REPORT OF

SUBSURFACE EXPLORATION AND GEOTECHNICAL ENGINEERING ANALYSIS

KINGMAN ISLAND IMPROVEMENTS
WASHINGTON, DC

FOR

LEE + PAPA AND ASSOCIATES

AUGUST 17, 2009

August 17, 2009

Mr. Craig Atkins
Lee + Papa and Associates
638 Eye Street, NW
Washington, DC 20001

ECS Job No. 15431

Reference: Report of Subsurface Exploration and Geotechnical Engineering Analysis, Kingman Island Improvements, Washington, DC

Dear Mr. Atkins:

As authorized by your acceptance of our Proposal No. 31151-GPR2, dated May 18, 2009, ECS Mid-Atlantic, LLC (ECS) has completed the subsurface exploration for the proposed improvements to Kingman Island in NE, Washington, DC. The enclosed report discusses the subsurface exploration procedures as well as the results of our subsurface exploration and laboratory testing programs, and presents our recommendations for the design and construction of the proposed structures. A Boring Location Diagram is included in the Appendix of this report, along with boring logs and laboratory test results.

We appreciate the opportunity to be of service to you on this project. If you have any questions regarding the information and recommendations contained in the accompanying report, please do not hesitate to contact us.

Respectfully,

ECS MID-ATLANTIC, LLC

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REPORT

PROJECT

Subsurface Exploration and
Geotechnical Engineering Analysis for
Kingman Island Improvements
Washington, DC

CLIENT

Lee + Papa and Associates
638 Eye Street
Washington, DC 20001

PROJECT #15431

DATE August 17, 2009

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PROJECT OVERVIEW

Introduction

This report presents the results of our subsurface exploration and geotechnical engineering analysis for the proposed site improvements to Kingman Island in NE, Washington, DC. The study was conducted in general accordance with ECS Proposal No. 31151-GPR2, dated May 18, 2009. The site location and the approximate boring locations are shown on the Boring Location Diagram included in the Appendix of this report.

Site Location and Proposed Construction

The subject site is located east of Oklahoma Avenue, NE, between Benning Road and East Capitol Street in Washington, DC. Kingman Island is located between Kingman Lake to the west and the Anacostia River to the east and is accessible via a pedestrian bridge from Heritage Island and the RFK stadium parking lot. The site is also accessible via a gate on the north side of the island off of Benning Road, NE.

The project will consist of site improvements including the construction of a bird observation deck, an elevated boardwalk, a memorial totem pole, various seat walls and paved and permeable trails throughout the island. Most of the development will occur at the section of the island bounded by Benning Road, NE and East Capitol Street, with gravel and earth paths extending beyond East Capitol Street, to the south.

If any of this information is in error, either due to our misunderstanding or due to any design changes that may occur later, ECS should be contacted so that we may review our recommendations and provide alternate or additional recommendations at that time.

Purpose and Scope of Work

The purpose of this exploration was to explore the subsurface conditions at the site and to develop engineering recommendations to guide the design and construction of the project. We accomplished these purposes by performing the following scope of services:

1. drilling traditional soil test borings to explore subsurface soil and groundwater conditions,

2. performing laboratory tests on selected representative soil samples from the borings to evaluate pertinent engineering properties,

3. analyzing the field and laboratory data to develop appropriate engineering recommendations, and

4. preparing this geotechnical report of our findings and recommendations.

The recommendations presented in this report are based on the results of our field subsurface exploration, laboratory testing and review of available geological and/or geotechnical data. A total of fourteen borings (Borings ECS-1 through ECS-14) were performed by ECS. All boring

locations were reviewed and approved by your office. The results of the completed soil borings along with a Boring Location Diagram are included in the Appendix of this report.

The borings were located in the field for drilling purposes by representatives of ECS using our Global Positioning Satellite (GPS) system. The GPS layout and ground surface elevations noted on the attached boring logs were based on the boundary survey contained on the current site plan prepared by Lee + Papa and Associates, dated March 6, 2009 which gives elevation contours at 1-foot intervals. The GPS unit used for the boring layout is certified to sub-meter accuracy. Therefore, the GPS System is capable of locating borings within approximately 3 feet of the intended location.

Following drilling operations, laboratory tests were performed on selected soil samples to identify the soils and to assist in determination of the properties of the site soils. The results of the laboratory testing are included in the Appendix of this report and are also noted on the boring logs. The results of the subsurface exploration, along with the Boring Location Diagram, are also included in the Appendix of this report. The Boring Location Diagram was developed from the site plans prepared by Lee + Papa and Associates.

EXPLORATION PROCEDURES

Subsurface Exploration Procedures

The soil borings were performed with an ATV-mounted auger drill rig, which utilized continuous flight, hollow-stem augers to advance the boreholes. In hollow-stem auger drilling operations, drilling fluid is not typically used to maintain or advance the borings. After the completion of each boring, the boreholes were grouted from the bottom up and the soil spoils were mounded next to the borehole.

Representative soil samples were obtained by means of the split-barrel sampling procedure in accordance with ASTM Specifications D-1586. In the split-barrel sampling procedure, a 2-inch O.D., split-barrel sampler is driven into the soil a distance of 18 inches by means of a 140-pound hammer falling 30 inches. The number of blows required to drive the sampler through a 12-inch interval is termed the Standard Penetration Test (SPT) “N” value and is indicated for each sample on the boring logs. This value can be used to provide a qualitative indication of the in-place relative density of cohesionless soils. In a less reliable way, it also indicates the consistency of cohesive soils. This indication is qualitative, since many factors can significantly affect the SPT value and prevent a direct correlation between drill crews, drill rigs, drilling procedures, and hammer-rod-sampler assemblies.

A field log of the soils encountered in the borings was maintained by the drill crew. After recovery, each sample was removed from the sampler and visually classified. Representative portions of each sample were then sealed and brought to our laboratory in Chantilly, Virginia for further visual examination and laboratory testing.

Laboratory Testing Program

Representative soil samples were selected and tested in our laboratory to help verify field classifications and to determine pertinent engineering properties. The laboratory testing program included visual classifications, natural moisture content tests, Atterberg Limits tests, and washed sieve analyses. All data obtained from the laboratory testing program is included on the respective boring logs and on the laboratory sheets within the Appendix of this report.

Each soil sample was visually classified on the basis of texture and plasticity in accordance with the Unified Soil Classification System (USCS). The group symbols for each soil type are indicated in parentheses following the soil descriptions on the boring logs. A brief explanation of the USCS will be included with the boring logs. The various soil types were grouped into the major zones noted on the boring logs. The stratification lines designating the interfaces between earth materials on the boring logs and profiles are approximate; in situ, the transitions may be gradual.

The soil samples from our exploration will be retained in our laboratory for a period of 60 days, after which they will be discarded unless other instructions are received as to their disposition.

EXPLORATION RESULTS

Site Conditions

The site is currently used as a park and is open to public access from an elevated boardwalk beginning at the east side of the RFK parking lot and spanning Kingman Lake and Heritage Island. A paved roadway exists at the east side of the island which begins at the gated entrance off of Benning Road, NE and continues south to the overpass of East Capitol Street. A network of hiking trails also exists throughout the dense vegetation across the island. The site varies in elevation from a topographic high of EL. 36± feet at the central part of the island to EL.0± feet along the perimeter of the island.

Regional Geology

The site is located within the Coastal Plain Physiographic Province of Washington, D.C. The near surface soils in the downtown Washington, D.C. area typically consist of man placed fill soils or natural soils which have been disturbed by previous construction. Beneath these near surface fill or disturbed materials, Coastal Plain deposits are generally encountered. These deposits vary in the percentage of sand, silt, clay and gravel, both laterally and vertically. A typical soil profile in the vicinity of the project consists of silty sand materials and sandy silts with varying amounts of clay and gravel. Within the sand soils, clay and gravel seams are often encountered. Beneath the Coastal Deposits, at depths deeper than the borings explored, the area is typically underlain by bedrock.

The natural soil profile at the site has been altered by past development that has resulted in the placement of man-made fills. The existence of fill soils in this area is well documented on local geologic maps. Existing man-made fill can be quite variable in depth, composition and consistency, and the engineering properties of such material can be difficult to assess. In general, the soils associated with these disturbed areas greatly vary, based on specific site locations. Presence of existing fill was confirmed by the soil borings.

Soil Conditions

The borings performed across the site generally encountered surficial debris consisting of old fill with rock, brick and concrete pieces, organics and topsoil, or a mixture thereof. The depth and consistency of the surficial materials varied at each boring location. Beneath the surficial layer, the natural soil strata encountered was generally consistent with the regional geology.

The encountered subsurface conditions are summarized in the subsequent text. Please refer to Cross-Sections A-A and B-B in the Appendix of this report for a graphical representation of the existing soil profiles. For detailed information at specific boring locations, please refer to the boring logs provided in the Appendix of this report.

Existing Fill

Existing fill was encountered within all of the borings performed. The fill typically consisted of concrete, brick, and asphalt fragments. The fill material extended to depths on the order of 10± feet to 27± feet below the existing ground surface or between EL. 6± feet and EL. -12± feet.

In general, the fill material consisted of Silty/Clayey SAND (SM, SC), low/high plasticity CLAY (CL, CH), and SILT (ML), with varying amounts of roots, wood, brick, asphalt, concrete, glass, and other non-soil debris.

Stratum I

Underlying the existing fill material, the upper natural soils encountered generally consisted of SILT (ML, MH) with varying amounts of Clay and Sand, Lean CLAY (CL) and Silty SAND (SM). The Standard Penetration Test (SPT) N-values recorded in this stratum were on the order of 2 blow per foot (bpf) to 13 bpf, corresponding to very soft to stiff consistencies for cohesive soils and very loose to medium dense relative densities for granular soils. This stratum was encountered at elevations ranging from EL. 6± feet to EL. -25± feet.

Stratum II

Underyling the upper natural soils of Stratum I, a generally denser soil strata was encountered in the deeper Borings ECS-1, ECS-2 and ECS-9. These soils consisted of Lean CLAY (CL) and SAND (SM, SC, SP) with varying amounts of Gravel and Silt. The Standard Penetration Test (SPT) N-values recorded in this stratum were on the order of 9 blow per foot (bpf) to 98 blows for 9 inches of penetration, corresponding to medium stiff to very hard consistencies for cohesive soils and loose to very dense relative densities for granular soils. This stratum was encountered between EL. -20± and EL. -25± feet and extended to the termination depths of each of the above-noted borings (EL. -47± to EL. -75± feet).

The borings performed by ECS are summarized in Table 1 below. For detailed information at specific boring locations, please refer to the boring logs included in the Appendix of this report.

Table 1 - Boring Summary

Boring No.	Surface Elevation (ft)	Termination Depth (ft)	Remarks
ECS-1	15.0	60.0	Existing fill to EL. -1.0’
ECS-2	17.0	60.0	Existing fill to EL. 2.0’
ECS-3	17.0	20.0	Refusal @ 4.5’, offset and existing fill to termination depth of EL. -3.0’
ECS-4	17.0	20.0	Existing fill to EL. 7.0’
ECS-5	8.0	20.0	Existing fill to EL. -4.0’
ECS-6	20.0	20.0	Existing fill to EL. 8.0’
ECS-7	12.0	20.0	Existing fill to EL. 0
ECS-8	20.0	20.0	Existing fill to EL. 8.0’

ECS-9	7.0	80.0	Existing fill to El. -5.0
ECS-10	12.0	20.0	Existing fill to EL. -4.0
ECS-11	28.0	30.0	Existing fill to EL. 1.0
ECS-12	32.0	30.0	Existing fill to EL. 9.0
ECS-13	36.0	28.9	Refusal at 28.9', existing fill to Termination
ECS-14	15.0	30.0	Existing fill to EL. 0

Groundwater Conditions

Groundwater was encountered in all borings with the exception of Borings ECS-3, ECS-11 and ECS-13, which were dry. In auger drilling operations, water is not introduced into the boreholes, and the groundwater position can often be determined by observing water flowing into or out of the boreholes. Furthermore, visual observation of the soil samples retrieved during the auger drilling exploration can often be used in evaluating the groundwater conditions. The following table is a summary of the groundwater encountered during our field exploration:

Table 2 - Groundwater Summary

Boring No.	Surface Elevation (ft)	Elevation of GW Encountered (ft)	GW Elevation before Casing Removal (ft)
ECS-1	15.0	1.0	-18.0
ECS-2	17.0	3.5	NA
ECS-3	17.0	DRY	NA
ECS-4	17.0	8.5	NA
ECS-5	8.0	1.0	NA
ECS-6	20.0	11.5	NA
ECS-7	12.0	3.5	-3.0
ECS-8	20.0	6.5	NA
ECS-9	7.0	-18.0	NA
ECS-10	12.0	-1.5	-5.0
ECS-11	28.0	DRY	NA
ECS-12	32.0	13.5	NA
ECS-13	36.0	DRY	NA
ECS-14	15.0	-3.5	NA

The groundwater table may undergo seasonal variations in elevation on the order of 10± feet or potentially greater. The proximity of the Anacostia River as well as the heterogeneous soils encountered throughout the site can add to the variability of the water table across Kingman Island. Generally, variations in the location of the water table can occur at the site as a result of changes in precipitation, evaporation, surface water runoff, pumping and other factors not immediately apparent at the time of this exploration. Perched water tables are also common at the interface of fill and natural soils.

ANALYSIS AND RECOMMENDATIONS

Based on the subsurface conditions encountered in the borings, it appears the site is suited for the proposed development from a geotechnical perspective. The conclusions and recommendations presented in this report should be incorporated in the design and construction of the project to minimize possible soil and/or foundation related problems.

The primary concern for the development is the presence of existing, heterogeneous fill materials across the site as well as the soft soils under the existing fill. These fill materials could settle excessively under new loading conditions. To reduce possible damage to the proposed structures resulting from settlement of these existing fill materials, we recommend that the proposed structures be supported on the foundation types described in the following sections.

The following sections present more detailed recommendations with regard to the support of the proposed structures. Discussion of the factors affecting the foundation for the proposed construction, as well as additional recommendations regarding design and construction at the project site are included below. We recommend that ECS review the final design and specifications to check that the earthwork and foundation recommendations presented in this report have been properly interpreted and implemented in the design and specifications.

Foundations

Due to the varying subsurface conditions underneath the structural elements proposed for this development, different foundation types are anticipated to be utilized across the site. The following is a summary of foundation recommendations based on the proposed structures:

Table 3 - Foundation Summary

	Steel H-piles (HP12x53)		**Timber Piles (Min. Tip Dia. 10”)**		**Shallow Foundations**
	Tip Elevation	**Capacity**	**Tip Elevation**	**Capacity**	**Capacity**
Bird Observation Deck	EL. -35± feet	10 Tons	EL. -35± feet	10 Tons	NA
Memorial Totem Pole	El. -25± feet	10 Tons	EL. -25± feet	10 Tons	NA
Elevated Boardwalk and Seat Walls	NA	NA	NA	NA	1,000 psf

Steel H-piles and Timber piles were considered for structural support. Steel H-piles were considered due to the ease of cutting and splicing in case capacities need to be adjusted in the field. Timber piles are typically a more economical deep foundation type; however, longer piles may need to be ordered to avoid the need for splicing. Therefore, we have provided recommendations for both types of deep foundations in the following sections.

Deep Foundation Option I – Driven Steel H-Piles

General – Driven Steel H-Pile Recommendations

We recommend that the Bird Observation Deck and the Memorial Totem Pole be supported on a deep foundation system of driven steel H-piles. A steel H-pile foundation system should consist of driven steel H-piles designed for an allowable individual bearing capacity of 10 tons. It should be noted that some below-grade obstructions will likely be encountered during the driving operations due to the presence of the existing fill materials.

The piles should be driven and tested to two times design capacity. Pile driving operations should be monitored continuously by the geotechnical engineer to document that the required length and capacity is obtained at each pile location.

Settlement of pile groups, designed in accordance with our recommendations presented in this report, is expected to be only short term, relatively small, and within tolerable limits for the proposed structures. For piles driven as recommended herein, maximum total settlement is expected to be on the order of 0.5 inches. Maximum differential settlement between adjacent columns is expected to be half the total settlement.

Piles should be driven to the design tip elevations. Piles may be acceptable if terminated above the design tip elevation provided that the geotechnical engineer reviews the driving record and compares it with the test pile results. An acceptable terminating blow count criteria will be established during the test pile program; however, the contractor should fully anticipate that the piles will need to be driven to the design tip elevations regardless of blow count or opinions of "hard driving".

Bird Observation Deck

Our field exploration in the vicinity of the proposed Bird Observation Deck (Boring ECS-9) indicates that existing fill materials were encountered to a depth of 12± feet below the existing site grade or EL. -5± feet. Although some of the fill materials exhibited SPT N-Values generally consistent with medium dense consistencies, they also exhibited erratic SPT N-values and signs of man-placed deleterious materials. Additionally, a very loose/soft layer of Silty SAND (SM) and SILT (ML) was encountered directly beneath the fill materials from approximately EL. -5± feet to EL. -20± feet. Given these observations, we do not recommend supporting the structure directly on or above the existing fill soils with shallow/spread foundations, since undesirable total and differential settlements may occur.

Due to the variable fill and underlying soft natural soils at this location, we recommend a deep foundation system consisting of driven steel H-piles be utilized to support the Bird Observation Deck. We recommend that a bearing capacity of 10 tons per pile be used for HP12x53 (36 ksi) H-piles with a minimum tip elevation of approximately EL. -35± feet. The natural soils encountered at this depth in nearby Boring ECS-9 consist of loose to medium dense Clayey SAND (SC) underlain by a thin layer of medium dense SAND (SP) and a layer of hard to very hard Sandy Lean CLAY (CL) to the boring termination depth of 80 feet below the ground surface (or EL. -73 feet).

Memorial Totem Pole

Our field exploration in the vicinity of the proposed Memorial Totem Pole (Boring ECS-1) indicates that existing fill materials were encountered to a depth of 16± feet below the existing site grade or EL. -15± feet.

Similar to the foundation recommendations for the Bird Observation Deck, we recommend a deep foundation system consisting of driven steel H-piles be utilized to support the Memorial Totem Pole. We recommend that a bearing capacity of 10 tons per pile be used for HP12x53 (36 ksi) H-piles with a minimum tip elevation of approximately EL. -25± feet. The natural soils encountered at this depth in nearby Boring ECS-1 consist of loose Silty Fine SAND (SM) underlain by medium dense Gravelly SAND (SP) to EL. -35 feet.

Deep Foundation Option II – Driven Timber Piles

General – Driven Timber Pile Recommendations

As an alternative to steel H-piles, timber piles may also be utilized to support the Bird Observation Deck and the Memorial Totem Pole. A timber pile foundation system should consist of driven timber piles designed for an allowable individual bearing capacity of 10 tons. The timber piles should have a minimum tip diameter of 10 inches and should be in accordance with ASTM D-25 and the American Timber Institute recommendations. It should be noted that some below-grade obstructions will likely be encountered during the driving operations due to the presence of the existing fill materials.

We recommend that the hammer used to drive the piles have a rated energy within the range of 16,000 to 24,000 foot-pounds. The suitability of the hammer selected by the contractor should be evaluated by a wave equation analysis prior to mobilization of the contractor's equipment.

We recommend a minimum center to center spacing of 3 times the pile butt diameter. The lateral variations for pile location should be limited to 2 inches in any direction and the vertical alignment should be such that the slope of the pile does not exceed one-quarter inch per foot in vertical direction.

For properly driven timber piles, settlement is expected to be minor, on the order of 0.5 inches or less with differential settlement of adjacent columns anticipated to be approximately half the total settlement value.

It may be necessary, if not advantageous, to pre-auger, spud or pre-trench to the depth necessary to advance the tip of the pile through the existing fill materials because of possible debris. At a minimum, the timber piles should be fitted with metal shoes on the tip to facilitate driving. If a pile is in danger of splitting or brooming as a result of difficult driving prior to the required embedment depth, the geotechnical engineer shall review the specific pile driving record and depth in order to determine the suitability. An

acceptable terminating blow count criteria will be established during the test pile program; however, the contractor should fully anticipate that the piles will need to be driven to the design tip elevations regardless of blow count or opinions of "hard driving".

Bird Observation Deck

We recommend that a bearing capacity of 10 tons per pile be used for timber piles with a minimum tip diameter of 10 inches and a minimum tip elevation of approximately EL. -35± feet. The natural soils encountered at this depth in nearby Boring ECS-9 consist of loose to medium dense Clayey SAND (SC) underlain by a thin layer of medium dense SAND (SP) and a layer of hard to very hard Sandy Lean CLAY (CL) to the boring termination depth of 80 feet below the ground surface (or EL. -73 feet).

The timber piles should be driven through the existing fill and bear in the underlying natural materials, described above. The anticipated pile length required is approximately 40 to 45 feet.

Memorial Totem Pole

Our field exploration in the vicinity of the proposed Memorial Totem Pole (Boring ECS-1) indicates that existing fill materials were encountered to a depth of 16± feet below the existing site grade or EL. -15± feet.

Similar to the foundation recommendations for the Bird Observation Deck, timber piles may also be utilized to support the Memorial Totem Pole. We recommend that a bearing capacity of 10 tons per pile be used for timber piles with a minimum tip diameter of 10 inches and a minimum tip elevation of approximately EL. -25± feet. The natural soils encountered at this depth in nearby Boring ECS-1 consist of loose Silty Fine SAND (SM) underlain by medium dense Gravelly SAND (SP) to EL. -35 feet.

Shallow Foundations

Elevated Boardwalk and Seat Walls

Our field exploration in the vicinity of the proposed Elevated Boardwalk (Borings ECS-2 through ECS-4) indicates that existing fill materials were encountered to depths of 10± to 20± feet below the existing site grade or EL. 7± to EL. -3± feet. In the vicinities of the proposed Seat Walls, existing fill materials were encountered to a depth of 20± feet below existing site grades. No major cut or fill operations are anticipated in these areas.

Based on the anticipated structural loading and considering the nature of the materials encountered in the borings, we recommend that these structures by supported by a shallow foundation system bearing on aggregate mats constructed within the existing fill material. Acceptable in-situ materials should consist of Clayey SAND or Sandy GRAVEL Fill which was encountered at a depth of up to 10± feet below existing site grades or from EL. 17± feet to EL. 10± feet. Each footing location should be undercut to a depth equal to the footing width, 2B (for column footings) or 4B (for continuous

footings). A diagram entitled “Select Aggregate Mat/Partial Undercut” is included in the appendix of this report. A high-density polyethylene geogrid, such as Tensar BX1200 or equivalent should be placed over the subgrade followed by AASHTO No. 21-A stone compacted to 95% of the maximum dry density (ASTM-698). The stone should be placed in lifts not exceeded 8 inches in loose thickness up to the footing design subgrade.

For footings that are to bear on aggregate mats constructed within the existing fill materials, a maximum allowable bearing pressure of 1,000 pounds per square foot (psf) may be utilized for the design of the structure. During construction, verification of the footing subgrades should be documented in the field by the Geotechnical Engineer of Record or his authorized representative to confirm that the in-situ bearing capacity at the bottom of each footing excavation is adequate for the design loads.

Settlement is a function of the compressibility of the heterogeneous fill material, the design bearing pressure, structural loads and the elevation of the footing with respect to the original ground surface. For the anticipated loads and bearing conditions at the Elevated Boardwalk and Seat Walls, total and differential settlement values of less than 1.5 inches are expected.

In order to prevent disproportionately small footing sizes, we recommend that continuous footings have a minimum width of 1.5 feet and that isolated column footings have a minimum lateral dimension of 3.0 feet. The minimum dimensions recommended above help reduce the possibility of foundation bearing failure and excessive settlement due to local shear or "punching" action. All footings should be placed at a minimum depth of 2.5 feet below finished grade. In areas where individual footings are stepped down and founded at different elevations, it is important to provide a minimum slope of 1H:1V exists between the bottom edge of each foundation at their closest point.

Driven Pile Test Program

A test pile program consisting of installing at least one test pile for each location while being monitored with a Pile Driving Analyzer (PDA), in general accordance with ASTM D4945, is recommended. The test pile(s) should be selected by the geotechnical engineer once the pile layout has been established. Each pile’s termination depth/driving criteria will be determined by the geotechnical engineer during installation and testing. Test piles should have a minimum length to meet the design tip elevation plus additional 10 feet for field adjustment of the tip elevations and to attach/detach electronic gauges associated with dynamic pile testing.

At least 48-hours after each pile is initially installed, it shall be restruck/redriven while being monitored with a Pile Driving Analyzer. The initial drive and restrike data will be used to evaluate the ultimate pile capacity and subsequent production pile lengths and driving criteria. The PDA data will also be used to evaluate the pile driving system performance and whether or not the driving stresses exceed the maximum values established herein. The test pile program should consist of the following chronological aspects:

1. Drive at least one test pile with PDA monitoring to the design tip elevations or to a depth/driving criteria determined by the geotechnical engineer during installation.

2. After at least 48 hours, restrike/redrive each test pile with PDA monitoring per the geotechnical engineer's instructions. Note that before any restrike test is conducted, the hammer should be warm and functioning properly (its efficiency near the anticipated maximum).

3. Perform CAPWAP analysis on selected blows obtained at end of initial drive and/or during restrike activities, preferably on blows with high energy transfer and early, high energy blows during restrike.

The geotechnical engineer, based on his familiarity with the design of the project, should be retained to conduct the test pile program with respect to the PDA testing and reporting. Once the data is analyzed, production pile lengths and driving criteria can be established. To avoid conflicts of interest, the PDA testing should be performed by the geotechnical engineer of record, and not the contractor's hired consultant.

The hammer type, size and condition used for the test pile program should be identical to the hammer type, size and condition used for production piles. The appropriate hammer size and type to be used for pile driving operations should be selected on the basis of wave equation analyses, prior to mobilization to the site. Any hammer capable of driving the piles to the required tip elevation without overstressing the pile as indicated below may be used. Final hammer approval will be based on the PDA test data obtained during the test pile program. If the contractor selects a single acting diesel hammer, a stroke stick must be supplied so that the hammer stroke can be observed. If a double acting diesel hammer is selected, a bounce chamber pressure gauge should be on site at all times so that the bounce chamber pressure can be observed at random by the pile driving inspector.

We do not recommend the use of multiple hammers during the test pile or production program, unless they are validated by proper dynamic tests with the PDA. Based on our review of subsurface conditions, we believe that a single acting air, steam, or hydraulic hammer would be the most appropriate hammer for the pre-cast, pre-stressed concrete piles. However, other hammer types may be feasible, depending upon the results of the wave equation analysis.

Fill Placement

Fill materials should consist of an approved material, free of organic matter, debris, and cobbles greater than 4 inches, and have a Liquid Limit and Plasticity Index less than 40 and 20, respectively. Unacceptable fill materials include topsoil and organic materials (OH, OL), and high plasticity clays and elastic silts (CH, MH). Such materials, if encountered during grading operations, should be removed and either stockpiled for later use in landscape areas or placed in approved disposal areas either on site or off site. Most on-site materials appeared to be unsuitable for use as engineered fill; therefore, any reuse of the on-site materials as engineered fill should be evaluated by the Geotechnical Engineer of Record on a case by case basis.

Fill materials should be placed in lifts not exceeding 8 inches in loose thickness and moisture conditioned to within 2 percentage points of the optimum moisture content. The soils should be compacted to a minimum of 95% of the maximum dry density obtained in accordance with ASTM Specification D-698, Standard Proctor Method.

All fill operations should be observed on a full-time basis by an authorized representative of the Geotechnical Engineer of Record to determine that compaction requirements are being met. All

fill shall be periodically tested to confirm that compaction is being achieved. A sufficient number of tests shall be taken in each lift before the next lift is placed, on the order of at least three tests per lift. The elevation and location of the tests should be clearly identified and recorded at the time of fill placement.

Compaction equipment suitable to the soil type used as fill should be selected to compact the fill. Theoretically, any equipment type can be used as long as the required density is achieved. Ideally, a steel drum roller would be most efficient for compacting and sealing the surface soils. All areas receiving fill should be graded to facilitate positive drainage away from the building pad and pavement areas of any free water associated with precipitation and surface run-off.

Fill materials should not be placed on frozen soils. All frozen soils should be removed prior to continuation of fill operations. All frost-heaved soils should be removed prior to placement of fill, stone, concrete, or asphalt.

Exterior Pavements

For pavement subgrades, specifically for trail types I, II and III for which a flexpave surface will be utilized, we present the following alternatives to address the existing fill materials. The first option would include a partial undercut on the order of 12 to 18 inches, and the use of a high-density polyethylene geogrid, such as Tensar BX1100 or equivalent. The final grades can then be established with compacted CR-6 or recycled RC-6 materials. The second option would be to proofroll the entire area that is to be paved at-grade with a 20-ton loaded dump truck and to selectively remove any soft areas. The second option carries more risk due to the variable nature of the fill materials and the possibility that deeper deleterious materials are not removed as part of the proofrolling operation. Grades should be reestablished by placing new engineered fill to the specifications outlined in the Subgrade Preparation and Earthwork Operations and Fill Placement sections of this report. The Geotechnical Engineer of Record or his authorized representative should be onsite at the time of construction to monitor the removal and/or proofrolling of the existing fill materials.

An important consideration with the design and construction of pavements is surface and subsurface drainage. Where standing water develops, either on the pavement surface or within the base course layer, softening of the subgrade and other problems related to the deterioration of the pavement can be expected. Furthermore, good drainage should minimize the possibility of the subgrade materials becoming saturated over a long period of time.

Construction Groundwater Control – Pumps & Sump Pits

Groundwater conditions at the site are strongly influenced by surface water flow and infiltration. Specifically, water that enters the site migrates downward through the cohesionless soils to perch on top of cohesive soils. Once the water reaches cohesive soils, which are relatively impermeable, the water perches and travels laterally, often over large distances. Such perched groundwater conditions will likely be encountered during construction operations, as suggested in most of our borings.

The perched water can be handled through the use of French Drains installed on the uphill side of any excavations performed on site. In addition, French Drains may need to be installed in

areas where springs develop. A typical Drain Installation Procedure detail is attached in the Appendix.

The perched groundwater conditions are seasonal in nature. While perched groundwater conditions may not be encountered during the summer months, such conditions can occur in the winter and late spring months. Specific recommendations regarding building design relative to these perched groundwater conditions are contained in subsequent sections of this report.

The surface of the site should be kept properly graded in order to enhance drainage of the surface water away from the proposed construction areas during the construction phase. We recommend that an attempt be made to enhance the natural drainage without interrupting its pattern.

Seismic Design Considerations

Based on our interpretation of the IBC 2000 Building Code, the project is defined as “Site Class E” for seismic design considerations. The Site Class definition should not be confused with the Seismic Design Category designation, which the Structural Engineer typically assesses. However, this calculation is based on relatively conservative SPT boring data. It may be possible to increase the Site Class to “D” by utilizing seismic shear wave measurement equipment. ECS can provide these seismic measurements under a separate scope, if desired.

Construction Considerations

Exposure to the environment may weaken the soils at the footing bearing level if the foundation excavations remain open for too long a time. Therefore, foundation concrete should be placed the same day that excavations are dug. If the bearing soils are softened by surface water intrusion or exposure, the softened soils must be removed from the foundation excavation bottom immediately prior to placement of concrete. If the excavation must remain open overnight, or if rainfall becomes imminent while the bearing soils are exposed, we recommend that a 1- to 3-inch thick "mud mat" of "lean" concrete be placed on the bearing soils before the placement of reinforcing steel.

The surficial soils contain fines which are considered moderately erodible. The Contractor should provide and maintain good site drainage during earthwork operations to help maintain the integrity of the surficial soils. All erosion and sedimentation shall be controlled in accordance with sound engineering practice and current requirements.

Closing

This report has been prepared in order to aid in the evaluation of this project and provide information necessary for the design of the building foundations. The scope is limited to the specific project and locations described herein, and the project description represents our understanding of the significant aspects relevant to geotechnical design issues. In the event that changes in the development are planned, we should be informed so the changes can be reviewed and the conclusions of this report modified or approved in writing by the Geotechnical Engineer of Record. As a check, we recommend that we be authorized to review the project plans and specifications to confirm that our report recommendations have been interpreted in

accordance with our intent. Without this review, we will not be responsible for misinterpretation of our data, our analysis, and/or our recommendations nor how these are incorporated into this final design.

APPENDIX

Unified Soil Classification System

Reference Notes for Boring Logs

Boring Logs ECS-1 through ECS-14

Laboratory Test Results

Select Aggregate Mat/Partial Undercut Diagram

French Drain Installation Procedure

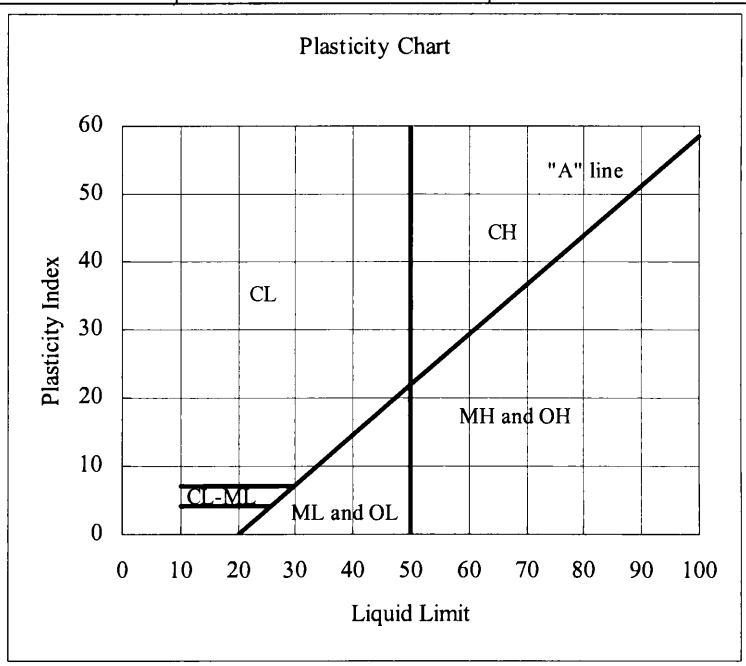
Boring Location Diagram

Cross Section Diagrams A-A and B-B

Unified Soil Classification System (ASTM D-2487)

Major Divisions			Group Symbols	Typical Names	Laboratory Classification Criteria	
Coarse-grained soils (More than half of material is larger than No. 200 Sieve size)	Gravels (More than half of coarse fraction is larger than No. 4 sieve size)	Clean gravels (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	$C_u = D_{60}/D_{10}$ greater than 4 $C_c = (D_{30})^2/(D_{10} x D_{60})$ between 1 and 3	
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines	Not meeting all gradation requirements for GW	
		Gravels with fines (Appreciable amount of fines)	GM[a] d u	Silty gravels, gravel-sand mixtures	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
			GC	Clayey gravels, gravel-sand-clay mixtures	Atterberg limits below "A" line or P.I. less than 7	
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines	$C_u = D_{60}/D_{10}$ greater than 6 $C_c = (D_{30})^2/(D_{10} x D_{60})$ between I and 3	
			SP	Poorly graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW	
		Sands with fines (Appreciable amount o fines)	SM[a] d u	Silty sands, sand-silt mixtures	Atterberg limits above "A" line or P.I. less than 4	Limits plotting in CL-ML zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
			SC	Clayey sands, sand-clay mixtures	Atterberg limits above "A" line with P.I. greater than 7	
Fine-grained soils (More than half material is smaller than No. 200 Sieve)	Silts and clays (Liquid limit less than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity		
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays		
			OL	Organic silts and organic silty clays of low plasticity		
	Silts and clays (Liquid limit greater than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts		
			CH	Inorganic clays of high plasticity, fat clays		
			OH	Organic clays of medium to high plasticity, organic silts		
	Highly Organic soils		Pt	Peat and other highly organic soils		

Determine percentage of sand and gravel from grain-size curve.
Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:
Less than 5 percent GW, GP, SW, SP
More than 12 percent GM, GC, SM, SC
5 to 12 percent Border 4 line cases requiring dual symbols[b]



[a] Division of GM and SM groups into subdivisions of d and u are for roads and airfields only. Subdivision is based on Atterberg limits; suffix d used when L.L. is 28 or less and the P.I. is 6 or less; the suffix u used when L.L. is greater than 28.

[b] Borderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example: GW-GC, well-graded gravel-sand mixture with clay binder.

From Winterkorn and Fang. 1975.

REFERENCE NOTES FOR BORING LOGS

I. Drilling and Sampling Symbols:

SS	-	Split Spoon Sampler	RB	-	Rock Bit Drilling
ST	-	Shelby Tube Sampler	BS	-	Bulk Sample of Cuttings
RC	-	Rock Core; NX, BX, AX	PA	-	Power Auger (no sample)
PM	-	Pressuremeter	HSA	-	Hollow Stem Auger
DC	-	Dutch Cone Penetrometer	WS	-	Wash Sample

Standard Penetration Test (SPT) resistance refers to the blows per foot (bpf) of a 140 lb hammer falling 30 inches on a 2 in. O.D. split-spoon sampler as specified in ASTM D-1586. The blow count is commonly referred to as the N-value.

II. Correlation of Penetration Resistances to Soil Properties:

Relative Density-Sands, Silts

SPT-N (bpf)	Relative Density
0 – 5	Very Loose
6 – 10	Loose
11 – 30	Medium Dense
31 – 50	Dense
51+	Very Dense

Consistency of Cohesive Soils

SPT-N (bpf)	Consistency	Unconfined Compressive Strength, Qp, tsf
0 – 3	Very Soft	Under 0.25
4 – 5	Soft	0.25 - 0.49
6 – 10	Medium Stiff	0.50 - 0.99
11 – 15	Stiff	1.00 - 1.99
16 – 30	Very Stiff	2.00 - 3.99
31 – 50	Hard	4.00 - 8.00
51+	Very Hard	Over 8.00

Weathered Rock (WR) may be defined as SPT-N values exceeding 60 bpf depending on site specific conditions. Refer carefully to boring logs.

