Phase II Investigation
Work Plan

Area B: Parcel B17
Tradepoint Atlantic
Sparrows Point, Maryland

Prepared for:
EnviroAnalytics Group
1650 Des Peres Road, Suite 230
Saint Louis, Missouri 63131

Prepared by:
ARM Group Inc.
9175 Guilford Road
Suite 310
Columbia, MD 21046

Revision 0
November 15, 2016

ARM Project 150300M-22

Respectfully Submitted,

Eric S. Magdar
Senior Geologist

T. Neil Peters, P.E.
Vice President

TABLE OF CONTENTS

TABLE OF CONTENTS
(CONT.)

FIGURES

APPENDICES

1.0 INTRODUCTION

1.1. INTRODUCTION

ARM Group Inc. (ARM), on behalf of EnviroAnalytics Group (EAG), has prepared the following Work Plan to complete a Phase II site investigation on a portion of the Tradepoint Atlantic property that has been designated as Area B, Parcel B17 (the Site). Parcel B17 is comprised of approximately 9.8 acres of the approximately 3,100-acre former plant property located as shown on **Figure 1**.

Site characterization of Parcel B17 will be performed in compliance with requirements pursuant to the following:

- Administrative Consent Order (ACO) between Tradepoint Atlantic (formerly Sparrows Point Terminal, LLC) and the Maryland Department of the Environment (effective September 12, 2014); and
- Settlement Agreement and Covenant Not to Sue (SA) between Tradepoint Atlantic (formerly Sparrows Point Terminal, LLC) and the United States Environmental Protection Agency (effective November 25, 2014).

An application to enter the Tradepoint Atlantic property into the Maryland Department of the Environment Voluntary Cleanup Program (MDE-VCP) was submitted to MDE on September 10, 2014. The property's current and anticipated future use is Tier 3 (Industrial), and plans for the property include demolition and redevelopment over the next several years.

Parcel B17 is part of the acreage that was removed (Carveout Area) from inclusion in the Multimedia Consent Decree between Bethlehem Steel Corporation, the United States Environmental Protection Agency (EPA), and the Maryland Department of the Environment (MDE) (effective October 8, 1997) as documented in correspondence received from EPA on September 12, 2014. Based on this agreement, EPA has determined that no further investigation or corrective measures will be required under the terms of the Consent Decree for the Carveout Area. However, the SA reflects that the property within the Carveout Area will remain subject to the EPA's RCRA Corrective Action authorities.

The objective of this Phase II Investigation is to identify the presence or absence of any existing hazardous conditions for future tenants or personnel working on the Site. During the Phase II Investigation, a total of 13 soil borings samples will be collected and analyzed to assess the presence of absence of contamination in Parcel B17. Groundwater at the Site has been previously investigated by the separate Area B Groundwater Phase II Investigation Report (dated September 30, 2016). Following the receipt of analytical data, a Human Health Screening Level

Risk Analysis (SLRA) will be completed to evaluate the potential risk to future workers, and a Phase II Investigation Report will be prepared to summarize the findings.

1.2. SITE BACKGROUND

From the late 1800s until 2012, the production and manufacturing of steel was conducted at Sparrows Point. Iron and steel production operations and processes at Sparrows Point included raw material handling, coke production, sinter production, iron production, steel production, and semi-finished and finished product preparation. In 1970, Sparrows Point was the largest steel facility in the United States, producing hot and cold rolled sheets, coated materials, pipes, plates, and rod and wire. The steel making operations at the Facility ceased in fall 2012.

Groundcover at the Site is comprised of approximately 20% natural soils and 80% slag based on the approximate shoreline of the Sparrows Point Peninsula in 1916, as shown on **Figure 2** (Adapted from Figure 2-20 on the Description of Current Conditions (DCC) Report prepared by Rust Environmental and Infrastructure, dated January 1998).

Parcel B17 was formerly occupied by the Machine Shop No. 2. The Site also included an Old Service Building, Old Blacksmith Shop, and a Heat Treating Plant. There is little information known about the specific processes included in the Machine Shop No. 2 area; however, some additional information on sampling targets is provided in Section 1.3. ARM conducted a site visit on June 1, 2016 to determine the current status of building demolition and debris/demolition piles. All of the buildings have been demolished in Parcel B17, and the concrete slabs remain on grade. There are no subgrade structures identified within Parcel B17. A photograph log from this site visit has been included as **Appendix A**.

Prior to the Area B Groundwater Investigation (conducted in accordance with the approved Work Plan dated October 6, 2015) there were no site-wide groundwater wells located within the Parcel B17 boundaries to provide relevant historical groundwater data. One well (SW-026-MWS) was installed within the parcel, and two additional wells were installed slightly outside of the parcel (SW-025-MWS and SW11-PZM005). The three new shallow wells were sampled during the Area B groundwater field investigation. The results from the recent groundwater sampling events (February 2016 through March 2016) are provided in **Appendix B**. Note that these results have been included in the Area B Phase II Investigation Report dated September 30, 2016. Aqueous Project Action Limit (PAL) exceedances are highlighted in red. There is no historical soil or soil gas sampling data available from this parcel.

1.3. SAMPLING DESIGN AND RATIONALE

Across the whole Tradepoint Atlantic property, several buildings and facilities may have been historical sources of environmental contamination. These areas were identified as targets for

sampling through a careful review of historical documents. When a sampling target was identified, at least two borings were placed at or around its location using GIS software (ArcMap Version 10.3.1). The first sampling targets to be identified were Recognized Environmental Conditions (RECs) located within the Site boundaries, as shown on the REC Location Map provided in the Phase I Environmental Site Assessment (ESA) prepared by Weaver Boos Consultants dated May 19, 2014. Weaver Boos completed site visits of Sparrows Point from February 19 through 21, 2014, for the purpose of characterizing current conditions at the former steel plant. A previous visual site inspection (VSI) was conducted as part of the RCRA Facility Assessment (RFA) prepared by A.T. Kearney, Inc. dated August 1993, for the purpose of identifying Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) on the property. This 1991 VSI is regularly cited in the DCC Report and Weaver Boos' Phase I ESA. All RECs were targeted with at least three (3) borings. Based on the review of historical documents and aerial images, REC boundaries are adjusted, as appropriate, from the original positions shown on the REC Location Map. The following RECs were identified within the Site boundaries:

Machine Shop No. 2 Asbestos Demolition Piles (REC 14A, Finding 250):
During the Phase I ESA site visit conducted by Weaver Boos, the Machine Shop No. 2 was observed to be demolished. Demolition material piles were observed where the Machine Shop No. 2 historically stood. Asbestos-containing debris was observed in demolition piles at this time (Finding 250). Weaver Boos reported that the abandoned debris was the subject of a current enforcement action by the MDE to be remedied by the combined efforts of Tradepoint Atlantic (former Sparrows Point LLC) and MCM. During an ARM site visit conducted on June 1, 2016, there were no demolition stock piles remaining on the Site.

Machine Shop No. 2 Oily Pits/Sumps (REC 14B, Finding 251):
During the Phase I ESA site visit, oily pits/sumps were observed in the Machine Shop No. 2 area. At that time, clean up and remediation had not be conducted. Due to safety reasons, Weaver Boos did not conduct further field investigation of this oily material during the site visit. Weaver Boos stated that it appeared that the oily pits/sumps had no historical records of assessing the oily materials. During an ARM Site visit, conducted on June 1, 2016, the oily pits and sumps were not present at the Site.

Following the identification and evaluation of all RECs at the Site, SWMUs and AOCs were identified from the DCC report Figure 3-1. **Figure 3** shows the proposed borings overlain on the DCC figure, which shows the SWMUs, AOCs, and main facility areas within the property boundaries. There were no additional SWMUs or AOCs that were identified at the Site based on this figure, and no additional units were identified from the DCC report Table 3-1.

Following the identification of all RECs, SWMUs, and AOCs, four (4) sets of historical site drawings were reviewed to identify additional sampling targets. These site drawings included the 5000 Set (Plant Arrangement), the 5100 Set (Plant Index), the 5500 Set (Plant Sewer Lines), and a set of drawings indicating coke oven gas distribution drip leg locations. (Drip legs are points throughout the distribution system where coke oven gas condensate was removed from the gas pipelines. The condensate from the drip legs was typically discharged to drums, although it is possible some spilled out of the drums and on to the ground.) **Figures 4 through 7** show the proposed borings and the parcel boundary overlain on the 5000 Set, 5100 Set, 5500 Set, and drip legs drawing, respectively. Careful review of these geospatially referenced figures and review of other historical documents (previously discussed) yielded the proposed boring locations. A summary of the specific drawings covering the Site is presented in the table below:

Parcel B17 Historical Site Drawings Details				
Set Name	Typical Features Shown	Drawing Number	Original Date Drawn	Latest Revision Date
Plant Arrangement	Roads, water bodies, building/structure footprints, electric lines, above-ground pipelines	5025	*Unknown*	3/11/1982
		5026	6/24/1958	3/11/1982
		5031	*Unknown*	3/11/1982
		5032	9/1/1958	3/11/1982
Plant Index	Roads, water bodies, demolished buildings/structures, electric lines, above-ground pipelines	5125	*Unknown*	7/8/2008
		5126	*Unknown*	9/27/2010
		5131	*Unknown*	7/9/2008
		5132	*Unknown*	8/15/2008
Plant Sewer Lines	Same as above plus trenches, sumps, underground piping (includes pipe materials)	5525	8/11/1959	3/6/1964
		5526	8/24/1959	3/19/1992
		5531	2/12/1960	2/12/1960
		5532	*Unknown*	6/1/1976
Drip Legs	Coke Oven Gas Drip Legs Locations	5886B	*Unknown*	Sept. 1988

Sampling target locations were identified if the historical site drawings depicted industrial activities or a specific feature at a location that may have been a source of environmental contamination that impacted the Site. Based on this criterion, the following sampling targets were identified at the Site: Old Blacksmith Shop and Heat Treating Plant, Chesapeake Heavy Machine Service, and Machine Shop. ARM received a list and map of former PCB-containing transformer equipment from Tradepoint Atlantic personnel, for inclusion as additional targets. There were no PCB-contaminated areas identified in the parcel based on this information. The number of proposed borings that targeted a specific feature is directly related to the size and

likely historical presence of materials that could have impacted the Site. The full list of sampling targets, along with the specific rationale for sampling each, is provided as **Appendix C**.

Sample locations were added, if needed, to fill in areas with insufficient coverage (large spatial gaps between proposed borings) within the Site and to meet the sample density requirements set forth in the Quality Assurance Project Plan (QAPP) Worksheet 17 – Sampling Design and Rationale. There were no additional parcel coverage borings proposed in Parcel B17. Parcel B17 contains a total of approximately 9.8 acres: 6.2 acres with engineered barriers (roads, parking, and building slabs) and 3.6 acres without engineered barriers. In accordance with the relevant sampling density requirements, a minimum of 3 soil boring locations are required in the area with engineered barriers, and a minimum of 3 soil boring locations are required in the area without engineered barriers. A total of 10 borings have been proposed in areas with engineered barriers, well in excess of the density requirement, and a total of 3 borings have been proposed in areas without engineered barriers. **Figure 8** shows the proposed borings on an aerial image to indicate locations of borings with regard to landmarks and ground cover.

