will be paid for at the unit price bid for "Removal and Disposal of Potentially Petroleum Soaked Sand". Basis of payment will be Class I Industrial Waste having a Total Petroleum Hydrocarbon (TPH) level greater than 1500 ppm.

1.03 REFERENCES

The following is a list of applicable requirements to this project. It is not intended to be a complete listing of all laws and regulations to which the Contractor must comply.

A. Environmental Protection Agency - Code of Federal Regulations

1. 40 CFR Part 261 - Identification and Testing of Hazardous Waste
2. 40 CFR 261, Appendix II EPA - Toxicity Characteristic Leaching Procedure
3. 40 CFR Part 262 - Standards Applicable to Generators of Hazardous Waste
4. 40 CFR Part 263 - Standards Applicable to Transporters of Hazardous Waste
5. 40 CFR Part 264 - Standards for Owner and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities
6. 40 CFR Part 265 - Interim Status for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities
7. 40 CFR 265, Subpart C EPA - Preparedness and Prevention
8. 40 CFR 265, Subpart D EPA - Contingency Plan and Emergency Procedures
9. 40 CFR 265.16 EPA - Personnel Training
10. 40 CFR Part 268 - Land Disposal Restrictions
11. 49 CFR Parts 173,178 and 179: (USDOT/ Hazardous Materials, Shipping, Containers.)
12. 40 CFR Part 355 - Emergency Planning and Notification

B. EPA Methods

1. 3050 - Acid Digestion of Sediment, Sludge, and Soils
2. SW 846 - Test Methods for Evaluating Solid Waste - Physical/Chemical Methods

C. Texas Commission on Environmental Quality

1. TAC Title 30, Chapter 305 "Consolidated Permits"
2. TAC Title 30, Chapter 335 "Industrial Solid Waste and Municipal Hazardous Waste"
3. TAC Title 30, Chapter 343 "Oil and Hazardous Substances"

- D. TWC Technical Guidelines
 - 1. Document #1, Waste Evaluation/Classification
- E. NIOSH Methods
 - 1. 7082 Lead
- F. Society for Protective Coatings
 - 1. SSPC 91-18 - Industrial Lead Paint Removal Handbook
 - 2. Guide 6 - Guide for Containing Debris Generated During Paint Removal Operations
 - 3. Guide 7 - Guide for the Disposal of Lead Contaminated Surface Preparation Debris

1.04 SUBMITTALS

- A. Submittals shall conform to requirements of Section 01330 – Submittal Procedures.
- B. Submittals shall conform to appropriate codes for regulatory requirements.
- C. Obtain and submit disposal permits for proposed disposal sites, if required by local ordinances.

1.05 TESTING AND IDENTIFICATION

- A. The Owner is the Generator of the debris for permitting purposes, and will obtain the EPA Identification number, but the Contractor is responsible for assuring that all testing, handling, storage, transportation, and disposal requirements are properly implemented, including satisfactory training of job site personnel and the cleaning of all reusable items and equipment prior to removal from the site.
- B. Prior to the bid date, if testing has been performed by the City and if hazardous material has been identified in the debris material in an existing tank, the paint to be removed from an existing tank, the work site soil, or the foundation material, the material or test results will be indicated in section 01110. It is the responsibility of the Contractor to properly test and to determine if any wastes generated as a result of this project are hazardous in accordance with 40 CFR Part 261.

1.06 DEFINITIONS

(Note Definitions applicable to this section are also presented elsewhere.)

- A. Hazardous Waste (lead paint debris): Waste that is classified as hazardous due to its concentrations of regulated hazardous substances. Paint debris is classified as hazardous waste if, after testing by the Toxicity Characteristic Leaching Procedure (TCLP), the leachate contains any

of the 8 metals or other substances in concentrations at or above limits established in 40 CFR 261.