Rock Fragments, gravel, cobbles, boulders, or debris may produce N-values that are not representative of actual soil properties.

III. Unified Soil Classification Symbols:

GP – Poorly Graded Gravel
GW – Well Graded Gravel
GM – Silty Gravel
GC – Clayey Gravels
SP – Poorly Graded Sands
SW – Well Graded Sands
SM – Silty Sands
SC – Clayey Sands

ML – Low Plasticity Silts
MH – High Plasticity Silts
CL – Low Plasticity Clays
CH – High Plasticity Clays
OL – Low Plasticity Organics
OH – High Plasticity Organics
CL-ML – Dual Classification (Typical)

IV. Water Level Measurement Symbols:

WL - Water Level
WS - While Sampling
WD - While Drilling

BCR – Before Casing Removal
ACR – After Casing Removal
WCI – Wet Cave In
DCI – Dry Cave In

The water levels are those water levels actually measured in the bore hole at the times indicated by the symbol. The measurements are relatively reliable when augering, without adding fluids, in a granular soil. In clays and plastic silts, the accurate determination of water levels may require several days for the water level to stabilize. In such cases, additional methods of measurement are generally required.

CLIENT	JOB #	BORING #	SHEET
LEE & PAPA AND ASSOCIATES, INC.	15431	ECS-1	1 OF 2

PROJECT NAME	ARCHITECT-ENGINEER
KINGMAN ISLAND IMPROVEMENTS	ROBERT SILMAN ASSOCIATES

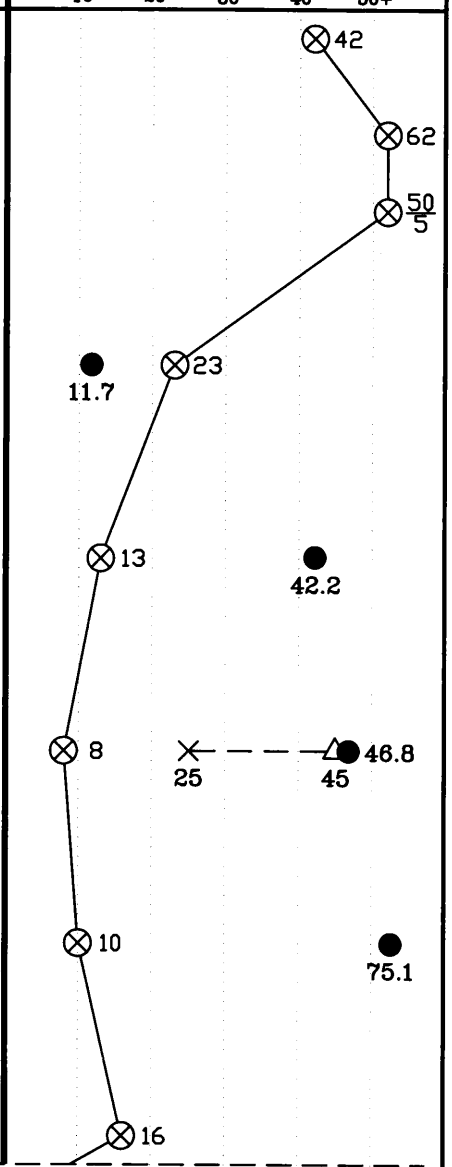
ECS LLC MID-ATLANTIC

SITE LOCATION
WASHINGTON, DC

CALIBRATED PENETROMETER TONS/FT.^{2} (1, 2, 3, 4, 5+)
PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %
ROCK QUALITY DESIGNATION & RECOVERY: RQD% — REC.% (20%, 40%, 60%, 80%, 100%)
STANDARD PENETRATION BLOWS/FT. (10, 20, 30, 40, 50+)

DESCRIPTION OF MATERIAL — ENGLISH UNITS
BOTTOM OF CASING — LOSS OF CIRCULATION 100%
SURFACE ELEVATION 15

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)
0	1	SS	18	14	Topsoil Depth 3"		
	2	SS	18	18	Gravelly SAND, With Brick and Organics, Brown, Moist, Dense to Very Dense, (GP-FILL)		
5	3	SS	5	5	Organic SILT, With Brick Fragments, Dark Brown, Moist, Medium Dense to Very Dense, (OL-FILL)		10
	4	SS	18	14			
10							5
	5	SS	18	18			0
15					Lean CLAY, With Mica, Gray to Black, Moist, Medium Stiff to Very Stiff, (CL)		
	6	SS	18	18			-5
20							
	7	SS	18	18			-10
25							
	8	SS	18	16			
30							



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THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

WL 14.0'	WS OR TD	BORING STARTED 07-28-09	
WL(BCR)	WL(ACR)	BORING COMPLETED 07-28-09	CAVE IN DEPTH ●
WL		RIG D50 FOREMAN CONNELLY	DRILLING METHOD HOLLOW STEM AUGER

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CLIENT	JOB #	BORING #	SHEET
LEE & PAPA AND ASSOCIATES, INC.	15431	ECS-1	2 OF 2

PROJECT NAME	ARCHITECT-ENGINEER
KINGMAN ISLAND IMPROVEMENTS	ROBERT SILMAN ASSOCIATES

ECS LLC MID-ATLANTIC

SITE LOCATION: WASHINGTON, DC

CALIBRATED PENETROMETER TONS/FT.^{2}: 1 2 3 4 5+

PLASTIC LIMIT % X — WATER CONTENT % ● — LIQUID LIMIT % △

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — — — REC.% ——— 20% 40% 60% 80% 100%

⊗ STANDARD PENETRATION BLOWS/FT. 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING ▶ LOSS OF CIRCULATION 100%

SURFACE ELEVATION 15

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
30					Lean CLAY, With Mica, Gray to Black, Moist, Medium Stiff to Very Stiff, (CL)			
	9	SS	18	18	Silty Fine SAND, Tan, Moist, Loose, (SM)		20	9
35								
	10	SS	18	6	Gravelly SAND, Trace Clay, Brown to Tan, Wet, Medium Dense, (SP)		25	15
40								
	11	SS	18	18			30	24
45								
	12	SS	18	12			35	30
50					Clayey SAND, Dark Brown, Wet, Medium Dense, (SC)			
	13	SS	18	10			40	29
55					Lean CLAY, Brown, Moist, Very Stiff, (CL)			
	14	SS	18	14				19
60								

END OF BORING @ 60.00'

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

▽WL 14.0' WS OR TD	BORING STARTED 07-28-09		
▽WL(BCR) ▽WL(ACR)	BORING COMPLETED 07-28-09	CAVE IN DEPTH ●	
▽WL	RIG D50 FOREMAN CONNELLY	DRILLING METHOD HOLLOW STEM AUGER	

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CLIENT	JOB #	BORING #	SHEET
LEE & PAPA AND ASSOCIATES, INC.	15431	ECS-2	1 OF 2

PROJECT NAME	ARCHITECT-ENGINEER
KINGMAN ISLAND IMPROVEMENTS	ROBERT SILMAN ASSOCIATES

ECS LLC MID-ATLANTIC

SITE LOCATION
WASHINGTON, DC

CALIBRATED PENETROMETER TONS/FT.^{2} 1 2 3 4 5+

PLASTIC LIMIT % X — WATER CONTENT % ● — LIQUID LIMIT % △

ROCK QUALITY DESIGNATION & RECOVERY
RQD% — — — REC.%
20% 40% 60% 80% 100%

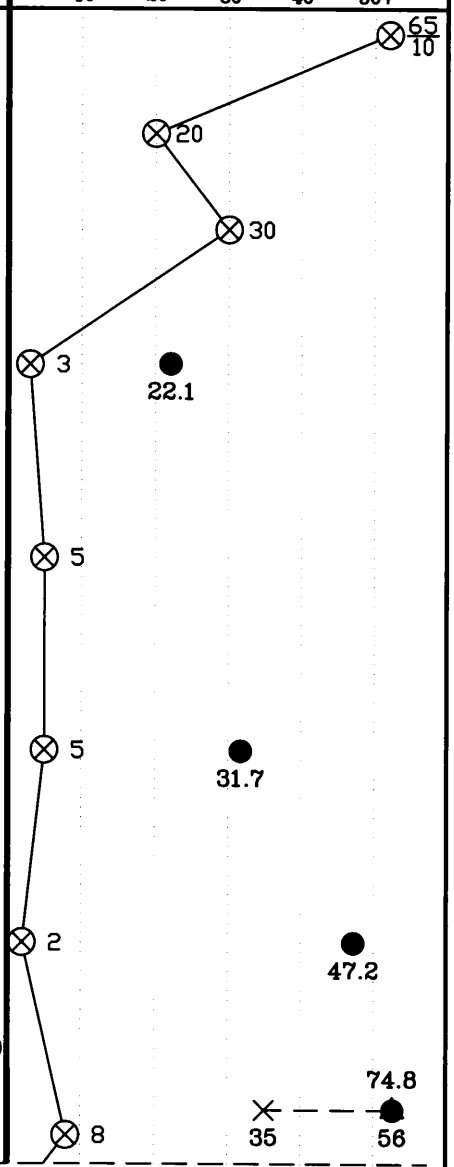
STANDARD PENETRATION BLOWS/FT. ⊗ 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING ▶ LOSS OF CIRCULATION 100%

SURFACE ELEVATION 17

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)
0	1	SS	16	14	Topsoil Depth 3"		
					Clayey SAND, With Gravel, Brown, Moist, Medium Dense to Very Dense, (SC-FILL)		15
5	2	SS	18	10			
	3	SS	18	14			
					Sandy CLAY, With Organics, Dark Brown, Moist, Very Soft to Soft, (CL-FILL)		10
10	4	SS	18	6			
						▽	5
	5	SS	18	12			
15					SILT, With Mica, Trace Organics, Brown, Moist, Very Loose, (ML)		0
20	6	SS	18	18			
							-5
	7	SS	18	16			
25					Elastic SILT, Dark Brown to Black, Moist, Very Loose to Loose, (MH)		-10
30	8	SS	18	18			



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THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

▽WL 13.5'	WS OR WD	BORING STARTED 07-22-09	
▼WL(BCR) 35.0' ▼WL(ACR)		BORING COMPLETED 07-22-09	CAVE IN DEPTH ●
▽WL		RIG D50 FOREMAN CONNELLY	DRILLING METHOD HOLLOW STEM AUGER

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CLIENT	JOB #	BORING #	SHEET
LEE & PAPA AND ASSOCIATES, INC.	15431	ECS-2	2 OF 2

PROJECT NAME	ARCHITECT-ENGINEER
KINGMAN ISLAND IMPROVEMENTS	ROBERT SILMAN ASSOCIATES

ECS LLC MID-ATLANTIC

SITE LOCATION: WASHINGTON, DC

CALIBRATED PENETROMETER TONS/FT.^{2} 1 2 3 4 5+

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — REC.% — 20% 40% 60% 80% 100%

STANDARD PENETRATION BLOWS/FT. 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION 17

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
30					Elastic SILT, Dark Brown to Black, Moist, Very Loose to Loose, (MH)	15	
	9	SS	18	16			5
35						20	
	10	SS	18	14			8
40					Clayey SAND, With Gravel from 50' to 55', Brown, Medium Dense, (SC)	25	
	11	SS	18	6			21
45						30	
	12	SS	18	0			20
50						35	
	13	SS	18	10			17
55					Lean CLAY, Gray, Moist, Very Stiff, (CL)	40	
	14	SS	18	12			17 — 22.7 — 37 — 24
60							

END OF BORING @ 60.00'

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

WL 13.5' WS OR TD	BORING STARTED 07-22-09		
WL(BCR) 35.0' WL(ACR)	BORING COMPLETED 07-22-09	CAVE IN DEPTH ●	
WL	RIG D50	FOREMAN CONNELLY	DRILLING METHOD HOLLOW STEM AUGER

(07/30/2009)

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MYcook

CLIENT	JOB #	BORING #	SHEET
LEE & PAPA AND ASSOCIATES, INC.	15431	ECS-3	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
KINGMAN ISLAND IMPROVEMENTS	ROBERT SILMAN ASSOCIATES

ECS LLC MID-ATLANTIC

SITE LOCATION: WASHINGTON, DC

CALIBRATED PENETROMETER TONS/FT.^{2}: 1 2 3 4 5+

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — REC.% — 20% 40% 60% 80% 100%

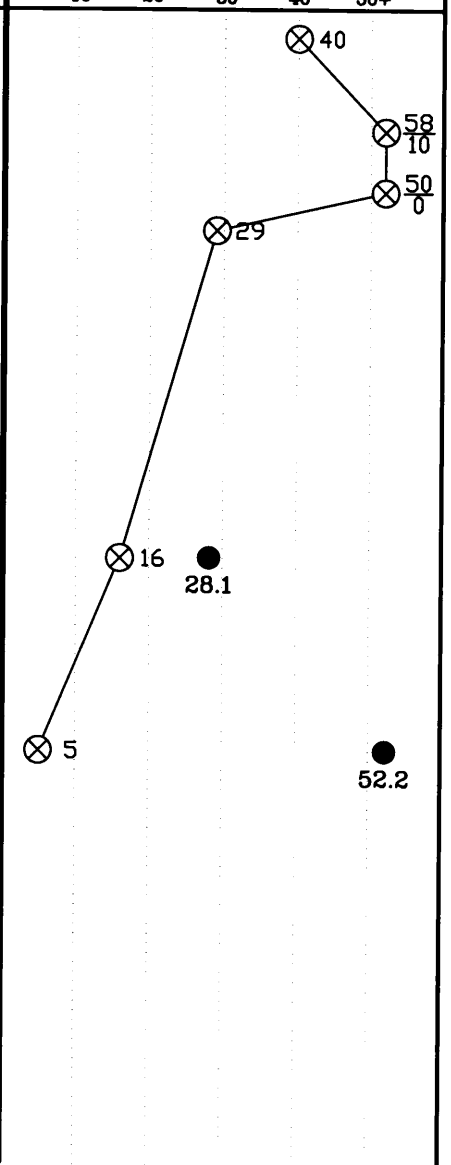
STANDARD PENETRATION BLOWS/FT.: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION 17

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)
0	1	SS	18	8	Topsoil Depth 6"	
					Clayey SAND, With Gravel and Organics, Brown, Moist, Medium Dense to Very Dense, (SC-FILL)	15
	2	SS	16	12		
5	3	SS	0	0		
	4	SS	18	12		
					Sandy CLAY, With Rock and Asphalt Fragments, Brown to Black, Moist, Soft to Very Stiff, (CL-FILL)	10
	5	ST	18	18		
10						5
	6	SS	18	12		
15						0
	7	SS	18	10		
20					END OF BORING @ 20.00'	-5
25						-10
30						



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

WL	WS OR WD	BORING STARTED 07-21-09	
WL(BCR)	WL(ACR)	BORING COMPLETED 07-21-09	CAVE IN DEPTH ●
WL		RIG D50 FOREMAN CONNELLY	DRILLING METHOD HOLLOW STEM AUGER

(07/28/2009)

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MYcook

CLIENT	JOB #	BORING #	SHEET
LEE & PAPA AND ASSOCIATES, INC.	15431	ECS-4	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
KINGMAN ISLAND IMPROVEMENTS	ROBERT SILMAN ASSOCIATES

ECS LLC MID-ATLANTIC

SITE LOCATION
WASHINGTON, DC

CALIBRATED PENETROMETER TONS/FT.^{2} 1 2 3 4 5+

PLASTIC LIMIT % X — WATER CONTENT % ● — LIQUID LIMIT % Δ

ROCK QUALITY DESIGNATION & RECOVERY
RQD% — — — REC.%
20% 40% 60% 80% 100%

STANDARD PENETRATION BLOWS/FT. 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING ▶ LOSS OF CIRCULATION 100%

SURFACE ELEVATION 17

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0	1	SS	18	10	Topsoil Depth 3"		32
	2	SS	18	6	Sandy GRAVEL, With Asphalt and Glass Fragments, Brown to Tan, Dry, Dense to Very Dense, (GP-FILL)	15	55
5	3	SS	18	14			52
	4	SS	18	4	Silty SAND, With Organics, Dark Brown, Moist, Loose, (SM-FILL)	10	9
10					Micaceous SILT, Dark Brown, Moist, Very Loose to Loose, (ML)	5	
15	5	SS	18	18			7
						0	
20	6	SS	18	16			4
					END OF BORING @ 20.00'	-5	
25						-10	
30							

ROCK QUALITY DESIGNATION & RECOVERY: 46.9, 69.0

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

▽WL 8.5' WS OR WD	BORING STARTED	07-21-09	
▼WL(BCR) ▼WL(ACR)	BORING COMPLETED	07-21-09	CAVE IN DEPTH ●
▽WL	RIG D50 FOREMAN CONNELLY		DRILLING METHOD HOLLOW STEM AUGER

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(07/28/2009)

MYcook

CLIENT	JOB #	BORING #	SHEET
LEE & PAPA AND ASSOCIATES, INC.	15431	ECS-5	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
KINGMAN ISLAND IMPROVEMENTS	ROBERT SILMAN ASSOCIATES

ECS LLC MID-ATLANTIC

SITE LOCATION: WASHINGTON, DC

CALIBRATED PENETROMETER TONS/FT.^{2}: 1 2 3 4 5+

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — REC.% — 20% 40% 60% 80% 100%

STANDARD PENETRATION BLOWS/FT.: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION: 8

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	STANDARD PENETRATION BLOWS/FT.
0	1	SS	11	4	Topsoil Depth 1"	50/5
					Micaceous Silty SAND, With Gravel and Brick Fragments, Dark Brown, Moist, Medium Dense to Very Dense, (SM-FILL)	
5	2	SS	18	6		16
	3	SS	18	4		23
	4	SS	18	12		48
10					Micaceous Elastic SILT, Dark Brown to Black, Moist, Very Loose to Loose, (MH)	
15	5	SS	18	18		5
20	6	SS	18	16		8
					END OF BORING @ 20.00'	
25						
30						

WATER LEVELS — ELEVATION (FT): 5, 0, -5, -10, -15, -20

Water level: 58.1; Cave in depth: 57.6; Rock quality: 32 51

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

WL 7.0'	WS OR WD	BORING STARTED 07-24-09	
WL(BCR)	WL(ACR)	BORING COMPLETED 07-24-09	CAVE IN DEPTH ●
WL		RIG D50 FOREMAN CONNELLY	DRILLING METHOD HOLLOW STEM AUGER

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(07/28/2009)

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CLIENT	JOB #	BORING #	SHEET
LEE & PAPA AND ASSOCIATES, INC.	15431	ECS-6	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
KINGMAN ISLAND IMPROVEMENTS	ROBERT SILMAN ASSOCIATES

ECS LLC MID-ATLANTIC

SITE LOCATION: WASHINGTON, DC

CALIBRATED PENETROMETER TONS/FT.^{2}: 1 2 3 4 5+

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — REC.% — 20% 40% 60% 80% 100%

STANDARD PENETRATION BLOWS/FT.: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION 20

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0	1	SS	18	5	Topsoil Depth 5"			3
	2	SS	18	8	Clayey SAND, With Gravel and Organics, Brown to Black, Moist, Very Loose to Very Dense, (SC-FILL)			59
5	3	SS	11	2			15	50/5
	4	SS	18	12				37
10							10	
	5	SS	18	10	Micaceous Sandy CLAY, With Gravel, Dark Brown, Moist, Very Soft, (CL)		5	2
15								
	6	SS	18	12			0	2
20					END OF BORING @ 20.00'			
25							-5	
30								

ROCK QUALITY DESIGNATION & RECOVERY: 23.3, 34.0

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

WL 8.5'	WS OR TD	BORING STARTED 07-23-09	
WL(BCR)	WL(ACR)	BORING COMPLETED 07-23-09	CAVE IN DEPTH ●
WL		RIG D50 FOREMAN CONNELLY	DRILLING METHOD HOLLOW STEM AUGER

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(07/29/2009)

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CLIENT	JOB #	BORING #	SHEET
LEE & PAPA AND ASSOCIATES, INC.	15431	ECS-7	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
KINGMAN ISLAND IMPROVEMENTS	ROBERT SILMAN ASSOCIATES

ECS LLC MID-ATLANTIC

SITE LOCATION: WASHINGTON, DC

CALIBRATED PENETROMETER TONS/FT.^{2}: 1 2 3 4 5+

PLASTIC LIMIT % X — WATER CONTENT % ● — LIQUID LIMIT % △

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — — — REC.% ——— 20% 40% 60% 80% 100%

⊗ STANDARD PENETRATION BLOWS/FT. 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING ▶ LOSS OF CIRCULATION 100%

SURFACE ELEVATION 12

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0					Topsoil Depth 1"		
	1	SS	18	13	Clayey SAND, With Gravel, Organics and Quartz Fragments, Brown, Moist, Loose to Very Dense, (SC-FILL)	10	34
	2	SS	18	10			8
5	3	SS	18	16		5	19
	4	SS	11	9			50/5
10					Micaceous Elastic SILT, Dark Brown to Black, Moist, Very Loose, (MH)	0	
	5	SS	18	11			2
15						-5	
	6	SS	18	6			3
20					END OF BORING @ 20.00'	-10	
25						-15	
30							

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

▽WL 8.5' WS OR WD	BORING STARTED 07-23-09	
▼WL(BCR) 15.0' ▼WL(ACR)	BORING COMPLETED 07-23-09	CAVE IN DEPTH ●
▽WL	RIG D50 FOREMAN CONNELLY	DRILLING METHOD HOLLOW STEM AUGER

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CLIENT	JOB #	BORING #	SHEET
LEE & PAPA AND ASSOCIATES, INC.	15431	ECS-8	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
KINGMAN ISLAND IMPROVEMENTS	ROBERT SILMAN ASSOCIATES

ECS LLC MID-ATLANTIC

SITE LOCATION: WASHINGTON, DC

CALIBRATED PENETROMETER TONS/FT.^{2}: 1 2 3 4 5+

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — REC.% — 20% 40% 60% 80% 100%

STANDARD PENETRATION BLOWS/FT.: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION: 20

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0	1	SS	18	10	Topsoil Depth 2"		5
					Clayey SAND, With Gravel and Roots, Brown, Moist, Very Loose to Very Dense, (SC-FILL)		
	2	SS	18	12			45
5	3	SS	17	10		15	75/11
	4	SS	18	12		10	27
10					Lean CLAY, With Mica, Dark Brown, Moist, Soft to Stiff, (CL)		
15	5	SS	18	12		5	5
	6	SS	18	0			13
20					END OF BORING @ 20.00'	0	
25						-5	
30							

WATER LEVELS: 8.3; 24; 40; 43.9

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

WL 13.5' WS OR WD	BORING STARTED 07-24-09	
WL(BCR) WL(ACR)	BORING COMPLETED 07-24-09	CAVE IN DEPTH ●
WL	RIG D50 FOREMAN CONNELLY	DRILLING METHOD HOLLOW STEM AUGER

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CLIENT	JOB #	BORING #	SHEET
LEE & PAPA AND ASSOCIATES, INC.	15431	ECS-9	1 OF 3

PROJECT NAME	ARCHITECT-ENGINEER
KINGMAN ISLAND IMPROVEMENTS	ROBERT SILMAN ASSOCIATES

ECS LLC MID-ATLANTIC

SITE LOCATION: WASHINGTON, DC

CALIBRATED PENETROMETER TONS/FT.^{2} (1, 2, 3, 4, 5+)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %

ROCK QUALITY DESIGNATION & RECOVERY: RQD% (20%, 40%, 60%, 80%, 100%) — REC.%

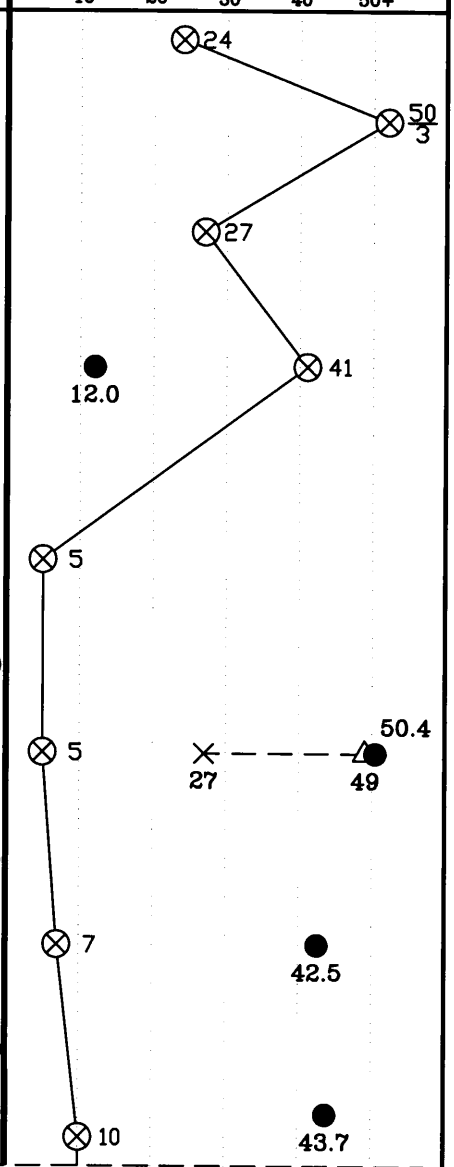
STANDARD PENETRATION BLOWS/FT. (10, 20, 30, 40, 50+)

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION: 7

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)
0	1	SS	18	6	Topsoil Depth 4"	
	2	SS	9	9	SAND, With Gravel, Organics and Asphalt Fragments, Brownish to Tan, Dry, Medium Dense to Very Dense, (SP-FILL)	5
5	3	SS	18	16		0
	4	SS	18	10		
10					Silty SAND, Brown, Moist, Very Loose, (SM)	-5
	5	SS	18	10		
15					SILT, Trace Mica, Dark Brown, Moist, Very Loose to Loose, (ML)	-10
	6	SS	18	12		
20						-15
	7	SS	18	18		
25					Clayey SAND, With Mica, Dark Gray, Moist to Wet, Loose to Medium Dense, (SC)	-20
	8	SS	18	12		
30						



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THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

WL 25.0'	WS OR WD	BORING STARTED 07-25-09	
WL(BCR)	WL(ACR)	BORING COMPLETED 07-25-09	CAVE IN DEPTH ●
WL		RIG D50 FOREMAN CONNELLY	DRILLING METHOD HOLLOW STEM AUGER

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CLIENT	JOB #	BORING #	SHEET
LEE & PAPA AND ASSOCIATES, INC.	15431	ECS-9	2 OF 3

PROJECT NAME	ARCHITECT-ENGINEER
KINGMAN ISLAND IMPROVEMENTS	ROBERT SILMAN ASSOCIATES

ECS LLC MID-ATLANTIC

SITE LOCATION
WASHINGTON, DC

CALIBRATED PENETROMETER TONS/FT.^{2} 1 2 3 4 5+

PLASTIC LIMIT % X — WATER CONTENT % ● — LIQUID LIMIT % △

ROCK QUALITY DESIGNATION & RECOVERY
RQD% — — — REC.%
20% 40% 60% 80% 100%

⊗ STANDARD PENETRATION BLOWS/FT. 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING ▶ LOSS OF CIRCULATION 100%

SURFACE ELEVATION 7

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
30					Clayey SAND, With Mica, Dark Gray, Moist to Wet, Loose to Medium Dense, (SC)	25	
	9	SS	18	10			10
35						30	
	10	SS	18	18			29
40					SAND, Dark Brown, Wet, Medium Dense, (SP)	35	
					Sandy Lean CLAY, Gray to Brown, Moist, Hard to Very Hard, (CL)		
	11	SS	18	12			58
45						40	
	12	SS	18	10			36
50						45	13 ✕ ● — △ 16.6 28
	13	SS	18	16			36
55						50	
	14	SS	15	0			98/9
60							

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THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

▽WL 25.0'	WS OR WD	BORING STARTED 07-25-09	
▽WL(BCR)	▽WL(ACR)	BORING COMPLETED 07-25-09	CAVE IN DEPTH ●
▽WL		RIG D50 FOREMAN CONNELLY	DRILLING METHOD HOLLOW STEM AUGER

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(07/29/2009)
MYGeek

CLIENT	JOB #	BORING #	SHEET
LEE & PAPA AND ASSOCIATES, INC.	15431	ECS-9	3 OF 3

PROJECT NAME	ARCHITECT-ENGINEER
KINGMAN ISLAND IMPROVEMENTS	ROBERT SILMAN ASSOCIATES

ECS LLC MID-ATLANTIC

SITE LOCATION: WASHINGTON, DC

CALIBRATED PENETROMETER TONS/FT.^{2}: 1 2 3 4 5+

PLASTIC LIMIT % X — WATER CONTENT % ● — LIQUID LIMIT % △

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — — — REC.% ——— 20% 40% 60% 80% 100%

⊗ STANDARD PENETRATION BLOWS/FT. 10 20 30 40 50+

BOTTOM OF CASING ▶ LOSS OF CIRCULATION 100%

SURFACE ELEVATION 7

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL (ENGLISH UNITS)	WATER LEVELS	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
60					Sandy Lean CLAY, Gray to Brown, Moist, Hard to Very Hard, (CL)		55	
	15	SS	18	18				38
65							60	
	16	SS	18	16				50
70							65	
	17	SS	18	18				36
75							70	
	18	SS	18	10				40
80					END OF BORING @ 80.00'		75	
85							80	
90								

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

▽WL 25.0' WS OR WD	BORING STARTED 07-25-09		
▼WL(BCR) ▼WL(ACR)	BORING COMPLETED 07-25-09	CAVE IN DEPTH ●	
▽WL	RIG D50 FOREMAN CONNELLY	DRILLING METHOD HOLLOW STEM AUGER	

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CLIENT	JOB #	BORING #	SHEET
LEE & PAPA AND ASSOCIATES, INC.	15431	ECS-10	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
KINGMAN ISLAND IMPROVEMENTS	ROBERT SILMAN ASSOCIATES

ECS LLC MID-ATLANTIC

SITE LOCATION
WASHINGTON, DC

CALIBRATED PENETROMETER TONS/FT.^{2}: 1 2 3 4 5+

PLASTIC LIMIT % X — WATER CONTENT % ● — LIQUID LIMIT % △

ROCK QUALITY DESIGNATION & RECOVERY
RQD% — — — REC.%
20% 40% 60% 80% 100%

STANDARD PENETRATION BLOWS/FT.: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING ▶ LOSS OF CIRCULATION 100%

SURFACE ELEVATION 12

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0	1	SS	18	18	Topsoil Depth 6"			10
	2	SS	18	2	Clayey SAND, With Gravel, Organics and Concrete Fragments, Brown, Moist, Very Loose to Medium Dense, (SC-FILL)		10	25
5	3	SS	18	16			5	7
	4	SS	18	6				10 (21.4)
10							0	
	5	SS	18	0				3
15					Micaceous Elastic SILT, Dark Brown, Moist, Loose, (MH)		-5	
	6	SS	18	18				7 (42.9)
20					END OF BORING @ 20.00'		-10	
25							-15	
30								

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

▽WL 13.5' WS OR ⓣ	BORING STARTED 07-24-09	
▼WL(BCR) 17.0' ▼WL(ACR)	BORING COMPLETED 07-24-09	CAVE IN DEPTH ●
▽WL	RIG D50 FOREMAN CONNELLY	DRILLING METHOD HOLLOW STEM AUGER

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CLIENT	JOB #	BORING #	SHEET
LEE & PAPA AND ASSOCIATES, INC.	15431	ECS-11	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
KINGMAN ISLAND IMPROVEMENTS	ROBERT SILMAN ASSOCIATES

ECS LLC MID-ATLANTIC

SITE LOCATION: WASHINGTON, DC

CALIBRATED PENETROMETER TONS/FT.^{2} (1, 2, 3, 4, 5+)

PLASTIC LIMIT % (X) — WATER CONTENT % (●) — LIQUID LIMIT % (Δ)

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — — — REC.% ——— (20%, 40%, 60%, 80%, 100%)

STANDARD PENETRATION BLOWS/FT. (⊗) (10, 20, 30, 40, 50+)

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING ▶ LOSS OF CIRCULATION 100%

SURFACE ELEVATION 28

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0	1	SS	18	4	Topsoil Depth 4"	28	2
					Organic Sandy SILT, With Gravel, Dark Brown to Black, Moist, Very Loose to Medium Dense, (OL-FILL)	25	5
	2	SS	18	0			
5	3	SS	18	2		20	8
	4	SS	18	0			10
10						15	
	5	SS	18	10			12
15					Silty SAND, With Gravel, Brown, Moist, Very Dense, (SM-FILL)	10	
	6	SS	12	6			50/6
20						5	
	7	SS	1	1			50/1
25					Micaceous Sandy SILT, Brown to Gray, Moist, Dense, (ML)	0	
30	8	SS	18	10			39

END OF BORING @ 30.00'

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

WL DRY — WS OR WD	BORING STARTED 07-27-09	
WL(BCR) DRY — WL(ACR)	BORING COMPLETED 07-27-09	CAVE IN DEPTH ●
WL	RIG D50 — FOREMAN CONNELLY	DRILLING METHOD HOLLOW STEM AUGER

(07/29/2009)

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CLIENT	JOB #	BORING #	SHEET
LEE & PAPA AND ASSOCIATES, INC.	15431	ECS-12	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
KINGMAN ISLAND IMPROVEMENTS	ROBERT SILMAN ASSOCIATES

ECS LLC MID-ATLANTIC

SITE LOCATION: WASHINGTON, DC

CALIBRATED PENETROMETER TONS/FT.^{2}: 1 2 3 4 5+

PLASTIC LIMIT % X — WATER CONTENT % ● — LIQUID LIMIT % Δ

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — — — REC.% ——— 20% 40% 60% 80% 100%

⊗ STANDARD PENETRATION BLOWS/FT.: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING ▶ LOSS OF CIRCULATION 100%

SURFACE ELEVATION 32

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0	1	SS	18	8	Topsoil Depth 8"		35
	2	SS	8	7	Clayey SAND, With Gravel and Concrete, Light Brown, Moist, Loose to Very Dense, (SC-FILL)	30	50/2
5	3	SS	18	0		25	31
	4	SS	18	4			8
10						20	
	5	SS	18	14			12
15						15	
	6	SS	18	6			21
20						10	
	7	SS	18	10	Micaceous Sandy CLAY, Brown, Moist, Soft, (CL)		5
25						5	
	8	SS	18	6			4
30							

END OF BORING @ 30.00'

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

▽WL 18.5'	WS OR WD	BORING STARTED 07-23-09	
▼WL(BCR)	▼WL(ACR)	BORING COMPLETED 07-23-09	CAVE IN DEPTH ●
▽WL		RIG D50 FOREMAN CONNELLY	DRILLING METHOD HOLLOW STEM AUGER

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(08/01/2008)

MYcook

CLIENT	JOB #	BORING #	SHEET
LEE & PAPA AND ASSOCIATES, INC.	15431	ECS-13	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
KINGMAN ISLAND IMPROVEMENTS	ROBERT SILMAN ASSOCIATES

ECS LLC MID-ATLANTIC

SITE LOCATION: WASHINGTON, DC

CALIBRATED PENETROMETER TONS/FT.^{2}: 1 2 3 4 5+

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — REC.% — 20% 40% 60% 80% 100%

STANDARD PENETRATION BLOWS/FT.: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION: 36

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0	1	SS	18	6	Topsoil Depth 4"	35	2
	2	SS	18	6	Organic Sandy SILT, With Gravel, Black, Moist, Very Loose to Medium Dense, (OL-FILL)		3
5	3	SS	18	2		30	11
	4	SS	18	4			8
10						25	
	5	SS	18	0			12
15						20	
	6	SS	18	2	Silty SAND, With Gravel, Brown, Moist, Very Dense, (SM-FILL)		61
20						15	
	7	SS	3	3			50/3
25						10	
	8	SS	4	0			50/4
30					END OF BORING @ 28.90'		

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

WL	WS OR WD	BORING STARTED 07-27-09	
WL(BCR)	WL(ACR)	BORING COMPLETED 07-27-09	CAVE IN DEPTH ●
WL		RIG D50 FOREMAN CONNELLY	DRILLING METHOD HOLLOW STEM AUGER

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RC (08-06-09) RC (08-06-09) RC (08-13-09) RC (08-14-09) RC (08-14-09)

(08/11/2009)

MYcook

CLIENT	JOB #	BORING #	SHEET
LEE & PAPA AND ASSOCIATES, INC.	15431	ECS-14	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
KINGMAN ISLAND IMPROVEMENTS	ROBERT SILMAN ASSOCIATES

ECS LLC MID-ATLANTIC

SITE LOCATION: WASHINGTON, DC

CALIBRATED PENETROMETER TONS/FT.^{2} (1, 2, 3, 4, 5+)

PLASTIC LIMIT % X — WATER CONTENT % ● — LIQUID LIMIT % Δ

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — — — REC.% ——— (20%, 40%, 60%, 80%, 100%)

⊗ STANDARD PENETRATION BLOWS/FT. (10, 20, 30, 40, 50+)