Tradepoint Atlantic has developed an initial master plan for the entire site that shows potential future development areas across the entire Tradepoint Atlantic property. This master plan is a working document and it is expected to undergo subsequent revisions in the future. In its current iteration, the plan shows that 100% of the total area within Parcel B17 may ultimately be proposed for paving. **Figure 9** shows the current existing engineered barriers within Parcel B17.

Groundwater sampling at the Site included SW-026-MWS installed for the Area B Groundwater Investigation. SW-025-MWS and SW11-PZM005 were also sampled in the vicinity of the parcel. The groundwater sample locations from this separate plan are shown on **Figure 10**. Groundwater analytical data for these locations has been provided in **Appendix B**.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

2.1. PROJECT PERSONNEL

The site characterization of Area B Parcel B17 will be conducted by ARM under a contract with EAG. ARM will provide project planning, field sampling and reporting support. The required drilling, Geoprobe® and laboratory services will be contracted directly by EAG. The management, field, and laboratory responsibilities of key project personnel are defined in this section.

The ARM Project Manager, Mr. Eric Magdar is responsible for ensuring that all activities are conducted in accordance with this Work Plan and the contract requirements. Mr. Magdar will provide technical coordination with the MDE, EPA and EAG. The ARM Project Manager is responsible for managing all operations conducted for this project including:

- Ensure all personnel assigned to this project review the technical project plans before initiation of all tasks associated with the project.
- Review of project plans in a timely manner.
- Ensure proper methods and procedures are implemented to collect representative samples.
- Monitor the project budget and schedule and ensure the availability of necessary personnel, equipment, subcontractors, and other necessary services.

The lead ARM Project Scientist, Mr. Nicholas Kurtz, will be responsible for coordinating field activities including the collection, preservation, documentation and shipment of samples. Mr. Kurtz will directly communicate with the ARM Project Manager and Laboratory Project Manager on issues pertaining to sample shipments, schedules, container requirements, and other necessary issues. Mr. Kurtz is also responsible for ensuring the accuracy of sample documentation including the completion of the chain-of-custody (CoC) forms.

Pace Analytical Services, Inc. (PACE) of Greensburg, Pennsylvania will provide the analytical services for this project. The address for the laboratory is as follows:

Pace Analytical
1638 Roseytown Road
Greensburg, PA 15601

During the field activities, the Laboratory Project Manager will coordinate directly with the ARM Project Manager on issues regarding sample shipments, schedules, container requirements, and other field-laboratory logistics. The Laboratory Project Manager will monitor the daily activities of the laboratory, coordinate all production activities, and ensure that work is being

conducted as specified in this document. Ms. Samantha Bayura will be the Laboratory Project Manager for PACE on this project.

2.2. HEALTH AND SAFETY ISSUES

Because of the potential presence of metals, petroleum hydrocarbons and chlorinated hydrocarbons in the soil and groundwater at the Site, the investigation will be conducted under a site-specific Health and Safety Plan to protect investigation workers from possible exposure to contaminated materials. The site-specific HASP for Parcel B17 is provided as **Appendix D**.

Based on information provided to ARM, the planned site activities will be conducted under modified Level D personal protection. The requirements of the modified Level D protection are defined in ARM's site specific Health and Safety Plan. All field personnel assigned for work at the Site have been trained in accordance with the Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response standard (29 CFR 1910.120) and other applicable OSHA training standards. All field staff will be experienced in hazardous waste site work, use of personal protective equipment (PPE), and emergency response procedures.

3.0 FIELD ACTIVITIES AND PROCEDURES

3.1. UTILITY CLEARANCE

ARM will take appropriate precautions to avoid subsurface utilities and structures during the site investigation. Prior to initiating any subsurface investigations, ARM will attempt to determine the location of utilities in the project area using the Miss Utility system. Additionally, any required state or local permits will be acquired prior to the commencement of site activities.

In addition to the Miss Utility system, EAG will clear each proposed boring with utility personnel currently working on the property. To facilitate this, ARM will locate with a GPS and mark all proposed boring locations in the field. ARM will coordinate the staking of borings in the field with Tradepoint Atlantic utility personnel to avoid conflicts. Historical utility drawings which may be relevant include the 5600 Set (Plant Water Lines) and 5800 Set (Plant Gas Lines).

3.2. SAMPLING PLAN

The purpose of this site characterization is to identify any existing hazardous conditions across the entire Site. A summary of the RECs and other areas of concern that will be investigated, along with the proposed boring identification number and the analyses being performed, has been provided as **Appendix C**.

This Work Plan presents the methods and protocols to be used to complete the site characterization. These methods and procedures follow the MDE-VCP and EPA guidelines. Information regarding the project organization, field activities and sampling methods, sampling equipment, sample handling and management procedures, the laboratory analytical methods and selected laboratory, quality control and quality assurance procedures, investigation-derived waste (IDW) management methods, reporting requirements are described in detail in the QAPP that has been developed to support the investigation and remediation of the Tradepoint Atlantic Site (Quality Assurance Project Plan, ARM Group Inc., April 5, 2016).

The proposed schedule of this investigation is contained in this work plan (Section 8.0). All site characterization activities will be conducted under the site-specific HASP (**Appendix D**).

3.3. SOIL INVESTIGATION

Soil samples will be collected from the locations identified on **Figures 3 through 9**, and in accordance with procedures referenced in the QAPP Worksheet 21 – Field SOPs (Standard Operating Procedures), SOP No. 009 – Sub-surface Soil Sampling. Regarding soil sampling depth, a shallow sample will be collected from the 0 to 1 foot depth interval, and a deeper sample will be collected from the 4 to 5 foot depth interval. One additional set of samples will also be collected from the 9 to 10 foot depth interval if groundwater has not been encountered; however,

these samples will be held by the laboratory pending the analysis of the 0 to 1 and 4 to 5 foot depth interval samples. If a concrete slab or large-diameter slag aggregate layer occupies the 0-1 foot bgs sample, the interval may be shifted to the depth of the first observed fine-grained soil interval. If the PID or other field observations indicate contamination to exist at a depth greater than 3 feet bgs but less than 9 feet bgs, and is above the water table, the sample from the deeper 4-5 foot interval may be shifted to the depth interval indicated by the PID response. It should be noted that no soil samples will be collected from a depth that is below the water table.

After soil sampling has been concluded at a location, all down-hole soil sampling equipment will be decontaminated according to procedures referenced in the QAPP Worksheet 21 – Field SOPs, SOP No. 016 Equipment Decontamination. The decontamination procedures that will be used during the course of this investigation include Decontamination Area (Section 3.1 of the SOP), Decontamination of Sampling Equipment (Section 3.5), Decontamination of Measurement Devices & Monitoring Equipment (Section 3.7), Decontamination of Subsurface Drilling Equipment (Section 3.8), and Document and Record Keeping (Section 5).

All soil samples will be analyzed for TCL-SVOCs, TAL-Metals, Oil & Grease, TPH-DRO, TPH-GRO, hexavalent chromium, and cyanide. During field screening of the soil cores, any sample interval which exceeds a PID reading of 10 ppm will also be analyzed for TCL-VOCs. Additionally, the shallow soil samples collected across the Site from the 0-1 foot bgs interval will also be analyzed for PCBs. All shallow soil samples within the boundary of REC 14A-14B (B17-003-SB through B17-013-SB) will be analyzed for asbestos due to the previous asbestos-containing piles in the demolition area. Analytical methods, sample containers, preservatives, and holding times for the sample analyses are listed in the QAPP Worksheet 19 & 30 – Sample Containers, Preservation, and Holding Times.

3.4. GROUNDWATER INVESTIGATION

The groundwater sampling plan for Parcel B17 is covered by the Area B Groundwater Investigation Work Plan (Revision 3), dated October 6, 2015. The sample locations from this groundwater Work Plan are indicated on **Figure 10**. The groundwater investigation included one shallow groundwater sample location (SW-026-MWS) within the parcel boundaries. An additional two shallow wells (SW-025-MWS and SW11-PZM005) are located just beyond the parcel boundaries. Based on the coverage specified in the Area B Groundwater Investigation Work Plan, no additional groundwater samples are warranted.

3.5. NAPL DELINEATION

The MDE will be notified of any NAPL bearing soils identified in a soil boring within one week of the field observation. In the event that NAPL bearing soils are identified in a soil boring, a temporary piezometer will be installed according to the specifications identified in SOP No. 028

– Direct Push Installation and Construction of Temporary Groundwater Sample Collection Points. ARM will immediately check the piezometer for the presence of NAPL using an oil-water interface probe in accordance with methods referenced in the SOP No. 019 – Depth to Groundwater and NAPL Measurements. Each piezometer installed to delineate the presence or absence of NAPL will be checked with an oil-water interface probe immediately after installation, 48 hours after installation, and 30 days after installation. If NAPL is not detected after 30 days of equilibration time, the piezometer will be emptied, removed and discarded, and the borehole will be abandoned in accordance with Maryland abandonment standards as stated in COMAR 26.04.04.34 through 36.

If measureable NAPL is present in the initial piezometer, ARM will remobilize (following utility clearance) to install and inspect additional soil borings and shallow, temporary piezometers to the north, south, east, and west of the detection point at distances of 25 feet. Delineation piezometers will extend into adjacent parcels (if applicable) but will not be installed off of Tradepoint Atlantic property and will only be installed up to the edge of existing buildings. At each location, continuous core soil samples will be screened with a hand-held PID and inspected for evidence of NAPL, and the additional temporary piezometers will be installed to a final depth determined by ARM personnel.

Each additional piezometer installed to delineate the NAPL will be checked for the presence of product with an oil-water interface probe immediately after installation, 48 hours after installation, and again after a 30 day equilibration period. If measureable NAPL is present within any of the piezometers, additional borings/piezometers will be added as necessary to complete the delineation. The MDE will be notified within 24 hours if NAPL is detected within the temporary piezometers. Once the MDE has given approval to abandon the additional piezometers, each piezometer will be emptied, removed and discarded. All boreholes will be abandoned in accordance with Maryland abandonment standards as stated in COMAR 26.04.04.34 through 36. A full report documenting the results of the delineation, including NAPL thickness, will be submitted to the MDE within 30 days of completing the field activities.

3.6. SAMPLE DOCUMENTATION

3.6.1. Sample Numbering

Samples will be numbered in accordance with the QAPP Appendix C – Data Management Plan.

3.6.2. Sample Labels & Chain-of-Custody Forms

Samples will be labeled and recorded on the Chain-of-Custody form in accordance with methods referenced in the QAPP Worksheet 26 & 27 – Sample Handling, Custody and Disposal.

3.7. LABORATORY ANALYSIS

EAG has contracted PACE of Greensburg, Pennsylvania to perform the laboratory analysis for this project. All sample analyses to be performed are listed in **Appendix C**. The samples will be submitted for analysis with a standard turnaround time (approximately 5 work days). The specific list of compounds and analytes that the soil samples will be analyzed for, as well as the quantitation limits and project action limits, is provided in QAPP Worksheet 15 – Project Action Limits and Laboratory-Specific Detection/Quantitation Limits.