- B. Lead Containing Dust and Debris: Dust and debris generated during the project which contains lead in any amount, including but not limited to pulverized paint, spent abrasive, filters (wet and dry), and containment materials upon which lead is still present.
- C. RCRA: Resource Conservation and Recovery Act. Federal law pertaining to hazardous waste management. EPA implementing regulations are contained in 40 CFR 240-280.
- D. TACB: Texas Air Control Board. Texas State Agency joined into the TCEQ and responsible for writing and enforcement of rules and regulations relating to air quality.
- E. TCEQ: Texas Commission on Environmental Quality. State of Texas Commission responsible for planning, oversight, monitoring and management of natural resources.
- F. TCLP: Toxicity Characteristic Leaching Procedure. Laboratory tests conducted on wastes that determine the amount of hazardous materials that leach out into a test solution. The test is intended to simulate the properties of water as it leaches through a solid waste landfill. TCLP testing is defined in 40 CFR 261, Appendix II.
- G. TWC: Texas Water Commission. Texas State Agency joined into the TCEQ and responsible for writing and enforcement of rules and regulations relating to water quality and solid waste programs.

PART 2 NOT USED

PART 3 EXECUTION

3.01 WASTE HANDLING AND STORAGE

- A. All chemicals to be brought on site by the contractor must be stored and used in a safe and proper manner in accordance with all applicable Federal, State and local laws and regulations as well as the manufacturers recommendations. Material Safety Data Sheets (MSDSs) shall be maintained on-site for all hazardous chemicals used.
- B. Hazardous wastes are to be handled and stored according to the requirements of TAC 30 Chapter 335 "Industrial Solid Waste and Municipal Hazardous Waste" and 40CFR Part 262, with regard to on-site storage, and 40CFR Part 264 with regard to required notices, site security, personnel training, contingency planning and emergency procedures, recordkeeping and reporting, time of storage, amount of material stored, and use of proper containers. Hazardous waste will be stored in covered containers in accordance with the requirements of 40 CFR 262 and 49 CFR 172,178 and 179.
- C. The contractor shall provide proper, segregated storage for hazardous and non-hazardous

materials to be used in the work area in order to ensure safe work conditions.

- D. All material, waste and debris from removal of lead containing coatings, including those products and materials employed for chemical paint stripping, shall be considered hazardous waste and handled accordingly, until such time that testing and analysis indicates otherwise.
1. Sampling of materials for TCLP testing of initial containers of debris shall be completed prior to or during filling. Until the TCLP test results are received, the containers shall be labeled as lead-containing debris. Hazardous waste labels shall be applied after the test results are received, if the debris tests hazardous.
 2. Hazardous waste shall not be stored at the project site for more than 90 days. Non-hazardous wastes shall be removed at a minimum of once per month (30 days).
 3. Special attention shall be given to the time of storage, storage conditions, amount of material stored at any one time, use of proper containers, and personnel training.
- E. Hazardous waste shall be placed on pallets over protected ground, be located in a secure area enclosed by a fence with signs around the perimeter, and be shielded adequately to prevent dispersion of the waste by wind or water. Under no circumstances shall the waste be stored within a flood plain area. Any evidence of improper storage shall be cause for immediate shutdown of the project until corrective action is taken. The storage area shall be within a security fence with a locked gate.

3.02 ENVIRONMENTAL CONTAMINATION

The contractor shall not contaminate the air, soils or surface and ground waters with any hazardous waste. Spills, releases and discharges of hazardous or toxic materials which inadvertently occur shall be reported in accordance with 40 CFR 265 and TAC 30 Chapter 343.

- A. Contingency Plan and Training: The Contractor shall comply with TCEQ Title 30 Regulations and EPA 40 CFR 265, Subpart C in the event of a spill or release of waste, EPA 40 CFR 265 Subpart D, and TCEQ regulations.
- B. All personnel associated with the handling of hazardous waste shall complete a formal training program in accordance with 40 CFR 265.16 and TCEQ Title 30 Regulations. Training records of all employees must be maintained and kept on file.