BOTTOM OF CASING ▶ LOSS OF CIRCULATION 100%

SURFACE ELEVATION 15

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL (ENGLISH UNITS)	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0	1	SS	18	10	Topsoil Depth 6"		14
					Organic Sandy SILT, Black, Moist, Medium Dense, (OL-FILL)		
	2	SS	18	10			29
5	3	SS	18	4		10	21
					Sandy CLAY, Trace Mica, Light Brown, Moist, Stiff, (CL-FILL)		
	4	SS	18	12			15
10						5	
	5	SS	18	0			12
15					Lean CLAY, Brown, Moist to Wet, Medium Stiff to Stiff, (CL)	0	
	6	SS	18	12			9
20						-5	
	7	SS	18	12			11
25						-10	
	8	SS	18	12			8
30							

END OF BORING @ 30.00'

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

▽WL 18.5' WS OR ⓦD	BORING STARTED 07-27-09		
▽WL(BCR) ▽WL(ACR)	BORING COMPLETED 07-27-09	CAVE IN DEPTH ●	
▽WL	RIG D50 FOREMAN CONNELLY	DRILLING METHOD HOLLOW STEM AUGER	

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RC (08-06-09) RC (08-06-09) RC (08-13-09) RC (08-14-09) RC (08-14-09)

(08/01/2009)

M.Yosek

ECS Mid-Atlantic, LLC
Chantilly, VA
Laboratory Testing Summary

August 13, 2009

Project No. 15431 | Project Name. Kingman Island Improvements Phase I
Project Engineer MYASEK | Principal Engineer SSTANNARD | Summary By MYASEK

Boring Number	Sample Number	Depth (feet)	Moisture Content (%)	USCS	Liquid Limit	Plastic Limit	Plasticity Index	Percent Passing No.200 Sieve	Corrected		CBR Value	Other
									Maximum Density (pcf)	Optimum Moisture (%)		
ECS-1	S-4	8.50 - 10.00	11.7									
ECS-1	S-5	13.50 - 15.00	42.2									
ECS-1	S-6	18.50 - 20.00	46.8	CL	45	25	20	96.7				
ECS-1	S-7	23.50 - 25.00	75.1									
ECS-1	S-9	33.50 - 35.00	19.1									
ECS-1	S-10	38.50 - 40.00	22.3									
ECS-1	S-11	43.50 - 45.00	13.8									
ECS-1	S-12	48.50 - 50.00	19.9									
ECS-10	S-4	8.50 - 10.00	21.4									
ECS-10	S-6	18.50 - 20.00	42.9									
ECS-2	S-4	8.50 - 10.00	22.1									
ECS-2	S-6	18.50 - 20.00	31.7									
ECS-2	S-7	23.50 - 25.00	47.2									
ECS-2	S-8	28.50 - 30.00	74.8	MH	56	35	21	98.9				
ECS-2	S-11	43.50 - 45.00	19.1									
ECS-2	S-12	48.50 - 50.00	19.3									

Summary Key:

SA = See Attached
S = Standard Proctor
M = Modified Proctor
V = Virginia Test Method
OC = Organic Content

Hyd = Hydrometer
Con = Consolidation
DS = Direct Shear
GS = Specific Gravity

UCS = Unconfined Compression Soil
UCR = Unconfined Compression Rock
LS = Lime Stabilization
CS = Cement Stabilization

NP = Non Plastic

ECS Mid-Atlantic, LLC
Chantilly, VA
Laboratory Testing Summary

August 13, 2009

Project No. 15431 | Project Name. Kingman Island Improvements Phase I
Project Engineer MYASEK | Principal Engineer SSTANNARD | Summary By MYASEK

Boring Number	Sample Number	Depth (feet)	Moisture Content (%)	USCS	Liquid Limit	Plastic Limit	Plasticity Index	Percent Passing No.200 Sieve	Corrected		CBR Value	Other
									Maximum Density (pcf)	Optimum Moisture (%)		
ECS-2	S-14	58.50 - 60.00	22.7	CL	37	17	20	89.2				
ECS-3	S-6	13.50 - 15.00	28.1									
ECS-3	S-7	18.50 - 20.00	52.2									
ECS-4	S-5	13.50 - 15.00	46.9									
ECS-4	S-6	18.50 - 20.00	69.0									
ECS-5	S-5	13.50 - 15.00	58.1									
ECS-5	S-6	18.50 - 20.00	57.6	MH	51	32	19	95.9				
ECS-6	S-5	13.50 - 15.00	23.3									
ECS-6	S-6	18.50 - 20.00	34.0									
ECS-7	S-5	13.50 - 15.00										
ECS-7	S-6	18.50 - 20.00										
ECS-8	S-2	2.50 - 4.00	8.3									
ECS-8	S-5	13.50 - 15.00	43.9	CL	40	24	16	91.5				
ECS-9	S-4	8.50 - 10.00	12.0									
ECS-9	S-6	18.50 - 20.00	50.4	ML	49	27	22	99.2				
ECS-9	S-7	23.50 - 25.00	42.5									

Summary Key:

SA = See Attached
S = Standard Proctor
M = Modified Proctor
V = Virginia Test Method
OC = Organic Content

Hyd = Hydrometer
Con = Consolidation
DS = Direct Shear
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UCS = Unconfined Compression Soil
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ECS Mid-Atlantic, LLC
Chantilly, VA
Laboratory Testing Summary

August 13, 2009

Project No. 15431 | Project Name. Kingman Island Improvements Phase I
Project Engineer MYASEK | Principal Engineer SSTANNARD | Summary By MYASEK

Boring Number	Sample Number	Depth (feet)	Moisture Content (%)	USCS	Liquid Limit	Plastic Limit	Plasticity Index	Percent Passing No.200 Sieve	Corrected		CBR Value	Other
									Maximum Density (pcf)	Optimum Moisture (%)		
ECS-9	S-8	28.50 - 30.00	43.7									
ECS-9	S-10	38.50 - 40.00	25.0									
ECS-9	S-12	48.50 - 50.00	16.6	CL	28	13	15	59.3				
ECS-9	S-13	53.50 - 55.00	16.6									
ECS-9	S-15	63.50 - 65.00	22.6									
ECS-9	S-16	68.50 - 70.00	21.9									
ECS-9	S-17	73.50 - 75.00	41.2									
ECS-9	S-18	78.50 - 80.00	24.9									

Summary Key:

SA = See Attached
S = Standard Proctor
M = Modified Proctor
V = Virginia Test Method
OC = Organic Content

Hyd = Hydrometer
Con = Consolidation
DS = Direct Shear
GS = Specific Gravity

UCS = Unconfined Compression Soil
UCR = Unconfined Compression Rock
LS = Lime Stabilization
CS = Cement Stabilization

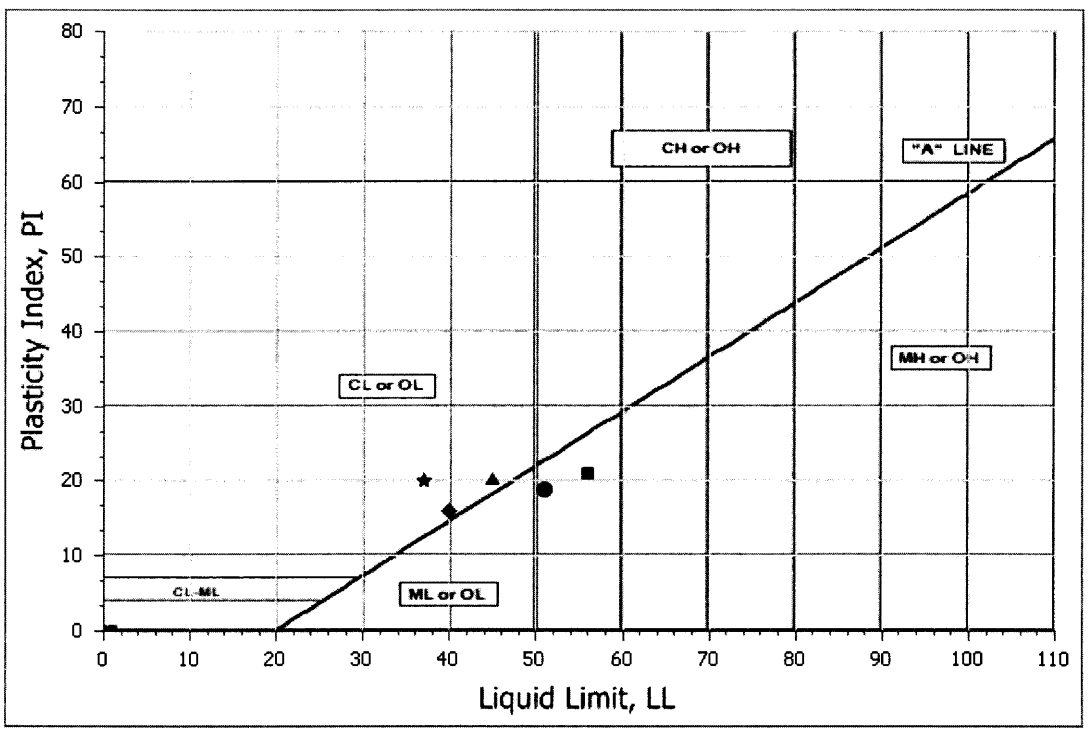
NP = Non Plastic

ECS - MID-ATLANTIC, LLC
Geotechnical • Construction Materials • Environmental • Facilities

August 13, 2009

Atterberg Limit (ASTM D-4318) Test Summary

Project No.	15431	Project Name.	Kingman Island Improvements Phase I
Project Engineer	MYASEK	Principal Engineer	SSTANNARD



Boring / Sample Number	Depth (feet)	Test Symbol	Description	Water Content (%)	LL	PL	PI
ECS-1 / S-6	18.50 - 20.00	▲	Lean Clay Grayish Brown	46.8	45	25	20
ECS-2 / S-8	28.50 - 30.00	■	Elastic Silt D/Gray	74.8	56	35	21
ECS-2 / S-14	58.50 - 60.00	★	Lean Clay w/Sand Grayish Brown	22.7	37	17	20
ECS-5 / S-6	18.50 - 20.00	●	Elastic Silt D/Grayish Brown	57.6	51	32	19
ECS-8 / S-5	13.50 - 15.00	◆	Lean Clay Grayish Brown	43.9	40	24	16

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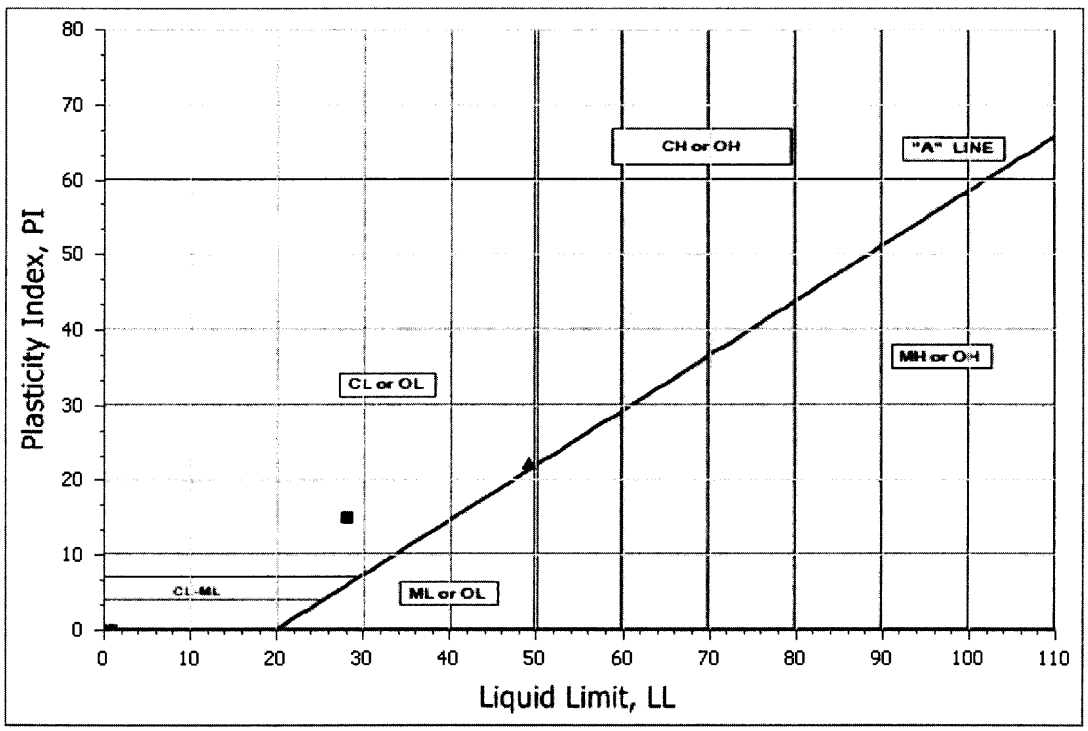
Geotechnical • Construction Materials • Environmental • Facilities

August 13, 2009

Atterberg Limit (ASTM D-4318) Test Summary

Project No.	15431	Project Name.	Kingman Island Improvements Phase I
Project Engineer	MYASEK	Principal Engineer	SSTANNARD



Boring / Sample Number	Depth (feet)	Test Symbol	Description	Water Content (%)	LL	PL	PI
ECS-9 / S-6	18.50 - 20.00	▲	Silt L/Grayish Brown	50.4	49	27	22
ECS-9 / S-12	48.50 - 50.00	■	Sandy Lean Clay Grayish Brown	16.6	28	13	15

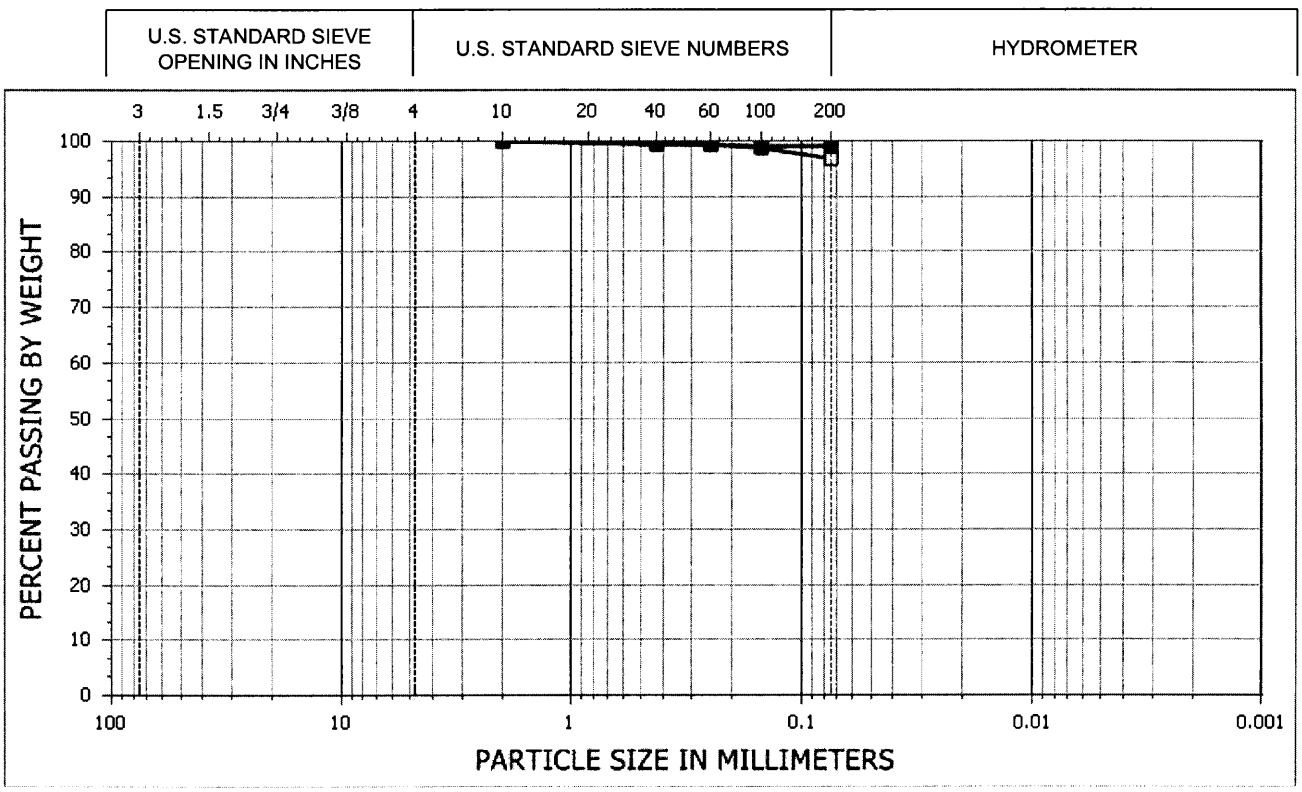
ECS - MID-ATLANTIC, LLC
Geotechnical • Construction Materials • Environmental • Facilities

August 13, 2009

Grain Size (ASTM D-422) Test Summary

Project No.	15431	Project Name.	Kingman Island Improvements Phase I
Project Engineer	MYASEK	Principal Engineer	SSTANNARD

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



Boring / Sample Number	Depth (feet)	Test Symbol	LL	PI	Description
ECS-1 / S-6	18.50 - 20.00	□	45	20	Lean Clay Grayish Brown
ECS-2 / S-8	28.50 - 30.00	■	56	21	Elastic Silt D/Gray

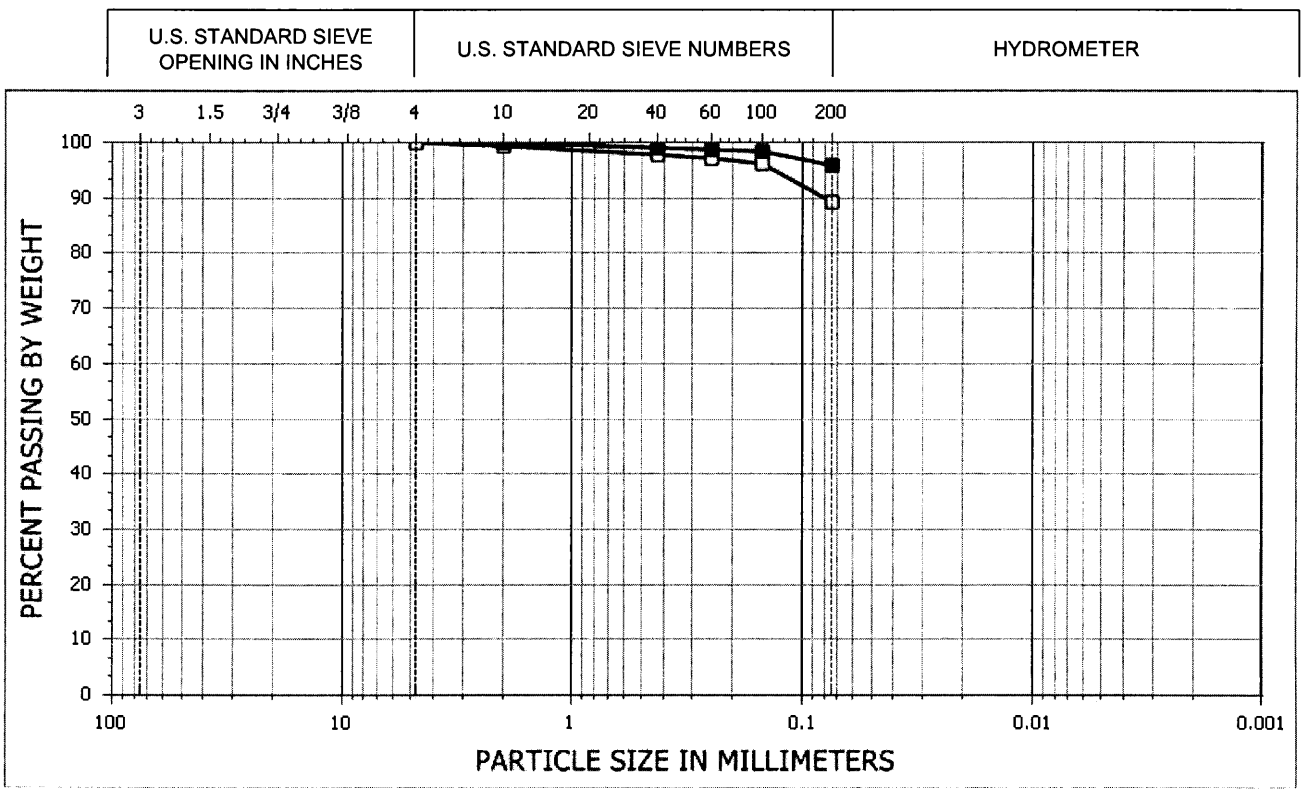
ECS - MID-ATLANTIC, LLC
Geotechnical • Construction Materials • Environmental • Facilities

August 13, 2009

Grain Size (ASTM D-422) Test Summary

Project No.	15431	Project Name.	Kingman Island Improvements Phase I
Project Engineer	MYASEK	Principal Engineer	SSTANNARD

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



Boring / Sample Number	Depth (feet)	Test Symbol	LL	PI	Description
ECS-2 / S-14	58.50 - 60.00	□	37	20	Lean CLAY
ECS-5 / S-6	18.50 - 20.00	■	51	19	Elastic Silt D/Grayish Brown

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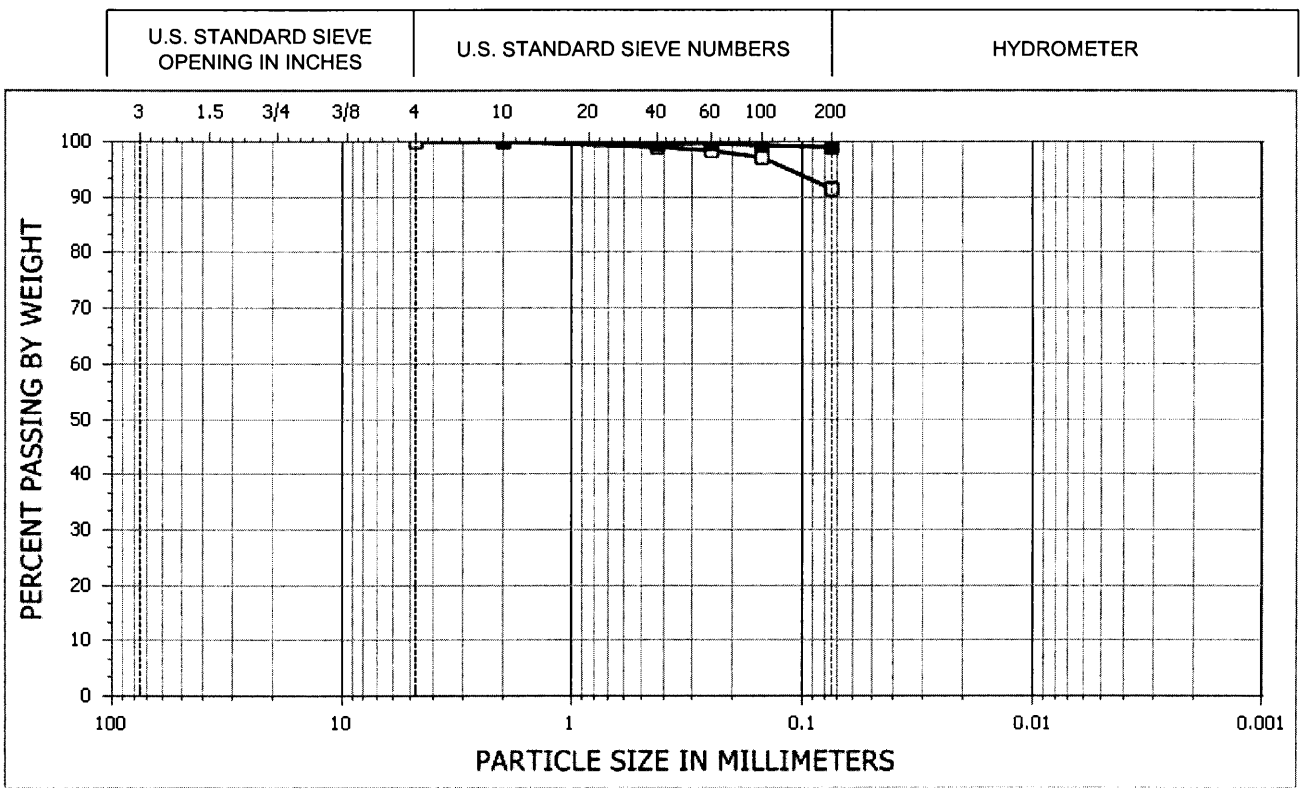
Geotechnical • Construction Materials • Environmental • Facilities

August 13, 2009

Grain Size (ASTM D-422) Test Summary

Project No.	15431	Project Name.	Kingman Island Improvements Phase I
Project Engineer	MYASEK	Principal Engineer	SSTANNARD

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



Boring / Sample Number	Depth (feet)	Test Symbol	LL	PI	Description
ECS-8 / S-5	13.50 - 15.00	□	40	16	Lean Clay Grayish Brown
ECS-9 / S-6	18.50 - 20.00	■	49	22	Silt L/Grayish Brown

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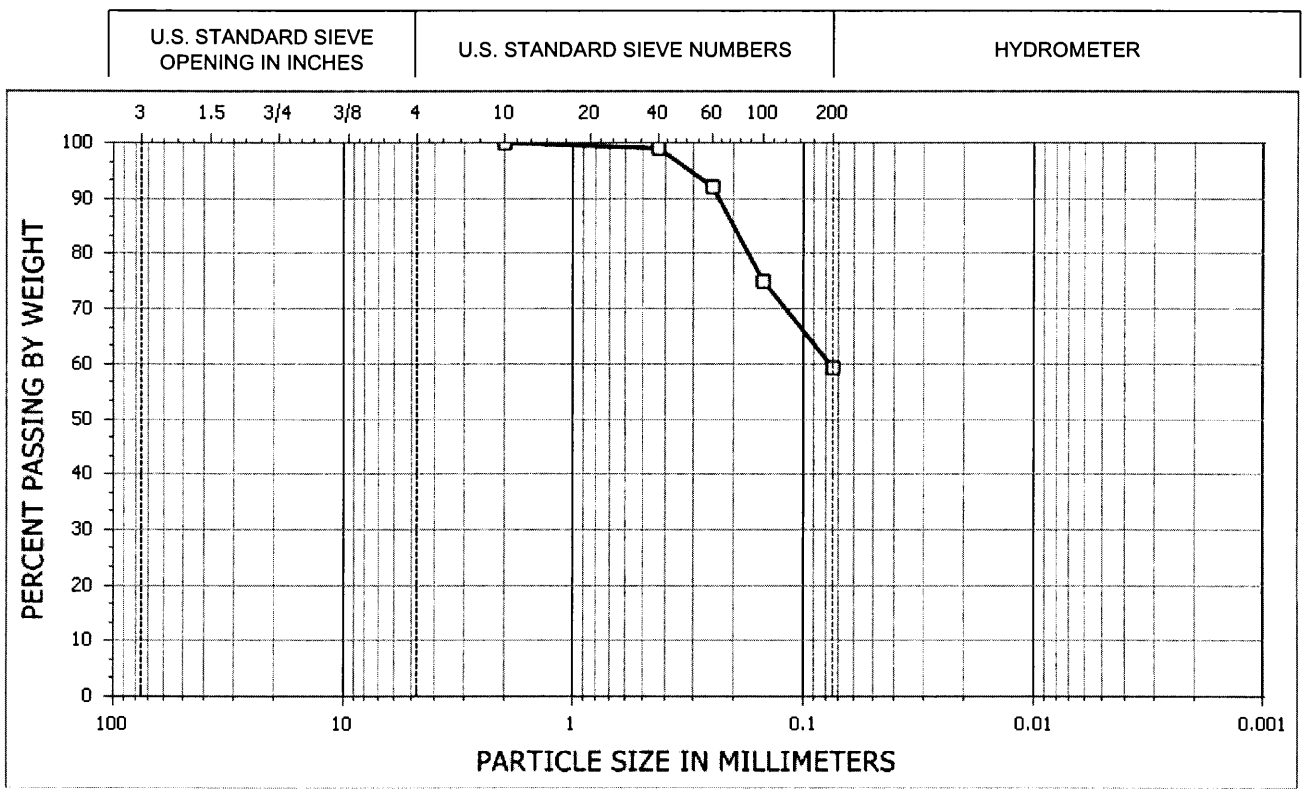
August 13, 2009

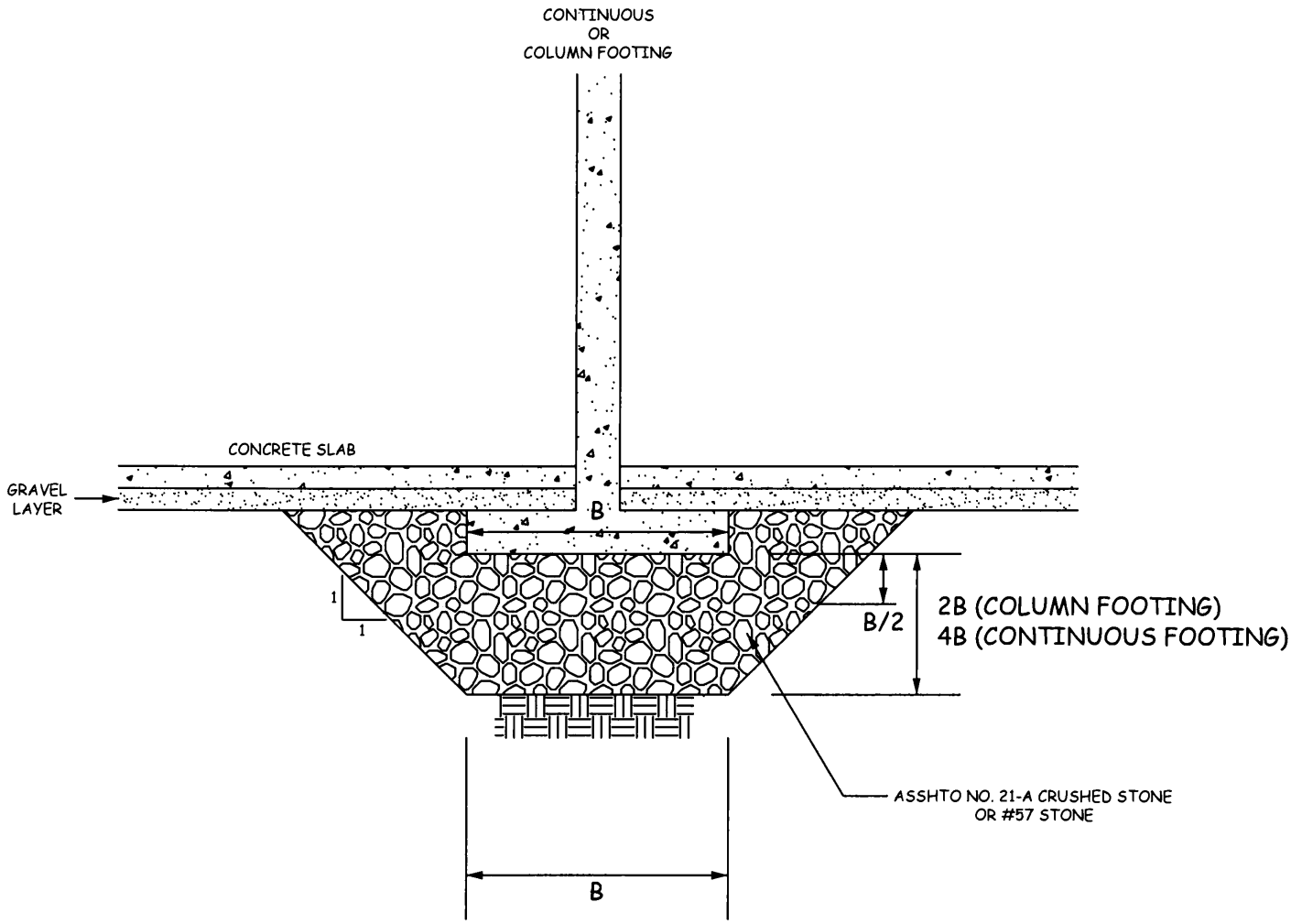
Grain Size (ASTM D-422) Test Summary

Project No.	15431	Project Name.	Kingman Island Improvements Phase I
Project Engineer	MYASEK	Principal Engineer	SSTANNARD

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



Boring / Sample Number	Depth (feet)	Test Symbol	LL	PI	Description
ECS-9 / S-12	48.50 - 50.00	□	28	15	Sandy Lean Clay Grayish Brown



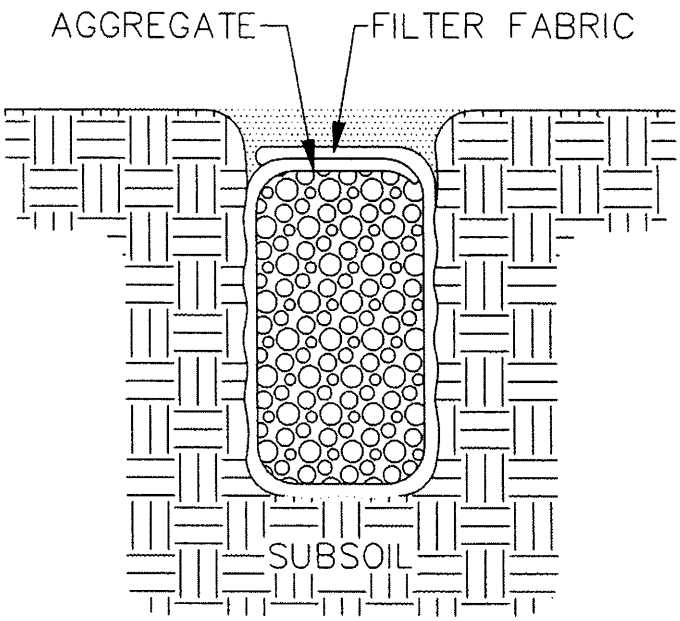
NOTES:

1) 1H:1V SIDE SLOPE OR FLATTER AS NEEDED FOR ADEQUATE STABILITY.