4.0 QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES

All soil samples will be collected using dedicated equipment including new soil core liners and sampling kits. Each cooler temperature will be measured and documented by the laboratory upon receipt.

Quality control (QC) samples are collected during field studies for various purposes, among which are to isolate site effects (control samples), to define background conditions (background sample), and to evaluate field/laboratory variability (spikes and blanks, trip blanks, duplicates, etc.).

The following QC samples will be submitted for analysis to support the data validation:

- Trip Blank – at a rate of one per cooler with VOC samples
  - Soil – VOCs only
- Blind Field Duplicate – at a rate of one duplicate per twenty samples
  - Soil – VOCs, SVOCs, Metals, TPH-DRO, TPH-GRO, Oil & Grease, PCBs, Hexavalent Chromium, and Cyanide
- Matrix Spike/Matrix Spike Duplicate – at a rate of one per twenty samples
  - Soil – VOCs, SVOCs, Metals, TPH-DRO, TPH-GRO, Oil & Grease, PCBs, Hexavalent Chromium, and Cyanide
- Field Blank and Equipment Blank
  - Soil – VOCs, SVOCs, Metals, TPH-DRO, TPH-GRO, Oil & Grease, PCBs, Hexavalent Chromium, and Cyanide

The QC samples will be collected and analyzed in accordance with the QAPP Worksheet 12 – Measurement Performance Criteria, QAPP Worksheet 20 – Field Quality Control, and QAPP Worksheet 28 – Analytical Quality Control and Corrective Action.

5.0 MANAGEMENT OF INVESTIGATION-DERIVED WASTE

All investigation derived waste (IDW) procedures will be carried out in accordance with methods referenced in the QAPP Worksheet 21 – Field SOPs, SOP No. 005 – Investigation-Derived Wastes Management.

6.0 DATA VALIDATION

For this Parcel B17 Phase II Investigation, a representative 50% of the complete analytical dataset will undergo data validation. Samples will be selected in groups according to the PACE project number assigned to each set of samples. Each PACE project number will be assigned a sequential number (from 1, 2, 3 … n) in the order received by the lab until all sample groups for the parcel have been received by the lab. The random number function will be used to randomly order the project numbers and project numbers will be selected from top to bottom until 50% or more of the total number of samples in the parcel have been identified for validation.

All data validation procedures will be carried out in accordance with the QAPP Worksheet 34 – Data Verification and Validation Inputs, QAPP Worksheet 35 – Data Verification Procedures, and QAPP Worksheet 36 – Data Validation Procedures.

7.0 REPORTING

Following the receipt of all sampling results from Area B: Parcel B17, a Phase II Investigation Report will be prepared that will document the sample collection procedures and supporting rationale, and present and interpret the analytical results. Results will be presented in tabular and graphical formats as appropriate to best summarize the data for future use. The sample results will be compared against the PALs specified in the QAPP, considering appropriate land use factors and institutional controls, to identify contaminants and exposure pathways of potential concern.

The Phase II Investigation Report will include a SLRA to evaluate potential baseline risks to future workers of the Site prior to any mitigative measures. Compounds that are present at concentrations at or above the PALs will be identified as constituents of potential concern (COPCs) to be included in the SLRA. The Site will be analyzed as a single exposure unit (EU) based on the relatively small size of the parcel. Exposure point concentrations (EPCs) will be estimated for each COPC dataset using ProUCL software. Lead will be evaluated by the arithmetic mean for the isolated surface (0-1 ft) and subsurface (>1 ft) soils. The estimates of potential EPCs for surface soils and subsurface soils will be compared to the USEPA Regional Screening Levels (RSLs) for the Composite Industrial Worker scenario and to site-specific RSLs for the Construction Worker scenario (calculated for each EU using the on-line RSL calculator) to develop Risk Ratios for each COPC relative to a cancer risk of 1E-6 and non-cancer Hazard Index of 1. The Risk Ratios may be computed using EPCs from pooled soil data or isolated surface and subsurface soil data. The final decision on the pooling of surface and subsurface data for each scenario will be determined prior to submission of the Phase II Report based on current discussions with the agencies. The risk ratios for individual COPCs will be summed for the carcinogens and non-carcinogens (summed by target organ) to provided screening level estimates of potential cumulative risk to determine if further action is warranted. ARM will also present recommendations for any additional site investigation activities if warranted.

8.0 SCHEDULE

The field activities below (including sample analysis and data validation) are planned so that they may be completed within six (6) months of agency approval of this Work Plan. In addition, the investigation report will be submitted to the regulatory authorities within two (2) months of completion of the field activities in accordance with these approximate timeframes:

- the sample collection activities will take approximately two (2) weeks to complete (including mobilization activities) once approval of the work plan is received;
- the sample analysis, data validation (≥50%) and review is expected to require an additional eight (8) weeks to complete; and
- the preparation of the investigation report, including an internal Quality Assurance Review cycle, will require another six (6) weeks.

FIGURES

N

ARM Group Inc.
Earth Resource Engineers and Consultants

0 375 750 1,500
Feet

Site Boundary
Private Property
Area A Boundaries
Area B Boundaries

Tradepoint Atlantic
Area A and Area B Parcels

August 1, 2016

EnviroAnalytics Group	Tradepoint Atlantic
Area A: Project 150298M Area B: Project 150300M	Baltimore County, MD

Figure
1

ARM Group Inc.
Earth Resource Engineers and Consultants

0 375 750 1,500 Feet

Site Boundary
Area A Boundaries
Area B Boundaries
Land
Marsh
Water

Approximate Shoreline 1916

August 1, 2016

Adapted from Figure 2-5 of the Description of Current Conditions Report prepared by Rust Environmental and Infrastructure, dated January 1998