3.03 WASTE CLASSIFICATION

A. Testing

1. All solid waste generated by the paint removal activities shall be tested in accordance with 40 CFR 261, Appendix II, Method 1311 Toxicity Characteristic Leaching Procedure (TCLP), to determine if it is hazardous.

2. In the case of wet methods of preparation, the use of chemical strippers, or containerized hygiene water, all liquids and sludge shall also be tested. When chemical strippers are used, the testing shall include pH to determine corrosivity. All waste water shall be tested for total lead.
3. Representative samples of the debris for each waste stream generated from the work on this project shall be collected. A minimum of four of the samples representative of each waste stream shall be analyzed to establish a waste is non-hazardous. Note that more than four initial samples of each waste stream shall be collected in order to obtain the four representative samples for analysis. Results from one test sample are sufficient to identify a waste as hazardous.
4. The collection of the initial representative samples of each waste stream and selection of the minimum of four for testing shall be accomplished using a random sampling technique and shall comply with the following: a minimum of one representative sample for each 55 gallons of waste, or a minimum of four representative samples for each gondola or roll-off box of waste. Samples shall be collected in accordance with SW-846, "Test Methods for Evaluating Solid Waste - Physical/ Chemical Methods".
5. Sampling and testing shall be performed by a certified laboratory acceptable to the Owner. The name, address, and qualifications of the laboratory shall be provided for approval. The Owner shall be provided with copies of the test results as soon as they are received by the Contractor.

B. Classification

1. Lead paint debris is classified as hazardous waste if, after testing by TCLP, the leachate contains any of the 8 metals or other hazardous substances in concentrations at or above limits established in 40 CFR 261:

Arsenic -	5.0 mg/L
Barium -	100.0 mg/L
Cadmium -	1.0 mg/L
Chromium -	5.0 mg/L
Lead -	5.0 mg/L
Mercury -	0.2 mg/L
Selenium -	1.0 mg/L
Silver -	5.0 mg/L
2. The above includes only the eight (8) characteristic metals listed by EPA among which are elements typically associated with paints. Other substances may be present which may cause debris to be classified as hazardous waste as defined in 40 CFR 261 (such as a pH ≤ 2.0 or ≥ 12.5 resulting in corrosivity), and must be taken into account.

3.04 DISPOSAL

- A. The contractor shall arrange to have wastes and debris transported from the site in accordance with all City Ordinances and State and Federal Laws. If wastes and/or debris is determined to be hazardous, transporting to be in accordance with TAC 30 Chapter 335 -Industrial Solid Waste and Municipal Hazardous Waste, 40CFR Part 263 - Standards Applicable to Transporters of Hazardous Waste and the applicable sections of 49 CFR Parts 171 through 179.
- B. Manifest and Reporting: The Contractor shall comply with all of the manifesting, certification, and reporting requirements of EPA 40 CFR 262, 40 CFR 268, and Texas regulations, including certificates of final disposal for each shipment.
- C. Copies of all records and reports, test sample chain of custody forms, TCLP and other test results shall be provided to the Owner.
- D. The contractor shall dispose of wastes and debris at a licensed site acceptable to the Owner. Hazardous wastes and debris shall be disposed of in accordance with 40CFR Part 265 and 40CFR Part 268 Land Disposal Restrictions. Manifesting of hazardous wastes shall be in accordance with 40CFR Part 262, Subpart B.
- E. Waste water resulting from surface preparation, washing, personal hygiene or decontamination shall not be discharged without testing and through arrangement with the local Publicly Owned Treatment Works (POTW) or other approved means.