SELECT AGGREGATE MAT/PARTIAL UNDERCUT

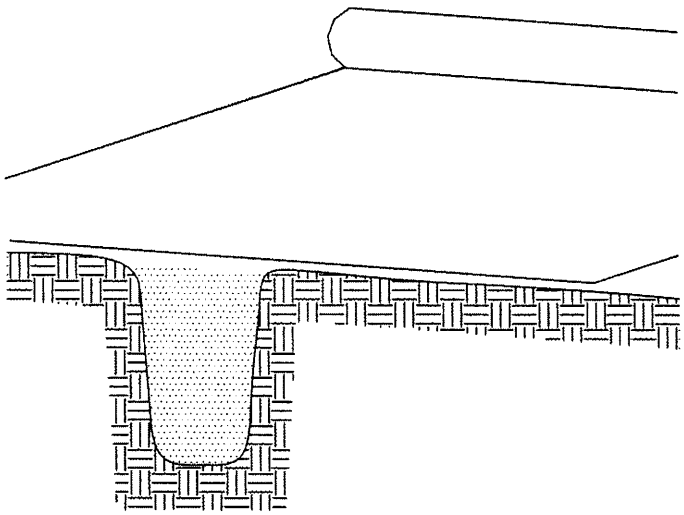
NOT TO SCALE

FINAL CONFIGURATION



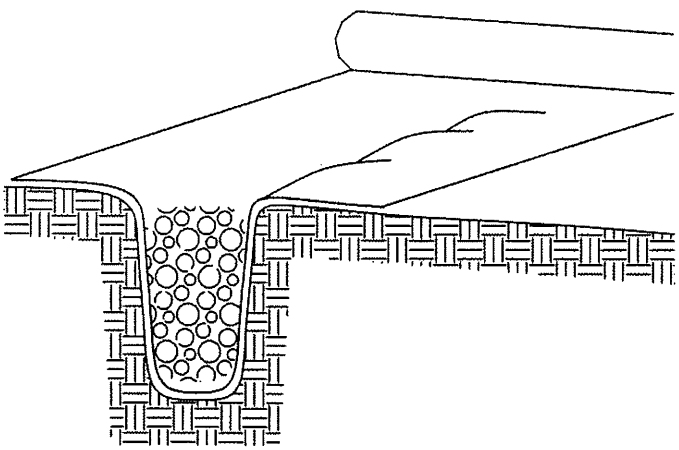
SUBDRAIN USING FILTER FABRIC

STEP 1



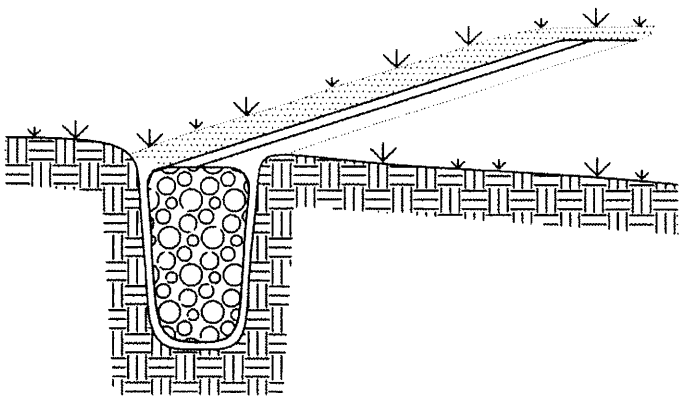
FABRIC IS UNROLLED
DIRECTLY OVER TRENCH

STEP 2



THE TRENCH IS FILLED
WITH AGGREGATE

STEP 3



THE FABRIC IS LAPPED CLOSED
AND COVERED WITH SOIL

ECS LLC
MID-ATLANTIC

14026 THUNDERBOLT PLACE
SUITE 100
CHANTILLY, VIRGINIA 20151
PHONE : (703) 471-8400
FAX : (703) 834-5527

FRENCH DRAIN INSTALLATION PROCEDURE©

SOIL CLASSIFICATION LEGEND

- FILL - FILL (POSS/PROB) OF ALL TYPES.
- GW - WELL GRADED GRAVEL
- GM - SILTY GRAVEL
- GP - POORLY GRADED GRAVEL
- GC - CLAYEY GRAVEL
- SW - WELL GRADED SAND

ST - SHELBY TUBE

- ML - LOW PLASTICITY SILT
- CL - LOW PLASTICITY CLAY
- MH - HIGH PLASTICITY SILT

RC - ROCK CORE

- SM - SILTY SAND
- SP - POORLY GRADED SAND
- SC - CLAYEY SAND

PM - PRESSURE METER

- CH - HIGH PLASTICITY CLAY
- OH - HIGH PLASTICITY ORGANIC SILTS AND CLAYS
- OL - LOW PLASTICITY ORGANIC SILTS AND CLAY
- PT - PEAT
- WR - WEATHERED ROCK

SURFACE MATERIALS

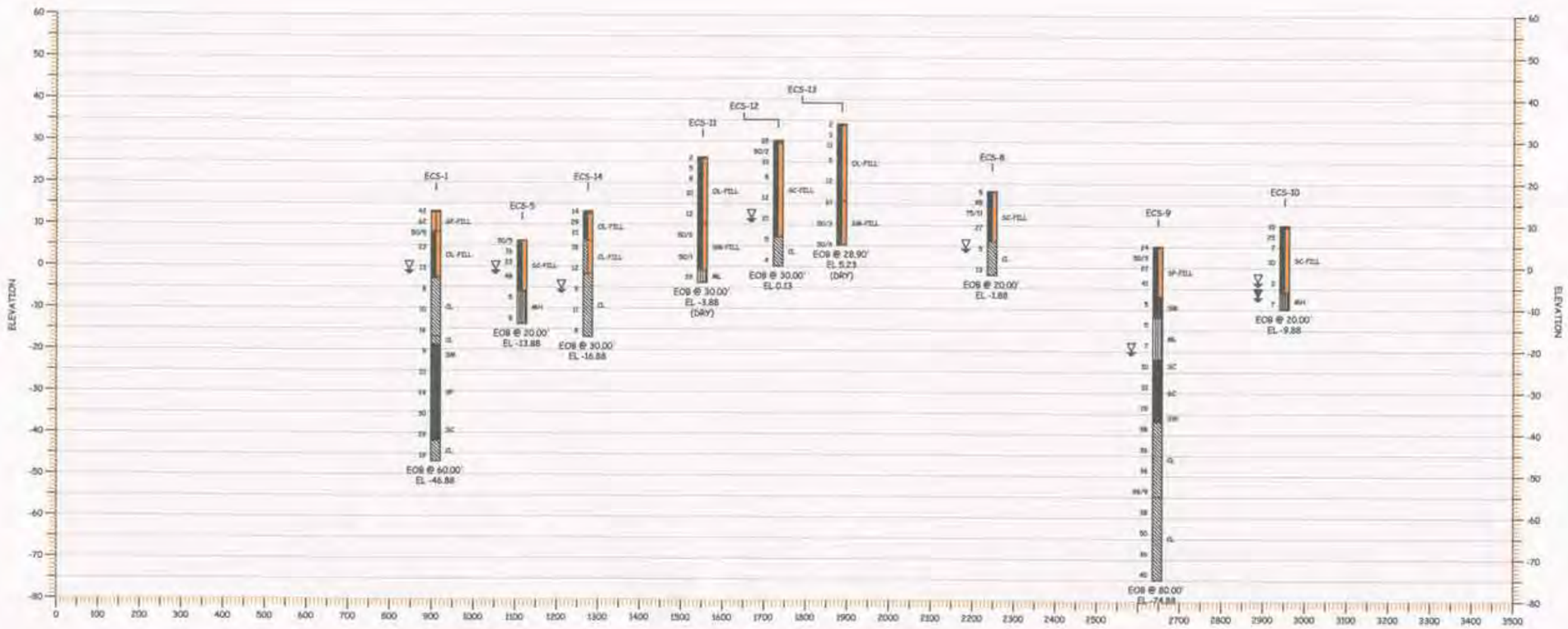
- TOPSOIL
- ASPHALT
- GRAVEL
- CONCRETE
- VOID

ROCK TYPES

- IGNEOUS
- METAMORPHIC
- SEDIMENTARY

SYMBOL LEGEND

- WATER LEVEL - DURING DRILLING/SAMPLING
- WATER LEVEL - BEFORE CASING REMOVAL
- WATER LEVEL - AFTER CASING REMOVAL
- WATER LEVEL - AFTER 24 HOURS



KINGMAN ISLAND IMPROVEMENTS

WASHINGTON, DC

ECS LLC MID-ATLANTIC

CROSS SECTION B-B

LEE & PAPA AND ASSOCIATES, INC.

ECS REVISIONS

ENGINEER	DRAFTING
MDY	RAC

SCALE: AS NOTED

PROJECT NO. 15431

SHEET 3 OF 3

DATE 08-06-09

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SOIL CLASSIFICATION LEGEND

- FILL - FILL (POSS/PROB) OF ALL TYPES
- GW - WELL GRADED GRAVEL
- GM - SILTY GRAVEL
- GP - POORLY GRADED GRAVEL
- GC - CLAYEY GRAVEL
- SW - WELL GRADED SAND
- ST - SHELBY TUBE
  - ML - LOW PLASTICITY SILT
  - CL - LOW PLASTICITY CLAY
  - MH - HIGH PLASTICITY SILT
- RC - ROCK CORE
  - SM - SILTY SAND
  - SP - POORLY GRADED SAND
  - SC - CLAYEY SAND
- PM - PRESSURE METER
  - CH - HIGH PLASTICITY CLAY
  - OH - HIGH PLASTICITY ORGANIC SILTS AND CLAYS
  - OL - LOW PLASTICITY ORGANIC SILTS AND CLAY
- PT - PEAT
- WR - WEATHERED ROCK

SURFACE MATERIALS

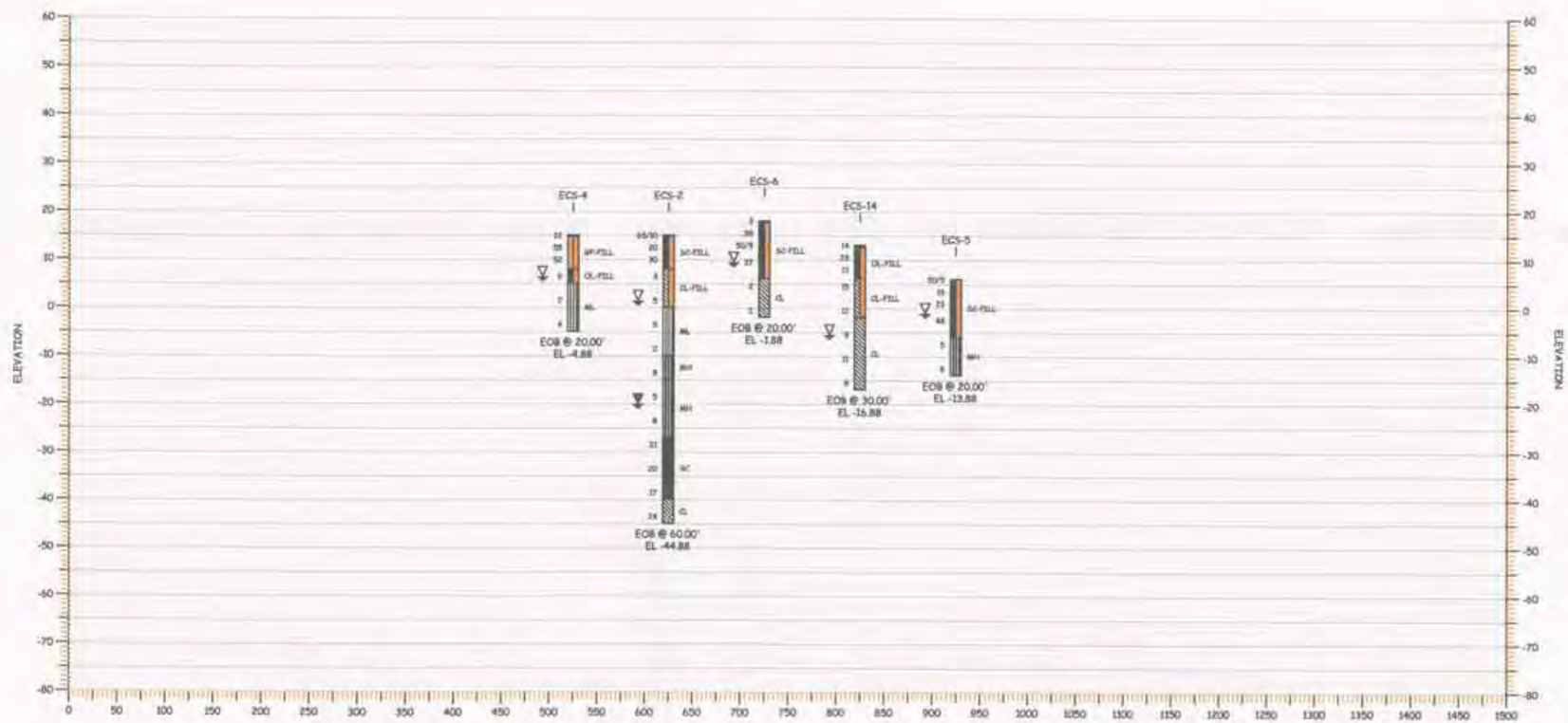
- TOPSOIL
- ASPHALT
- GRAVEL
- CONCRETE
- VOID

ROCK TYPES

- IGNEOUS
- METAMORPHIC
- SEDIMENTARY

SYMBOL LEGEND

- WATER LEVEL - DURING DRILLING/SAMPLING
- WATER LEVEL - BEFORE CASING REMOVAL
- WATER LEVEL - AFTER CASING REMOVAL
- WATER LEVEL - AFTER 24 HOURS



KINGMAN ISLAND IMPROVEMENTS

WASHINGTON, DC

ECS LLC MID-ATLANTIC

CROSS SECTION A-A

LEE & PAPA AND ASSOCIATES, INC.

ECS REVISIONS

ENGINEER	DRAFTING
MDY	RAC

SCALE: AS NOTED

PROJECT NO.: 15431

SHEET: 2 OF 3

DATE: 08-06-09

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VICINITY MAP

NTS

LEGEND:

APPROX. BORING LOCATION

SCALE (IN FEET)

175 350

350 0

KINGMAN ISLAND IMPROVEMENTS

WASHINGTON, DC

ECS LLC MID-ATLANTIC

BORING LOCATION DIAGRAM

LEE & PAPA AND ASSOCIATES, INC.

ECS REVISIONS

ENGINEER	DRAFTING
MDY	RAC

SCALE 1"=350'

PROJECT NO. 15431

SHEET 1 OF 3

DATE 08-03-09

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Geosyntec consultants
www.geosyntec.com

10015 Old Columbia Road, Suite A-200
Columbia, Maryland 21046
PH 410.381.4333
FAX 410.381.4499

12 December 2007

Ms. Adrienne McCray, ASLA
Associate
Lee + Pappa and Associates, Inc.
638 Eye Street NW
Washington, D.C. 20001

Subject: Results of Stockpile Investigation
Kingman Island
Washington, D.C.

Dear Ms. McCray:

Geosyntec Consultants, Inc. (Geosyntec) is pleased to submit this letter report summarizing the results of the Stockpile Investigation conducted at Kingman Island, Washington, D.C. The remainder of this letter report is organized in the following sections: Project Background, Summary of Findings, Field Investigation, Material Composition Analysis, Volume Estimates, Laboratory Analysis Results, and Recommendations. This letter report has been prepared by Mr. Michael Hansen and Dr. Carlos Lazarte, P.E, and reviewed by Dr. James Wang and Mr. Steve Roy, all of Geosyntec, in accordance with Geosyntec's internal review policy.

PROJECT BACKGROUND

The development plan for the Memorial Grove at Kingman Island, Washington, D.C. (Figure 1) include the use of two existing stockpiles composed of leaf compost, other organics, soil, and other materials as permanent landscape features. The stockpiles are identified as north stockpile and south stockpile on Figure 2. Geosyntec recommended performing an investigation to establish whether the stockpile material was suitable and durable. In March 2007, Geosyntec proposed a scope of work to: (i) investigate the physical properties of the existing stockpiles via field exploration and laboratory testing; (ii) assess the suitability of the stockpile as a durable backfill while allowing vegetation on top of the stockpiles; (iii) estimate the quantity of reusable materials, including compost and suitable backfill; (iv) evaluate procedures to improve the suitability of existing stockpiles; (v) develop a technical specification for processing the on-site material as usable material for construction; and (vi) provide recommendations.

SUMMARY OF FINDINGS

The main findings of this letter report are:

North Stockpile

- This stockpile is composed of suitable, durable backfill, as indicated by field observations and laboratory test results.
- It is recommended that this stockpile be left in place.
- Surficial construction debris (i.e., concrete and asphalt pieces) on the top of the stockpile should be removed.
- Compost (or a mixed of compost and other materials) generated from processing the south stockpile (see below) can be used to cap portions or the entirety of the north stockpile.

South Stockpile

- This stockpile is not suitable as a durable backfill as is.
- This stockpile needs to be processed to separate compost from non-usable material (i.e., debris).
- The compost may require some processing (including possibly debris stripping, aeration, and weed killing).
- The material in this stockpile requires the incorporation of imported aggregate or similar material to serve as a durable material.
- Additional laboratory analysis and soil fertility tests are required to determine the correct proportions and selections of individual components of the mix of compost and aggregate.

FIELD INVESTIGATION

On 30 October 2007, Geosyntec conducted a field investigation at Kingman Island that had the following objectives: observe conditions of the stockpiles fill materials, retrieve samples for laboratory testing, obtain relevant information, and support development of recommendations. Two types of laboratories testing were conducted: (i) geotechnical testing to obtain engineering properties of the stockpile materials; (ii) agricultural testing of basic index parameters for vegetation sustainability. Additionally, a fertility test (i.e., plant growth) of mixes of compost and other imported aggregate (sands or crushed glass) are proposed.

Initial site reconnaissance indicated that the stockpiles were heterogeneous and contained material that would be difficult to sample with hand-held tools. Based on these observations,

Geosyntec excavated the stockpiles using a backhoe instead to observe subsurface conditions and obtain more representative samples for testing and characterization.

On 30 October 2007, a contractor supervised by Geosyntec mobilized a rubber-tire backhoe to the site to excavate test pits at the stockpiles. Four test pits (TP-1 and TP-3 through TP-5) were excavated in the south stockpile and one (TP-2) in the north stockpile (Figure 2). Figures 3 and 4 present conceptual cross sections of the stratigraphy encountered in the north and south stockpiles, respectively. Attachment 1 includes a field log of test pits. A photograph log of test pits is presented in Attachment 2.

North Stockpile

The north stockpile has an oval shape on plan view, is approximately 230 feet (ft) long and 8 ft high. The current elevations of this stockpile will be provided once survey data is available. The top surface of this stockpile is vegetated with small trees, shrubs, and grass. Debris comprising concrete, asphalt, and other construction refuse is present on the stockpile surface. Around TP-2, the surface was vegetated with vines and short shrubs. No surface debris was observed in this area.

The subsurface conditions in this stockpile were observed in test pit TP-2, which was excavated on the west side of the stockpile (Figure 3), in an area slopping approximately 4:1 (horizontal to vertical). TP-2 was approximately 32 ft long and 6 to 0.5 ft deep. The predominant material encountered in this test pit consisted of an orange to brown clayey sand with gravel and cobbles (classified as SC, per the Unified Soil Classification System [USCS]). Concrete debris, asphalt pieces, and some lumber were also observed in this test pit. Concrete pieces, apparently part of a broken slab, were approximately 6 inches (in.) thick, 3 to 4 ft wide, and had 0.5-in. diameter protruding rebar. Numerous boulders 1- to 2- ft in size were also observed. At least one boulder was too large to be removed from the bottom of the test pit using the backhoe.

Composite soil samples were collected from the excavated material for laboratory testing and composition analysis. The test pit was backfilled with the excavated material upon completion.

South Stockpile

On plan view, this stockpile is shaped as a horseshoe (Figure 2), is approximately 250 ft long, and its height ranges from 6 ft on the north to about 17 ft on the south. The surface of the stockpile is vegetated with grass, some shrubs, and a few small trees. The surface is covered with abundant debris. Four test pits were excavated in this stockpile: TP-1, on the top of the stockpile, and TP-3, TP-4, and TP-5 on the sides. TP-1 was 13 ft deep and 10 ft long. The other test pits were shorter and their depths varied from 6 to 8 ft.

The south stockpile appears to be composed of two distinctive layers (Figure 4). The upper 2- to 4- ft thick layer includes high contents of debris mixed with compost. Debris in the upper layer

included plastic, glass, metal, and other household waste. A few tires and large pieces of carpet were also noted. The bottom layer, up to 11 to 13 ft thick, consists of a matrix of compost, soil, stones, rubble, and debris (at a smaller concentration than in the upper layer). The compost consists of partially-decomposed leaves. The soil fraction in the compost is primarily sandy silt. At a depth of approximately 7 ft below the top of the stockpile, lenses of decomposing leaves were observed. The subsurface conditions observed by Geosyntec are similar to those made by MACTEC in March 2007.

A composite soil sample was obtained from the excavated material collected from TP-4 for geotechnical testing and composition analysis. A composite soil sample was created from the excavated material obtained over the entire depth of test pit TP-1 for geotechnical and agricultural testing and composition analysis.

After completion of sampling and logging of subsurface conditions, test pits were backfilled with the excavated material. Composite samples from TP-2 and TP-4 were sent to a geotechnical laboratory (ATC Associates, Inc. of Columbia, MD) for soil analysis. The sample from TP-1 was submitted to Pine and Swallow of Groton, MA for agricultural analysis.

MATERIAL COMPOSITION ANALYSIS

Using the composite samples obtained from TP-2 (north stockpile) and TP-4 (south stockpile), Geosyntec conducted a material composition analysis to asses the existing proportions of each fraction. Based on the observations made on the predominant materials, the fractions considered in this analysis were: (i) soil (unmixed); (ii) soil and compost mixture; (iii) stones, rubble and asphalt; and (iv) other debris.

The analysis results from the TP-2 sample (north stockpile) showed that the material of the north stockpile was quite homogeneous and that soil (including sand, gravel, cobbles, and clay; but excluding non-usable rubble) is the only significant fraction, with a content percentage close to 100 percent. The percent contents of rubble and debris in the composite sample are negligible. At the bottom of test pit TP-2, however, the observed contents of rubble (e.g., pieces of concrete) are high.

Composition analyses on material from TP-4 (south stockpile) were conducted by manually sorting a 123-lb sample into the fractions listed above. Subsequently, each fraction was weighed and percentages calculated (See Table 1). Photographs of each fraction are presented in Attachment 2.

Table 1: Material Composition Analysis

Fraction	Mass (lbs)	Percent of Total Mass
Soil (unmixed)	0	0
Soil and Compost Mixture	115	94
Stones, Rubble, and Asphalt	6.5	5
Other Debris	1.5	1

The compositional analysis indicated that approximately 90 to 94 percent of the material encountered in the lower layer of the south stockpile is reusable.

VOLUME ESTIMATES

Estimates of stockpile volumes have been made to assess quantities of materials that may be reused on-site or that require disposal offsite.

A volume estimate of the north stockpile was made using the most recent topographic information contained in AutoCAD® files available from the site (dated 1998, and shown on Figure 5). The total volume of the north stockpile is estimated at 3,100 cubic yards (cy). In early 2007, MACTEC had presented an estimate of the north stockpile volume of at 7,000 cy. The discrepancy is likely because MACTEC simplistically conceived the stockpile as a rectangular prism rather than as a complex three-dimensional volume this stockpile actually is. The established vegetation over the entire stockpile suggests that no significant amount of material has been removed from the stockpile since MACTEC's observations were made in March 2007.

The existing AutoCAD® file of the site dated 1998 does not reflect the current conditions of the south stockpile. Therefore, Geosyntec requested CDDI of Beltsville, MD to conduct a new topographic survey to update the stockpile elevation data. The volume estimate of the south stockpile will be conducted once the topographic survey results are submitted to Geosyntec, and will be presented in the near future.

RESULTS OF LABORATORY ANALYSIS

Geotechnical Analysis

Samples were tested for geotechnical properties, including particle size distribution, Atterberg limits, moisture content, and organic content. Attachment 3 includes geotechnical laboratory test results.

Two composite samples from TP-2 in the north stockpile were tested for geotechnical properties: one sample from test pit segment 0 - 10 ft (measuring from east end of test pit) and one from the

10-20 ft segment. These samples were classified as SC and borderline between clayey gravel to silty gravel (GC-GM), respectively, per USCS. Atterberg limits results indicate that the fraction of fines is of low to medium plasticity. This material has an organic content of approximately 1 percent and water content between 8 to 10 percent. Overall, these parameters are reasonable for a stable fill material.

The soil fraction of the compost/soil mixture from TP-4 in the south stockpile was also tested. Particle size analysis results for the composite sample from TP-4 show that the fines content of this material is about 6 percent and can be classified borderline between poorly graded sand to silty sand (SP-SM) per USCS. The material has a water content of 12 percent and an organic content near 10 percent, which reflect the mixture of the compost. Atterberg limits were not obtained from sample from TP-4 as this sample was non plastic.

Agronomic Analysis

A composite sample from TP-1 in the south stockpile was tested for several agronomic properties to determine its suitability as a material to support vegetation. The tested properties included soil pH, micro- and macronutrients, organic matter nitrogen, nitrate-nitrogen, and ammonium-nitrogen. Attachment 4 includes agronomic laboratory test results.

Analysis results indicate that this material is suitable to support vegetation. A nearly optimal carbon to nitrogen ratio (C/N), a normal pH, low soluble salts, and trace metal concentrations indicate the material is composting to a topsoil-like material. While nutrient content of the material is relatively low (except for nitrogen), the compost is not deficient in any nutrients.

Results show that only a fraction of the nitrogen in this material is immediately available with the remainder becoming available as decomposition of the material progresses (i.e. a slow release fertilizer).

Results of carbon dioxide content tests (CO_2 color index = 7.5, using the Solvita Maturity Test™ [SMT]) and ammonia content tests (NH_3 color index = 5, per SMT) indicate that this material has reached a mature level of decomposition and is classified with a Maturity Index = 7, according to the SMT. The material is well-matured, aged, “cured” compost that has few limitations for use. According to the SMT, this compost will be suitable for a wide ranges of uses, including turf, topsoil substitute blends, and containers medium.

Further observations suggest that this compost will require some processing, including possibly debris stripping, aeration, and weed killing, to ensure long-term survival.

A preliminary specification of compost is presented in Attachment 5.

RECOMMENDATIONS

This section provides Geosyntec's recommendations for both stockpiles based on the results of the field exploration and laboratory tests and analyses.

North Stockpile

This stockpile is a relatively homogeneous material, consisting mostly of granular soil with limited contents of fines material. The fines fraction is of moderate plasticity. Cobbles and large rubbles fragment are common within the stockpile. Assuming that the conditions observed in TP-2 represent those within the stockpile, Geosyntec's opinion is that this stockpile can be left in place. The material is reasonably stable and resistant and will allow vegetation on the top surface. The following work is recommended. If pathways are to be developed or public will be allowed to access the stockpile, the surface should be stripped from debris (i.e. concrete and asphalt pieces) prior to development. In some areas (e.g., west side of the stockpile, where the stockpile is least vegetated), relative high contents of debris will require partial excavation and/or placement with a suitable topsoil cover. A 1- to 2-ft thick topsoil cap could be placed over the concrete surface debris selected areas or over the entire stockpile area and later vegetated.

South Stockpile

This stockpile is a heterogeneous mixture of: (i) materials that can be reused (e.g., compost) but need to be mixed with imported soils or other suitable recycled aggregate (e.g., crushed glass aggregate), and (ii) materials that have to be removed from the stockpile (e.g., debris).

Geosyntec recommends to: (i) process the entire stockpile, separate compost from non-usable material; (ii) mix compost with imported aggregate (e.g., soil or other suitable aggregate such as crushed glass); and (iii) stockpile this mixture of compost/aggregate for later use as fill to be part of landscape features. Depending on the final specified proportions of this mix (proposed to be investigated with additional testing) the volume of the stockpile will likely increase. Material derived from the south stockpile and blended with other materials could be used to cap the north stockpile over the areas with surface debris. Environmental sampling and laboratory analyses may be needed for the sorted and separated compost material if this is planned for reuse. These additional tests will help to confirm that no potential environmental quality concerns are associated with this material.

The upper 2- to 4- ft thick layer of this stockpile consists of both compost and non-usable material. It is estimated that approximately 80 percent of the upper layer is reusable compost. The majority of the lower layer material (estimated at 90 to 94 percent) is compost that is mostly

reusable. It is estimated that approximately 6 to 10 percent of lower layer material in this stockpile must be disposed offsite.

Geosyntec proposes to conduct a fertility analysis to test different proportions of compost and an aggregate derived from recycled materials (i.e., crushed glass) and establish acceptable mixes to promote vegetation. Once acceptable mixes are identified, additional agronomic analyses would be necessary. A preliminary specification for compost has been presented. A soil specification will be developed once acceptable mixes to promote vegetation are identified.

CLOSING

Geosyntec appreciates the opportunity to prepare this letter report summarizing the Stockpile Investigation for you. If you have any questions regarding this report, please do not hesitate to contact us at 410-381-4333.

Sincerely,

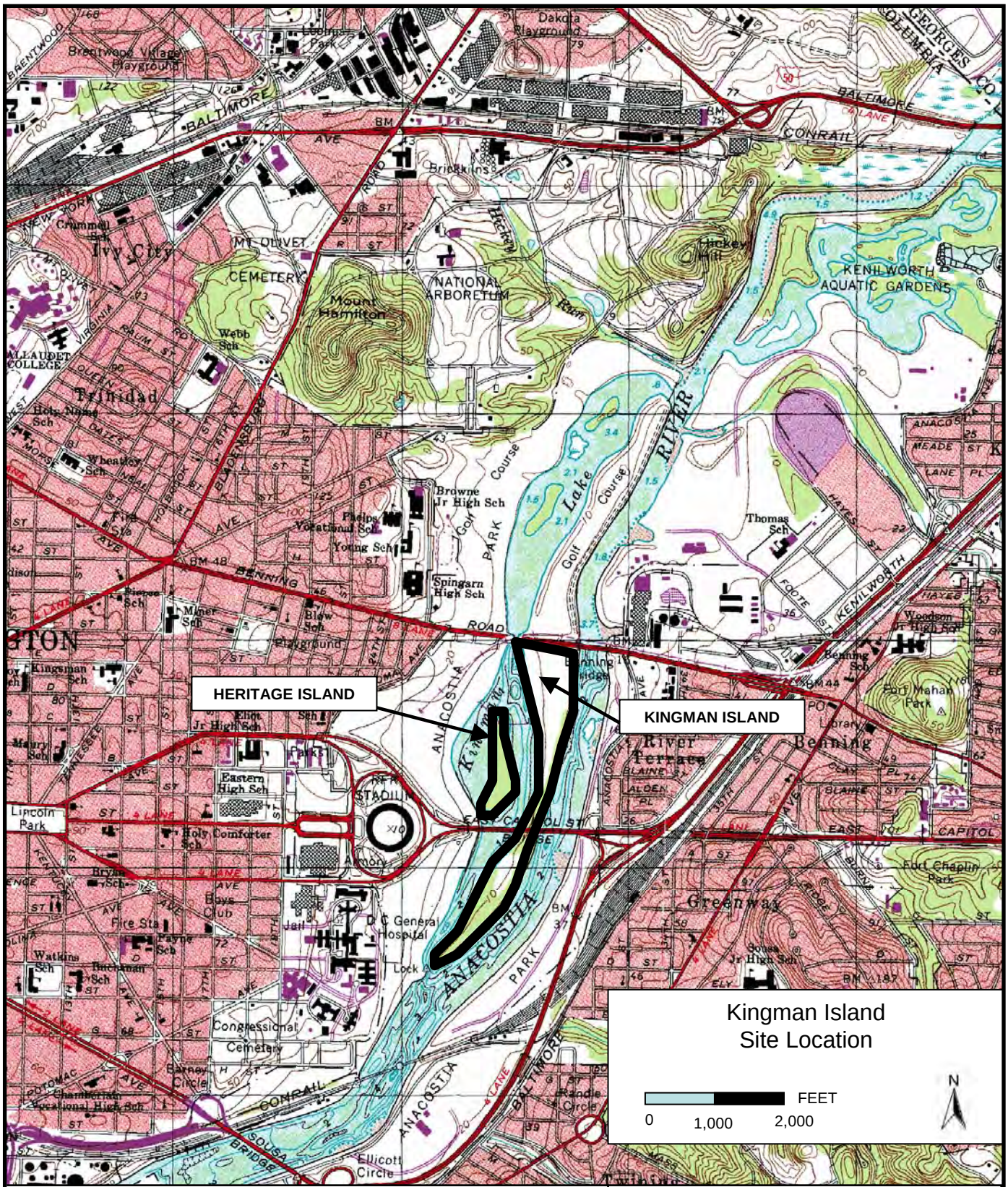
Michael A. Hansen
Senior Staff Scientist

Carlos A. Lazarte, Ph.D., P.E.
Senior Engineer

Attachments

Cc: Jennifer Smith, Steve Roy

FIGURES



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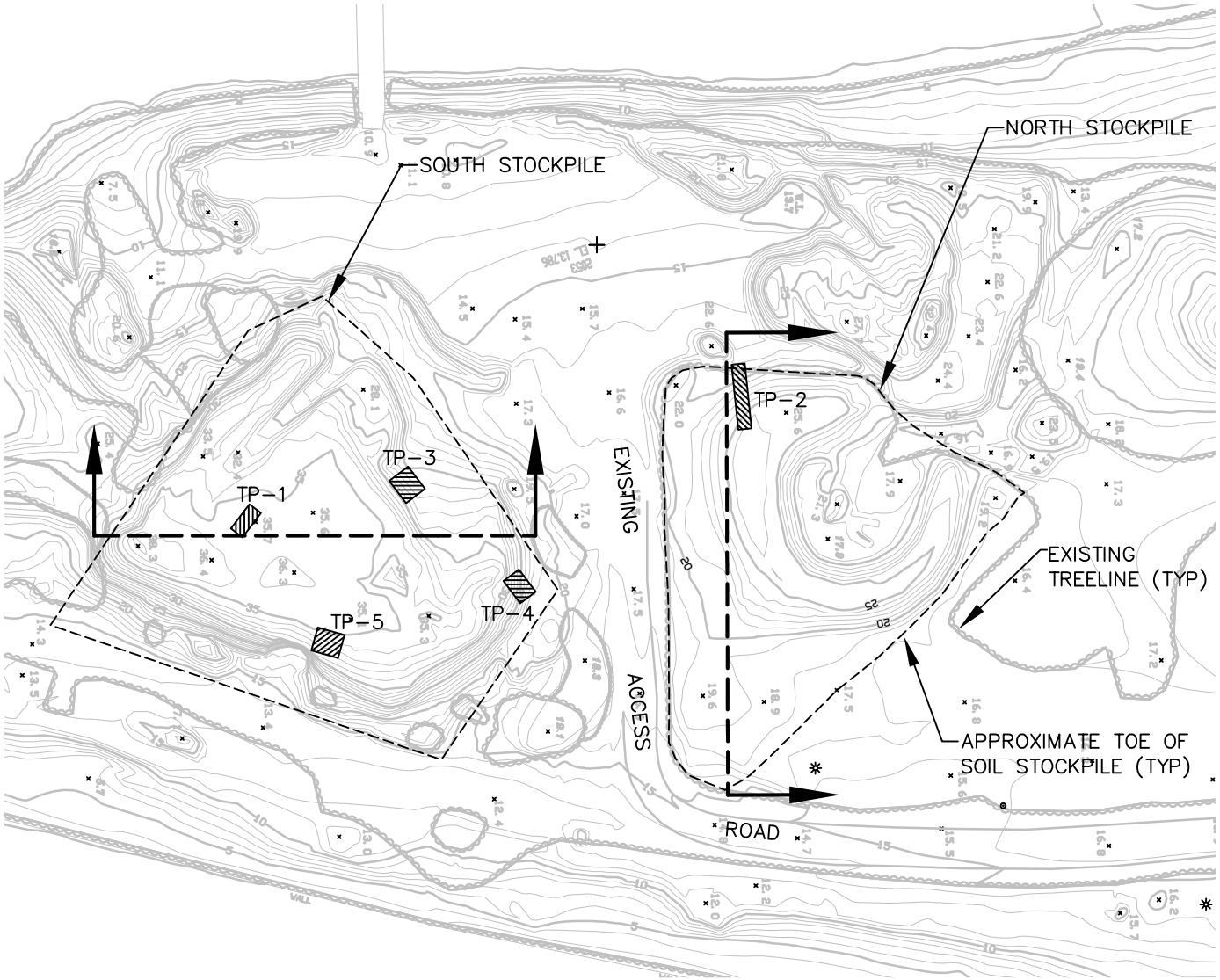
engineers | scientists | innovators

FIGURE NO.	1
PROJECT NO.	MS0568
DATE	OCTOBER 2007
FILE NO.	



NORTH

LEGEND

CROSS SECTION FOR CONCEPTUAL STRATIGRAPHY

100 50 0 100

SCALE: 1" = 100'

NOTES:

1. TEST PIT LOCATIONS AND LIMITS ARE APPROXIMATE.
2. SOUTH STOCKPILE CONTOURS DO NOT REFLECT THE CURRENT CONDITIONS.

STOCKPILE LOCATION PLAN

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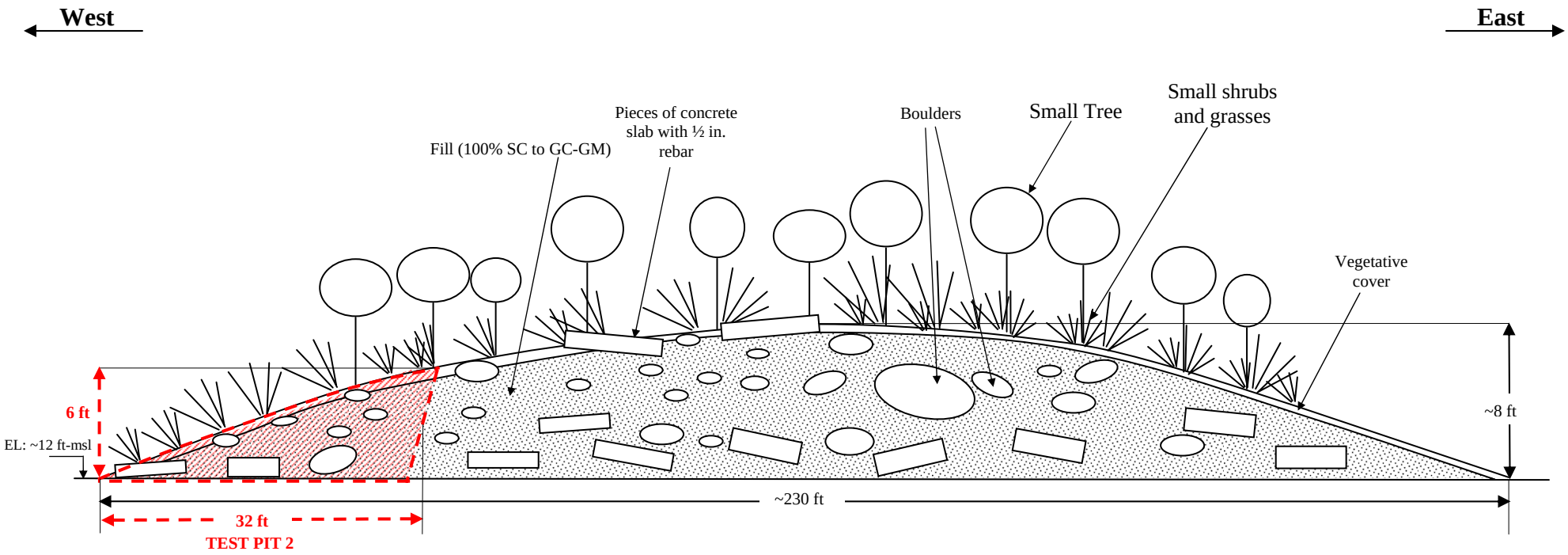
COLUMBIA, MARYLAND

DATE:	NOV 2007
PROJECT NO.	ME0558
DOCUMENT NO.	
FILE NO.	0558F006
FIGURE NO.	2

P:\cadd\0558-kingman\0558-000\0558F006.dwg, Layout1, 12/12/2007 3:47:57 PM, geosyntec consultants (joc)

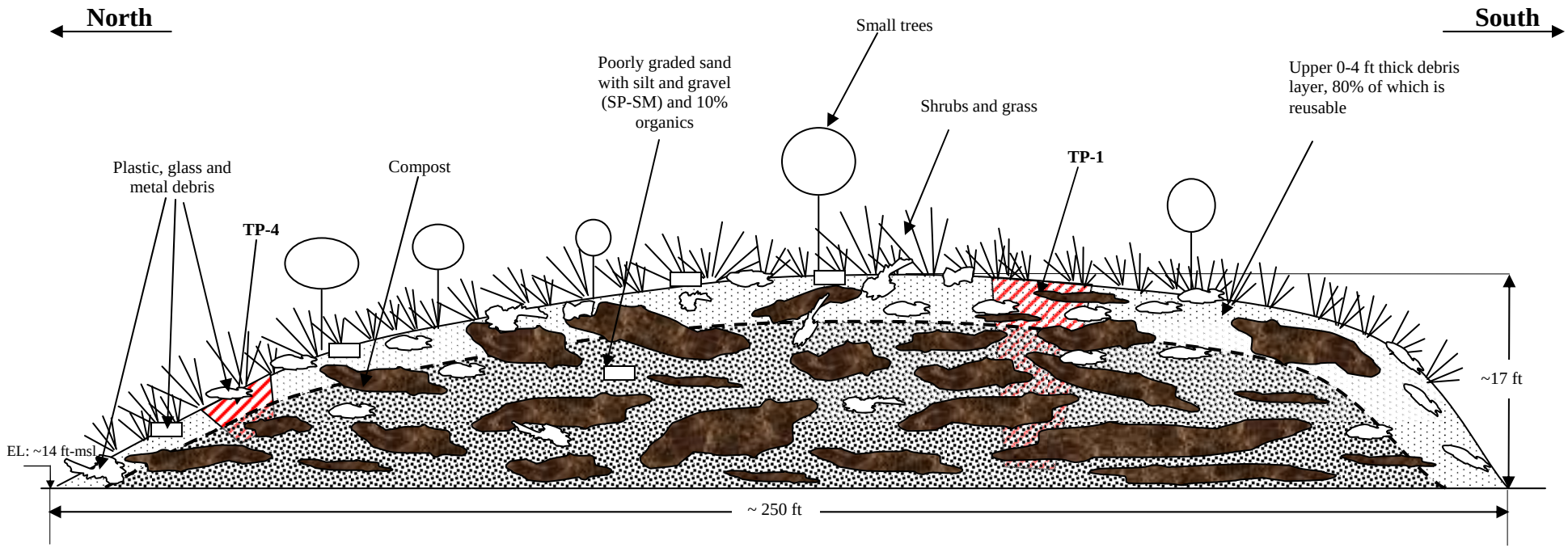


Volume: 3105 yd^3

Notes:
1. Conditions observed in test pit are assumed to exist elsewhere in the stockpile.
2. Not to scale.
3. Vertical scale exaggerated.