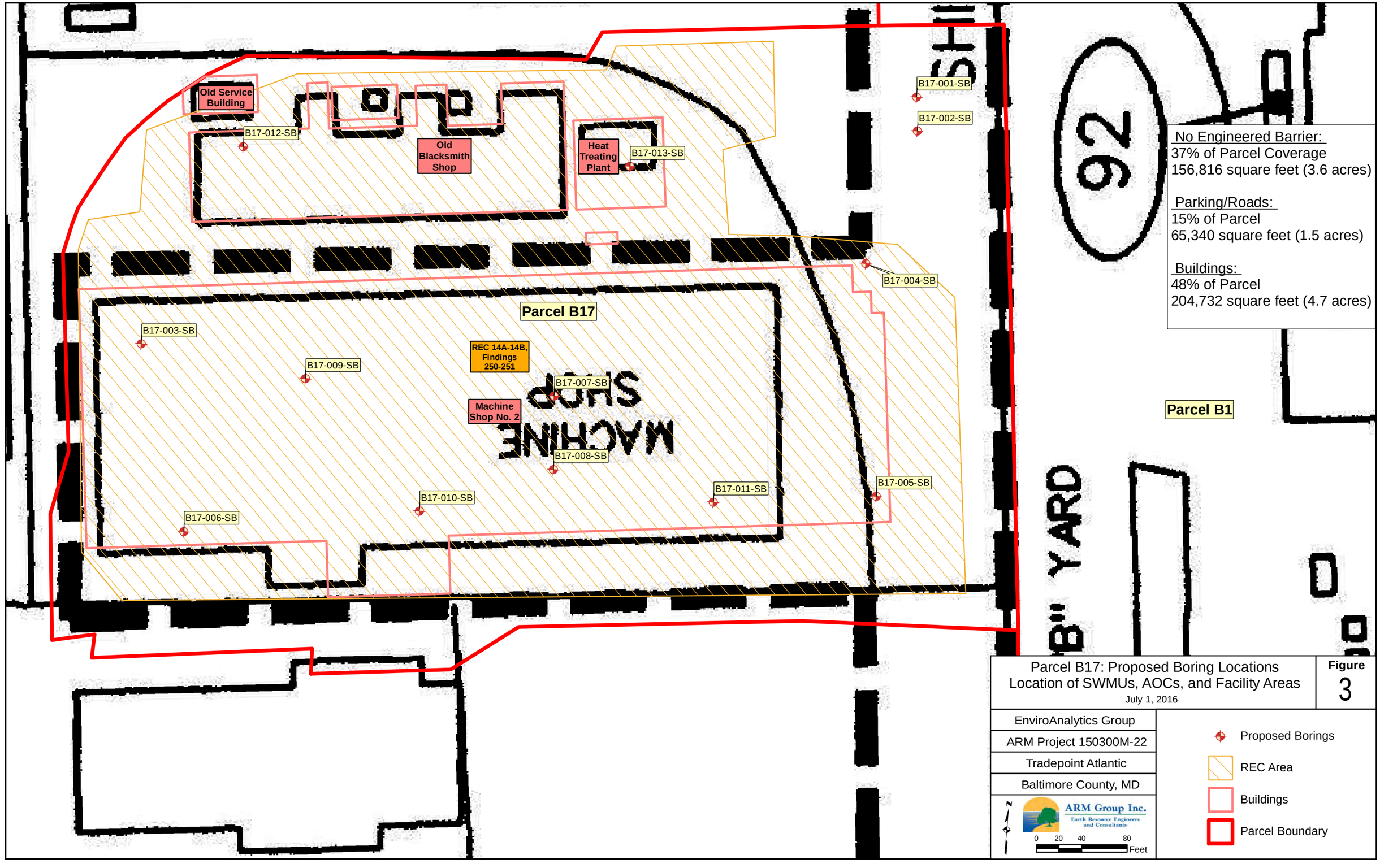
EnviroAnalytics Group

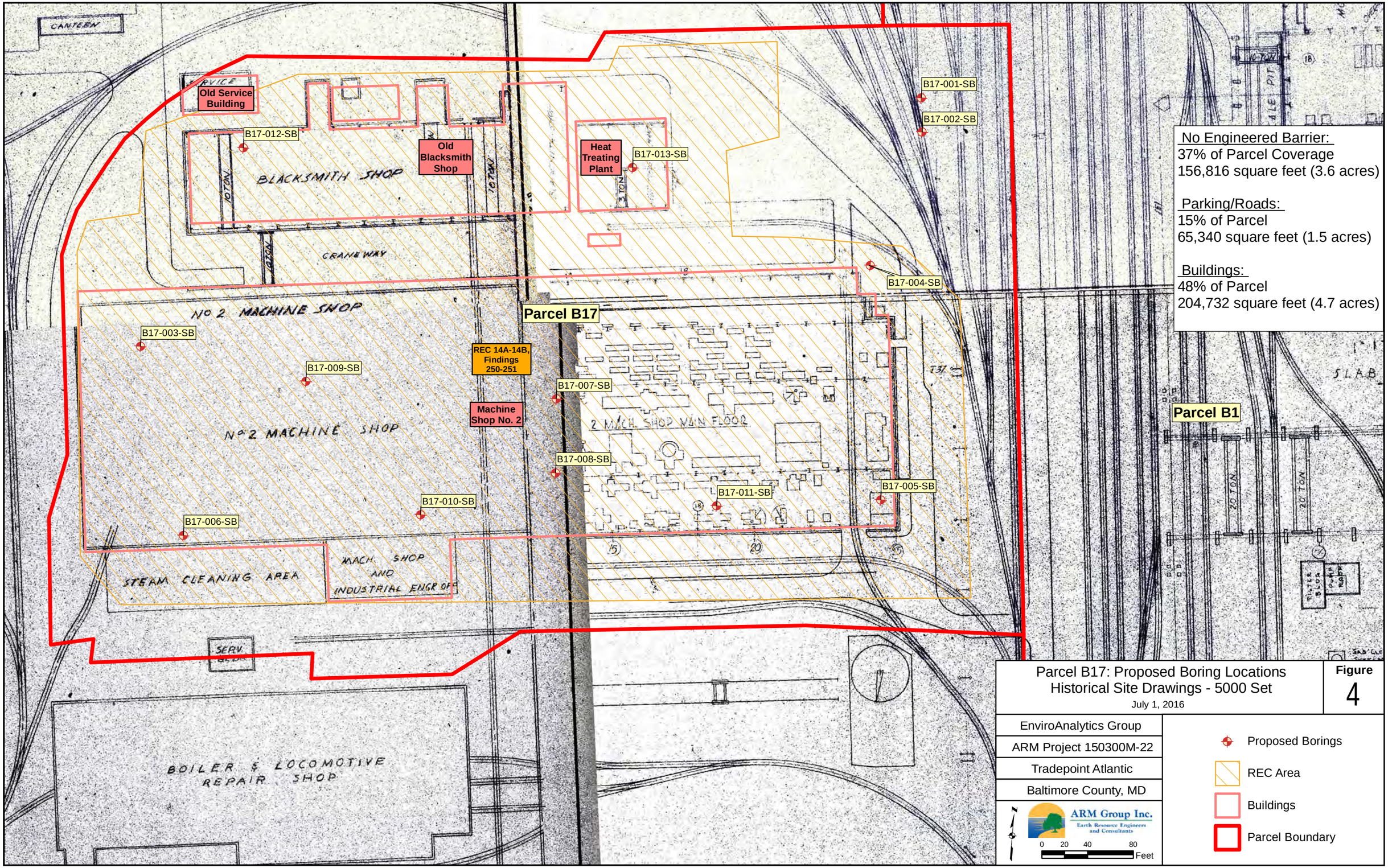
Area A: Project 150298M
Area B: Project 150300M

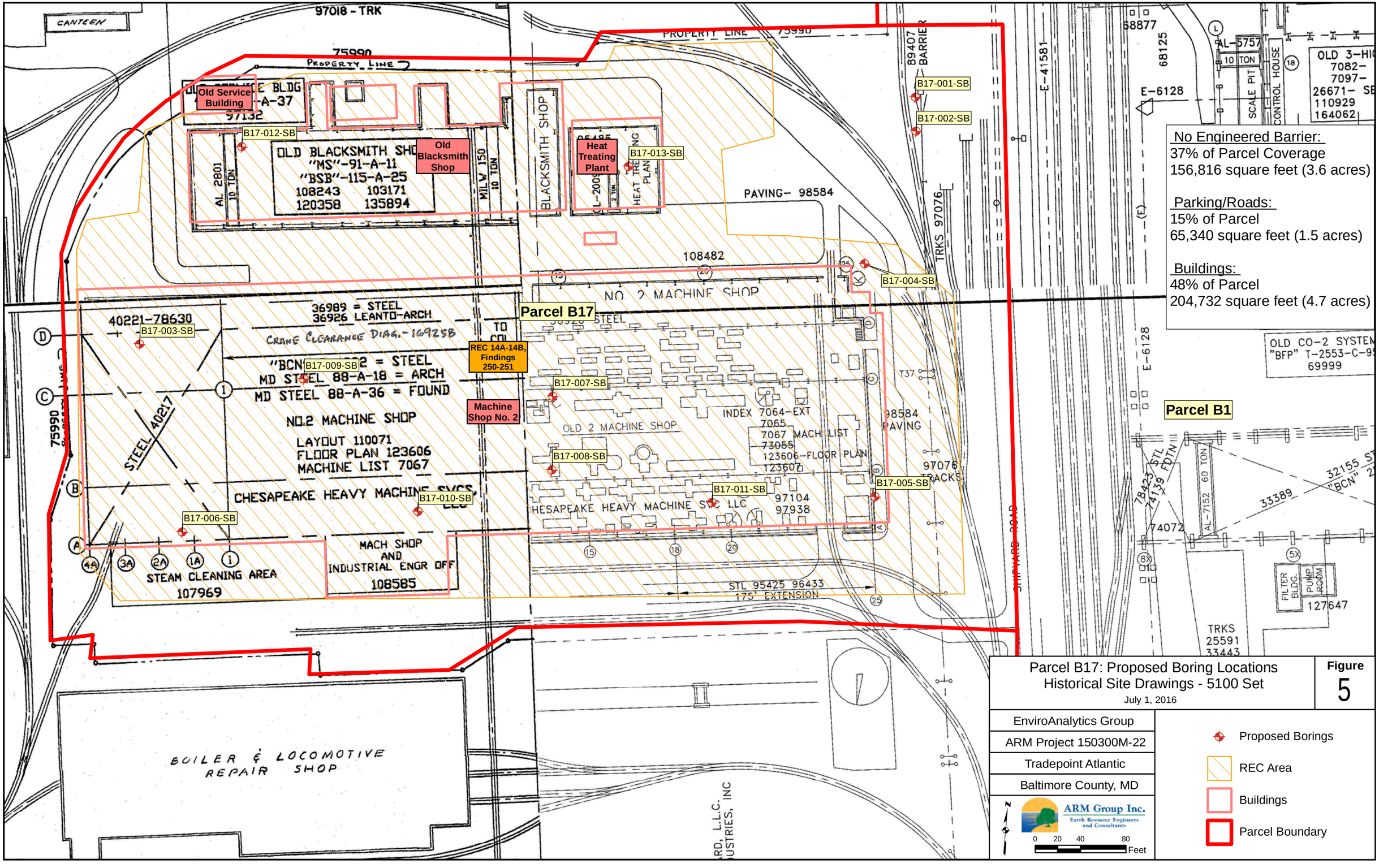
Tradepoint Atlantic

Baltimore County, MD

Figure 2


Old Service Building
B17-012-SB
Old Blacksmith Shop
Heat Treating Plant
B17-013-SB
B17-001-SB
B17-002-SB
B17-004-SB
Parcel B17
B17-003-SB
B17-009-SB
REC 14A-14B, Findings 250-251
B17-007-SB
Machine Shop No. 2
SHOP
MACHINE
B17-008-SB
B17-011-SB
B17-005-SB
B17-010-SB
B17-006-SB
92
Parcel B1
8" YARD
No Engineered Barrier:
37% of Parcel Coverage
156,816 square feet (3.6 acres)
Parking/Roads:
15% of Parcel
65,340 square feet (1.5 acres)
Buildings:
48% of Parcel
204,732 square feet (4.7 acres)
Parcel B17: Proposed Boring Locations
Location of SWMUs, AOCs, and Facility Areas
July 1, 2016
Figure
3
EnviroAnalytics Group
ARM Project 150300M-22
Tradepoint Atlantic
Baltimore County, MD
ARM Group Inc.
Earth Resource Engineers and Consultants
0 20 40 80
Feet
Proposed Borings
REC Area
Buildings
Parcel Boundary


Old Service Building
B17-012-SB
Old Blacksmith Shop
Heat Treating Plant
B17-013-SB
B17-001-SB
B17-002-SB
B17-004-SB
Parcel B17
B17-003-SB
REC 14A-14B, Findings 250-251
B17-009-SB
B17-007-SB
Machine Shop No. 2
B17-008-SB
B17-011-SB
B17-005-SB
B17-010-SB
B17-006-SB
Parcel B1
BLACKSMITH SHOP
CRANE WAY
No 2 MACHINE SHOP
2 MACH. SHOP MAIN FLOOR
STEAM CLEANING AREA
MACH. SHOP AND INDUSTRIAL ENGR OFF
BOILER & LOCOMOTIVE REPAIR SHOP
CANTEEN
SERV.
SLAB
20 TON
10 TON
3 TON
No Engineered Barrier:
37% of Parcel Coverage
156,816 square feet (3.6 acres)
Parking/Roads:
15% of Parcel
65,340 square feet (1.5 acres)
Buildings:
48% of Parcel
204,732 square feet (4.7 acres)
Parcel B17: Proposed Boring Locations
Historical Site Drawings - 5000 Set
July 1, 2016
Figure
4
EnviroAnalytics Group
ARM Project 150300M-22
Tradepoint Atlantic
Baltimore County, MD
ARM Group Inc.
Earth Resource Engineers and Consultants
0 20 40 80
Feet
Proposed Borings
REC Area
Buildings
Parcel Boundary



No Engineered Barrier:
37% of Parcel Coverage
156,816 square feet (3.6 acres)

Parking/Roads:
15% of Parcel
65,340 square feet (1.5 acres)

Buildings:
48% of Parcel
204,732 square feet (4.7 acres)