END OF SECTION

**Limited Phase II Environmental Site Assessment for 24-Inch Water Line Replacement
Along West Airport Boulevard, Houston, Texas**

APPENDIX G

RESUME



ROBERT J. METZGER, PG, CAPM

POSITION	Senior Geologist for 12 years Aviles Engineering Corporation, Houston, Texas
EDUCATION	Bowling Green State University, Bachelor of Science in Education - Earth and Biological Sciences Bowling Green State University, Master of Science – Geology
REGISTRATIONS	Texas Registered Professional Geoscientist License No. 1133 Texas Commission on Environmental Quality Corrective Action Project Manager No. 01418 Certified with 40-Hour OSHA Hazardous Material Health and Safety Training and 8-Hour Refresher
EXPERIENCE	Conducted Phase I and Phase II ESAs for the City of Houston Department of Public Works and Engineering Projects: <ul style="list-style-type: none">• Riverwood Estates No. 1 Lift Station and Force Main• Harvey Wilson Drive and Armour Drive Reconstruction• Riverwood Estates, John Alber, and Garden Oaks Phase II Areas Water Line Replacements• Jensen Drive Pump Station Valve Box and Pipeline• Polk Street Underpass Storm Water Inlet Replacement• Park Row Road from State Highway 6 to Eldridge Parkway• Heights Area Waterline Replacement• West Little York Street Reconstruction from Deep Forest Drive to TC Jester Boulevard• Bastrop Street Sanitary Sewer Line• Northgate Regional Lift Station and Force Main• Corder Subdivision Water Main Replacement• Bennington Subdivision Water Main Replacement• Westheimer North Water Main Replacement• Lockwood Street Paving from Bennington Boulevard to Tidwell Road• Huntington Water Main Replacement• McCarty #1 Lift Station and Force Main Replacement• Parker Road Water Main Replacement• Kingspoint Road Sanitary Sewer Line• Alabonson Area Water Line Replacment• Mangum Manor Areas Water Line Replacment Phase II Environmental Site Assessment: Toyota Center, Houston, Texas: Conducted comprehensive Phase II ESA of a six-block site to assess and delineate contaminated soil and groundwater prior to construction of the Toyota Center.

**EXPERIENCE,
continued**

Houston Airport Systems Hobby Airport Taxiway H Phase II Environmental Site Assessment: Conducted Phase II ESA for expansion of Taxiway H at Hobby Airport, which included advancement of soil borings, installation of temporary groundwater monitoring wells and soil and groundwater sampling. Prepared Phase II ESA report.

Environmental Assessment: Houston Police Department Firing Range at George Bush Intercontinental Airport: Oversight of drilling soil borings and installation of monitor wells during decommissioning of firing range to determine soil and groundwater disposal options and site cleanup. Prepared and edited assessment report.

Environmental Soil Sampling and Analysis Woodhouse Paving Phase I and II Project Areas at Port of Houston Authority: During the Phase I Project, surface concrete was cored, a soil boring was conducted from the soil surface to 18 inches below the surface, and a soil sample was collected from each boring at 20 locations. During the Phase II Project, six soil borings were drilled to 4 feet below the ground surface (bgs), two borings were drilled to 10 feet bgs, and two borings were drilled to 30 feet bgs. One to two soil samples were collected from each boring for a total of 14 samples. Each of the soil samples collected during Phase I and Phase II was submitted to a commercial laboratory for analyses of the following potential environmental contaminants:

- Total petroleum hydrocarbons
- Total RCRA metals
- Volatile and semi volatile organic compounds
- Polychlorinated biphenyls (PCBs)
- Herbicides and Pesticides

Following analysis, a report was prepared for each project area describing the soil boring and sampling procedures, and the results of the laboratory analyses. Concentrations of contaminant in the soil samples were compared to applicable TCEQ standards.

Additional Phase II Environmental Site Assessments

- City of Pasadena Strawberry Road Improvements from Cherrybrook Lane to Spencer Highway.
- City of Pasadena Strawberry Road Improvements from State Highway 225 to Harris Avenue.
- Property at 44 Aldine Bender Road impacted by adjoining leaking underground storage tank site.