North Stockpile - Conceptual Stratigraphy	
Project:	Kingman Island
Project No:	MS0557
Figure No:	3

Geosyntec consultants



Volume: TBD

Notes:
1. Conditions observed in test pits are assumed to exist elsewhere in the stockpile.
2. Not to scale.
3. Vertical scale exaggerated.

South Stockpile - Conceptual Stratigraphy	
Project:	Kingman Island
Project No:	MS0557
Figure No:	4

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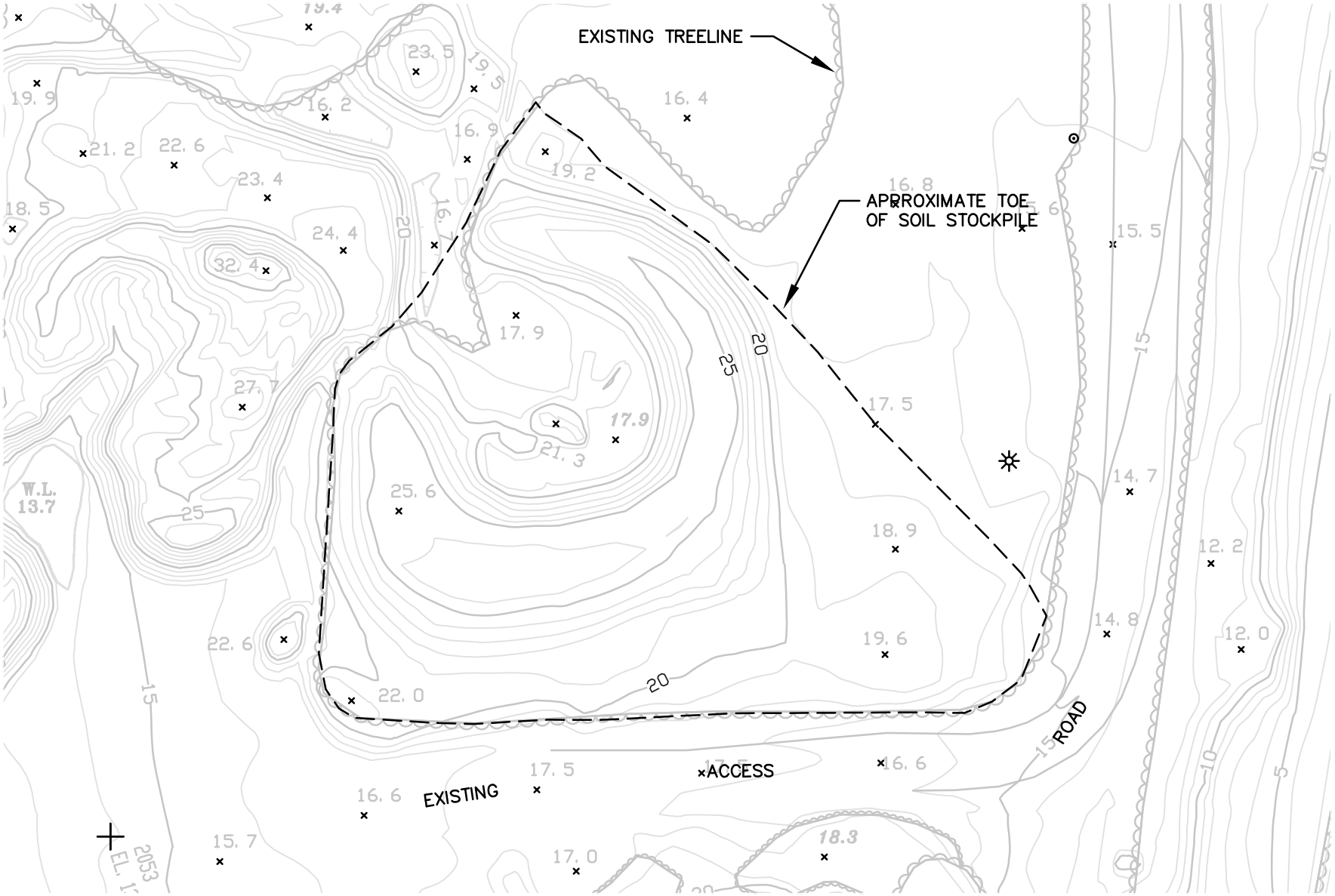

50 25 0 50

SCALE: 1" = 50'

NORTH STOCKPILE PLAN

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COLUMBIA, MARYLAND

DATE:	NOV 2007
PROJECT NO.	ME0558
DOCUMENT NO.	
FILE NO.	0558F005
FIGURE NO.	5

ATTACHMENT 1

Test Pit Logs

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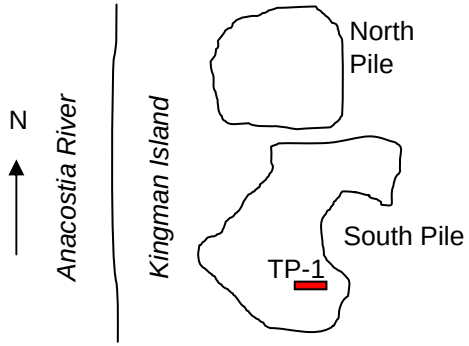
TEST PIT LOG

Location of Test Pit:	Dimentions of test pit:		Test Pit ID:	TP- 1	
	Length (ft) 10		Site:	Kingman Island	
	Depth (ft) 13		Project No.:	MS0557-01	
	Width (ft) 2		Project Mgr:	CAL	
			Started -	Date:	10/302007
				Time:	1300
			Backfilled -	Date:	10/30/2007
	Field Conditions: Sunny, low 70's			Time:	1430
			Logged by:	MAH / NNY	
	Sample numbers: TP-1		Entered by:	NNY	
			Equipment:	JCB 214e	

Depth Interval *(ft bgs)*	Soil Description
0-3	Moist, soft, dark brown silt with sand (estimated proportion: 70%), compost and other organics (25%), plastic and miscellaneous debris (2%), glass (2%), and metal (1%)
3-7	Moist, soft, dark brown silt with sand (estimated proportion: 48%), compost and other organics (48%), plastic and miscellaneous debris (2%), glass (1%), and metal (1%)
7-13	Compost and other organics (60%), silt with sand (38%), plastic, glass and metal debris (2%).
	Bottom of pit at 13'

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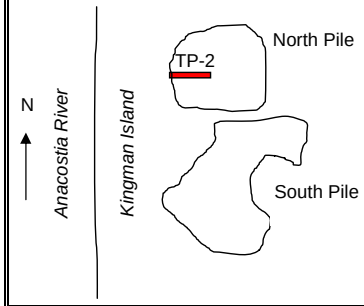
TEST PIT LOG

Test Pit Location:	Test Pit Dimensions:		Test Pit ID:	TP-2
	Length (ft) 32 Depth (ft) 8 Width (ft) 3		Site:	Kingman Island
			Project No.:	MS0557-01
			Project Mgr:	CAL
			Started -	Date: 10/30/2007 Time: 15:00
			Backfilled -	Date: 10/30/2007 Time: 16:00
	Field Conditions: Sunny, low 70°F		Logged by:	MAH / NNY
			Entered by:	NNY
	***Sample Numbers:** 1,2,3		Equipment:	JCB 214e

Depth (ft bgs)	Horizontal Interval - *feet from East end of trench*						
	0-6	6-7	7-15	15-19	19-25	25-27	27-32
0-1	Clayey sand (SC) with gravel, loose, moist, light brown, fine to medium sand, angular to sub-angular, trace silt. Some rounded boulders up to 2' in diameter.	SC, same as previous section At 5', large boulder >3' in diameter - backhoe bucket refusal.	SC, same as previous section	SC, same as previous section. At 4', large concrete piece >3' in diameter -backhoe bucket refusal.	SC, same as previous section	SC, same as previous section At 4', large concrete pieces with 1/2 in. rebar sticking out.	SC, same as previous section. At 3', large concrete slabs with 1/2 in. rebar sticking out.
1-2							
2-3							
3-4							Bottom of pit at 3'
4-5				Bottom of pit at 4'		Bottom of pit at 4'	
5-6		Bottom of pit at 5'					
6-7					Bottom of pit at 6'		
7-8			Bottom of pit at 7'				
	Bottom of pit at 8'						

***Note:** Sample 1 is composite from material removed from 0-10 ft starting from east end of test pit going west
Sample 2 is composite from material removed from 10-20ft
Sample 3 is composite from material removed from 20-32ft

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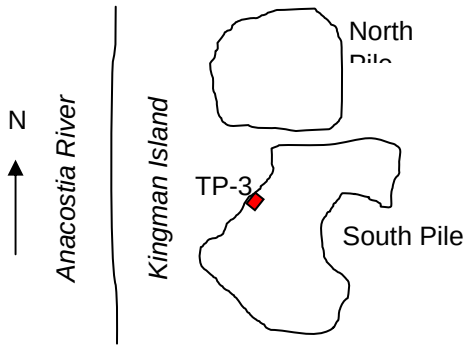
TEST PIT LOG

Location of Test Pit:	Dimentions of test pit:		Test Pit ID:	TP- 3	
	Length (ft) 10 Depth (ft) 10 Width (ft) 3		Site:	Kingman Island	
			Project No.:	MS0557-01	
			Project Mgr:	CAL	
			Started -	Date:	10/302007
				Time:	1630
			Backfilled -	Date:	10/30/2007
	Field Conditions: Sunny, low 70's			Time:	1700
			Logged by:	MAH / NNY	
	Sample numbers: No sample collected		Entered by:	NNY	
			Equipment:	JCB 214e	

Depth Interval *(ft bgs)*	Soil Description
0-2	Moist, soft, dark brown silt with sand, with compost and other organics (proportion estimated at 90%), debris (including tires, metal scrap, piece of carpet, plastic bags) (10%).
2-10	Moist, soft, dark brown compost and other organics (60%), interbedded layers of moist, dark brown silt with sand (38), debris (2%).
	Bottom of pit at 10'

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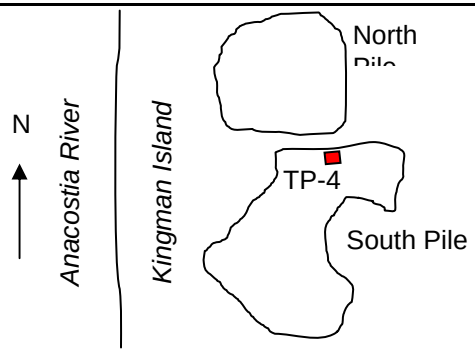
TEST PIT LOG

Location of Test Pit:	Dimentions of test pit:		Test Pit ID:	TP- 4
	Length (ft) 10		Site:	Kingman Island
	Depth (ft) 10		Project No.:	MS0557-01
	Width (ft) 3		Project Mgr:	CAL
			Started -	Date: 10/302007
				Time: 1715
			Backfilled -	Date: 10/30/2007
	Field Conditions: Sunny, low 70's			Time: 1745
			Logged by:	MAH / NNY
	Sample numbers: TP-4(0-2')		Entered by:	NNY
			Equipment:	JCB 214e

Depth Interval *(ft bgs)*	Soil Description
0-2	Moist, soft, dark brown silt with sand with leaf compost and other organics (estimated proportion 95%), plastic bags and miscellaneous plastic debris (2%), glass (2%), and metal debris (1%).
2-10	Moist, soft, dark brown silt with sand with compost and other organics (98%), plastic, metal and glass debris (2%)
	Bottom of pit at 10'

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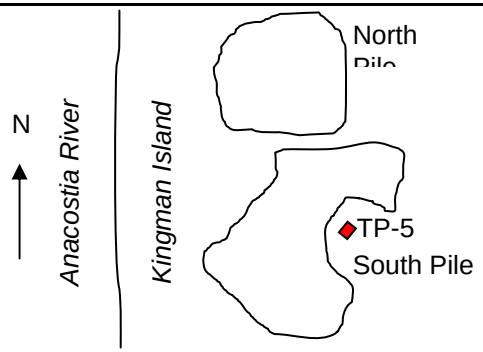
TEST PIT LOG

Location of Test Pit:	Dimentions of test pit:			
	Length (ft) 10 Depth (ft) 5 Width (ft) 5	**Test Pit ID:**	**TP- 5**	
		Site:	Kingman Island	
		Project No.:	MS0557-01	
		Project Mgr:	CAL	
		Started -	Date:	10/302007
			Time:	1800
		Backfilled -	Date:	10/30/2007
	Field Conditions: Sunny, low 70's		Time:	1830
		Logged by:	MAH / NNY	
	Sample numbers: No sample collected	**Entered by:**	NNY	
		Equipment:	JCB 214e	

Depth Interval *(ft bgs)*	Soil Description
0-5	Moist, soft, dark brown silt with sand with leaf compost and other organics (98%), trace plastic, glass, and metal debris (2%)
	Bottom of pit at 5'

ATTACHMENT 2

Photo Log

GEOSYNTEC CONSULTANTS
Photographic Record

Client:	Lee + Papa Associates, Inc.	**Project Number:**	MS0557
Site Name:	Kingman Island	**Site Location:**	Washington, DC
Date: 10/30/2007		**TEST PIT 1**	

Photograph 1

View: Looking West

Test Pit 1 location at top of south pile

Photograph 2

View: Looking East

Leaf compost and other organics as exposed

GEOSYNTEC CONSULTANTS
Photographic Record

Client:	Lee + Papa Associates, Inc.	**Project Number:**	MS0557
Site Name:	Kingman Island	**Site Location:**	Washington, DC
Date: 10/30/2007		**TEST PIT 1**	

Photograph 3

View: Looking East

Leaf compost and moist soft, silt with sand

Photograph 4

View: Looking East

Plastic debris was found to be more prevalent in top 4 ft of pit

GEOSYNTEC CONSULTANTS
Photographic Record

Client:	Lee + Papa Associates, Inc.	**Project Number:**	MS0557
Site Name:	Kingman Island	**Site Location:**	Washington, DC
Date: 10/30/2007		**TEST PIT 2**	

Photograph 1

View: Looking East

Excavation of Test Pit 2

Photograph 2

View: Looking East

South wall of test pit

GEOSYNTEC CONSULTANTS
Photographic Record

Client:	Lee + Papa Associates, Inc.	**Project Number:**	MS0557
Site Name:	Kingman Island	**Site Location:**	Washington, DC
Date: 10/30/2007		**TEST PIT 2**	

Photograph 3

View: Looking East

Boulder, approximately 2 ft in diameter, removed from test pit

Photograph 4

View: Looking East

Large piece of concrete slab, approximately 6 in. thick, removed from test pit

GEOSYNTEC CONSULTANTS
Photographic Record

Client:	Lee + Papa Associates, Inc.	**Project Number:**	MS0557
Site Name:	Kingman Island	**Site Location:**	Washington, DC
Date: 10/30/2007		**TEST PIT 3**	

Photograph 1

View: Looking East

View of test pit location

Photograph 2

View: Looking East

Test pit sidewall

GEOSYNTEC CONSULTANTS
Photographic Record

Client:	Lee + Papa Associates, Inc.	**Project Number:**	MS0557
Site Name:	Kingman Island	**Site Location:**	Washington, DC
Date: 10/30/2007		**TEST PIT 4**	

Photograph 1

View: Looking South

View of test pit location

Photograph 2

View: Looking East

Test pit sidewall

GEOSYNTEC CONSULTANTS
Photographic Record

Client:	Lee + Papa Associates, Inc.	**Project Number:**	MS0557
Site Name:	Kingman Island	**Site Location:**	Washington, DC
Date: 10/30/2007		**TEST PIT 5**	

Photograph 1

View: Looking West

Test pit sidewall

Photograph 2

View: Standing on North side of test pit looking down

Test pit sidewalls and bottom

GEOSYNTEC CONSULTANTS
Photographic Record

Client:	Lee + Papa Associates, Inc.	**Project Number:**	MS0557
Site Name:	Kingman Island	**Site Location:**	Washington, DC
Date: 10/31/2007	**MATERIAL COMPOSITION ANAYLSIS**		

Photograph 1

Soil and compost mixture.

Photograph 2

Stones, rubble, asphalt.

GEOSYNTEC CONSULTANTS
Photographic Record

Client:	Lee + Papa Associates, Inc.	**Project Number:**	MS0557
Site Name:	Kingman Island	**Site Location:**	Washington, DC
Date: 10/30/2007		**MATERIAL COMPOSITION ANAYLSIS**	

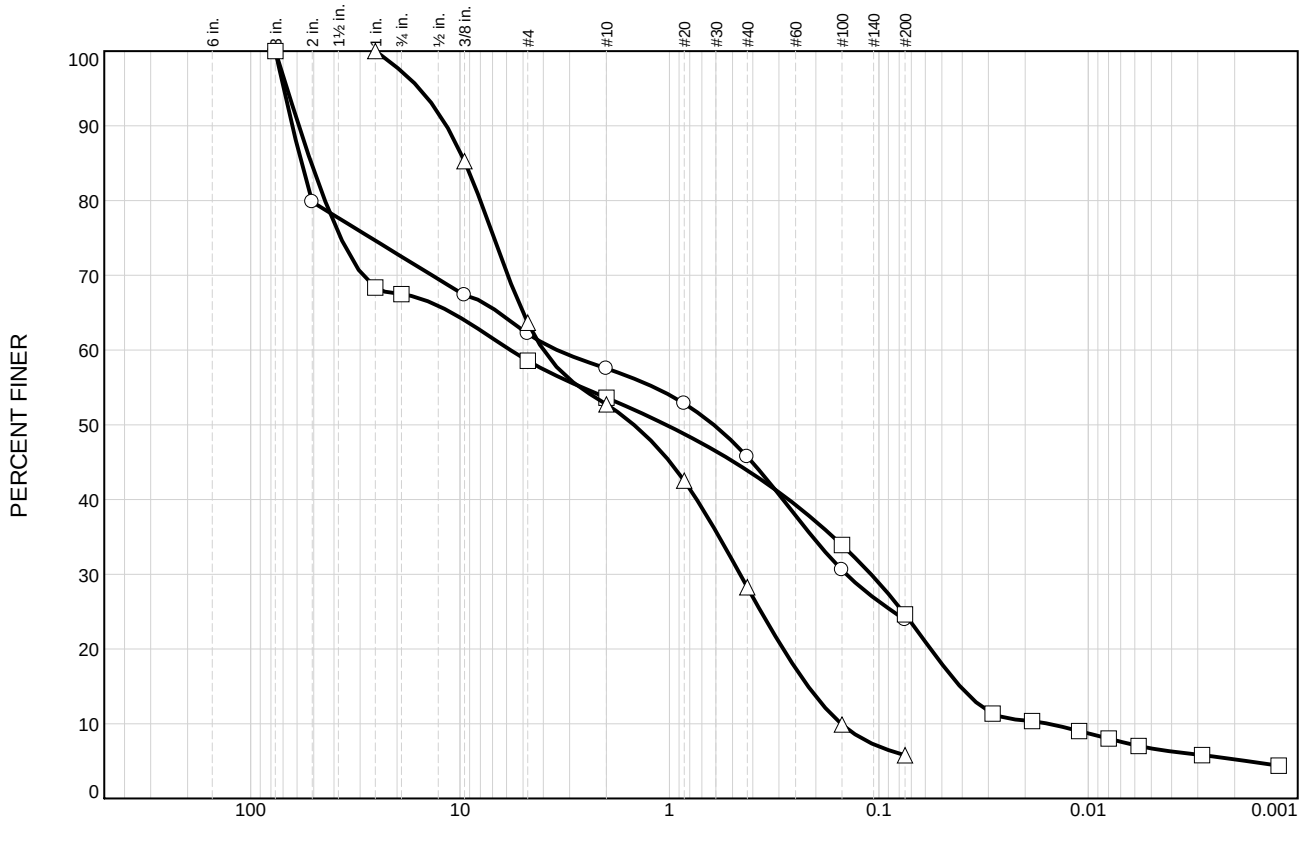
Photograph 3

Soil and compost mixture.

ATTACHMENT 3

Results of Geotechnical Laboratory Tests

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	27.5	10.3	4.7	11.8	21.8	23.9	
□	0.0	32.5	8.9	5.0	9.7	19.3	17.9	6.7
△	0.0	2.7	33.6	11.0	24.4	22.5	5.8	

SOIL DATA

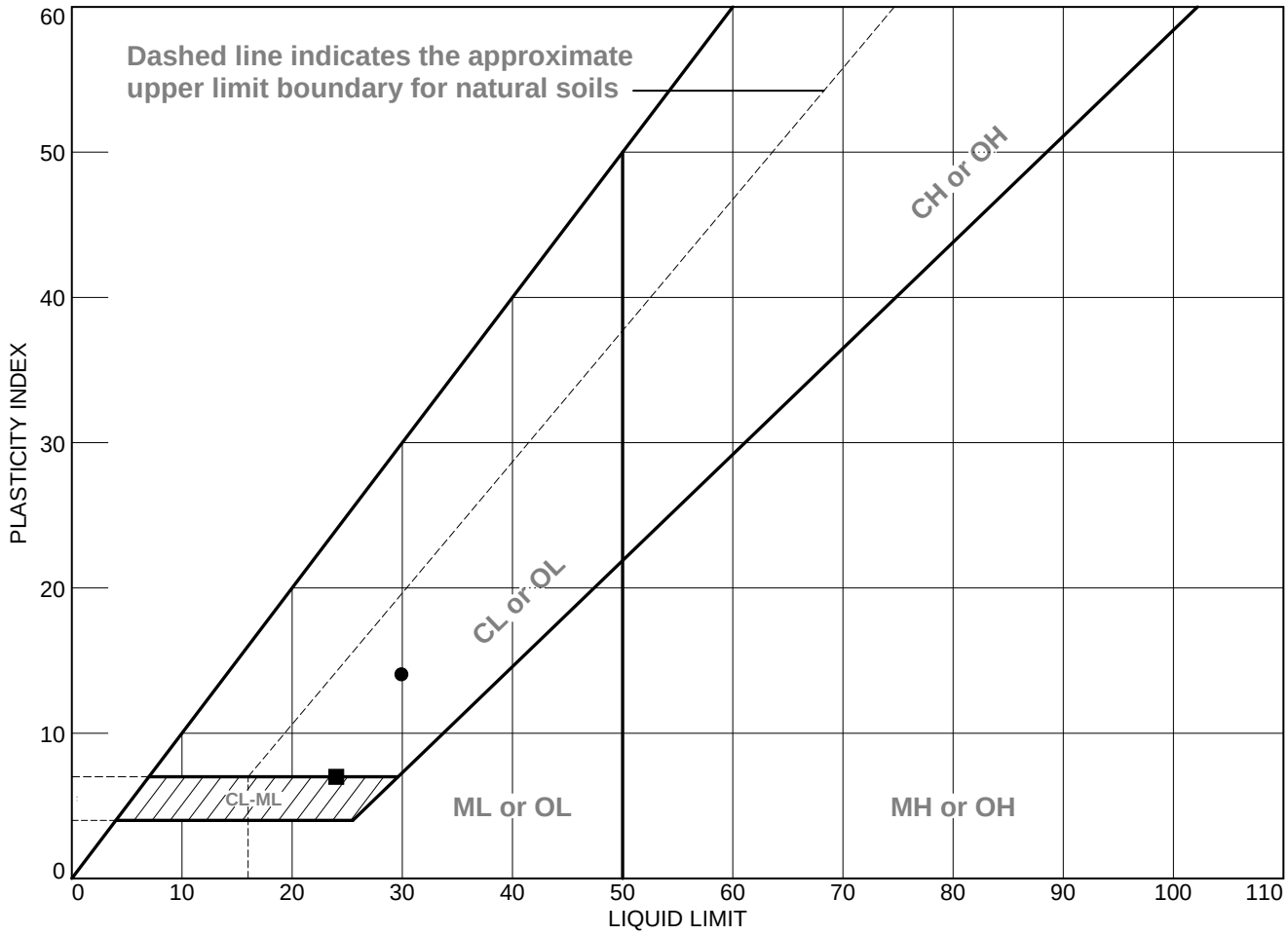
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	Test Pit 2	1		brown clayey sand with gravel (1.05% organic)	SC
□	Test Pit 2	2		brown silty clayey gravel with sand	GC-GM
△	Test Pit 4	1		dark brown poorly graded sand with silt and gravel (9.58% organic)	SP-SM

ATC ASSOCIATES, INC.

Client: Geosyntec Consultants
Project: Geosyntec Materials Testing
Project No.: 09.18312.0001 **Figure**

Tested By: KMT **Checked By:** JC

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Test Pit 2	1		9.6	16	30	14	SC
■	Test Pit 2	2		8.2	17	24	7	GC-GM
▲	Test Pit 4	1		12.1	NP	NV	NP	SP-SM

ATC ASSOCIATES, INC.

Client: Geosyntec Consultants
Project: Geosyntec Materials Testing
Project No.: 09.18312.0001 **Figure**

Tested By: KMT **Checked By:** JC

ATTACHMENT 4

Results of Agronomic Laboratory Tests

ANALYSIS REPORT FOR COMPOST

11/16/07

SOIL AND PLANT TISSUE TESTING LABORATORY
WEST EXPERIMENT STATION
UNIVERSITY OF MASSACHUSETTS
AMHERST, MA 01003

Lab Number: C071113-104
Bag Number: 74582

SAMPLE INFORMATION

PINE AND SWALLOW ENVIRONMENTAL
967 BOSTON ROAD
GROTON, MA 01450

COMPOSTING METHOD:
AGE:
INTENDED USE:
COMPONENTS:

COMPOST ANALYSIS REPORT

SAMPLE ID: 07247 D.C. COMPOST

Moisture As Received: 44.2 %
Moist Bulk Density: 0.75 grams/cm3 (0.63 tons/yd3)
Coarse Fragments: 25.6

pH (v:v): 7.4
Soluble Salts (Elec. Cond.): 1.14 dS/M

Total Nitrogen: 0.82 % (5.8 lbs/yd3)
Nitrate-N: 66 mg/kg (0.05 lbs/yd3)
Ammonium-N: 33 mg/kg (0.02 lbs/yd3)

Organic Matter: 32.7 %
Estimated Organic Carbon: 17.7 %
Carbon/Nitrogen Ratio: 21.5

NUTRIENT RATING

NUTRIENT LEVELS:		PPM	LOW	MEDIUM	HIGH	VERY HIGH
Phosphorus	(P)	76	xxxxxx			
Potassium	(K)	1427	xxxxxxxxxxxxxxxxxx			
Calcium	(Ca)	10015	xxxxxxxxxxxxxxxxx			
Magnesium	(Mg)	1235	xxxxxxxxxxxxxxx			

EQUIVALENT BASE CATION PERCENTAGES
Ca =78.5 Mg =15.9 K = 5.8

POTENTIAL ACIDITY
0.0 lbs CaCO3/yd3

EXTRACTABLE MICRONUTRIENTS

MICRONUTRIENT		mg/kg	COMPOST RANGE
Boron	(B)	9.5	(0.5-20)
Manganese	(Mn)	181.2	(5-200)
Zinc	(Zn)	39.5	(5-50)
Copper	(Cu)	0.7	(0.5-5)
Iron	(Fe)	8.4	(5-200)

EXTRACTABLE HEAVY METALS

METAL		mg/kg	COMPOST RANGE
Lead	(Pb)	8.0	(0-25)
Cadmium	(Cd)	0.2	(0-1.0)
Nickel	(Ni)	0.9	(0-2.5)
Chromium	(Cr)	0.1	(0-2.5)

Consult enclosed interpretation sheet. Questions may be directed to either Frank Mangan (Extension Specialist) at (978) 422-6374 or the UMass Soil Lab at (413)545-2311

Soil and Plant Nutrient Testing Lab
West Experiment Station
University of Massachusetts
Amherst, MA 01003
413.545.2311
http://www.umass.edu/plsoils/soiltest

11/15/07

TEXTURAL ANALYSIS RESULTS

Customer Name: Pine & Swallow Environmental
John Swallow
867 Boston Road
Groton, MA 01450

Sample ID: 74582

Customer Designation: 07247 D.C. Compost

USDA SIZE FRACTIONS

Main Fractions	Size (mm)	Percent
Sand	0.05-2.0	78.8
Silt	0.002-0.05	16.6
Clay	< 0.002	4.6
Total	< 2.0	100.0

Sand Fractions	Size (mm)	Percent
Very Coarse	1.0-2.0	8.9
Coarse	0.5-1.0	15.2
Medium	0.25-0.5	27.4
Fine	0.10-0.25	22.2
Very Fine	0.05-0.10	5.1
		78.8

Silt Fractions	Size (mm)	Percent
Coarse	0.02-0.05	3.8
Medium	0.005-0.02	9.6
Fine	0.002-0.005	3.2
		16.6

PERCENT OF WHOLE SAMPLE PASSING

Size (mm)	Sieve #	%
2.00	#10	68.1
1.00	#18	62.1
0.50	#35	51.7
0.25	#60	33.1
0.10	#140	17.9
0.05	#270	14.5
0.02	20 um	11.9
0.005	5 um	5.3
0.002	2 um	3.2

USDA Textural Class = loamy sand

Gravel Content = 31.9%

COMMENTS:

PSA Soil Testing Laboratory
pH, Soluble Salt and Solvita
Testing Form

Job #/Job Name: Washington D.C. 07247 Date: 12-8-07

Solvita Maturity Test

Sample ID	**CO_2**	**NH_3**	**Maturity Index**
compost	7.5	5	7

ATTACHMENT 5

Preliminary Compost Specification

MATERIALS

Compost shall be derived from organic wastes leaf and yard residues, and biosolids that meet all Federal and or District of Columbia Environmental Agency requirements. The product shall be well composted, free of viable weed seeds, and contain material of a generally humus nature capable of sustaining growth of vegetation, with no materials toxic to plant growth.

Compost shall have the following properties:

Parameter	Range
pH	5.5-8.0
Moisture Content	35%-55%
C:N Ratio	15-30:1
Organic Matter	> 40%
Particle Size	< 1 inch
Soluble Salts	< 4.0 mmhos (dS)
Bulk Density	< 1,000 lbs/cyd
Foreign Matter	< 1% (by weight)

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EXECUTIVE SUMMARY - FILL MOUND ENVIRONMENTAL ASSESSMENT REPORT
KINGMAN ISLAND, NORTHEAST, WASHINGTON, DC
MACTEC PROJECT 3552-06-0944.6.0

MACTEC Engineering and Consulting, Inc. (MACTEC) completed a Fill Mound Environmental Assessment for the Kingman Island ("Site") located in Northeast, Washington, D.C. Eighteen backhoe-excavated test pits were completed around the perimeter and within the central portion of three fill mounds at the Site identified by the Anacostia Waterfront Corporation (AWC), in order to assess the lateral and vertical extent of the fill and their general composition. The soil materials encountered were generally described in Pile No. 1 and 2 as topsoil/compost or a silty sand to silty gravel, mixed with varying amounts of debris such as plastic, metal, glass, tin cans, concrete and asphalt, which are not suitable as controlled fill for future on-site construction. Pile No. 3 was primarily comprised of an orange rubber membrane material, with some silty sand and debris. Although the three primary fill mounds evaluated had variable dimensions and heights, the approximate volumes of soil estimated were 12,000 cubic yards (Pile 1), 7,000 cubic yards (Pile 2) and 30 cubic yards (Pile 3). Due to the highly variable and irregular shapes and heights of each fill mound, detailed topographic surveys are recommended, if accurate estimates of total fill volumes are required.

Based on TPH-DRO laboratory analytical results (ranging from 7.39 to 838 mg/kg), the soil piles appear to contain some diesel range petroleum hydrocarbons. Although DC does not have a "clean fill" standard, soil can be left in place that does not exceed the DC UST Division and related RBCA soil quality standard of 960 mg/kg, for TPH-DRO. However, if this soil is removed it must be handled and disposed of as a solid waste or in accordance with a regulatory approved CAP or Soil Management Plan. No TCLP constituents (VOCs, SVOCs, pesticides, herbicides or metals) were detected in the two composite soil samples, which exceeded their regulatory levels. Based on these and associated ignitability and corrosivity results, the fill material would not classify as a characteristic hazardous waste. Although a 0.437 mg/kg concentration of the PCB Aroclor 1254 was detected in Pile 1 which slightly exceeded the 0.32 mg/kg USEPA RBC for residential use, it was less than the industrial use RBC of 1.4 mg/kg.

Although no TCLP lead was detected was detected in the two composite soil samples, future soil testing should include total lead analysis, and potential remediation of lead-impacted soil exceeding 1,000 mg/kg, as recommended in the Corps of Engineers November 2002 Risk Assessment Report for the Site. More detailed information regarding future Site development including building locations, cut and fill depths and utility line locations will be needed to develop a Soil Management Plan and anticipated remediation options. Petroleum contaminated soils could possibly be used as Site grading material or in berm construction, providing the surface is capped or covered with at least one foot of "clean" soil, and no direct exposure pathways to human or ecological receptors are identified.

Soil materials in each soil mound can be subdivided into "Cells" or waste management units with pre-defined volumes suitable for appropriate characterization (such as 100 to 500 cubic yards) with on-site field testing using a PID and supplemental hydrocarbon field test kits (such as immunoassay analyses) to semi-quantatively estimate the TPH concentration present. Mobile screening and recycling equipment (with integrated sorting lines, magnets, conveyors, screeners, grinders, etc.) can be utilized on-site to sort out concrete, rubble, trash, debris and gravel from the soil so the end product can be further tested for potential petroleum contaminants of concern. This processing should reduce the overall volume (weight) of potential petroleum contaminated soil requiring off-site disposal, and possibly allow much of the organic topsoil to be utilized on-site in areas of rough grading, where roads and load-bearing structures are not proposed. Soil materials may be separated into different Waste Profiles, depending on the levels of petroleum contaminants present. Appropriate Waste Profiles include a profile for Clean - Non-Petroleum Contaminated Soils, State Clean Fill Soils and Petroleum-Contaminated Soils.

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March 7, 2007

Mr. Jeffrey Seltzer, P.E.
Capital Projects Manager
Anacostia Waterfront Corporation
1100 New Jersey Avenue, SE, Suite 700
Washington, DC 20003

Subject: **Fill Mound Environmental Assessment Report**
Kingman Island
Northeast, Washington, DC
MACTEC Project 3552-06-0944.6.0

Dear Mr. Seltzer:

MACTEC Engineering and Consulting, Inc. (MACTEC) is pleased to submit this Fill Mound Environmental Assessment Report for the Kingman Island ("Site") located in Northeast, Washington, D.C. The approximate location of the Site is shown on Figure 1. The purpose of this assessment was to complete backhoe-excavated test pits around the perimeter and within the central portion of various fill mounds at the Site identified by the Anacostia Waterfront Corporation (AWC), in order to assess the lateral and vertical extent of the fill and its general composition. This project was performed for the AWC in general accordance with MACTEC's Proposal dated January 18, 2007.

BACKGROUND AND PROJECT INFORMATION

The U.S. Army Corps of Engineers prepared a Risk Assessment Report for Kingman Island dated November 2002, which was provided to MACTEC for review. The purpose of the risk assessment was to evaluate the feasibility of proposed development plans for Kingman Island for recreational and habitat-enhancement purposes. Based on information included in the report, Kingman Island consists of approximately 94 acres of land and separates Kingman Lake from the Anacostia River mainstream. The island is approximately 1.5 miles long and is bisected by Benning Road. In addition, the East Capitol Street Bridge passes directly over the middle of the southern portion of the island. The area south of Benning Road where MACTEC completed the fill mound test pit excavations. This area is owned by the District of Columbia, consists of approximately 70 acres and remains undeveloped.