Parcel B17: Proposed Boring Locations
Historical Site Drawings - 5100 Set

July 1, 2016

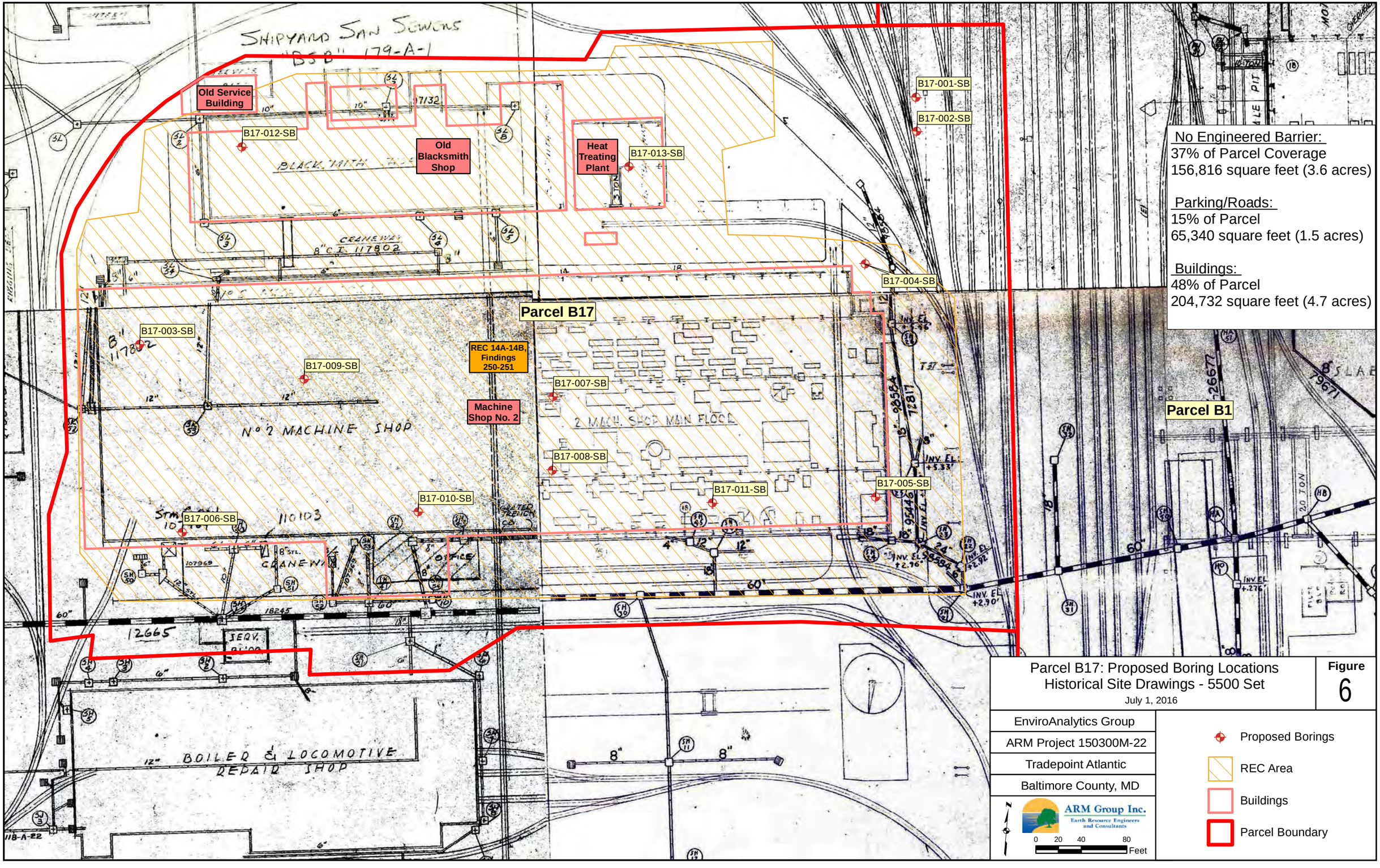
Figure 5

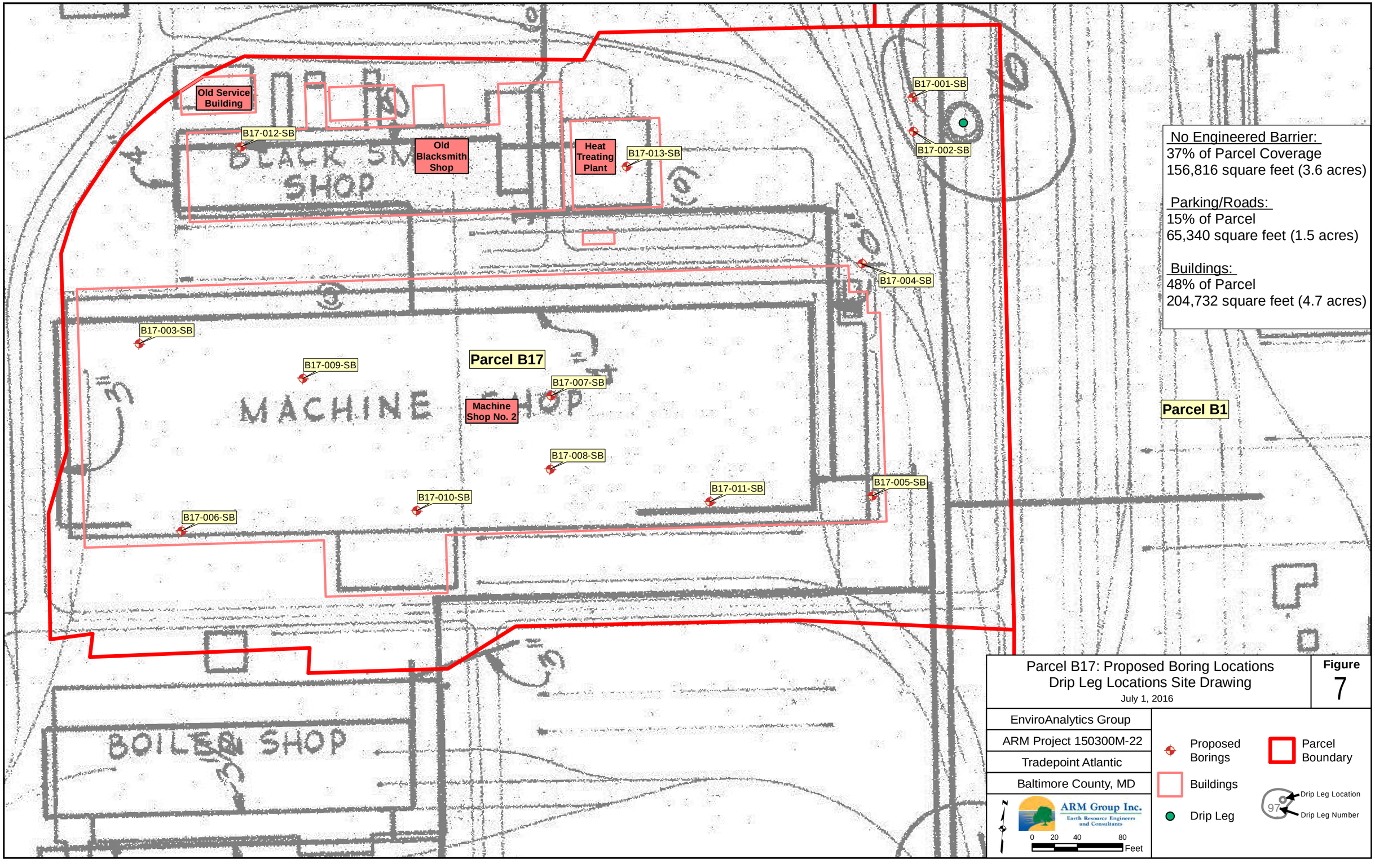
EnviroAnalytics Group
ARM Project 150300M-22
Tradepoint Atlantic
Baltimore County, MD

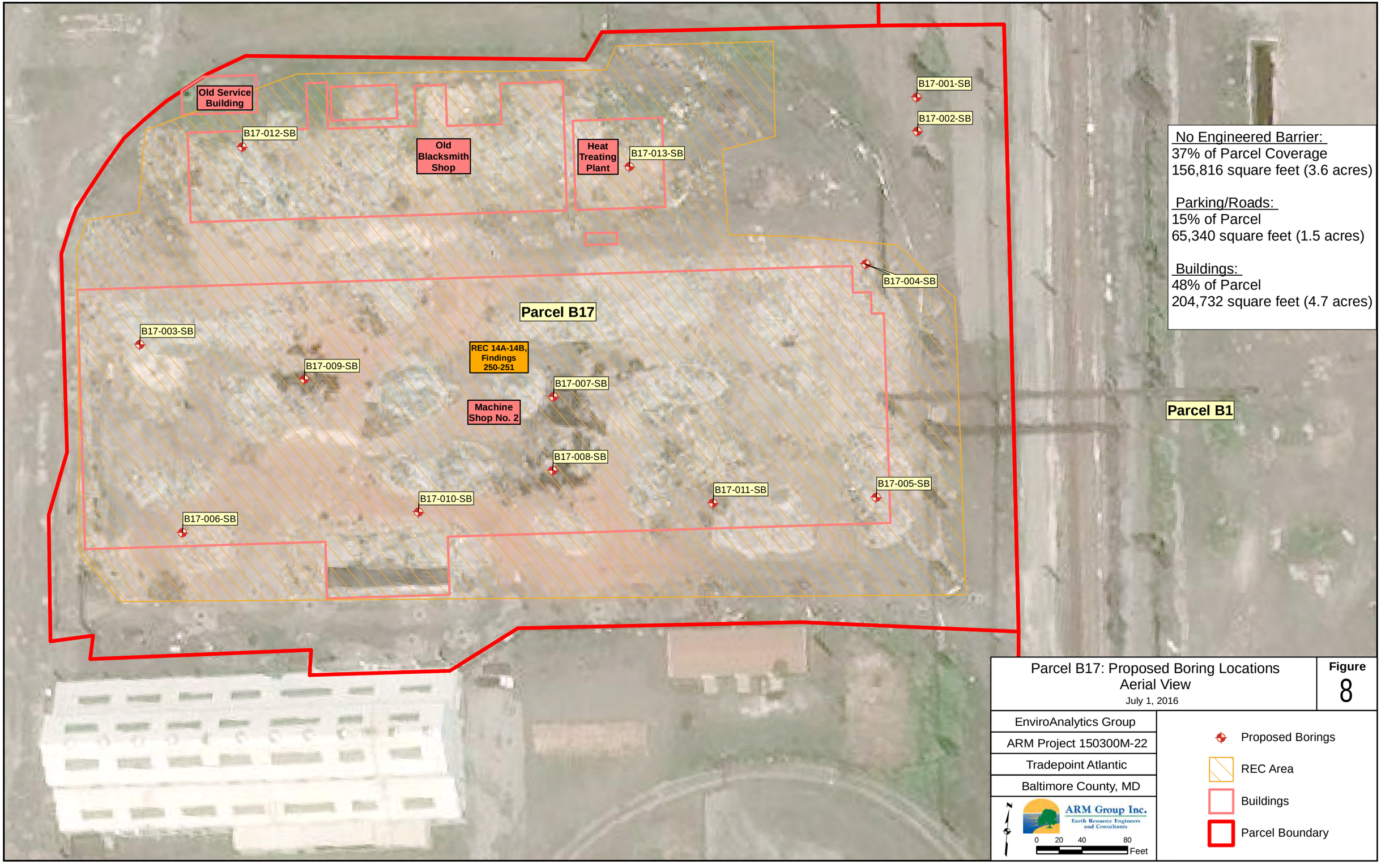
ARM Group Inc.
Earth Resource Engineers and Consultants