MACTEC Engineering and Consulting, Inc.
21740 Beaumeade Circle, Suite 150 • Ashburn, Virginia 20147 • Phone: 703-729-1416 • Fax: 703-858-1858
www.mactec.com

The creation of Kingman Island reportedly began in 1916 by the U.S. Army Corps of Engineers as a result of Anacostia River dredging operations. The placement of dredged material at the Site ceased prior to 1920. The original intent of the island was to provide outdoor recreational areas for surrounding city communities, but development was interrupted during the outbreak of World War II. During this time the neighboring communities used the island for fishing and nature walks, and to create "victory gardens" during the war. Since then, the island has been growing wild and has reportedly been used for unofficial dumping of local refuse. The historic, unauthorized dumping of fill and the presence of large composting piles are reportedly the only recent changes in the topography of Kingman Island. Sources of this later fill material are unknown, although it was suggested in the Risk Assessment Report that some fill material came from the old Kenilworth Landfill.

AWC requested MACTEC to complete backhoe excavated test pits within several of the larger fill mounds at the Site, to evaluate the types of material present, the presence of potential contaminants of concern, and estimate the volume of soil/debris. The approximate locations of the two primary fill mounds evaluated by MACTEC (designated as Pile No. 1 and 2) are shown on Figure 3. A third smaller fill mound evaluated, Pile No. 3, is shown on Figure 2.

The MS Word version of the Corps of Engineers November 2002 Risk Assessment Report for Kingman Island provided to MACTEC by AWC, did not contain tables or figures to illustrate the locations of sampling points and the associated concentrations of contaminants of concern previously detected. Therefore, no direct correlation can be made between these results and the recent analytical results for soil samples collected by MACTEC in February 2007. However, the Risk Assessment Report indicates that there was no reason to alter the Preferred Master Plan, based on current Site conditions. Risks to humans were found to be acceptable and although some risks to wildlife were identified, there appeared to be no effect on overall populations. Although predicted lead concentrations at the Site were not of concern in the blood-lead level modeling, the presence of lead concentrations at the Site over 1,000 mg/kg in soil was considered a concern. It was therefore recommended in the Corps of Engineers 2002 Risk Assessment Report that concentrations of lead in soil of 1,000 mg/kg or greater be remediated.

FIELD SAMPLING ACTIVITIES

Field sampling activities were completed by MACTEC on February 7, 2007. A John Deere 310G backhoe and operator were utilized to collect composite soil samples along the sidewalls and from the base of 18 test pits, that were excavated into the fill mounds. A MACTEC Environmental Geologist provided oversight

during the field sampling activities. The approximate locations of the 18 test pits, designated as TP-1 through TP-18, are shown on Figures 2 and 3.

A representative composite soil sample was collected from the base and sidewalls of each test pit using a decontaminated stainless steel trowel. The composite soil samples were visually described and given an estimated Unified Soil Classification System (USCS) classification. A representative portion of each soil sample was placed into a plastic baggie, filling about half of it and allowing a "head-space" to remain above the sample. The bag was then sealed and labeled. A portable HNU Systems photoionization detector (PID) equipped with a 10.2 ev lamp was subsequently used to test for the presence of volatile organic compounds (VOCs) in the "head-space" of each collected soil sample after approximately 15 minutes and then recorded. The remaining portion of the sample was placed into an additional bag, sealed, placed on ice and retained for laboratory analysis, if required.

Test pits TP-1 through TP-7 were completed within the limits of the fill mound Pile #1, while test pits TP-8, 12, 13, 15, 16 and 17 were completed within the limits of Pile #2 (see Figure 3). One composite soil sample was prepared for each of these two large soil piles by combining representative portions of soil samples collected from each test pit. These two composite samples designated as Pile 1 and Pile 2 Composites, were laboratory analyzed for full Toxicity Characteristics Leaching Procedure (TCLP) constituents (VOCs, SVOCs, pesticides/herbicides, and metals), and for PCBs, ignitability, pH and percent moisture. Both of these composite samples and one “representative” test pit composite sample collected in each Pile (TP-5 @ 0-10 feet and TP-8 @ 0-6 feet) were also laboratory analyzed for total petroleum hydrocarbons-diesel range organics (TPH-DRO), TPH-gasoline range organics (GRO), and for benzene, toluene, ethylbenzene, and xylenes (BTEX). The soil samples selected for analysis were transferred to sample containers provided by the laboratory, labeled with sample information, and placed on ice with chain-of-custody forms. Each sample was analyzed by Test America. No surveying was performed and each sampling point location was established on Figures 2 and 3 by its approximate location relative to the fill mounds.

RESULTS

Soil sample laboratory analytical data results are summarized in Table 1. Site photographs are included in Attachment A, while field soil classifications and PID head-space organic vapor results are shown on the Test Pit Summary Logs in Attachment B. Laboratory Data Reports from Test America are included in Attachment C.

PID Organic Vapor Results

As indicated on the Test Pit Logs in Attachment B, no significant organic vapor PID readings were detected in the soil samples, which ranged from 0.2 to 0.4 ppm. It should be noted that, where detected, PID readings may represent naturally occurring organic compounds or moisture/humidity influence, and are not necessarily attributable to volatile organic contaminants.

Laboratory Analytical Results

TPH-DRO was detected in each of the 4 soil samples analyzed, at concentrations ranging from 7.39 to 838 mg/kg. However, TPH-GRO was not detected above the laboratory reporting limit (ND) in these samples, except for a trace TPH-GRO concentration of 0.198 mg/kg detected in the Pile 1 sample. Benzene, toluene, ethylbenzene, and xylenes (BTEX) were also ND in these samples, except for a trace 0.00254 mg/kg concentration of ethylbenzene detected in the Pile 1 sample. Based on these results, the soil piles appear to contain some diesel and potentially heavier than diesel range petroleum hydrocarbons, with no or only trace constituents associated with lighter gasoline-range hydrocarbons. Although DC does not have a "clean fill" standard or guideline for petroleum-contaminated soils, the DC Underground Storage Tank (UST) Division regulations and associated Risk Based Corrective Action (RBCA) guidelines contain soil quality standards for TPH-DRO (960 mg/kg), TPH-GRO (814 mg/kg), BTEX and other petroleum constituents. In general, soil can be left in place that does not exceed the soil quality standards; however, if this soil is removed it must be handled and disposed of as a solid waste or in accordance with a regulatory approved Corrective Action Plan (CAP) or Soil Management Plan.

PCBs were also ND, aside from a 0.437 mg/kg concentration of the PCB Aroclor 1254 detected in Pile 1, which was slightly greater than the USEPA Risk-Based Concentration (RBC) for residential use of 0.32 mg/kg, but less than the industrial use RBC of 1.4 mg/kg. No TCLP constituents (VOCs, SVOCs, pesticides, herbicides or metals) were detected in the two composite samples, aside from trace concentrations of barium, ranging from 0.327 to 0.553 mg/L. The detected TCLP barium was significantly less than the associated USEPA Regulatory Level of 100 mg/L. Barium is also a naturally occurring metal and likely represents naturally occurring or background concentrations. In addition, both composite samples were not ignitable or corrosive. Based on these results, the fill material would not classify as a characteristic hazardous waste.

Estimated Volume of Soil Mounds

Although the three primary fill mounds evaluated had variable dimensions and heights, the approximate dimensions of the fill mounds are summarized below based on field measurements in February 2007:

IDENTIFICATION	DIMENSIONS IN FEET (L x W x H)	ESTIMATED CUBIC YARDS
PILE 1	210 x 100 x 15	12,000
PILE 2	200 x 150 x 6	7,000
PILE 3	50 x 6 x 3	30

Due to the highly variable and irregular shapes and heights of each fill mound, detailed topographic surveys are recommended if accurate estimates of total fill volumes are required. Although detailed descriptions of the fill material encountered in each test pit are included in Attachment B, most of the fill material was generally described as topsoil/compost or a silty sand to silty gravel, mixed with varying amounts of debris such as plastic, metal, glass, tin cans, concrete and asphalt. Pile No. 3 was primarily comprised of an orange rubber membrane material, with some silty sand and debris. No ground water was encountered in the test pit excavations. Much of the soil is not suitable for controlled fill or backfill material, based on the presence of trash and debris, and/or the high organic content.

PETROLEUM-CONTAMINATED SOIL MANAGEMENT PROCEDURES

No development plans regarding future construction at the Site were provided to MACTEC. We understand that the portion of the Site in the area of Piles 1 and 2 will be developed with a memorial structure, and that most of the Pile 1 and Pile 2 fill materials will require removal during future Site grading activities. More detailed information regarding the building locations, cut and fill depths and utility line locations will be needed to develop a Soil Management Plan and anticipated remediation options. The Soil Management Plan or CAP will detail proposed soil removal and disposal procedures, and establish remedial end points. In addition, Construction Specifications specifically addressing the handling, transportation and disposal of contaminated soil will need to be prepared.

As a preliminary method of pre-characterizing the Site, soil materials in each soil mound can be subdivided into "Cells" or waste management units with pre-defined volumes suitable for appropriate characterization (such as 100 to 500 cubic yards). A more thorough grid-based soil sampling approach can then be implemented, to pre-characterize the material in each Cell of waste management unit prior to removal. During subsequent soil excavation, the soil material can be field tested on-site for hydrocarbon

vapors using a PID and supplemental hydrocarbon field test kits (such as immunoassay analyses) to semi-quantatively estimate the TPH concentration present. If required, additional parameters can be analyzed, based upon the ultimate disposition of the materials (e.g., landfill, thermal treatment, biotreatment, etc.) and the waste acceptance criteria established by the facilities to which the materials will be sent for treatment and/or disposal.

Mobile screening and recycling equipment (with integrated sorting lines, magnets, conveyors, screeners, grinders, etc.) can also be utilized on-site to sort out concrete, rubble, trash, debris and gravel from the soil so the end product can be further tested for potential petroleum contaminants of concern. This processing should reduce the overall volume (weight) of potential petroleum contaminated soil requiring off-site disposal, and possibly allow much of the organic topsoil to be utilized on-site in areas of rough grading, where roads and load-bearing structures are not proposed.

Following characterization, the soils may also be separated into different Waste Profiles, depending on the levels of petroleum contaminants present. For example, “Profile A” soils might have no detectible petroleum hydrocarbon concentrations while “Profile B” soils may have TPH (or benzene, toluene, ethylbenzene, xylenes; BTEX) contamination at sufficiently low levels to permit their use as fill material pursuant to state and local requirements, including applicable set-back requirements. “Profile C” soils might require treatment and/or disposal at regulated facilities other than hazardous waste facilities. At a minimum, soil Waste Profiles should include a profile for Clean - Non-Petroleum Contaminated, State Clean Fill Soils and Petroleum-Contaminated Soils, as described below.

<u>Profile A: Clean – Non Petroleum Contaminated Soils</u>

Clean or Non-Petroleum Contaminated Soils do not contain detectable concentrations of petroleum hydrocarbons or other hazardous materials.

<u>Profile B: State or DC Clean Fill Soils</u>

These materials include soils below the State "clean soil" standards of either Maryland (TPH less than 10 mg/kg), Virginia (TPH less than 50 mg/kg), or a similar site-specific guideline approved by the District of Columbia, subject to other related analytical testing, siting and regulatory restrictions. Petroleum contaminated soils from the excavation may also be aerated, processed or treated (including the use of approved biological or chemical additives), to reduce/remediate these marginally impacted soils to concentrations less than state clean fill standards. Following analytical confirmation that the material is less than the appropriate clean fill standard, potential disposal alternatives for these materials may include, but not necessarily limited to, use off-site as standard construction fill material or disposal at a Construction and Demolition Debris (CDD) Landfill or similar approved facility that is permitted to accept petroleum contaminated materials below the “clean soil" criteria.

Profile C: Petroleum Contaminated Soils

Soils with TPH concentrations exceeding State Clean Fill guidelines (or that cannot be treated or processed to achieve TPH concentrations less than the Maryland, Virginia or related clean fill standards) must be disposed of in accordance with applicable Law. Potential disposal/treatment alternatives for these soil materials may include, but not necessarily limited to, use as daily cover or disposal at Subtitle D landfills or off-site treatment using thermal desorption, bioremediation, asphalt encapsulation or other proven technologies capable of remediating hydrocarbon levels to concentrations less than applicable regulatory standards.

CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations were developed based on MACTEC's soil sampling activities:

- MACTEC completed 18 backhoe-excavated test pits around the perimeter and within the central portion of various fill mounds at the Site identified by AWC, in order to assess the lateral and vertical extent of the fill and their general composition. The soil materials encountered were generally described in Pile No. 1 and 2 as topsoil/compost or a silty sand to silty gravel, mixed with varying amounts of debris such as plastic, metal, glass, tin cans, concrete and asphalt, which are not suitable as controlled fill for future on-site construction. Pile No. 3 was primarily comprised of an orange rubber membrane material, with some silty sand and debris.

- Although the three primary fill mounds evaluated had variable dimensions and heights, the approximate volumes of soil estimated were 12,000 cubic yards (Pile 1), 7,000 cubic yards (Pile 2) and 30 cubic yards (Pile 3). Due to the highly variable and irregular shapes and heights of each fill mound, detailed topographic surveys are recommended, if accurate estimates of total fill volumes are required.

- Based on TPH-DRO laboratory analytical results (ranging from 7.39 to 838 mg/kg), the soil piles appear to contain some diesel range petroleum hydrocarbons. Although DC does not have a "clean fill" standard or guideline, soil can be left in place that does not exceed the DC UST Division and related RBCA soil quality standard of 960 mg/kg, for TPH-DRO. However, if this soil is removed it must be handled and disposed of as a solid waste or in accordance with a regulatory approved CAP or Soil Management Plan.

- No TCLP constituents (VOCs, SVOCs, pesticides, herbicides or metals) were detected in the two composite soil samples, which exceeded their regulatory levels. Based on these and associated ignitability and corrosivity results, the fill material would not classify as a characteristic hazardous waste. Although a 0.437 mg/kg concentration of the PCB Aroclor 1254 was detected in Pile 1 which slightly exceeded the 0.32 mg/kg USEPA RBC for residential use, it was less than the industrial use RBC of 1.4 mg/kg.

- Although no TCLP lead was detected was detected in the two composite samples, future soil testing should include total lead analysis, and potential remediation of lead-impacted soil

exceeding 1,000 mg/kg considered, as recommended in the Corps of Engineers Risk Assessment Report.

- More detailed information regarding future Site development including building locations, cut and fill depths and utility line locations will be needed to develop a Soil Management Plan and anticipated remediation options. Petroleum contaminated soils could possibly be used as Site grading material or in berm construction, providing the surface is capped or covered with at least one foot of “clean” soil, and no direct exposure pathways to human or ecological receptors are identified.

- Soil materials in each soil mound can be subdivided into "Cells" or waste management units with pre-defined volumes suitable for appropriate characterization (such as 100 to 500 cubic yards) with on-site field testing using a PID and supplemental hydrocarbon field test kits (such as immunoassay analyses) to semi-quantatively estimate the TPH concentration present.

- Mobile screening and recycling equipment (with integrated sorting lines, magnets, conveyors, screeners, grinders, etc.) can be utilized on-site to sort out concrete, rubble, trash, debris and gravel from the soil so the end product can be further tested for potential petroleum contaminants of concern. This processing should reduce the overall volume (weight) of potential petroleum contaminated soil requiring off-site disposal, and possibly allow much of the organic topsoil to be utilized on-site in areas of rough grading, where roads and load-bearing structures are not proposed.

- Soil materials may be separated into different Waste Profiles, depending on the levels of petroleum contaminants present. Appropriate Waste Profiles include a profile for Clean - Non-Petroleum Contaminated Soils, State Clean Fill Soils and Petroleum-Contaminated Soils.

CLOSING

We appreciate the opportunity to provide our environmental services to AWC on this project. If you have any questions, please do not hesitate to contact our office at (703) 729-1416.

Sincerely,

MACTEC ENGINEERING AND CONSULTING, INC.

Jeffrey E Paget, P.G.
Senior Geolgoist

BY BRC
WITH PERMISSION

Brent R. Chapman, P.G.
Principal

TABLES AND FIGURES:

Table 1 – Soil Analytical Results
Figure 1 – Topographic Map
Figure 2 – Site Location Map
Figure 3 – Test Pit Locations Map

ATTACHMENT A – PHOTOGRAPHS
ATTACHMENT B – TEST PIT SUMMARY LOGS
ATTACHMENT C – LABORATORY ANALYTICAL DATA REPORTS

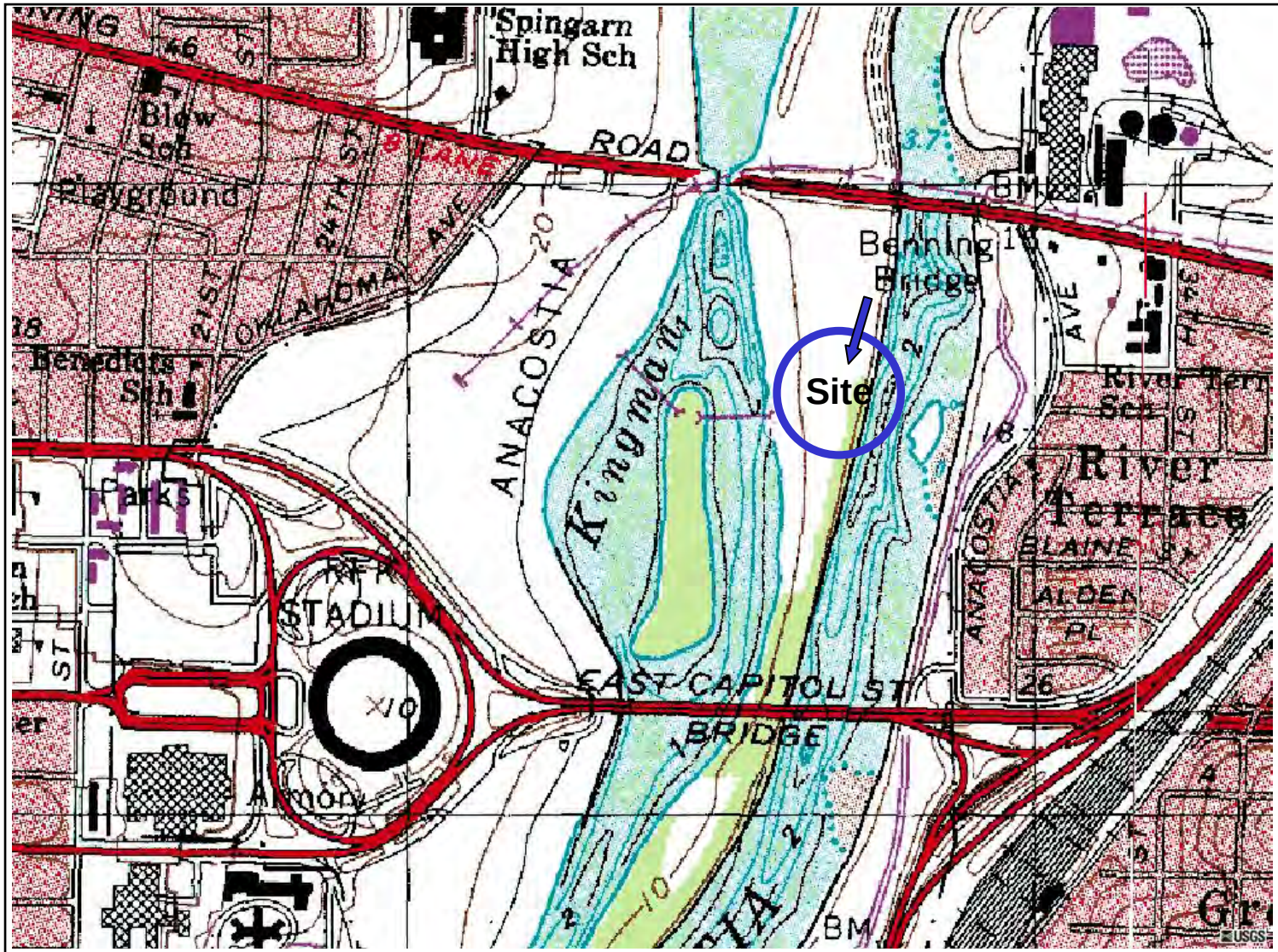
TABLES AND FIGURES

TABLE 1: Soil Analytical Results

Sample Location:	PILE 1 COMPOSITE	TP-5	PILE 2 COMPOSITE	TP-8	
Sample Date:	2/7/2007	2/7/2007	2/7/2007	2/7/2007	
Sample Depth (feet):	Composite	0 - 10	Composite	0 - 6	**DC Soil Quality Standard or USEPA Regulatory Level**
PARAMETER ANALYZED (units)					
TPH-DRO (mg/kg)	**128**	**838**	**7.39**	**10.5**	960
TPH-GRO (mg/kg)	**0.198**	<119	<0.109	<0.108	814
Benzene (mg/kg)	<0.00125	<1.19	<0.00109	<0.00108	0
Toluene (mg/kg)	<0.00125	<1.19	<0.00109	<0.00108	125
Ethylbenzene (mg/kg)	**0.00254**	<1.19	<0.00109	<0.00108	1,160
Total Xylenes (mg/kg)	<0.00374	<3.56	<0.00326	<0.00325	504
Total BTEX (mg/kg)	**0.00254**	ND	ND	ND	**---**
TCLP VOLATILES:	ND	**---**	ND	**---**	**---**
TCLP SEMI-VOLATILES:	ND	**---**	ND	**---**	**---**
TCLP PESTICIDES:	ND	**---**	ND	**---**	**---**
TCLP HERBICIDES:	ND	**---**	ND	**---**	**---**
TCLP METALS:	ND	**---**	ND	**---**	**---**
Barium (mg/L):	**0.327**	**---**	**0.553**	**---**	100
PCBs (mg/kg)	ND		ND		
PCB 1254 (mg/kg):	**0.437**		<0.0347		0.32 ; Residential Use RBC
Ignitability (^{O}C)	NO	**---**	NO	**---**	**YES**
pH (SU)	**7.8**	**---**	**8.5**	**---**	**---**
Percent Moisture (%)	**19.7**	**---**	**9.3**	**---**	**---**

Prepared/Date: BRC/3-5-2007
Checked/Date: JEP/3-7-2007

Notes:
Only detected Toxicity Leaching Characteristics Procedure (TCLP) constituents are shown in Table.
mg/L - Milligrams per Liter
mg/kg - milligrams per kilogram
ND - All or the remaining TCLP constituents were not detected (i.e., less than the laboratory maximum reporting level).
< - Less than the Laboratory Maximum Reporting Level shown



Source: USGS 1983, Available online: http://terraserver-usa.com/usgsentry.aspx?T=2&S=11&Z=18&X=823&Y=10766&W=3, Accessed February 19, 2007

Key:

Site

- N -

SCALE : Graphical

m 100 200 300
yds 100 200 300

Kingman Island Washington, DC	MACTEC 21740 Beaumeade Circle, Suite 150 Ashburn, Virginia 20147	Topographic Map Project 3552-06-0944.6.0 Figure 1

Key:

- Site
- Test Pit
- Fill Mound No. 3

- N -

SCALE : Graphical

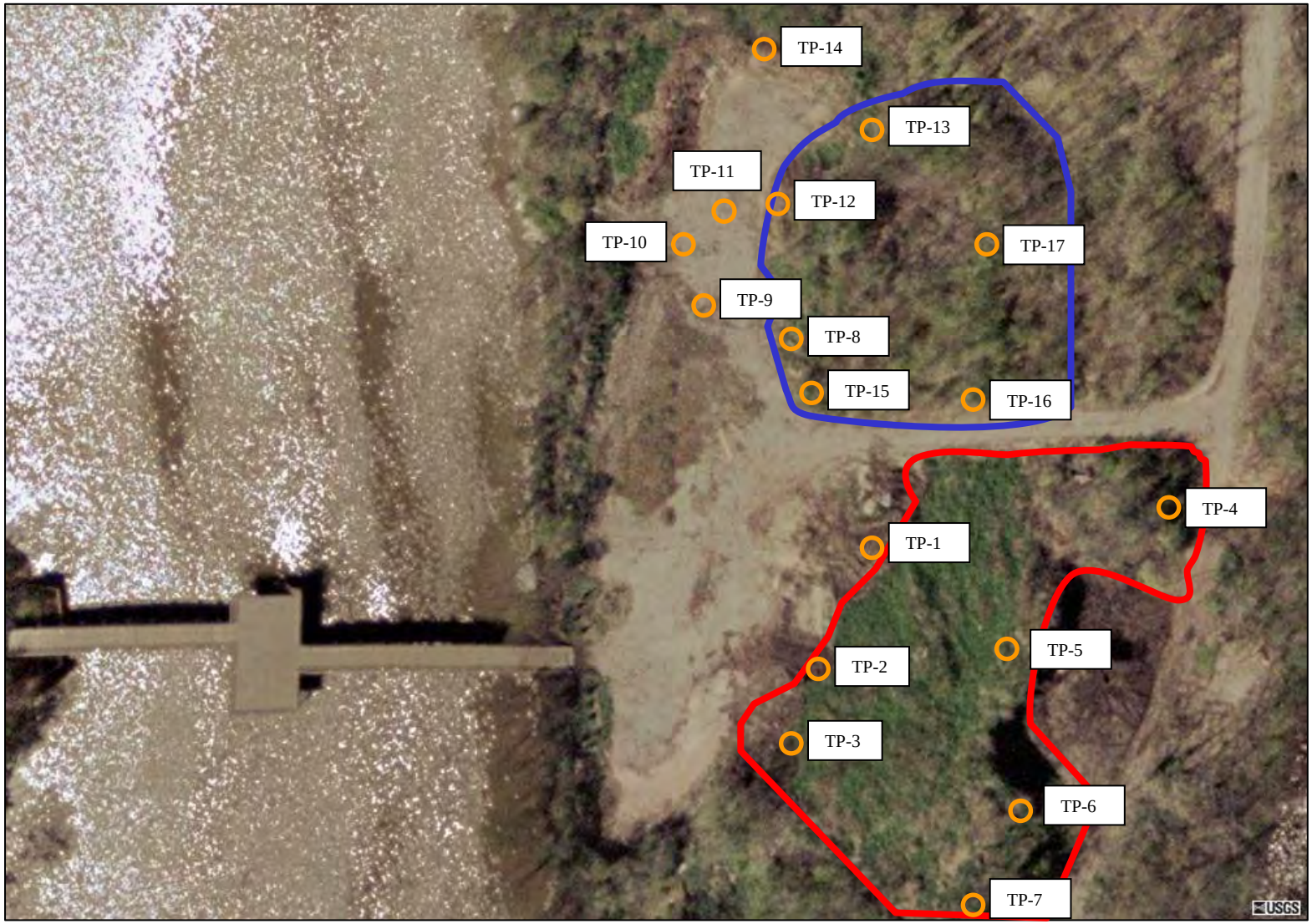
m 100 200 300
yds 100 200 300

Source: USGS 2002, Available online: http://terraserver-usa.com/usgsentry.aspx?T=4&S=11&Z=18&X=823&Y=10766&W=3, Accessed February 19, 2007

Kingman Island
Washington, DC

MACTEC
21740 Beaumeade Circle, Suite 150
Ashburn, Virginia 20147

Site Location Map
Project 3552-06-0944.6.0
Figure 2



Source: USGS 2002, Available online: http://terraserver-usa.com/usgsentry.aspx?T=4&S=9&Z=18&X=3296&Y=43068&W=3, Accessed February 19, 2007

Key:

- Test Pit
- Fill Mound No. 1
- Fill Mound No. 2

- N -

SCALE : Graphical

m 10 20 30 40
yds 15 30 45

Kingman Island Washington, DC	MACTEC 21740 Beaumeade Circle, Suite 150 Ashburn, Virginia 20147	Test Pit Location Map Project 3552-06-0944.6.0 Figure 3

ATTACHMENT A

PHOTOGRAPHS

PHOTO 1 – View of Fill Mound No. 1 facing east. Note concrete foundation slab with empty metal drum in center and large fill mound in background.

PHOTO 2 – View of Test Pit (TP-2) facing east into Fill Mound No. 1. Note organics and limited plastic debris.

PHOTO 3 – View of Test Pit (TP-3) facing southeast, into Fill Mound No. 1. Note relatively clean fill with little to no debris.

PHOTO 4 – View of Test Pit (TP-4) facing west, into Fill Mound No. 1. Note abundance of plastic, glass, tin cans and debris mixed with organics and sandy gravel.

PHOTO 5 – View of trash pile located along the west side of Fill Mound No. 1, facing west. Note garbage bags, debris, and empty apparent petroleum tank.

PHOTO 6 – View of Fill Mound No. 2, facing east.

PHOTO 7 – View of Test Pit (TP-15), into Fill Mound No. 2, facing east. Note silty sand and gravel fill with some asphalt and concrete.

PHOTO 8 – View of Isolated small fill piles just west of Fill Mound No. 2. Also note edge of the 3rd large fill mound to the north, where Test Pit (TP-14) was completed.

ATTACHMENT B

TEST PIT SUMMARY LOGS

Test Pit Summary Log				
Date	Test Pit No.	Depth (feet bgs)	Test Pit Soil Descriptions	PID Results (ppm)
2/7/2007	TP-1	0-4.5	FILL - topsoil with trace to some trash/debris and sand, black, some plastic, metal cans and gravel with wood, leaves and composte material	0.2
		4.5-5.0	FILL - Original ground, Silty Gravel - Clayey Gravel (GM-GC), gray, with some sand, apparent dredge spoils, some well rounded quartz gravels and quartz gravels and cobbles, moist to very moist	0
			Pit Terminated at 5.0 feet bgs. No ground water encountered.	
2/7/2007	TP-2		(*Excavated into hillside at mound)	
		0-17	FILL - topsoil and composte with tree limbs, leaves, mostly organics - onlytrace plastic	0
			FILL - original ground, (SM) Silty sand with some gravel (GM), trace clay, moist, light grey to brown, dredge spoils	0
			Pit Terminated at 18.0 feet bgs. No ground water encountered.	
2/7/2007	TP-3		(10+ year old tree on side of mound)	
		0-6	FILL - topsoil and organics with some brown silty sand, trace gravel, slightly moist	0
		6-7	FILL - original ground becomes (GM) silty gravel with sand	
			Pit Terminated at 7.0 feet bgs. No ground water encountered.	
2/7/2007	TP-4		(Adjacent to the road)	
		0-7.5	FILL - topsoil with some silty sand, black and brown, some gravel and trash (cans, plastic, metal, tin) concrete rubble, glass bottles, paper	0
		7.5-8	FILL - orignal ground(GM) Silty gravel - sandy gravel, grey, some iron staining, well rounded gravel, slightly moist	0
			Pit Terminated at 8.0 feet bgs. No ground water encountered.	
2/7/2007	TP-5		(Adjacent to top of mound in center of pile)	
		0-10	FILL - topsoil, black, moist to wet, trace of plastic, composte (leaves, wood, organics, trace to some silt and only trace of debris/garbage	0.4
			Pit Terminated at 10.0 feet bgs. No ground water encountered.	0
2/7/2007	TP-6		(Into side of mound - by iron pin with yellow flag)	
		0-18	FILL - Topsoil- Compost and organics with some silt and sand, trace plastic, burlap, decayed leaves and twigs, small piece of electrical wire, trace paper, wood, mostly organics, trace paper, wood, mostly organics	0
		18-19	FILL - originial ground, sandy clay with gravel, grey, moist	0
			Pit Terminated at 19.0 feet bgs. No ground water encountered.	
2/7/2007	TP-7		(By road adjacent to large boulder)	
		0-22	FILL - Brown silty sand with well rounded gravel, moist, no organics, trace metal-wire cable, concrete, trace to no garbage	0.2
			Pit Terminated at 22.0 feet bgs. No ground water encountered.	
2/7/2007	TP-8	0-6	FILL - light brown silty sand with gravel, trace organics and well rounded agate gravels, trace tin cans, paper, cobbles, increase with depth	0
			Asphalt and concrete at base	
			Pit Terminated at 6.0 feet bgs. No ground water encountered.	
2/7/2007	TP-9	0-4	(Isolated small mound)	0
			FILL -topsoil, plastic, tin cans, brick, organics, sand	
			Pit Terminated at 4.0 feet bgs. No ground water encountered.	

Date	Test Pit No.	Depth (feet bgs)	Test Pit Soil Descriptions	PID Results (ppm)
2/7/2007	TP-10	0-5	FILL - topsoil and silty sand, no debris Pit Terminated at 5.0 feet bgs. No ground water encountered.	0
2/7/2007	TP-11	0-5	(Isolated small mound) FILL - brown silty sand with gravel, trace organics, no debris Pit Terminated at 5.0 feet bgs. No ground water encountered.	0
2/7/2007	TP-12	0-8	FILL - orange brown, silty sand with some clay and gravel, trace concrete and tin cans, little to no trash Pit Terminated at 8.0 feet bgs. No ground water encountered.	0
2/7/2007	TP-13	0-7	FILL - orange brown silty sand with gravel and organics, trace plastic and wood, metal wire. No significant trash Pit Terminated at 7.0 feet bgs. No ground water encountered.	0
2/7/2007	TP-14	0-8	(In adjacent "large hill" mound 30' high) FILL - light brown silty sand with gravel, trace bricks, plastic, some large well rounded quartz cobbles. No significant trash Pit Terminated at 8.0 feet bgs. No ground water encountered.	0
2/7/2007	TP-15	0-6	FILL - light brown, silty sand with topsoil and gravel, trace clay, trace asphalt/concrete, no significant plastic or trash materials Pit Terminated at 6.0 feet bgs. No ground water encountered.	0
2/7/2007	TP-16	0-5	(Asphalt and concrete at surface) FILL - Light brown, silty sand with gravel and cobbles, trace bricks, concrete and asphalt, metal/ tin, some wood organics Pit Terminated at 5.0 feet bgs. No ground water encountered.	0
2/7/2007	TP-17	0-9	FILL - brown clayey sand with gravel, some cobbles No trash or debris, no topsoil Pit Terminated at 9.0 feet bgs. No ground water encountered.	0
2/7/2007	TP-18	0-3	Linear debris pile~ 3 feet high approximately 600 feet from Bridge 0-3 piles include orange 2" thick foam, compressed rubber membrane panels with silt/sand and organics Pit Terminated at 3.0 feet bgs. No ground water encountered.	0

Notes:
Test pits completed using a John Deere 310G backhoe
PID - Photo-ionization detector field headspace organic vapor reading
bgs - Below ground surface
ppm - Parts per million

Prepared/Date:
BRC 2/15/07
Checked/Date:

ATTACHMENT C

LABORATORY TEST DATA

TestAmerica
ANALYTICAL TESTING CORPORATION
2960 Foster Creighton Road Nashville, TN 37204 * 800-765-0980 * Fax 615-726-3404

February 28, 2007 3:56:37PM

Client: MACTEC Engineering & Consulting, Inc. (3740)
21740 Beaumeade Circle, Suite 150
Ashburn, VA 20147
Attn: Brent Chapman

Work Order: NQB0823
Project Name: MACTEC
Project Nbr: 3552060944.6.0
P/O Nbr: 76211
Date Received: 02/08/07

SAMPLE IDENTIFICATION	LAB NUMBER	COLLECTION DATE AND TIME
TP-5(0-10')	NQB0823-01	02/07/07 09:45
TP-8(0-6')	NQB0823-02	02/07/07 10:30
PILE 1 Composite	NQB0823-03	02/07/07 12:30
PILE 2 Composite	NQB0823-04	02/07/07 12:40

An executed copy of the chain of custody, the project quality control data, and the sample receipt form are also included as an addendum to this report. If you have any questions relating to this analytical report, please contact your Laboratory Project Manager at 1-800-765-0980. Any opinions, if expressed, are outside the scope of the Laboratory's accredidation.

This material is intended only for the use of the individual(s) or entity to whom it is addressed, and may contain information that is privileged and confidential. If you are not the intended recipient, or the employee or agent responsible for delivering this material to the intended recipient, you are hereby notified that any dissemination, distribution, or copying of this material is strictly prohibited. If you have received this material in error, please notify us immediately at 615-726-0177.

Additional Laboratory Comments:
Revised Report 2/28/07

Added TCLP Herbs, TCLP SVOC, TCLP VOA, and Ignitability to NQB0823-03 per client request.
Virginia Certification Number: 00323

The Chain(s) of Custody, 2 pages, are included and are an integral part of this report.

These results relate only to the items tested. This report shall not be reproduced except in full and with permission of the laboratory.

Estimated uncertainity is available upon request.

This report has been electronically signed.

Report Approved By:

Roxanne L. Connor

Roxanne Connor

Program Manager - Conventional Accounts

TestAmerica
ANALYTICAL TESTING CORPORATION
2960 Foster Creighton Road Nashville, TN 37204 * 800-765-0980 * Fax 615-726-3404

Client	MACTEC Engineering & Consulting, Inc. (3740)	Work Order:	NQB0823
	21740 Beaumeade Circle, Suite 150	Project Name:	MACTEC
	Ashburn, VA 20147	Project Number:	3552060944.6.0
Attn	Brent Chapman	Received:	02/08/07 08:00

ANALYTICAL REPORT

Analyte	Result	Flag	Units	MRL	Dilution Factor	Analysis Date/Time	Method	Batch
Sample ID: NQB0823-01 (TP-5(0-10') - Soil) Sampled: 02/07/07 09:45								
General Chemistry Parameters								
% Dry Solids	**42.1**		%	0.500	1	02/20/07 15:00	SW-846	7022880
Volatile Organic Compounds by EPA Method 8021B								
Benzene	ND	RL1	mg/kg dry	1.19	50	02/13/07 20:15	SW846 8021B	7022205
Ethylbenzene	ND	RL1	mg/kg dry	1.19	50	02/13/07 20:15	SW846 8021B	7022205
Toluene	ND	RL1	mg/kg dry	1.19	50	02/13/07 20:15	SW846 8021B	7022205
Xylenes, total	ND	RL1	mg/kg dry	3.56	50	02/13/07 20:15	SW846 8021B	7022205
Surr: a,a,a-Trifluorotoluene (59-159%)	*98 %*					*02/13/07 20:15*	*SW846 8021B*	*7022205*
Extractable Petroleum Hydrocarbons								
Diesel	**838**		mg/kg dry	119	10	02/10/07 01:05	SW846 8015B	7021478
Surr: o-Terphenyl (32-132%)	*	*Z3*				*02/10/07 01:05*	*SW846 8015B*	*7021478*
Purgeable Petroleum Hydrocarbons								
GRO as Gasoline	ND	RL1	mg/kg dry	119	50	02/13/07 20:15	SW846 8015B	7022205
Surr: a,a,a-Trifluorotoluene (66-146%)	*98 %*					*02/13/07 20:15*	*SW846 8015B*	*7022205*
Sample ID: NQB0823-02 (TP-8(0-6') - Soil) Sampled: 02/07/07 10:30								
General Chemistry Parameters								
% Dry Solids	**91.5**		%	0.500	1	02/20/07 15:00	SW-846	7022880
Volatile Organic Compounds by EPA Method 8021B								
Benzene	ND		mg/kg dry	0.00108	1	02/13/07 00:17	SW846 8021B	7021981
Ethylbenzene	ND		mg/kg dry	0.00108	1	02/13/07 00:17	SW846 8021B	7021981
Toluene	ND		mg/kg dry	0.00108	1	02/13/07 00:17	SW846 8021B	7021981
Xylenes, total	ND		mg/kg dry	0.00325	1	02/13/07 00:17	SW846 8021B	7021981
Surr: a,a,a-Trifluorotoluene (59-159%)	*97 %*					*02/13/07 00:17*	*SW846 8021B*	*7021981*
Extractable Petroleum Hydrocarbons								
Diesel	**10.5**		mg/kg dry	10.5	2	02/10/07 20:18	SW846 8015B	7021478
Surr: o-Terphenyl (32-132%)	*70 %*					*02/10/07 20:18*	*SW846 8015B*	*7021478*
Purgeable Petroleum Hydrocarbons								
GRO as Gasoline	ND		mg/kg dry	0.108	1	02/13/07 00:17	SW846 8015B	7021981
Surr: a,a,a-Trifluorotoluene (66-146%)	*97 %*					*02/13/07 00:17*	*SW846 8015B*	*7021981*
Sample ID: NQB0823-03 (PILE 1 Composite - Soil) Sampled: 02/07/07 12:30								
General Chemistry Parameters								
% Dry Solids	**80.3**		%	0.500	1	02/20/07 15:00	SW-846	7022880
Ignitability	**No**		°F	NA	1	02/14/07 10:16	ASTM D4982B	7022118
pH	**7.80**	HTI	pH Units	0.100	1	02/09/07 16:15	SW846 9045D	7021507
Temperature of pH determination	**22.0**	HTI	°C	NA	1	02/09/07 16:23	EPA 170.1	7021511
TCLP Metals by 6000/7000 Series Methods								
Arsenic	ND		mg/L	0.100	1	02/13/07 19:56	W846 1311/6010	7022124
Barium	**0.327**		mg/L	0.100	1	02/13/07 19:56	W846 1311/6010	7022124
Cadmium	ND		mg/L	0.0100	1	02/13/07 19:56	W846 1311/6010	7022124

TestAmerica
ANALYTICAL TESTING CORPORATION
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Client	MACTEC Engineering & Consulting, Inc. (3740)	Work Order:	NQB0823
	21740 Beaumeade Circle, Suite 150	Project Name:	MACTEC
	Ashburn, VA 20147	Project Number:	3552060944.6.0
Attn	Brent Chapman	Received:	02/08/07 08:00

ANALYTICAL REPORT

Analyte	Result	Flag	Units	MRL	Dilution Factor	Analysis Date/Time	Method	Batch
Sample ID: NQB0823-03 (PILE 1 Composite - Soil) - cont. Sampled: 02/07/07 12:30								
TCLP Metals by 6000/7000 Series Methods - cont.								
Chromium	ND		mg/L	0.0500	1	02/13/07 19:56	W846 1311/6010	7022124
Lead	ND		mg/L	0.0500	1	02/13/07 19:56	W846 1311/6010	7022124
Selenium	ND		mg/L	0.100	1	02/13/07 19:56	W846 1311/6010	7022124
Silver	ND		mg/L	0.0500	1	02/13/07 19:56	W846 1311/6010	7022124
Mercury	ND		mg/L	0.0100	1	02/14/07 09:52	W846 1311/7470	7022074
Polychlorinated Biphenyls by EPA Method 8082								
PCB-1016	ND		mg/kg dry	0.0411	1	02/12/07 15:46	SW846 8082	7021466
PCB-1221	ND		mg/kg dry	0.0411	1	02/12/07 15:46	SW846 8082	7021466
PCB-1232	ND		mg/kg dry	0.0411	1	02/12/07 15:46	SW846 8082	7021466
PCB-1242	ND		mg/kg dry	0.0411	1	02/12/07 15:46	SW846 8082	7021466
PCB-1248	ND		mg/kg dry	0.0411	1	02/12/07 15:46	SW846 8082	7021466
PCB-1254	**0.437**		mg/kg dry	0.0411	1	02/12/07 15:46	SW846 8082	7021466
PCB-1260	ND		mg/kg dry	0.0411	1	02/12/07 15:46	SW846 8082	7021466
Surr: Tetrachloro-meta-xylene (63-132%)	*71 %*					*02/12/07 15:46*	*SW846 8082*	*7021466*
Surr: Decachlorobiphenyl (39-108%)	*91 %*					*02/12/07 15:46*	*SW846 8082*	*7021466*
TCLP Chlorinated Herbicides by EPA Method 8151								
2,4-D	ND	H8	mg/L	0.100	1	02/27/07 00:38	W846 1311/8151	7024277
2,4,5-TP (Silvex)	ND	H8	mg/L	0.100	1	02/27/07 00:38	W846 1311/8151	7024277
Surr: Dichloroacetic Acid (27-153%)	*56 %*					*02/27/07 00:38*	*W846 1311/8151*	*7024277*
Volatile Organic Compounds by EPA Method 8021B								
Benzene	ND		mg/kg dry	0.00125	1	02/13/07 01:23	SW846 8021B	7021981
Ethylbenzene	ND		mg/kg dry	0.00125	1	02/13/07 01:23	SW846 8021B	7021981
Toluene	**0.00254**		mg/kg dry	0.00125	1	02/13/07 01:23	SW846 8021B	7021981
Xylenes, total	ND		mg/kg dry	0.00374	1	02/13/07 01:23	SW846 8021B	7021981
Surr: a,a,a-Trifluorotoluene (59-159%)	*89 %*					*02/13/07 01:23*	*SW846 8021B*	*7021981*
TCLP Volatile Organic Compounds by EPA Method 1311/8260B								
Benzene	ND		mg/L	0.100	10	02/15/07 07:48	W846 1311/8260	7024602
2-Butanone	ND		mg/L	2.50	10	02/15/07 07:48	W846 1311/8260	7024602
Carbon Tetrachloride	ND		mg/L	0.100	10	02/15/07 07:48	W846 1311/8260	7024602
Chlorobenzene	ND		mg/L	0.100	10	02/15/07 07:48	W846 1311/8260	7024602
Chloroform	ND		mg/L	0.100	10	02/15/07 07:48	W846 1311/8260	7024602
1,2-Dichloroethane	ND		mg/L	0.100	10	02/15/07 07:48	W846 1311/8260	7024602
1,1-Dichloroethene	ND		mg/L	0.100	10	02/15/07 07:48	W846 1311/8260	7024602
Tetrachloroethene	ND		mg/L	0.100	10	02/15/07 07:48	W846 1311/8260	7024602
Trichloroethene	ND		mg/L	0.100	10	02/15/07 07:48	W846 1311/8260	7024602
Vinyl chloride	ND		mg/L	0.100	10	02/15/07 07:48	W846 1311/8260	7024602
Surr: 1,2-Dichloroethane-d4 (62-142%)	*94 %*					*02/15/07 07:48*	*W846 1311/8260*	*7024602*
Surr: Dibromofluoromethane (78-123%)	*83 %*					*02/15/07 07:48*	*W846 1311/8260*	*7024602*
Surr: Toluene-d8 (79-120%)	*93 %*					*02/15/07 07:48*	*W846 1311/8260*	*7024602*
Surr: 4-Bromofluorobenzene (75-133%)	*91 %*					*02/15/07 07:48*	*W846 1311/8260*	*7024602*
TCLP Semivolatile Organic Compounds by EPA Method 1311/8270C								
Cresol(s)	ND	H8	mg/L	0.0200	2	02/24/07 22:41	W846 1311/8270	7024267

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ANALYTICAL TESTING CORPORATION
2960 Foster Creighton Road Nashville, TN 37204 * 800-765-0980 * Fax 615-726-3404

Client	MACTEC Engineering & Consulting, Inc. (3740)	Work Order:	NQB0823
	21740 Beaumeade Circle, Suite 150	Project Name:	MACTEC
	Ashburn, VA 20147	Project Number:	3552060944.6.0
Attn	Brent Chapman	Received:	02/08/07 08:00

ANALYTICAL REPORT

Analyte	Result	Flag	Units	MRL	Dilution Factor	Analysis Date/Time	Method	Batch
Sample ID: NQB0823-03 (PILE 1 Composite - Soil) - cont. Sampled: 02/07/07 12:30								
TCLP Semivolatile Organic Compounds by EPA Method 1311/8270C - cont.								
1,4-Dichlorobenzene	ND	H8	mg/L	0.0200	2	02/24/07 22:41	W846 1311/8270	7024267
2,4-Dinitrotoluene	ND	H8	mg/L	0.0200	2	02/24/07 22:41	W846 1311/8270	7024267
Hexachlorobenzene	ND	H8	mg/L	0.0200	2	02/24/07 22:41	W846 1311/8270	7024267
Hexachlorobutadiene	ND	H8	mg/L	0.0200	2	02/24/07 22:41	W846 1311/8270	7024267
Hexachloroethane	ND	H8	mg/L	0.0200	2	02/24/07 22:41	W846 1311/8270	7024267
Nitrobenzene	ND	H8	mg/L	0.0200	2	02/24/07 22:41	W846 1311/8270	7024267
Pentachlorophenol	ND	H8	mg/L	0.0200	2	02/24/07 22:41	W846 1311/8270	7024267
Pyridine	ND	H8	mg/L	0.0200	2	02/24/07 22:41	W846 1311/8270	7024267
2,4,6-Trichlorophenol	ND	H8	mg/L	0.0200	2	02/24/07 22:41	W846 1311/8270	7024267
2,4,5-Trichlorophenol	ND	H8	mg/L	0.0200	2	02/24/07 22:41	W846 1311/8270	7024267
Surr: Terphenyl-d14 (29-149%)	*70 %*					*02/24/07 22:41*	*W846 1311/8270*	*7024267*
Surr: 2,4,6-Tribromophenol (40-161%)	*75 %*					*02/24/07 22:41*	*W846 1311/8270*	*7024267*
Surr: Phenol-d5 (11-76%)	*35 %*					*02/24/07 22:41*	*W846 1311/8270*	*7024267*
Surr: 2-Fluorobiphenyl (30-120%)	*68 %*					*02/24/07 22:41*	*W846 1311/8270*	*7024267*
Surr: 2-Fluorophenol (20-86%)	*47 %*					*02/24/07 22:41*	*W846 1311/8270*	*7024267*
Surr: Nitrobenzene-d5 (24-125%)	*66 %*					*02/24/07 22:41*	*W846 1311/8270*	*7024267*
TCLP Pesticides by EPA Method 1311/8081A								
gamma-BHC (Lindane)	ND		mg/L	0.000500	1	02/14/07 19:17	W846 1311/8081.	7022153
Chlordane	ND		mg/L	0.00100	1	02/14/07 19:17	W846 1311/8081.	7022153
Endrin	ND		mg/L	0.000500	1	02/14/07 19:17	W846 1311/8081.	7022153
Heptachlor	ND		mg/L	0.000500	1	02/14/07 19:17	W846 1311/8081.	7022153
Heptachlor epoxide	ND		mg/L	0.000500	1	02/14/07 19:17	W846 1311/8081.	7022153
Methoxychlor	ND		mg/L	0.000500	1	02/14/07 19:17	W846 1311/8081.	7022153
Toxaphene	ND		mg/L	0.0500	1	02/14/07 19:17	W846 1311/8081.	7022153
Surr: Tetrachloro-meta-xylene (46-127%)	*62 %*					*02/14/07 19:17*	*W846 1311/8081.*	*7022153*
Surr: Decachlorobiphenyl (25-144%)	*71 %*					*02/14/07 19:17*	*W846 1311/8081.*	*7022153*
Extractable Petroleum Hydrocarbons								
Diesel	**128**		mg/kg dry	61.1	10	02/10/07 01:39	SW846 8015B	7021478
Surr: o-Terphenyl (32-132%)	*	*Z3*				*02/10/07 01:39*	*SW846 8015B*	*7021478*
Purgeable Petroleum Hydrocarbons								
GRO as Gasoline	**0.198**		mg/kg dry	0.125	1	02/13/07 01:23	SW846 8015B	7021981
Surr: a,a,a-Trifluorotoluene (66-146%)	*89 %*					*02/13/07 01:23*	*SW846 8015B*	*7021981*

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Client	MACTEC Engineering & Consulting, Inc. (3740)	Work Order:	NQB0823
	21740 Beaumeade Circle, Suite 150	Project Name:	MACTEC
	Ashburn, VA 20147	Project Number:	3552060944.6.0
Attn	Brent Chapman	Received:	02/08/07 08:00

ANALYTICAL REPORT

Analyte	Result	Flag	Units	MRL	Dilution Factor	Analysis Date/Time	Method	Batch
Sample ID: NQB0823-04 (PILE 2 Composite - Soil) Sampled: 02/07/07 12:40								
General Chemistry Parameters								
% Dry Solids	**91.7**		%	0.500	1	02/20/07 15:00	SW-846	7022880
Ignitability	**No**		°F	NA	1	02/14/07 10:16	ASTM D4982B	7022118
pH	**8.50**	HTI	pH Units	0.100	1	02/09/07 16:15	SW846 9045D	7021507
Temperature of pH determination	**22.0**	HTI	°C	NA	1	02/09/07 16:23	EPA 170.1	7021511
TCLP Metals by 6000/7000 Series Methods								
Arsenic	ND		mg/L	0.100	1	02/13/07 20:00	W846 1311/6010	7022124
Barium	**0.553**		mg/L	0.100	1	02/13/07 20:00	W846 1311/6010	7022124
Cadmium	ND		mg/L	0.0100	1	02/13/07 20:00	W846 1311/6010	7022124
Chromium	ND		mg/L	0.0500	1	02/13/07 20:00	W846 1311/6010	7022124
Lead	ND		mg/L	0.0500	1	02/13/07 20:00	W846 1311/6010	7022124
Selenium	ND		mg/L	0.100	1	02/13/07 20:00	W846 1311/6010	7022124
Silver	ND		mg/L	0.0500	1	02/13/07 20:00	W846 1311/6010	7022124
Mercury	ND		mg/L	0.0100	1	02/14/07 09:55	W846 1311/7470	7022074
Polychlorinated Biphenyls by EPA Method 8082								
PCB-1016	ND		mg/kg dry	0.0347	1	02/12/07 16:07	SW846 8082	7021466
PCB-1221	ND		mg/kg dry	0.0347	1	02/12/07 16:07	SW846 8082	7021466
PCB-1232	ND		mg/kg dry	0.0347	1	02/12/07 16:07	SW846 8082	7021466
PCB-1242	ND		mg/kg dry	0.0347	1	02/12/07 16:07	SW846 8082	7021466
PCB-1248	ND		mg/kg dry	0.0347	1	02/12/07 16:07	SW846 8082	7021466
PCB-1254	ND		mg/kg dry	0.0347	1	02/12/07 16:07	SW846 8082	7021466
PCB-1260	ND		mg/kg dry	0.0347	1	02/12/07 16:07	SW846 8082	7021466
Surr: Tetrachloro-meta-xylene (63-132%)	*74 %*					*02/12/07 16:07*	*SW846 8082*	*7021466*
Surr: Decachlorobiphenyl (39-108%)	*74 %*					*02/12/07 16:07*	*SW846 8082*	*7021466*
TCLP Chlorinated Herbicides by EPA Method 8151								
2,4-D	ND		mg/L	0.100	1	02/15/07 01:58	W846 1311/8151	7022156
2,4,5-TP (Silvex)	ND		mg/L	0.100	1	02/15/07 01:58	W846 1311/8151	7022156
Surr: Dichloroacetic Acid (27-153%)	*53 %*					*02/15/07 01:58*	*W846 1311/8151*	*7022156*
Volatile Organic Compounds by EPA Method 8021B								
Benzene	ND		mg/kg dry	0.00109	1	02/13/07 00:50	SW846 8021B	7021981
Ethylbenzene	ND		mg/kg dry	0.00109	1	02/13/07 00:50	SW846 8021B	7021981
Toluene	ND		mg/kg dry	0.00109	1	02/13/07 00:50	SW846 8021B	7021981
Xylenes, total	ND		mg/kg dry	0.00326	1	02/13/07 00:50	SW846 8021B	7021981
Surr: a,a,a-Trifluorotoluene (59-159%)	*99 %*					*02/13/07 00:50*	*SW846 8021B*	*7021981*
TCLP Volatile Organic Compounds by EPA Method 1311/8260B								
Benzene	ND		mg/L	0.100	10	02/14/07 04:58	W846 1311/8260	7022079
2-Butanone	ND		mg/L	2.50	10	02/14/07 04:58	W846 1311/8260	7022079
Carbon Tetrachloride	ND		mg/L	0.100	10	02/14/07 04:58	W846 1311/8260	7022079
Chlorobenzene	ND		mg/L	0.100	10	02/14/07 04:58	W846 1311/8260	7022079
Chloroform	ND		mg/L	0.100	10	02/14/07 04:58	W846 1311/8260	7022079
1,2-Dichloroethane	ND		mg/L	0.100	10	02/14/07 04:58	W846 1311/8260	7022079
1,1-Dichloroethene	ND		mg/L	0.100	10	02/14/07 04:58	W846 1311/8260	7022079

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	21740 Beaumeade Circle, Suite 150	Project Name:	MACTEC
	Ashburn, VA 20147	Project Number:	3552060944.6.0
Attn	Brent Chapman	Received:	02/08/07 08:00

ANALYTICAL REPORT

Analyte	Result	Flag	Units	MRL	Dilution Factor	Analysis Date/Time	Method	Batch
Sample ID: NQB0823-04 (PILE 2 Composite - Soil) - cont. Sampled: 02/07/07 12:40								
TCLP Volatile Organic Compounds by EPA Method 1311/8260B - cont.								
Tetrachloroethene	ND		mg/L	0.100	10	02/14/07 04:58	W846 1311/8260	7022079
Trichloroethene	ND		mg/L	0.100	10	02/14/07 04:58	W846 1311/8260	7022079
Vinyl chloride	ND		mg/L	0.100	10	02/14/07 04:58	W846 1311/8260	7022079
Surr: 1,2-Dichloroethane-d4 (62-142%)	*92 %*					*02/14/07 04:58*	*W846 1311/8260*	*7022079*
Surr: Dibromofluoromethane (78-123%)	*86 %*					*02/14/07 04:58*	*W846 1311/8260*	*7022079*
Surr: Toluene-d8 (79-120%)	*92 %*					*02/14/07 04:58*	*W846 1311/8260*	*7022079*
Surr: 4-Bromofluorobenzene (75-133%)	*90 %*					*02/14/07 04:58*	*W846 1311/8260*	*7022079*
TCLP Semivolatile Organic Compounds by EPA Method 1311/8270C								
Cresol(s)	ND		mg/L	0.0200	2	02/14/07 18:35	W846 1311/8270	7022152
1,4-Dichlorobenzene	ND		mg/L	0.0200	2	02/14/07 18:35	W846 1311/8270	7022152
2,4-Dinitrotoluene	ND		mg/L	0.0200	2	02/14/07 18:35	W846 1311/8270	7022152
Hexachlorobenzene	ND		mg/L	0.0200	2	02/14/07 18:35	W846 1311/8270	7022152
Hexachlorobutadiene	ND		mg/L	0.0200	2	02/14/07 18:35	W846 1311/8270	7022152
Hexachloroethane	ND		mg/L	0.0200	2	02/14/07 18:35	W846 1311/8270	7022152
Nitrobenzene	ND		mg/L	0.0200	2	02/14/07 18:35	W846 1311/8270	7022152
Pentachlorophenol	ND		mg/L	0.0200	2	02/14/07 18:35	W846 1311/8270	7022152
Pyridine	ND		mg/L	0.0200	2	02/14/07 18:35	W846 1311/8270	7022152
2,4,6-Trichlorophenol	ND		mg/L	0.0200	2	02/14/07 18:35	W846 1311/8270	7022152
2,4,5-Trichlorophenol	ND		mg/L	0.0200	2	02/14/07 18:35	W846 1311/8270	7022152
Surr: Terphenyl-d14 (29-149%)	*78 %*					*02/14/07 18:35*	*W846 1311/8270*	*7022152*
Surr: 2,4,6-Tribromophenol (40-161%)	*77 %*					*02/14/07 18:35*	*W846 1311/8270*	*7022152*
Surr: Phenol-d5 (11-76%)	*61 %*					*02/14/07 18:35*	*W846 1311/8270*	*7022152*
Surr: 2-Fluorobiphenyl (30-120%)	*74 %*					*02/14/07 18:35*	*W846 1311/8270*	*7022152*
Surr: 2-Fluorophenol (20-86%)	*73 %*					*02/14/07 18:35*	*W846 1311/8270*	*7022152*
Surr: Nitrobenzene-d5 (24-125%)	*83 %*					*02/14/07 18:35*	*W846 1311/8270*	*7022152*
TCLP Pesticides by EPA Method 1311/8081A								
gamma-BHC (Lindane)	ND		mg/L	0.000500	1	02/14/07 19:32	W846 1311/8081	7022153
Chlordane	ND		mg/L	0.00100	1	02/14/07 19:32	W846 1311/8081	7022153
Endrin	ND		mg/L	0.000500	1	02/14/07 19:32	W846 1311/8081	7022153
Heptachlor	ND		mg/L	0.000500	1	02/14/07 19:32	W846 1311/8081	7022153
Heptachlor epoxide	ND		mg/L	0.000500	1	02/14/07 19:32	W846 1311/8081	7022153
Methoxychlor	ND		mg/L	0.000500	1	02/14/07 19:32	W846 1311/8081	7022153
Toxaphene	ND		mg/L	0.0500	1	02/14/07 19:32	W846 1311/8081	7022153
Surr: Tetrachloro-meta-xylene (46-127%)	*65 %*					*02/14/07 19:32*	*W846 1311/8081*	*7022153*
Surr: Decachlorobiphenyl (25-144%)	*52 %*					*02/14/07 19:32*	*W846 1311/8081*	*7022153*
Extractable Petroleum Hydrocarbons								
Diesel	**7.39**		mg/kg dry	5.36	1	02/12/07 10:50	SW846 8015B	7021478
Surr: o-Terphenyl (32-132%)	*82 %*					*02/12/07 10:50*	*SW846 8015B*	*7021478*
Purgeable Petroleum Hydrocarbons								
GRO as Gasoline	ND		mg/kg dry	0.109	1	02/13/07 00:50	SW846 8015B	7021981
Surr: a,a,a-Trifluorotoluene (66-146%)	*99 %*					*02/13/07 00:50*	*SW846 8015B*	*7021981*

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Client	MACTEC Engineering & Consulting, Inc. (3740)	Work Order:	NQB0823
	21740 Beaumeade Circle, Suite 150	Project Name:	MACTEC
	Ashburn, VA 20147	Project Number:	3552060944.6.0
Attn	Brent Chapman	Received:	02/08/07 08:00

SAMPLE EXTRACTION DATA

Parameter	Batch	Lab Number	Wt/Vol Extracted	Extracted Vol	Date	Analyst	Extraction Method
Extractable Petroleum Hydrocarbons							
SW846 8015B	7021478	NQB0823-01	25.00	1.00	02/09/07 10:58	AMT	EPA 3550B
SW846 8015B	7021478	NQB0823-02	26.04	1.00	02/09/07 10:58	AMT	EPA 3550B
SW846 8015B	7021478	NQB0823-02RE1	26.04	1.00	02/09/07 10:58	AMT	EPA 3550B
SW846 8015B	7021478	NQB0823-03	25.47	1.00	02/09/07 10:58	AMT	EPA 3550B
SW846 8015B	7021478	NQB0823-04	25.42	1.00	02/09/07 10:58	AMT	EPA 3550B
SW846 8015B	7021478	NQB0823-04RE1	25.42	1.00	02/09/07 10:58	AMT	EPA 3550B
SW846 8015B	7021478	NQB0823-04RE2	25.42	1.00	02/09/07 10:58	AMT	EPA 3550B
Polychlorinated Biphenyls by EPA Method 8082							
SW846 8082	7021466	NQB0823-03	30.29	10.00	02/09/07 15:18	AMT	EPA 3550B
SW846 8082	7021466	NQB0823-04	31.39	10.00	02/09/07 15:18	AMT	EPA 3550B
Purgeable Petroleum Hydrocarbons							
SW846 8015B	7021981	NQB0823-01	1.00	10.00	02/08/07 15:48	NKN	EPA 5035A (GC)
SW846 8015B	7022205	NQB0823-01RE1	1.00	10.00	02/08/07 15:48	NKN	EPA 5035A (GC)
SW846 8015B	7021981	NQB0823-02	5.05	5.00	02/08/07 15:50	NKN	EPA 5035A (GC)
SW846 8015B	7021981	NQB0823-03	4.99	5.00	02/08/07 15:53	NKN	EPA 5035A (GC)
SW846 8015B	7021981	NQB0823-04	5.02	5.00	02/08/07 15:56	NKN	EPA 5035A (GC)
TCLP Chlorinated Herbicides by EPA Method 8151							
SW846 1311/8151A	7024277	NQB0823-03	5.00	5.00	02/24/07 08:17	BJM	EPA 8151A
SW846 1311/8151A	7022156	NQB0823-04	5.00	5.00	02/13/07 13:40	BJM	EPA 8151A
TCLP Extraction by EPA 1311							
SW846 1311	7021509	NQB0823-03	100.00	2000.00	02/12/07 16:30	SLW	EPA 1311
SW846 1311	7021509	NQB0823-03	100.00	2000.00	02/12/07 16:30	SLW	EPA 1311
SW846 1311	7021509	NQB0823-03	100.00	2000.00	02/12/07 16:30	SLW	EPA 1311
SW846 1311	7021509	NQB0823-04	100.00	2000.00	02/12/07 16:30	SLW	EPA 1311
SW846 1311	7021509	NQB0823-04	100.00	2000.00	02/12/07 16:30	SLW	EPA 1311
SW846 1311	7021509	NQB0823-04	100.00	2000.00	02/12/07 16:30	SLW	EPA 1311
TCLP Metals by 6000/7000 Series Methods							
SW846 1311/6010B	7022124	NQB0823-03	5.00	50.00	02/13/07 10:47	LTB	EPA 3015
SW846 1311/6010B	7022124	NQB0823-03	5.00	50.00	02/13/07 10:47	LTB	EPA 3015
SW846 1311/6010B	7022124	NQB0823-03	5.00	50.00	02/13/07 10:47	LTB	EPA 3015
SW846 1311/6010B	7022124	NQB0823-03	5.00	50.00	02/13/07 10:47	LTB	EPA 3015
SW846 1311/6010B	7022124	NQB0823-03	5.00	50.00	02/13/07 10:47	LTB	EPA 3015
SW846 1311/6010B	7022124	NQB0823-03	5.00	50.00	02/13/07 10:47	LTB	EPA 3015
SW846 1311/6010B	7021509	NQB0823-03	100.00	2000.00	02/12/07 16:30	SLW	EPA 1311
SW846 1311/6010B	7022124	NQB0823-03	5.00	50.00	02/13/07 10:47	LTB	EPA 3015
SW846 1311/6010B	7022124	NQB0823-04	5.00	50.00	02/13/07 10:47	LTB	EPA 3015
SW846 1311/6010B	7022124	NQB0823-04	5.00	50.00	02/13/07 10:47	LTB	EPA 3015
SW846 1311/6010B	7022124	NQB0823-04	5.00	50.00	02/13/07 10:47	LTB	EPA 3015
SW846 1311/6010B	7022124	NQB0823-04	5.00	50.00	02/13/07 10:47	LTB	EPA 3015
SW846 1311/6010B	7022124	NQB0823-04	5.00	50.00	02/13/07 10:47	LTB	EPA 3015
SW846 1311/6010B	7022124	NQB0823-04	5.00	50.00	02/13/07 10:47	LTB	EPA 3015
SW846 1311/6010B	7021509	NQB0823-04	100.00	2000.00	02/12/07 16:30	SLW	EPA 1311
SW846 1311/6010B	7022124	NQB0823-04	5.00	50.00	02/13/07 10:47	LTB	EPA 3015
SW846 1311/7470A	7022074	NQB0823-03	3.00	30.00	02/12/07 18:22	JMR	EPA 7470

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	21740 Beaumeade Circle, Suite 150	Project Name:	MACTEC
	Ashburn, VA 20147	Project Number:	3552060944.6.0
Attn	Brent Chapman	Received:	02/08/07 08:00

SAMPLE EXTRACTION DATA

Parameter	Batch	Lab Number	Wt/Vol Extracted	Extracted Vol	Date	Analyst	Extraction Method
SW846 1311/7470A	7022074	NQB0823-04	3.00	30.00	02/12/07 18:22	JMR	EPA 7470
TCLP Pesticides by EPA Method 1311/8081A							
SW846 1311/8081A	7022153	NQB0823-03	100.00	10.00	02/14/07 07:25	BJM	EPA 3510C Leachate
SW846 1311/8081A	7022153	NQB0823-04	100.00	10.00	02/14/07 07:25	BJM	EPA 3510C Leachate
TCLP Semivolatile Organic Compounds by EPA Method 1311/8270C							
SW846 1311/8270C	7024267	NQB0823-03	500.00	1.00	02/24/07 07:30	BJM	EPA 3510C Leachate
SW846 1311/8270C	7021509	NQB0823-03	100.00	2000.00	02/12/07 16:30	SLW	EPA 1311
SW846 1311/8270C	7022152	NQB0823-04	500.00	1.00	02/13/07 14:05	BJM	EPA 3510C Leachate
SW846 1311/8270C	7021509	NQB0823-04	100.00	2000.00	02/12/07 16:30	SLW	EPA 1311
Volatile Organic Compounds by EPA Method 8021B							
SW846 8021B	7021981	NQB0823-01	1.00	10.00	02/08/07 15:48	NKN	EPA 5035A (GC)
SW846 8021B	7022205	NQB0823-01RE1	1.00	10.00	02/08/07 15:48	NKN	EPA 5035A (GC)
SW846 8021B	7021981	NQB0823-02	5.05	5.00	02/08/07 15:50	NKN	EPA 5035A (GC)
SW846 8021B	7021981	NQB0823-03	4.99	5.00	02/08/07 15:53	NKN	EPA 5035A (GC)
SW846 8021B	7021981	NQB0823-04	5.02	5.00	02/08/07 15:56	NKN	EPA 5035A (GC)

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	Ashburn, VA 20147	Project Number:	3552060944.6.0
Attn	Brent Chapman	Received:	02/08/07 08:00

PROJECT QUALITY CONTROL DATA
Blank

Analyte	Blank Value	Q	Units	Q.C. Batch	Lab Number	Analyzed Date/Time
General Chemistry Parameters						
7021507-BLK1						
pH	<0.100		pH Units	7021507	7021507-BLK1	02/09/07 16:15
7022118-BLK1						
Ignitability	>200		°F	7022118	7022118-BLK1	02/14/07 10:16
TCLP Metals by 6000/7000 Series Methods						
7022074-BLK1						
Mercury	<0.00500		mg/L	7022074	7022074-BLK1	02/14/07 09:19
7022124-BLK1						
Arsenic	0.0290		mg/L	7022124	7022124-BLK1	02/13/07 18:46
Barium	<0.00200		mg/L	7022124	7022124-BLK1	02/13/07 18:46
Cadmium	0.00400		mg/L	7022124	7022124-BLK1	02/13/07 18:46
Chromium	0.00800		mg/L	7022124	7022124-BLK1	02/13/07 18:46
Lead	<0.00300		mg/L	7022124	7022124-BLK1	02/13/07 18:46
Selenium	<0.00500		mg/L	7022124	7022124-BLK1	02/13/07 18:46
Silver	0.00900		mg/L	7022124	7022124-BLK1	02/13/07 18:46
Polychlorinated Biphenyls by EPA Method 8082						
7021466-BLK1						
PCB-1016	<0.0160		mg/kg wet	7021466	7021466-BLK1	02/12/07 11:00
PCB-1221	<0.00490		mg/kg wet	7021466	7021466-BLK1	02/12/07 11:00
PCB-1232	<0.0110		mg/kg wet	7021466	7021466-BLK1	02/12/07 11:00
PCB-1242	<0.0140		mg/kg wet	7021466	7021466-BLK1	02/12/07 11:00
PCB-1248	<0.00580		mg/kg wet	7021466	7021466-BLK1	02/12/07 11:00
PCB-1254	<0.0140		mg/kg wet	7021466	7021466-BLK1	02/12/07 11:00
PCB-1260	<0.00551		mg/kg wet	7021466	7021466-BLK1	02/12/07 11:00
PCB-1262	<0.00370		mg/kg wet	7021466	7021466-BLK1	02/12/07 11:00
PCB-1268	<0.00190		mg/kg wet	7021466	7021466-BLK1	02/12/07 11:00
Surrogate: Tetrachloro-meta-xylene	85%			7021466	7021466-BLK1	02/12/07 11:00
Surrogate: Decachlorobiphenyl	86%			7021466	7021466-BLK1	02/12/07 11:00
TCLP Chlorinated Herbicides by EPA Method 8151						
7022156-BLK1						
2,4-D	<0.0220		mg/L	7022156	7022156-BLK1	02/14/07 23:54
2,4,5-TP (Silvex)	<0.0460		mg/L	7022156	7022156-BLK1	02/14/07 23:54
Surrogate: Dichloroacetic Acid	75%			7022156	7022156-BLK1	02/14/07 23:54
7024277-BLK1						
2,4-D	<0.0220		mg/L	7024277	7024277-BLK1	02/26/07 22:34
2,4,5-TP (Silvex)	<0.00400		mg/L	7024277	7024277-BLK1	02/26/07 22:34
Surrogate: Dichloroacetic Acid	48%			7024277	7024277-BLK1	02/26/07 22:34

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Client	MACTEC Engineering & Consulting, Inc. (3740)	Work Order:	NQB0823
	21740 Beaumeade Circle, Suite 150	Project Name:	MACTEC
	Ashburn, VA 20147	Project Number:	3552060944.6.0
Attn	Brent Chapman	Received:	02/08/07 08:00

PROJECT QUALITY CONTROL DATA
Blank - Cont.

Analyte	Blank Value	Q	Units	Q.C. Batch	Lab Number	Analyzed Date/Time
TCLP Chlorinated Herbicides by EPA Method 8151						
Volatile Organic Compounds by EPA Method 8021B						
7021981-BLK1						
Benzene	<0.000400		mg/kg wet	7021981	7021981-BLK1	02/12/07 20:26
Ethylbenzene	<0.000400		mg/kg wet	7021981	7021981-BLK1	02/12/07 20:26
Toluene	0.000355		mg/kg wet	7021981	7021981-BLK1	02/12/07 20:26
Xylenes, total	<0.000400		mg/kg wet	7021981	7021981-BLK1	02/12/07 20:26
Surrogate: a,a,a-Trifluorotoluene	96%			7021981	7021981-BLK1	02/12/07 20:26
7022205-BLK1						
Benzene	<0.000400		mg/kg wet	7022205	7022205-BLK1	02/13/07 12:31
Ethylbenzene	<0.000400		mg/kg wet	7022205	7022205-BLK1	02/13/07 12:31
Toluene	0.000469		mg/kg wet	7022205	7022205-BLK1	02/13/07 12:31
Xylenes, total	<0.000400		mg/kg wet	7022205	7022205-BLK1	02/13/07 12:31
Surrogate: a,a,a-Trifluorotoluene	96%			7022205	7022205-BLK1	02/13/07 12:31
7022205-BLK2						
Benzene	<0.000400		mg/kg wet	7022205	7022205-BLK2	02/13/07 19:09
Ethylbenzene	<0.000400		mg/kg wet	7022205	7022205-BLK2	02/13/07 19:09
Toluene	0.000780		mg/kg wet	7022205	7022205-BLK2	02/13/07 19:09
Xylenes, total	<0.000400		mg/kg wet	7022205	7022205-BLK2	02/13/07 19:09
Surrogate: a,a,a-Trifluorotoluene	95%			7022205	7022205-BLK2	02/13/07 19:09
7022205-BLK3						
Benzene	<0.000400		mg/kg wet	7022205	7022205-BLK3	02/14/07 00:08
Ethylbenzene	<0.000400		mg/kg wet	7022205	7022205-BLK3	02/14/07 00:08
Toluene	0.000312		mg/kg wet	7022205	7022205-BLK3	02/14/07 00:08
Xylenes, total	<0.000400		mg/kg wet	7022205	7022205-BLK3	02/14/07 00:08
Surrogate: a,a,a-Trifluorotoluene	97%			7022205	7022205-BLK3	02/14/07 00:08
TCLP Volatile Organic Compounds by EPA Method 1311/8260B						
7022079-BLK1						
Benzene	<0.00310		mg/L	7022079	7022079-BLK1	02/13/07 23:07
2-Butanone	<0.00310		mg/L	7022079	7022079-BLK1	02/13/07 23:07
Carbon Tetrachloride	<0.00220		mg/L	7022079	7022079-BLK1	02/13/07 23:07
Chlorobenzene	<0.00340		mg/L	7022079	7022079-BLK1	02/13/07 23:07
Chloroform	<0.00510		mg/L	7022079	7022079-BLK1	02/13/07 23:07
1,2-Dichloroethane	<0.00370		mg/L	7022079	7022079-BLK1	02/13/07 23:07
1,1-Dichloroethene	<0.00270		mg/L	7022079	7022079-BLK1	02/13/07 23:07
Tetrachloroethene	<0.00320		mg/L	7022079	7022079-BLK1	02/13/07 23:07
Trichloroethene	<0.00250		mg/L	7022079	7022079-BLK1	02/13/07 23:07
Vinyl chloride	<0.00260		mg/L	7022079	7022079-BLK1	02/13/07 23:07
Surrogate: 1,2-Dichloroethane-d4	91%			7022079	7022079-BLK1	02/13/07 23:07

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Client	MACTEC Engineering & Consulting, Inc. (3740)	Work Order:	NQB0823
	21740 Beaumeade Circle, Suite 150	Project Name:	MACTEC
	Ashburn, VA 20147	Project Number:	3552060944.6.0
Attn	Brent Chapman	Received:	02/08/07 08:00

PROJECT QUALITY CONTROL DATA
Blank - Cont.