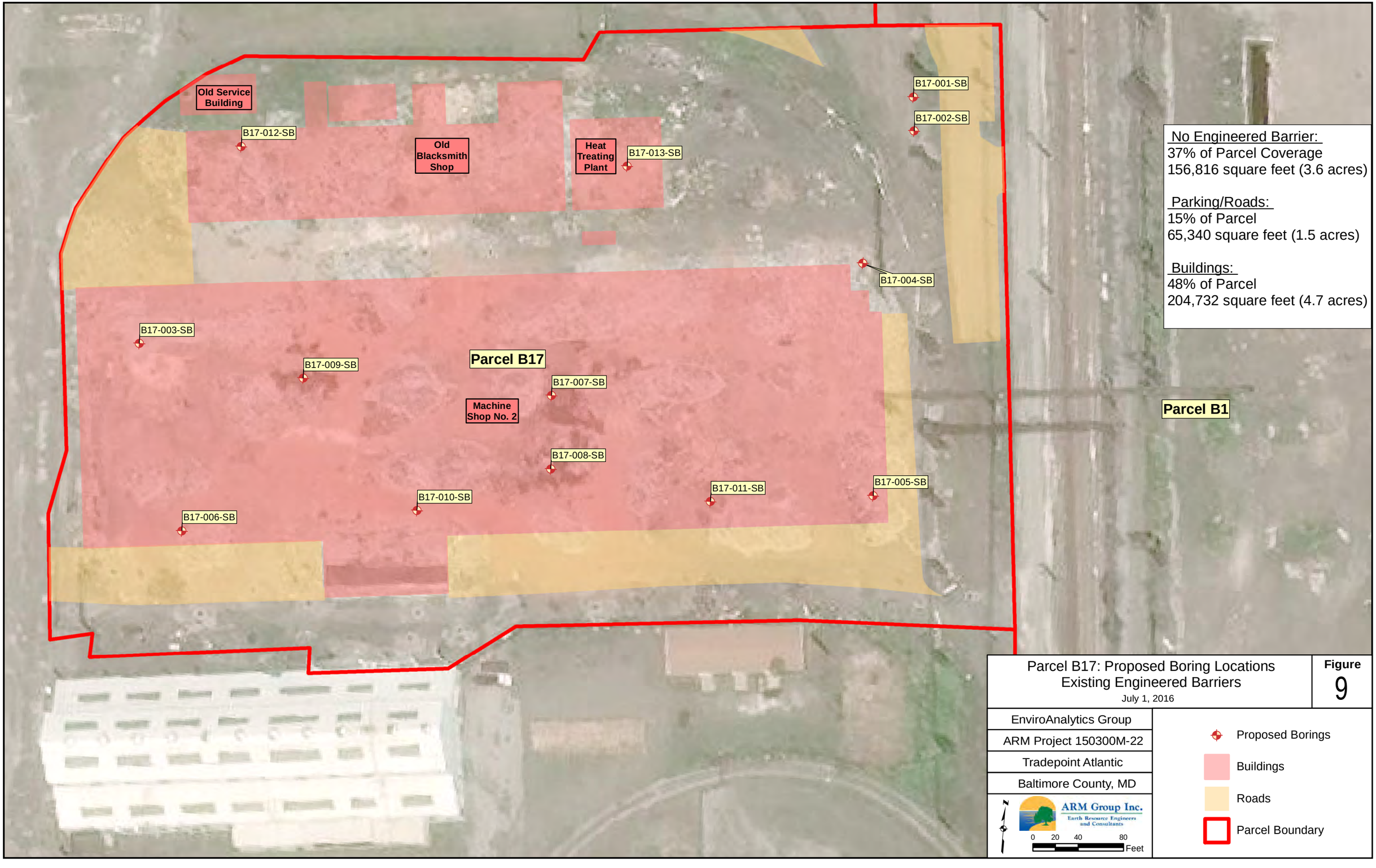
0 20 40 80 Feet

- Proposed Borings
- REC Area
- Buildings
- Parcel Boundary


Old Service Building
Old Blacksmith Shop
Heat Treating Plant
Parcel B17
Parcel B1
REC 14A-14B, Findings 250-251
Machine Shop No. 2
B17-001-SB
B17-002-SB
B17-003-SB
B17-004-SB
B17-005-SB
B17-006-SB
B17-007-SB
B17-008-SB
B17-009-SB
B17-010-SB
B17-011-SB
B17-012-SB
B17-013-SB
No Engineered Barrier:
37% of Parcel Coverage
156,816 square feet (3.6 acres)
Parking/Roads:
15% of Parcel
65,340 square feet (1.5 acres)
Buildings:
48% of Parcel
204,732 square feet (4.7 acres)
Parcel B17: Proposed Boring Locations
Historical Site Drawings - 5500 Set
July 1, 2016
Figure 6
EnviroAnalytics Group
ARM Project 150300M-22
Tradepoint Atlantic
Baltimore County, MD
ARM Group Inc.
Earth Resource Engineers and Consultants
0 20 40 80
Feet
Proposed Borings
REC Area
Buildings
Parcel Boundary


Old Service Building
B17-012-SB
BLACK SM SHOP
Old Blacksmith Shop
Heat Treating Plant
B17-013-SB
B17-001-SB
B17-002-SB
B17-004-SB
B17-003-SB
B17-009-SB
Parcel B17
B17-007-SB
MACHINE SHOP
Machine Shop No. 2
B17-008-SB
B17-010-SB
B17-011-SB
B17-005-SB
B17-006-SB
Parcel B1
BOILER SHOP
No Engineered Barrier:
37% of Parcel Coverage
156,816 square feet (3.6 acres)
Parking/Roads:
15% of Parcel
65,340 square feet (1.5 acres)
Buildings:
48% of Parcel
204,732 square feet (4.7 acres)
Parcel B17: Proposed Boring Locations
Drip Leg Locations Site Drawing
July 1, 2016
Figure
7
EnviroAnalytics Group
ARM Project 150300M-22
Tradepoint Atlantic
Baltimore County, MD
ARM Group Inc.
Earth Resource Engineers and Consultants
0 20 40 80
Feet
Proposed Borings
Parcel Boundary
Buildings
Drip Leg
Drip Leg Location
97
Drip Leg Number


Old Service Building
B17-012-SB
Old Blacksmith Shop
Heat Treating Plant
B17-013-SB
B17-001-SB
B17-002-SB
B17-004-SB
Parcel B17
B17-003-SB
REC 14A-14B, Findings 250-251
B17-009-SB
B17-007-SB
Machine Shop No. 2
B17-008-SB
B17-010-SB
B17-011-SB
B17-005-SB
B17-006-SB
Parcel B1
No Engineered Barrier:
37% of Parcel Coverage
156,816 square feet (3.6 acres)
Parking/Roads:
15% of Parcel
65,340 square feet (1.5 acres)
Buildings:
48% of Parcel
204,732 square feet (4.7 acres)
Parcel B17: Proposed Boring Locations
Aerial View
July 1, 2016
Figure
8
EnviroAnalytics Group
ARM Project 150300M-22
Tradepoint Atlantic
Baltimore County, MD
ARM Group Inc.
Earth Resource Engineers and Consultants
0 20 40 80
Feet
Proposed Borings
REC Area
Buildings
Parcel Boundary


Old Service Building
B17-012-SB
Old Blacksmith Shop
Heat Treating Plant
B17-013-SB
B17-001-SB
B17-002-SB
B17-004-SB
B17-003-SB
B17-009-SB
Parcel B17
B17-007-SB
Machine Shop No. 2
B17-008-SB
B17-010-SB
B17-011-SB
B17-005-SB
B17-006-SB
Parcel B1
No Engineered Barrier:
37% of Parcel Coverage
156,816 square feet (3.6 acres)
Parking/Roads:
15% of Parcel
65,340 square feet (1.5 acres)
Buildings:
48% of Parcel
204,732 square feet (4.7 acres)
Parcel B17: Proposed Boring Locations
Existing Engineered Barriers
July 1, 2016
Figure
9
EnviroAnalytics Group
ARM Project 150300M-22
Tradepoint Atlantic
Baltimore County, MD
ARM Group Inc.
Earth Resource Engineers and Consultants
0 20 40 80
Feet
Proposed Borings
Buildings
Roads
Parcel Boundary


SW-025-MWS
SW-026-MWS
Parcel B17
Parcel B1
SW11-PZM005
No Engineered Barrier:
37% of Parcel Coverage
156,816 square feet (3.6 acres)
Parking/Roads:
15% of Parcel
65,340 square feet (1.5 acres)
Buildings:
48% of Parcel
204,732 square feet (4.7 acres)
Parcel B17: Area B Groundwater Samples
Aerial View
July 1, 2016
Figure
10
EnviroAnalytics Group
ARM Project 150300M-22
Tradepoint Atlantic
Baltimore County, MD
ARM Group Inc.
Earth Resource Engineers and Consultants
0 35 70 140
Feet
Area B Well Locations
Parcel Boundary

APPENDIX A

Parcel B17 Site Visit Photograph Log
Former Machine Shop No. 2 Area
Sparrows Point, Maryland

060116-1: Northwest corner, facing north.

060116-2: Northeast corner, facing northeast.

060116-3: Southeast corner, facing south.

060116-4: Southwest corner, facing southwest.

060116-5: West to east view.

060116-6: Stained ground in the western portion of the parcel.

APPENDIX B

Area B Groundwater Investigation
Parcel B17
Tradepoint Atlantic
Sparrows Point, Maryland

Parameter	Units	PAL	SW-025-MWS Shallow Screen: 5.5-15.5	SW-026-MWS Shallow Screen: 4.2-14.2	SW11-PZM005 Shallow Screen: 4.2-14.2
Volatile Organic Compounds					
Isopropylbenzene	µg/L	450	**0.29 J**	1 U	1 U
Semi-Volatile Organic Compounds					
2-Methylnaphthalene	µg/L	36	0.1 U	**0.97**	0.1 U
Acenaphthene	µg/L	530	0.1 U	**0.12**	0.1 U
Acenaphthylene	µg/L	530	0.1 U	**0.02 J**	0.1 U
Anthracene	µg/L	1,800	**0.02 J**	**0.15**	0.1 U
Benzo[a]anthracene	µg/L	0.012	**0.046 J**	**0.043 J**	0.1 U
Benzo[a]pyrene	µg/L	0.2	**0.046 J**	0.1 U	0.1 U
Benzo[b]fluoranthene	µg/L	0.034	**0.17**	0.1 U	0.1 U
Benzo[k]fluoranthene	µg/L	0.34	**0.12**	0.1 U	0.1 U
bis(2-Ethylhexyl)phthalate	µg/L	6	1 U	**0.21 J**	1 U
Chrysene	µg/L	3.4	**0.041 B**	**0.021 J**	0.1 U
Fluoranthene	µg/L	800	**0.032 J**	**0.051 J**	0.1 U
Fluorene	µg/L	290	0.1 U	**0.2**	0.1 U
Naphthalene	µg/L	0.17	**0.025 B**	**0.36**	**0.018 B**
Phenanthrene	µg/L		**0.034 J**	**0.7**	0.1 U
Pyrene	µg/L	120	**0.025 J**	**0.09 J**	0.1 U
TPH/Oil and Grease					
Diesel Range Organics	µg/L	47	102 UJ	**530 J**	101 UJ
Metal (Total)					
Aluminum	µg/L	20,000	**125**	**726**	**71.4**
Barium	µg/L	2,000	**69.4**	**54.9**	**50.1**
Cadmium	µg/L	5	3 U	3 U	**0.77 B**
Chromium	µg/L	100	**1.1 B**	**1.1 J**	**3.6 B**
Chromium VI	µg/L	0.035	10 U	10 U	**5 J**
Cobalt	µg/L	6	5 U	5 U	**1 J**
Copper	µg/L	1,300	**3.9 B**	5 U	**3.7 B**
Iron	µg/L	14,000	**765**	**65.4 B**	**40.9 B**
Lead	µg/L	15	**14**	5 U	5 U
Manganese	µg/L	430	**1,360**	**11.2**	**83.6**
Nickel	µg/L	390	**0.8 B**	10 U	**0.61 B**
Selenium	µg/L	50	8 U	**4 B**	8 U
Thallium	µg/L	2	10 U	10 U	**4.4 J**
Vanadium	µg/L	86	5 U	5 U	**12.4**
Zinc	µg/L	6,000	**19.2**	**1.5 J**	**13.5**
Metal (Dissolved)					
Aluminum, Dissolved	µg/L	20,000	**21.5 J**	**582**	**21.3 J**
Barium, Dissolved	µg/L	2,000	**69.3**	**52.2**	**48.8**
Cadmium, Dissolved	µg/L	5	3 U	3 U	**0.68 J**
Chromium, Dissolved	µg/L	100	5 U	**1 B**	**3.2 B**
Cobalt, Dissolved	µg/L	6	5 U	5 U	**0.96 B**
Copper, Dissolved	µg/L	1,300	5 U	5 U	**4.2 J**
Iron, Dissolved	µg/L	14,000	**263**	**21.3 J**	**68.6 B**
Manganese, Dissolved	µg/L	430	**1,320**	**1.4 B**	**73.6**
Nickel, Dissolved	µg/L	390	**0.7 B**	**0.78 B**	**1 B**
Selenium, Dissolved	µg/L	50	8 U	8 U	**3.8 J**
Vanadium, Dissolved	µg/L	86	5 U	5 U	**12.4**
Zinc, Dissolved	µg/L	6,000	**1.5 J**	10 U	**14.8**

Detections in bold
U: This analyte was not detected in the sample. The numeric value represents the sample quantitation/detection limit
UJ: This analyte was not detected in the sample. The actual quantitation/detection limit may be higher than reported.
J: The positive result reported for this analyte is a quantitative estimate
B: This analyte was not detected substantially above the level of the associated method blank/preparation or field blank
Values in Red indicate an exceedance of the Project Action Limit (PAL)

APPENDIX C

Parcel B17 Sampling Plan Summary
Former Sparrows Point Steel Mill
Sparrows Point, Maryland

Source Area/ Description	REC & Finding/ SWMU/ AOC	Figure or Drawing of Reference	RATIONALE	Number of Locations	Sample Locations	Boring Depth	Sample Depth	Analytical Parameters: Soil Samples
Drip Legs		Drip Legs Drawings 5885B	Coke oven gas condensate was removed from the gas pipelines at drip legs located throughout the distribution system. The condensate was typically discharged to drums, although it is possible some spilled out of the drums and on to the ground.	2	B17-001 and B17-002	Total depth of 20 feet or groundwater.	0-1', 4-5', 9-10' bgs. 4-5' interval may be adjusted in the field based on observations or field screening.	VOC*, SVOC, Metals, DRO/GRO, O&G, PCBs (0-1')
Machine Shop No. 2 Asbestos Piles *	REC 14A, Finding 250	REC Location Map/ DCC Figure	During the Phase I ESA site visit conducted by Weaver Boos, the Machine Shop No. 2 was observed to be demolished. Demolition material piles were observed where the Machine Shop No. 2 historically stood. Asbestos-containing debris was observed in demolition piles during this time . During an ARM site visit, conducted on June 1, 2016, there were no demolition stock piles present within the Site.	4	B17-003 through B17-006	Total depth of 20 feet or groundwater.	0-1', 4-5', 9-10' bgs. 4-5' interval may be adjusted in the field based on observations or field screening.	VOC*, SVOC, Metals, DRO/GRO, O&G, PCBs (0-1'), Asbestos (0-1')
Machine Shop No. 2 Stained Ground (Possible Oily Pits/Sumps)	REC 14B, Finding 251	REC Location Map/ DCC Figure	During the Phase I ESA site visit, oily pits/sumps were observed in the Machine Shop No. 2 area. Due to safety reasons, Weaver Boos did not conduct further field investigation. Little information is known about this oily materials extent. During an ARM Site visit, conducted on June 1, 2016, the oily pits and sumps were not present at the Site.	3	B17-007 through B17-009	Total depth of 20 feet or groundwater.	0-1', 4-5', 9-10' bgs. 4-5' interval may be adjusted in the field based on observations or field screening.	VOC*, SVOC, Metals, DRO/GRO, O&G, PCBs (0-1'), Asbestos (0-1')
Chesapeake Heavy Machine Service		Drawings 5025 and 5026	Investigate potential impacts related to the Machine Shop and Industiral Eng. Off. (potential leaks or releases).	2	B17-010 and B17-011	Total depth of 20 feet or groundwater.	0-1', 4-5', 9-10' bgs. 4-5' interval may be adjusted in the field based on observations or field screening.	VOC*, SVOC, Metals, DRO/GRO, O&G, PCBs (0-1'), Asbestos (0-1')
Old Blacksmith Shop/ Heat Treating Plant		Drawings 5031 and 5032	Investigate potential impacts related to the Old Blacksmith Shop (potential leaks or releases).	2	B17-012 and B17-013	Total depth of 20 feet or groundwater.	0-1', 4-5', 9-10' bgs. 4-5' interval may be adjusted in the field based on observations or field screening.	VOC*, SVOC, Metals, DRO/GRO, O&G, PCBs (0-1'), Asbestos (0-1')
			Total	13				

Soil Borings Sampling Density Requirements (from **Worksheet 17 - Sampling Design and Rationale**)

No Engineered Barrier (1-15 acres): 1 boring per acre with no less than 3.

Engineered Barrier (1-15 acres): 0.5 boring per acre with no less than 2.

No Engineered Barrier (3.6 acres) = **3 borings required, 3 proposed**

Engineered Barrier (6.2 acres) = **3 borings required, 10 proposed**

Parking/Roads (1.5 acres)

Buildings (4.7 acres)

VOC - Volatile Organic Compounds (Target Compound List)
SVOCs - Semivolatile Organic Compounds (Target Compound List)
Metals - (Target Analyte List plus Hexavalent Chromium and Cyanide)
DRO/GRO - Diesel Range Organics/Gasoline Range Organics
O&G - Oil and Grease
*VOCs are only collected if the PID reading exceeds 10 ppm
bgs - Below Ground Surface

* All proposed samples located in the REC 14A-14B area will be analyzed for asbestos (0-1') due to previous asbestos piles in the No. 2 Machine demolition area.

APPENDIX D

Health and Safety Plan

Area B: Parcel B17
Tradepoint Atlantic
Sparrows Point, Maryland

Prepared for:
EnviroAnalytics Group
1650 Des Peres Road
Suite 230
Saint Louis, Missouri 63131

Prepared by:
ARM Group Inc.
9175 Guilford Road
Suite 310
Columbia, MD 21046

November 2016

ARM Project 150300M-22

Respectfully submitted,

Eric S. Magdar
Senior Geologist

T. Neil Peters
Vice President

TABLE OF CONTENTS

1.0 INTRODUCTION

This Health and Safety Plan (HASP) has been prepared by ARM Group Inc. (ARM) to address personnel health and safety requirements for employees of ARM and its subcontractors to complete a Phase II investigation on a portion of the Tradepoint Atlantic property that has been designated as Parcel B17. The on-site activities may include the following: installation of soil borings, collection of soil samples, and installation and gauging of temporary piezometers. ARM will comply with industry-standard health and safety protocol and Occupational Safety and Health Administration (OSHA) 29 CFR 1910.120 to prevent human exposure to volatile organic compounds (VOC), semi-volatile organic compounds (SVOC), petroleum hydrocarbons, polychlorinated biphenyls (PCB) and metals that may be present in site soil and groundwater.

2.0 GENERAL INFORMATION

2.1 Site Description

Parcel B17, which is comprised of 9.8 acres of the approximately 3,100-acre former plant property, is located off of Sparrows Point Boulevard in Sparrows Point, Maryland. Parcel B17 is one of several parcels that make up a larger area, known as Area B, of the Tradepoint Atlantic facility. Area B and its parcels are shown on **Figure 1.**

From the late 1800s until 2012, the Tradepoint Atlantic property was used for the production and manufacturing of steel. Iron and steel production operations and processes at the Site included raw material handling, coke production, sinter production, iron production, steel production, and semi-finished and finished product preparation. In 1970, it was the largest steel facility in the United States, producing hot and cold rolled sheets, coated materials, pipes, plates, and rod and wire. The steel making operations at the facility ceased in fall 2012.

2.2 Site Hazards

The following is a general description of the potential site hazards.

Chemical Hazards:

- VOCs, SVOCs, PCBs, petroleum hydrocarbons, and metals potentially present in soil and groundwater.

Explosive Hazards:

- VOC and petroleum hydrocarbon vapors in boreholes, piezometers and collection containers.

Physical Hazards:

- Slipping/tripping in work area
- Stress/fatigue from heat or cold temperatures
- Traffic
- Driving on steep slopes and/or off-road conditions
- Insect and animal bites
- Hand tools

Mechanical/Electrical Hazards:

- Underground utilities
- Heavy equipment (Geoprobe)
- Noise from heavy equipment operations
- Power tools

2.3 Utilities

Prior to initiating any subsurface investigations, all underground utilities will be cleared using the Miss Utility system. Additionally, EnviroAnalytics Group (EAG) will clear each proposed boring with utility personnel currently working on the property. The ARM staff will be responsible for avoiding any above ground utilities while operating vehicles on the site.

2.4 Waste Management

A small quantity of investigation derived waste (IDW) material will be generated as a result of the planned site work. These wastes could include decontamination fluids, soil cuttings, personal protective equipment (PPE) and disposable sampling equipment. All IDW will be containerized in steel 55-gallon drums for on-site treatment or off-site disposal, pending the receipt of analytical results. Specific procedures associated with the management of the IDW have been established in SOP 005, attached in Appendix A of the EPA approved Quality Assurance Project Plan (QAPP).

2.5 Site Controls and Security

It is the responsibility of ARM staff to keep unauthorized personnel away from the work areas during site work. All equipment used at the site must be secured or taken off-site. Subsurface intrusions should be covered to reduce any hazard that may be posed. Traffic cones, caution tape, physical barriers, or other such means as necessary shall be used to ensure that no unauthorized work area entry occurs.

3.0 OPERATING PROCEDURES

3.1 Air Monitoring

Due to the nature of the site activities and materials potentially present at the site, no vapor hazards are expected. If discernable odors are noted in the breathing zone, then work will be temporarily suspended and air monitoring will be initiated using a PID or explosive gas indicator. If sustained vapor concentrations are measured at or above action levels in the breathing zone, work will immediately cease until such time as appropriate action is established. This action may require the upgrade of PPE or reevaluation of the need to proceed.

3.2 Personnel Protection

Personnel health and safety protection shall follow the guidelines provided by this HASP. Modifications to the HASP may be made by the field supervisor with the approval of the ARM Project Manager on a day-to-day basis as conditions change, based on existing conditions. Any necessary revisions must be fully documented by the field supervisor to include the specifics and rationalizations for the change.

It is anticipated that a modified Level D of personal protection will be appropriate for the anticipated site activities. PPE associated with this designated level of protection (Level D), as established by the USEPA, is listed in a later section. The PPE listed for this level of protection should be available to all personnel.

PPE will be stored in a clean, dry environment prior to it usage. Disposable equipment shall remain, in as much as possible, its original manufacturer's packaging to ensure its integrity. PPE that is assigned to a specific end user is subject to inspection by the supervisor at any time.

3.2.1 Determination of Level of Protection Requirements

The appropriate level of personnel protection must be established on the basis of ambient air monitoring responses. Air monitoring action levels should be consistent with the primary compounds of concern as listed in Table 3-1 (below). Appropriate action should be taken if total organic vapor air concentrations are sustained at a concentration equal to or greater than the PEL listed on Table 3-1.

Table 3-1

Substance	CAS #	OSHA PEL (ppm)	IDLH (ppm)
Benzene	71-43-2	10	500
Toluene	108-88-3	200	500
Ethyl benzene	100-41-4	100	800
Xylenes	1330-20-7	100	900
Naphthalene	91-20-3	10	250
Tetrachloroethylene	127-18-4	100	150
Trichloroethylene	79-01-6	100	1,000

Notes: ppm = parts per million
PEL = Permissible Exposure Limit
IDLH = Immediately Dangerous to Life or Health

This criterion will be applicable to all activities unless specific protection requirement for a certain task are addressed separately. As previously stated, it is anticipated that a modified Level D will be appropriate for the anticipated site activities; which requires a regular worker uniform, steel-toed safety shoes, hardhat, safety glasses and long pants. Level D will be considered the minimum protection level for all work on-site.

Respiratory protection against dust must also be considered during site work. The usage of dust respirators (high efficiency particulate air [HEPA] filters) or NIOSH P100 filter paired with a half-mask respirator will be determined by site conditions and judgment of the field supervisor. Sprinklers may be used to control dust during work activities.

3.2.2 Dermal Protection

In general, dermal protection levels will correspond with the respiratory protection level in use during an activity as described in other sections. For most activities on the site, Level D dermal protection will be adequate. When work tasks are such that a higher level of personal protection is required, dermal protection may be upgraded to coated Tyvek (Saranex) or chemical-resistant rain suit or Tyvek. This determination will be made by the ARM Field Supervisor as required.

Chemical and abrasion-resistant outer gloves and inner chemical-resistant disposable gloves would be required in the work zone to provide adequate protection of hands and assist in preventing transfer of contaminants. As much of the investigation may require handling of possibly contaminated equipment, groundwater, or soil, chemical-resistant gloves should be required for all on-site work with these materials. Various operations, which require dexterity and do not necessitate the abrasion-resistant feature of outer gloves, could be performed with the inner gloves only, at the direction of the ARM Field Supervisor.

3.2.3 Eye Protection

Since many volatile contaminants are capable of penetrating skin tissues, the eyes provide a potential route of entry into the body. Typically, volatile organic vapors will be detected in the air-monitoring program. Dust and air-borne particulates will be monitored visually and nuisance dust standards will be applied. If exceeded, dust masks will be donned. Eye protection, beyond the use of safety glasses, must correspond to the respiratory protection level.

3.3 Task-Related Personnel Protection

At a minimum, all workers are required to wear long pants, steel toed shoes and a sleeved shirt at all times. Additional PPE will be required on a task-specific basis.

3.3.1 Installation of Geoprobe Soil Borings and Piezometers, Soil Logging and Soil Sampling Activities

All personnel should wear the following:

- Long pants and sleeved shirt/vest (high visibility)
- Steel toe safety boots
- Safety glasses with side shields
- Hearing protection
- Chemical resistant gloves

3.4 Explosion Prevention

Due to the potential presence of flammable materials at the site, the following safety guidelines must be followed to prevent the possibility of explosion:

a. All monitoring equipment will be intrinsically safe or explosion-proof, if used in areas of possible explosive atmospheres.

b. A fire extinguisher, first-aid kit, and an eye wash station will be located at the site within a short distance of site work.

c. Any compressed gas cylinders or bottles will be stored safely as required by the OSHA regulations. In addition, metal barriers must be provided and installed between oxygen and acetylene bottles, extending above the height of the regulators. At the end of each work shift, regulators shall be removed and replaced with protective caps.

d. No explosives, whatsoever, shall be used or stored on the premises.

e. All cleaning fluids or solvents must be stored and transported in OSHA-approved safety containers.

f. Propane, butane, or other heavier-than-air gases shall not be transported onto or used on-site unless prior approval is obtained in writing from the Project Manager and the Facility Operator.

4.0 DECONTAMINATION PROCEDURES

Decontamination procedures will be used on some field tasks, but not all, completed at the site. All decontamination operations may be performed at the sampling location unless the level of PPE is upgraded. If the level of PPE is upgraded, all decontamination operations will be performed in a central decontamination area and supervised by the ARM Field Supervisor. If necessary, a decontamination corridor will be set up adjacent to the area and equipped with brushes, plastic bags, and drum storage. Disposable outerwear and contaminated disposable equipment will be collected for future disposal. The ARM Field Supervisor would be required to inspect PPE and clothing to determine if decontamination procedures were sufficient to allow passage into the staging area.

The following decontamination facilities, as a minimum, will be provided in the staging area:

a. Hand washing facilities

b. First-aid kit

c. Eye wash station

d. Fire extinguisher

Proper on-site decontamination procedures, the use of disposable outer clothing, and field wash of hands and face as soon as possible after leaving the decontamination corridor could effectively minimize the opportunity for skin contact with contaminants.

4.1 Personnel Decontamination Procedures

Decontamination procedures should be as follows:

Level D decontamination will consist of:

1. Potable water wash and potable water rinse of boots and outer gloves (if worn).

2. Drum all visibly impacted disposable clothing.

3. Field wash of hands and face.

4.2 Equipment Decontamination

All equipment decontamination will be completed in accordance with the procedures referenced in QAPP Worksheet 21—Field SOPs, SOP No. 016 Equipment Decontamination. The decontamination procedures that will be used during the course of this investigation include Decontamination Area (Section 3.1 of the SOP), Decontamination of Sampling Equipment

(Section 3.5), Decontamination of Measurement Devices & Monitoring Equipment (Section 3.7), Decontamination of Subsurface Drilling Equipment (Section 3.8), and Document and Record Keeping (Section 5).

Level D personnel protection is required during equipment decontamination.

5.0 EMERGENCY CONTINGENCY INFORMATION

Pertinent emergency telephone numbers are listed in Table 5-1. This information must be reviewed by and provided to all personnel prior to site entry.

Table 5-1
Emergency Telephone Numbers

Facility/Title	Telephone Number
Fire and Police	911
Ambulance	911
James Calenda, EnviroAnalytics Group	(314) 620-3056
Eric Magdar, ARM Manager	Office: (410) 290-7775 Cell: (301) 529-7140
Hospital – Johns Hopkins Bayview	(410) 550-0350

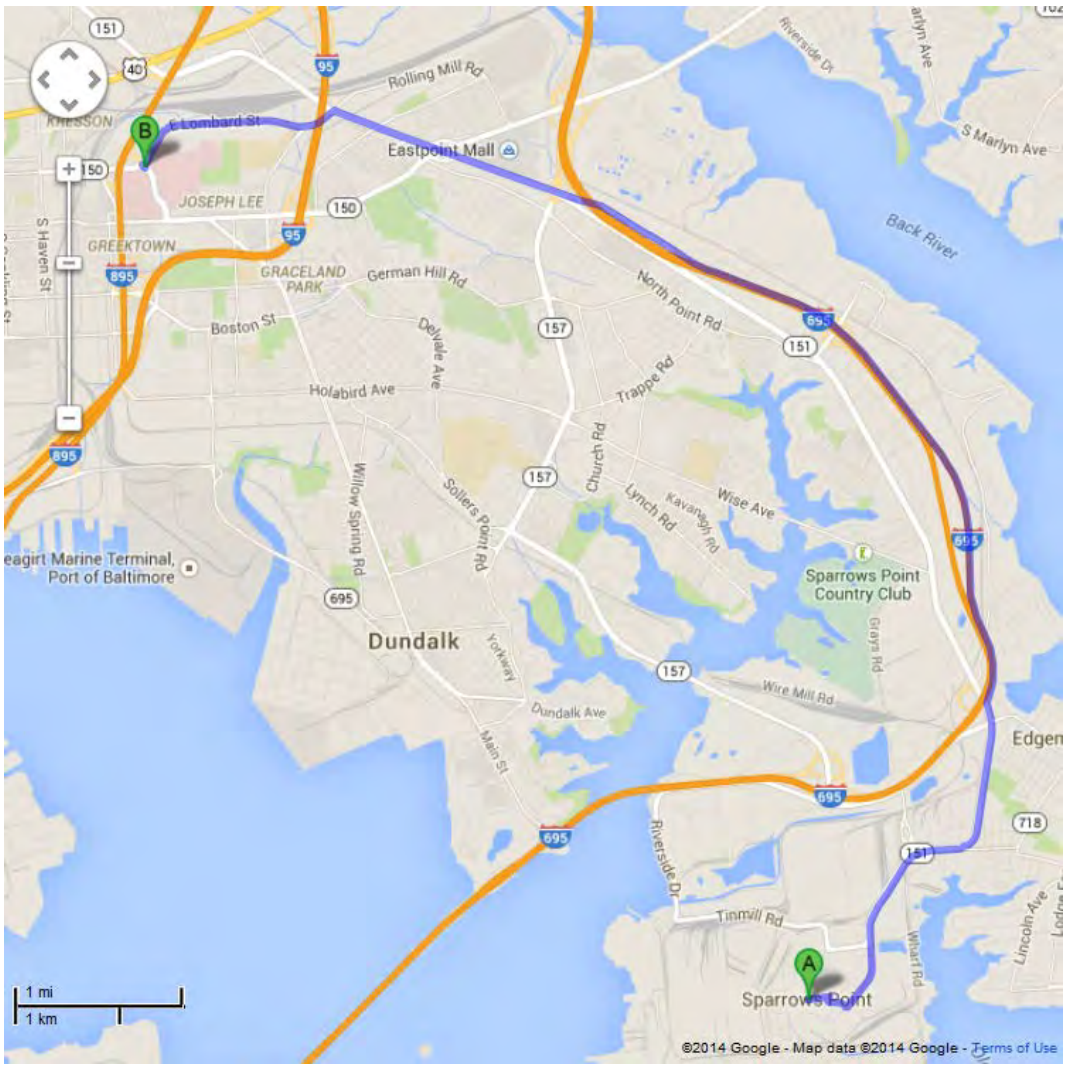
In the event of a fire or explosion, the site will be evacuated immediately and the appropriate emergency response groups notified. In the event of an environmental incident caused by spill or spread of contamination, personnel will attempt to contain the spread of contamination, if possible.

In the event of a personnel injury, emergency first aid would be applied on site by ARM as deemed necessary. The victim should be transported to the local medical facility if needed. The map to the hospital is provided below.

Hospital Route From Tradepoint Atlantic

Johns Hopkins Bayview
4940 Eastern Avenue
Baltimore, MD
(410) 550-0350

1. Start out going East on 7th Street.
2. Turn LEFT onto Sparrow Point Road.
3. Travel 1.4 miles and continue onto North Point Boulevard.
4. Travel 0.9 miles and turn slight right to merge onto I-695 North/Baltimore Beltway toward Essex.
5. Travel 3.4 miles and take EXIT 40 for MD-151/N. Pt. Blvd. N toward MD-150/East. Blvd W/Baltimore.
6. Travel 0.5 miles and merge onto MD-151 N/North Point Blvd.
7. Travel 2.0 miles and turn LEFT onto Kane Street.
8. Travel 0.2 miles and turn slight right onto E. Lombard Street.
9. Travel 1.2 miles and turn left onto Bayview Blvd.
10. Make a left at the emergency room of the hospital



6.0 ACKNOWLEDGEMENT OF PLAN

All site personnel are required to read and comply with the HASP. The following safety compliance affidavit should be signed and dated by each person directed to work on-site.

I have read this HASP and agree to conduct all on-site work in conformity with the requirements of the HASP. I acknowledge that failure to comply with the designated procedures in the HASP may lead to my removal from the site, and appropriate disciplinary actions by my employer.

Title and Company	Name	Signature	Date