Analyte	Blank Value	Q	Units	Q.C. Batch	Lab Number	Analyzed Date/Time
TCLP Volatile Organic Compounds by EPA Method 1311/8260B						
7022079-BLK1						
Surrogate: Dibromofluoromethane	85%			7022079	7022079-BLK1	02/13/07 23:07
Surrogate: Toluene-d8	95%			7022079	7022079-BLK1	02/13/07 23:07
Surrogate: 4-Bromofluorobenzene	93%			7022079	7022079-BLK1	02/13/07 23:07
7024602-BLK1						
Benzene	<0.00310		mg/L	7024602	7024602-BLK1	02/15/07 04:52
2-Butanone	<0.00310		mg/L	7024602	7024602-BLK1	02/15/07 04:52
Carbon Tetrachloride	<0.00220		mg/L	7024602	7024602-BLK1	02/15/07 04:52
Chlorobenzene	<0.00340		mg/L	7024602	7024602-BLK1	02/15/07 04:52
Chloroform	<0.00510		mg/L	7024602	7024602-BLK1	02/15/07 04:52
1,2-Dichloroethane	<0.00370		mg/L	7024602	7024602-BLK1	02/15/07 04:52
1,1-Dichloroethene	<0.00270		mg/L	7024602	7024602-BLK1	02/15/07 04:52
Tetrachloroethene	<0.00320		mg/L	7024602	7024602-BLK1	02/15/07 04:52
Trichloroethene	<0.00250		mg/L	7024602	7024602-BLK1	02/15/07 04:52
Vinyl chloride	<0.00260		mg/L	7024602	7024602-BLK1	02/15/07 04:52
Surrogate: 1,2-Dichloroethane-d4	95%			7024602	7024602-BLK1	02/15/07 04:52
Surrogate: Dibromofluoromethane	86%			7024602	7024602-BLK1	02/15/07 04:52
Surrogate: Toluene-d8	93%			7024602	7024602-BLK1	02/15/07 04:52
Surrogate: 4-Bromofluorobenzene	92%			7024602	7024602-BLK1	02/15/07 04:52
TCLP Semivolatile Organic Compounds by EPA Method 1311/8270C						
7022152-BLK1						
Cresol(s)	<0.0188		mg/L	7022152	7022152-BLK1	02/14/07 17:31
1,4-Dichlorobenzene	<0.0112		mg/L	7022152	7022152-BLK1	02/14/07 17:31
2,4-Dinitrotoluene	<0.0104		mg/L	7022152	7022152-BLK1	02/14/07 17:31
Hexachlorobenzene	<0.00860		mg/L	7022152	7022152-BLK1	02/14/07 17:31
Hexachlorobutadiene	<0.0104		mg/L	7022152	7022152-BLK1	02/14/07 17:31
Hexachloroethane	<0.0116		mg/L	7022152	7022152-BLK1	02/14/07 17:31
Nitrobenzene	<0.00900		mg/L	7022152	7022152-BLK1	02/14/07 17:31
Pentachlorophenol	<0.00900		mg/L	7022152	7022152-BLK1	02/14/07 17:31
Pyridine	<0.0102		mg/L	7022152	7022152-BLK1	02/14/07 17:31
2,4,6-Trichlorophenol	<0.00840		mg/L	7022152	7022152-BLK1	02/14/07 17:31
2,4,5-Trichlorophenol	<0.00840		mg/L	7022152	7022152-BLK1	02/14/07 17:31
Surrogate: Terphenyl-d14	85%			7022152	7022152-BLK1	02/14/07 17:31
Surrogate: 2,4,6-Tribromophenol	73%			7022152	7022152-BLK1	02/14/07 17:31
Surrogate: Phenol-d5	55%			7022152	7022152-BLK1	02/14/07 17:31
Surrogate: 2-Fluorobiphenyl	68%			7022152	7022152-BLK1	02/14/07 17:31
Surrogate: 2-Fluorophenol	63%			7022152	7022152-BLK1	02/14/07 17:31
Surrogate: Nitrobenzene-d5	67%			7022152	7022152-BLK1	02/14/07 17:31
7024267-BLK1						
Cresol(s)	<0.00204		mg/L	7024267	7024267-BLK1	02/24/07 21:00

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	21740 Beaumeade Circle, Suite 150	Project Name:	MACTEC
	Ashburn, VA 20147	Project Number:	3552060944.6.0
Attn	Brent Chapman	Received:	02/08/07 08:00

PROJECT QUALITY CONTROL DATA
Blank - Cont.

Analyte	Blank Value	Q	Units	Q.C. Batch	Lab Number	Analyzed Date/Time
TCLP Semivolatile Organic Compounds by EPA Method 1311/8270C						
7024267-BLK1						
1,4-Dichlorobenzene	<0.00146		mg/L	7024267	7024267-BLK1	02/24/07 21:00
2,4-Dinitrotoluene	<0.00244		mg/L	7024267	7024267-BLK1	02/24/07 21:00
Hexachlorobenzene	<0.00162		mg/L	7024267	7024267-BLK1	02/24/07 21:00
Hexachlorobutadiene	<0.00138		mg/L	7024267	7024267-BLK1	02/24/07 21:00
Hexachloroethane	<0.00130		mg/L	7024267	7024267-BLK1	02/24/07 21:00
Nitrobenzene	<0.00158		mg/L	7024267	7024267-BLK1	02/24/07 21:00
Pentachlorophenol	<0.00144		mg/L	7024267	7024267-BLK1	02/24/07 21:00
Pyridine	<0.00174		mg/L	7024267	7024267-BLK1	02/24/07 21:00
2,4,6-Trichlorophenol	<0.00216		mg/L	7024267	7024267-BLK1	02/24/07 21:00
2,4,5-Trichlorophenol	<0.00142		mg/L	7024267	7024267-BLK1	02/24/07 21:00
Phenol	<0.00200		mg/L	7024267	7024267-BLK1	02/24/07 21:00
2-Methylphenol	<0.00560		mg/L	7024267	7024267-BLK1	02/24/07 21:00
3/4-Methylphenol	<0.00620		mg/L	7024267	7024267-BLK1	02/24/07 21:00
Surrogate: Terphenyl-d14	92%			7024267	7024267-BLK1	02/24/07 21:00
Surrogate: 2,4,6-Tribromophenol	79%			7024267	7024267-BLK1	02/24/07 21:00
Surrogate: Phenol-d5	45%			7024267	7024267-BLK1	02/24/07 21:00
Surrogate: 2-Fluorobiphenyl	84%			7024267	7024267-BLK1	02/24/07 21:00
Surrogate: 2-Fluorophenol	56%			7024267	7024267-BLK1	02/24/07 21:00
Surrogate: Nitrobenzene-d5	79%			7024267	7024267-BLK1	02/24/07 21:00
TCLP Pesticides by EPA Method 1311/8081A						
7022153-BLK1						
gamma-BHC (Lindane)	<0.000300		mg/L	7022153	7022153-BLK1	02/14/07 16:30
Chlordane	<0.000700		mg/L	7022153	7022153-BLK1	02/14/07 16:30
Endrin	<0.000400		mg/L	7022153	7022153-BLK1	02/14/07 16:30
Heptachlor	<0.000300		mg/L	7022153	7022153-BLK1	02/14/07 16:30
Heptachlor epoxide	<0.000300		mg/L	7022153	7022153-BLK1	02/14/07 16:30
Methoxychlor	<0.000300		mg/L	7022153	7022153-BLK1	02/14/07 16:30
Toxaphene	<0.0170		mg/L	7022153	7022153-BLK1	02/14/07 16:30
Surrogate: Tetrachloro-meta-xylene	50%			7022153	7022153-BLK1	02/14/07 16:30
Surrogate: Decachlorobiphenyl	76%			7022153	7022153-BLK1	02/14/07 16:30
Extractable Petroleum Hydrocarbons						
7021478-BLK1						
Diesel	<2.00		mg/kg wet	7021478	7021478-BLK1	02/10/07 00:32
Surrogate: o-Terphenyl	85%			7021478	7021478-BLK1	02/10/07 00:32
Purgeable Petroleum Hydrocarbons						
7021981-BLK1						
GRO as Gasoline	0.0376		mg/kg wet	7021981	7021981-BLK1	02/12/07 20:26
Surrogate: a,a,a-Trifluorotoluene	96%			7021981	7021981-BLK1	02/12/07 20:26

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	21740 Beaumeade Circle, Suite 150	Project Name:	MACTEC
	Ashburn, VA 20147	Project Number:	3552060944.6.0
Attn	Brent Chapman	Received:	02/08/07 08:00

PROJECT QUALITY CONTROL DATA
Blank - Cont.

Analyte	Blank Value	Q	Units	Q.C. Batch	Lab Number	Analyzed Date/Time
Purgeable Petroleum Hydrocarbons						
7022205-BLK1						
GRO as Gasoline	0.0383		mg/kg wet	7022205	7022205-BLK1	02/13/07 12:31
Surrogate: a,a,a-Trifluorotoluene	96%			7022205	7022205-BLK1	02/13/07 12:31
7022205-BLK2						
GRO as Gasoline	0.0409		mg/kg wet	7022205	7022205-BLK2	02/13/07 19:09
Surrogate: a,a,a-Trifluorotoluene	95%			7022205	7022205-BLK2	02/13/07 19:09
7022205-BLK3						
GRO as Gasoline	0.0368		mg/kg wet	7022205	7022205-BLK3	02/14/07 00:08
Surrogate: a,a,a-Trifluorotoluene	97%			7022205	7022205-BLK3	02/14/07 00:08

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	21740 Beaumeade Circle, Suite 150	Project Name:	MACTEC
	Ashburn, VA 20147	Project Number:	3552060944.6.0
Attn	Brent Chapman	Received:	02/08/07 08:00

PROJECT QUALITY CONTROL DATA
Duplicate

Analyte	Orig. Val.	Duplicate	Q	Units	RPD	Limit	Batch	Sample Duplicated	Analyzed Date/Time
General Chemistry Parameters									
7021507-DUP1									
pH	3.70	3.70		pH Units	0	200	7021507	NQB0622-01	02/09/07 16:15
7022118-DUP1									
Ignitability	0.00	>200		°F		200	7022118	NQB0578-01	02/14/07 10:16

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	21740 Beaumeade Circle, Suite 150	Project Name:	MACTEC
	Ashburn, VA 20147	Project Number:	3552060944.6.0
Attn	Brent Chapman	Received:	02/08/07 08:00

PROJECT QUALITY CONTROL DATA
LCS

Analyte	Known Val.	Analyzed Val	Q	Units	% Rec.	Target Range	Batch	Analyzed Date/Time
General Chemistry Parameters								
7021507-BS1								
pH	7.00	7.00		pH Units	100%	0 - 200	7021507	02/09/07 16:15
TCLP Metals by 6000/7000 Series Methods								
7022074-BS1								
Mercury	0.0200	0.0195		mg/L	98%	78 - 124	7022074	02/14/07 09:21
7022124-BS1								
Arsenic	10.0	10.1		mg/L	101%	80 - 120	7022124	02/13/07 18:51
Barium	50.0	50.5		mg/L	101%	80 - 120	7022124	02/13/07 18:51
Cadmium	10.0	10.1		mg/L	101%	80 - 120	7022124	02/13/07 18:51
Chromium	50.0	49.3		mg/L	99%	80 - 120	7022124	02/13/07 18:51
Lead	50.0	49.6		mg/L	99%	80 - 120	7022124	02/13/07 18:51
Selenium	10.0	10.7		mg/L	107%	80 - 120	7022124	02/13/07 18:51
Silver	10.0	9.67		mg/L	97%	80 - 120	7022124	02/13/07 18:51
Polychlorinated Biphenyls by EPA Method 8082								
7021466-BS1								
PCB-1242	0.167	0.133		mg/kg wet	80%	73 - 141	7021466	02/12/07 11:21
Surrogate: Tetrachloro-meta-xylene	0.0167	0.0155			93%	63 - 132	7021466	02/12/07 11:21
Surrogate: Decachlorobiphenyl	0.0167	0.0135			81%	39 - 108	7021466	02/12/07 11:21
TCLP Chlorinated Herbicides by EPA Method 8151								
7022156-BS1								
2,4-D	1.00	0.932		mg/L	93%	10 - 173	7022156	02/15/07 00:25
2,4,5-TP (Silvex)	1.00	0.825		mg/L	82%	10 - 150	7022156	02/15/07 00:25
Surrogate: Dichloroacetic Acid	1.00	0.770			77%	27 - 153	7022156	02/15/07 00:25
7024277-BS1								
2,4-D	1.00	0.774		mg/L	77%	10 - 173	7024277	02/26/07 23:04
2,4,5-TP (Silvex)	1.00	0.739		mg/L	74%	10 - 150	7024277	02/26/07 23:04
Surrogate: Dichloroacetic Acid	1.00	0.689			69%	27 - 153	7024277	02/26/07 23:04
Volatile Organic Compounds by EPA Method 8021B								
7021981-BS1								
Benzene	0.100	0.0887		mg/kg wet	89%	69 - 131	7021981	02/13/07 15:56
Ethylbenzene	0.100	0.0871		mg/kg wet	87%	79 - 123	7021981	02/13/07 15:56
Toluene	0.100	0.0872		mg/kg wet	87%	74 - 122	7021981	02/13/07 15:56
Xylenes, total	0.200	0.181		mg/kg wet	90%	75 - 125	7021981	02/13/07 15:56
Surrogate: a,a,a-Trifluorotoluene	30.0	29.8			99%	59 - 159	7021981	02/13/07 15:56
7022205-BS1								
Benzene	0.100	0.107		mg/kg wet	107%	69 - 131	7022205	02/14/07 02:54

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	21740 Beaumeade Circle, Suite 150	Project Name:	MACTEC
	Ashburn, VA 20147	Project Number:	3552060944.6.0
Attn	Brent Chapman	Received:	02/08/07 08:00

PROJECT QUALITY CONTROL DATA
LCS - Cont.

Analyte	Known Val.	Analyzed Val	Q	Units	% Rec.	Target Range	Batch	Analyzed Date/Time
Volatile Organic Compounds by EPA Method 8021B								
7022205-BS1								
Ethylbenzene	0.100	0.107		mg/kg wet	107%	79 - 123	7022205	02/14/07 02:54
Toluene	0.100	0.0998		mg/kg wet	100%	74 - 122	7022205	02/14/07 02:54
Xylenes, total	0.200	0.203		mg/kg wet	102%	75 - 125	7022205	02/14/07 02:54
Surrogate: a,a,a-Trifluorotoluene	30.0	30.3			101%	59 - 159	7022205	02/14/07 02:54
TCLP Volatile Organic Compounds by EPA Method 1311/8260B								
7022079-BS1								
Benzene	50.0	50.6		ug/L	101%	80 - 129	7022079	02/13/07 21:52
2-Butanone	250	261		ug/L	104%	72 - 132	7022079	02/13/07 21:52
Carbon Tetrachloride	50.0	51.2		ug/L	102%	66 - 147	7022079	02/13/07 21:52
Chlorobenzene	50.0	55.4		ug/L	111%	83 - 119	7022079	02/13/07 21:52
Chloroform	50.0	51.5		ug/L	103%	77 - 128	7022079	02/13/07 21:52
1,2-Dichloroethane	50.0	50.6		ug/L	101%	78 - 126	7022079	02/13/07 21:52
1,1-Dichloroethene	50.0	53.0		ug/L	106%	77 - 134	7022079	02/13/07 21:52
Tetrachloroethene	50.0	56.8		ug/L	114%	81 - 124	7022079	02/13/07 21:52
Trichloroethene	50.0	48.4		ug/L	97%	77 - 134	7022079	02/13/07 21:52
Vinyl chloride	50.0	44.6		ug/L	89%	55 - 150	7022079	02/13/07 21:52
Surrogate: 1,2-Dichloroethane-d4	50.0	49.5			99%	62 - 142	7022079	02/13/07 21:52
Surrogate: Dibromofluoromethane	50.0	44.4			89%	78 - 123	7022079	02/13/07 21:52
Surrogate: Toluene-d8	50.0	48.9			98%	79 - 120	7022079	02/13/07 21:52
Surrogate: 4-Bromofluorobenzene	50.0	43.6			87%	75 - 133	7022079	02/13/07 21:52
7024602-BS1								
Benzene	50.0	44.3		ug/L	89%	80 - 129	7024602	02/15/07 03:37
2-Butanone	250	279		ug/L	112%	72 - 132	7024602	02/15/07 03:37
Carbon Tetrachloride	50.0	43.0		ug/L	86%	66 - 147	7024602	02/15/07 03:37
Chlorobenzene	50.0	50.0		ug/L	100%	83 - 119	7024602	02/15/07 03:37
Chloroform	50.0	45.7		ug/L	91%	77 - 128	7024602	02/15/07 03:37
1,2-Dichloroethane	50.0	48.5		ug/L	97%	78 - 126	7024602	02/15/07 03:37
1,1-Dichloroethene	50.0	45.0		ug/L	90%	77 - 134	7024602	02/15/07 03:37
Tetrachloroethene	50.0	49.0		ug/L	98%	81 - 124	7024602	02/15/07 03:37
Trichloroethene	50.0	42.6		ug/L	85%	77 - 134	7024602	02/15/07 03:37
Vinyl chloride	50.0	34.2		ug/L	68%	55 - 150	7024602	02/15/07 03:37
Surrogate: 1,2-Dichloroethane-d4	50.0	46.6			93%	62 - 142	7024602	02/15/07 03:37
Surrogate: Dibromofluoromethane	50.0	44.2			88%	78 - 123	7024602	02/15/07 03:37
Surrogate: Toluene-d8	50.0	48.9			98%	79 - 120	7024602	02/15/07 03:37
Surrogate: 4-Bromofluorobenzene	50.0	45.3			91%	75 - 133	7024602	02/15/07 03:37
TCLP Semivolatile Organic Compounds by EPA Method 1311/8270C								
7022152-BS1								
Cresol(s)	0.400	0.344	MNR1	mg/L	86%	44 - 116	7022152	02/14/07 18:03
1,4-Dichlorobenzene	0.200	0.126	MNR1	mg/L	63%	28 - 95	7022152	02/14/07 18:03

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Client	MACTEC Engineering & Consulting, Inc. (3740)	Work Order:	NQB0823
	21740 Beaumeade Circle, Suite 150	Project Name:	MACTEC
	Ashburn, VA 20147	Project Number:	3552060944.6.0
Attn	Brent Chapman	Received:	02/08/07 08:00

PROJECT QUALITY CONTROL DATA
LCS - Cont.

Analyte	Known Val.	Analyzed Val	Q	Units	% Rec.	Target Range	Batch	Analyzed Date/Time
TCLP Semivolatile Organic Compounds by EPA Method 1311/8270C								
7022152-BS1								
2,4-Dinitrotoluene	0.200	0.176	MNR1	mg/L	88%	59 - 125	7022152	02/14/07 18:03
Hexachlorobenzene	0.200	0.195	MNR1	mg/L	97%	52 - 125	7022152	02/14/07 18:03
Hexachlorobutadiene	0.200	0.124	MNR1	mg/L	62%	24 - 102	7022152	02/14/07 18:03
Hexachloroethane	0.200	0.131	MNR1	mg/L	66%	28 - 92	7022152	02/14/07 18:03
Nitrobenzene	0.200	0.139	MNR1	mg/L	70%	45 - 111	7022152	02/14/07 18:03
Pentachlorophenol	0.200	0.208	MNR1	mg/L	104%	48 - 139	7022152	02/14/07 18:03
Pyridine	0.200	0.0840	MNR1	mg/L	42%	12 - 82	7022152	02/14/07 18:03
2,4,6-Trichlorophenol	0.200	0.172	MNR1	mg/L	86%	53 - 116	7022152	02/14/07 18:03
2,4,5-Trichlorophenol	0.200	0.171	MNR1	mg/L	86%	55 - 120	7022152	02/14/07 18:03
Surrogate: Terphenyl-d14	0.100	0.0823			82%	29 - 149	7022152	02/14/07 18:03
Surrogate: 2,4,6-Tribromophenol	0.100	0.0883			88%	40 - 161	7022152	02/14/07 18:03
Surrogate: Phenol-d5	0.100	0.0505			50%	11 - 76	7022152	02/14/07 18:03
Surrogate: 2-Fluorobiphenyl	0.100	0.0755			75%	30 - 120	7022152	02/14/07 18:03
Surrogate: 2-Fluorophenol	0.100	0.0640			64%	20 - 86	7022152	02/14/07 18:03
Surrogate: Nitrobenzene-d5	0.100	0.0664			66%	24 - 125	7022152	02/14/07 18:03
7024267-BS1								
Cresol(s)	0.400	0.257	MNR1	mg/L	64%	44 - 99	7024267	02/24/07 21:34
1,4-Dichlorobenzene	0.200	0.109	MNR1	mg/L	54%	37 - 93	7024267	02/24/07 21:34
2,4-Dinitrotoluene	0.200	0.152	MNR1	mg/L	76%	59 - 114	7024267	02/24/07 21:34
Hexachlorobenzene	0.200	0.167	MNR1	mg/L	84%	52 - 120	7024267	02/24/07 21:34
Hexachlorobutadiene	0.200	0.0905	MNR1	mg/L	45%	31 - 94	7024267	02/24/07 21:34
Hexachloroethane	0.200	0.103	MNR1	mg/L	52%	32 - 92	7024267	02/24/07 21:34
Nitrobenzene	0.200	0.116	MNR1	mg/L	58%	47 - 105	7024267	02/24/07 21:34
Pentachlorophenol	0.200	0.139	MNR1	mg/L	70%	48 - 116	7024267	02/24/07 21:34
Pyridine	0.200	0.0858	MNR1	mg/L	43%	12 - 82	7024267	02/24/07 21:34
2,4,6-Trichlorophenol	0.200	0.157	MNR1	mg/L	78%	53 - 116	7024267	02/24/07 21:34
2,4,5-Trichlorophenol	0.200	0.153	MNR1	mg/L	76%	55 - 120	7024267	02/24/07 21:34
Phenol	0.200	0.0710	MNR1	mg/L	36%	22 - 50	7024267	02/24/07 21:34
2-Methylphenol	0.200	0.129	MNR1	mg/L	64%	15 - 90	7024267	02/24/07 21:34
3/4-Methylphenol	0.200	0.129	MNR1	mg/L	64%	4 - 99	7024267	02/24/07 21:34
Surrogate: Terphenyl-d14	0.100	0.0745			74%	31 - 111	7024267	02/24/07 21:34
Surrogate: 2,4,6-Tribromophenol	0.100	0.0738			74%	40 - 118	7024267	02/24/07 21:34
Surrogate: Phenol-d5	0.100	0.0301			30%	11 - 48	7024267	02/24/07 21:34
Surrogate: 2-Fluorobiphenyl	0.100	0.0670			67%	33 - 101	7024267	02/24/07 21:34
Surrogate: 2-Fluorophenol	0.100	0.0405			40%	20 - 64	7024267	02/24/07 21:34
Surrogate: Nitrobenzene-d5	0.100	0.0574			57%	31 - 112	7024267	02/24/07 21:34
TCLP Pesticides by EPA Method 1311/8081A								
7022153-BS1								
gamma-BHC (Lindane)	0.0100	0.00704		mg/L	70%	48 - 142	7022153	02/14/07 17:31
Endrin	0.0100	0.00731		mg/L	73%	43 - 165	7022153	02/14/07 17:31

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	21740 Beaumeade Circle, Suite 150	Project Name:	MACTEC
	Ashburn, VA 20147	Project Number:	3552060944.6.0
Attn	Brent Chapman	Received:	02/08/07 08:00

PROJECT QUALITY CONTROL DATA
LCS - Cont.

Analyte	Known Val.	Analyzed Val	Q	Units	% Rec.	Target Range	Batch	Analyzed Date/Time
TCLP Pesticides by EPA Method 1311/8081A								
7022153-BS1								
Heptachlor	0.0100	0.00690		mg/L	69%	30 - 134	7022153	02/14/07 17:31
Heptachlor epoxide	0.0100	0.00708		mg/L	71%	47 - 140	7022153	02/14/07 17:31
Methoxychlor	0.0100	0.00652		mg/L	65%	40 - 145	7022153	02/14/07 17:31
Surrogate: Tetrachloro-meta-xylene	0.00250	0.00148			59%	46 - 127	7022153	02/14/07 17:31
Surrogate: Decachlorobiphenyl	0.00250	0.00202			81%	25 - 144	7022153	02/14/07 17:31
7022153-BS2								
Chlordane	0.0500	0.0654		mg/L	131%	70 - 184	7022153	02/14/07 17:46
Toxaphene	0.100	0.112		mg/L	112%	85 - 172	7022153	02/14/07 17:46
Surrogate: Tetrachloro-meta-xylene	0.00250	0.00150			60%	46 - 127	7022153	02/14/07 17:46
Surrogate: Decachlorobiphenyl	0.00250	0.00205			82%	25 - 144	7022153	02/14/07 17:46
Extractable Petroleum Hydrocarbons								
7021478-BS1								
Diesel	40.0	43.0		mg/kg wet	108%	41 - 141	7021478	02/10/07 00:49
Surrogate: o-Terphenyl	0.800	0.891			111%	32 - 132	7021478	02/10/07 00:49
Purgeable Petroleum Hydrocarbons								
7021981-BS2								
GRO as Gasoline	10.0	11.4		mg/kg wet	114%	76 - 117	7021981	02/13/07 15:56
Surrogate: a,a,a-Trifluorotoluene	30.0	44.4	Z2		148%	66 - 146	7021981	02/13/07 15:56
7022205-BS2								
GRO as Gasoline	10.0	10.7		mg/kg wet	107%	76 - 117	7022205	02/14/07 04:00
Surrogate: a,a,a-Trifluorotoluene	30.0	34.7			116%	66 - 146	7022205	02/14/07 04:00

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	21740 Beaumeade Circle, Suite 150	Project Name:	MACTEC
	Ashburn, VA 20147	Project Number:	3552060944.6.0
Attn	Brent Chapman	Received:	02/08/07 08:00

PROJECT QUALITY CONTROL DATA
LCS Dup

Analyte	Orig. Val.	Duplicate	Q	Units	Spike Conc	% Rec.	Target Range	RPD	Limit	Batch	Sample Duplicated	Analyzed Date/Time
General Chemistry Parameters												
7021507-BSD1												
pH		7.00		pH Units	7.00	100%	0 - 200	0	200	7021507		02/09/07 16:15
Polychlorinated Biphenyls by EPA Method 8082												
7021466-BSD1												
PCB-1242		0.134		mg/kg wet	0.167	80%	73 - 141	0.7	35	7021466		02/12/07 11:41
Surrogate: Tetrachloro-meta-xylene		0.0150		mg/kg wet	0.0167	90%	63 - 132			7021466		02/12/07 11:41
Surrogate: Decachlorobiphenyl		0.0139		mg/kg wet	0.0167	83%	39 - 108			7021466		02/12/07 11:41
Volatile Organic Compounds by EPA Method 8021B												
7021981-BSD1												
Benzene		0.0879		mg/kg wet	0.100	88%	69 - 131	0.9	48	7021981		02/13/07 15:56
Ethylbenzene		0.0864		mg/kg wet	0.100	86%	79 - 123	0.8	46	7021981		02/13/07 15:56
Toluene		0.0860		mg/kg wet	0.100	86%	74 - 122	1	50	7021981		02/13/07 15:56
Xylenes, total		0.179		mg/kg wet	0.200	90%	75 - 125	1	50	7021981		02/13/07 15:56
Surrogate: a,a,a-Trifluorotoluene		29.7		ug/L	30.0	99%	59 - 159			7021981		02/13/07 15:56
7022205-BSD1												
Benzene		0.0994		mg/kg wet	0.100	99%	69 - 131	7	48	7022205		02/14/07 03:27
Ethylbenzene		0.0974		mg/kg wet	0.100	97%	79 - 123	9	46	7022205		02/14/07 03:27
Toluene		0.0940		mg/kg wet	0.100	94%	74 - 122	6	50	7022205		02/14/07 03:27
Xylenes, total		0.190		mg/kg wet	0.200	95%	75 - 125	7	50	7022205		02/14/07 03:27
Surrogate: a,a,a-Trifluorotoluene		29.5		ug/L	30.0	98%	59 - 159			7022205		02/14/07 03:27
TCLP Semivolatile Organic Compounds by EPA Method 1311/8270C												
7024267-BSD1												
Cresol(s)		0.295		mg/L	0.400	74%	44 - 99	14	26	7024267		02/24/07 22:07
1,4-Dichlorobenzene		0.119		mg/L	0.200	60%	37 - 93	9	29	7024267		02/24/07 22:07
2,4-Dinitrotoluene		0.168		mg/L	0.200	84%	59 - 114	10	22	7024267		02/24/07 22:07
Hexachlorobenzene		0.176		mg/L	0.200	88%	52 - 120	5	19	7024267		02/24/07 22:07
Hexachlorobutadiene		0.0976		mg/L	0.200	49%	31 - 94	8	29	7024267		02/24/07 22:07
Hexachloroethane		0.109		mg/L	0.200	54%	32 - 92	6	29	7024267		02/24/07 22:07
Nitrobenzene		0.124		mg/L	0.200	62%	47 - 105	7	23	7024267		02/24/07 22:07
Pentachlorophenol		0.159		mg/L	0.200	79%	48 - 116	13	24	7024267		02/24/07 22:07
Pyridine		0.0892		mg/L	0.200	45%	12 - 82	4	50	7024267		02/24/07 22:07
2,4,6-Trichlorophenol		0.174		mg/L	0.200	87%	53 - 116	10	50	7024267		02/24/07 22:07
2,4,5-Trichlorophenol		0.170		mg/L	0.200	85%	55 - 120	11	50	7024267		02/24/07 22:07
Phenol		0.0881		mg/L	0.200	44%	22 - 50	21	50	7024267		02/24/07 22:07
2-Methylphenol		0.142		mg/L	0.200	71%	15 - 90	10	52	7024267		02/24/07 22:07
3/4-Methylphenol		0.153		mg/L	0.200	76%	4 - 99	17	54	7024267		02/24/07 22:07
Surrogate: Terphenyl-d14		0.0813		mg/L	0.100	81%	31 - 111			7024267		02/24/07 22:07
Surrogate: 2,4,6-Tribromophenol		0.0757		mg/L	0.100	76%	40 - 118			7024267		02/24/07 22:07

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	21740 Beaumeade Circle, Suite 150	Project Name:	MACTEC
	Ashburn, VA 20147	Project Number:	3552060944.6.0
Attn	Brent Chapman	Received:	02/08/07 08:00

PROJECT QUALITY CONTROL DATA

LCS Dup - Cont.

Analyte	Orig. Val.	Duplicate	Q	Units	Spike Conc	% Rec.	Target Range	RPD	Limit	Batch	Sample Duplicated	Analyzed Date/Time
TCLP Semivolatile Organic Compounds by EPA Method 1311/8270C												
7024267-BSD1												
Surrogate: Phenol-d5		0.0383		mg/L	0.100	38%	11 - 48			7024267		02/24/07 22:07
Surrogate: 2-Fluorobiphenyl		0.0742		mg/L	0.100	74%	33 - 101			7024267		02/24/07 22:07
Surrogate: 2-Fluorophenol		0.0516		mg/L	0.100	52%	20 - 64			7024267		02/24/07 22:07
Surrogate: Nitrobenzene-d5		0.0628		mg/L	0.100	63%	31 - 112			7024267		02/24/07 22:07
Purgeable Petroleum Hydrocarbons												
7022205-BSD2												
GRO as Gasoline		11.5		mg/kg wet	10.0	115%	76 - 117	7	22	7022205		02/14/07 05:06
Surrogate: a,a,a-Trifluorotoluene		43.2		ug/L	30.0	144%	66 - 146			7022205		02/14/07 05:06

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	21740 Beaumeade Circle, Suite 150	Project Name:	MACTEC
	Ashburn, VA 20147	Project Number:	3552060944.6.0
Attn	Brent Chapman	Received:	02/08/07 08:00

PROJECT QUALITY CONTROL DATA
Matrix Spike

Analyte	Orig. Val.	MS Val	Q	Units	Spike Conc	% Rec.	Target Range	Batch	Sample Spiked	Analyzed Date/Time
TCLP Metals by 6000/7000 Series Methods										
7022074-MS1										
Mercury	ND	0.0209		mg/L	0.0200	104%	63 - 138	7022074	NQB0819-01	02/14/07 09:31
7022124-MS1										
Arsenic	ND	10.1		mg/L	10.0	101%	75 - 125	7022124	NQB0819-01	02/13/07 19:00
Barium	9.98	60.5		mg/L	50.0	101%	75 - 125	7022124	NQB0819-01	02/13/07 19:00
Cadmium	0.00700	9.87		mg/L	10.0	99%	75 - 125	7022124	NQB0819-01	02/13/07 19:00
Chromium	0.0760	48.9		mg/L	50.0	98%	75 - 125	7022124	NQB0819-01	02/13/07 19:00
Lead	ND	50.2		mg/L	50.0	100%	75 - 125	7022124	NQB0819-01	02/13/07 19:00
Selenium	0.0801	10.8		mg/L	10.0	107%	75 - 125	7022124	NQB0819-01	02/13/07 19:00
Silver	ND	10.1		mg/L	10.0	101%	75 - 125	7022124	NQB0819-01	02/13/07 19:00
Polychlorinated Biphenyls by EPA Method 8082										
7021466-MS1										
PCB-1242	ND	0.0875	M8	mg/kg dry	0.172	51%	52 - 155	7021466	NQB0604-07	02/12/07 12:02
Surrogate: Tetrachloro-meta-xylene		0.00938	Z5	mg/kg dry	0.0172	55%	63 - 132	7021466	NQB0604-07	02/12/07 12:02
Surrogate: Decachlorobiphenyl		0.00973		mg/kg dry	0.0172	57%	39 - 108	7021466	NQB0604-07	02/12/07 12:02
TCLP Chlorinated Herbicides by EPA Method 8151										
7022156-MS1										
2,4-D	ND	0.840		mg/L	1.00	84%	10 - 173	7022156	NQB0823-04	02/15/07 00:56
2,4,5-TP (Silvex)	ND	0.855		mg/L	1.00	86%	10 - 154	7022156	NQB0823-04	02/15/07 00:56
Surrogate: Dichloroacetic Acid		0.652		mg/L	1.00	65%	27 - 153	7022156	NQB0823-04	02/15/07 00:56
7024277-MS1										
2,4-D	ND	0.910		mg/L	1.00	91%	10 - 173	7024277	NQB0823-03	02/26/07 23:36
2,4,5-TP (Silvex)	ND	0.787		mg/L	1.00	79%	10 - 154	7024277	NQB0823-03	02/26/07 23:36
Surrogate: Dichloroacetic Acid		0.648		mg/L	1.00	65%	27 - 153	7024277	NQB0823-03	02/26/07 23:36
Volatile Organic Compounds by EPA Method 8021B										
7021981-MS1										
Benzene	0.000490	0.0512		mg/kg dry	0.0596	85%	10 - 147	7021981	NQB0842-05	02/13/07 15:56
Ethylbenzene	ND	0.0444		mg/kg dry	0.0596	74%	10 - 138	7021981	NQB0842-05	02/13/07 15:56
Toluene	0.000717	0.0465		mg/kg dry	0.0596	77%	10 - 138	7021981	NQB0842-05	02/13/07 15:56
Xylenes, total	ND	0.0899		mg/kg dry	0.119	76%	10 - 142	7021981	NQB0842-05	02/13/07 15:56
Surrogate: a,a,a-Trifluorotoluene		27.5		ug/L	30.0	92%	59 - 159	7021981	NQB0842-05	02/13/07 15:56
TCLP Volatile Organic Compounds by EPA Method 1311/8260B										
7022079-MS1										
Benzene	ND	44.7		ug/L	50.0	89%	58 - 160	7022079	NQB0763-01	02/14/07 07:54

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	21740 Beaumeade Circle, Suite 150	Project Name:	MACTEC
	Ashburn, VA 20147	Project Number:	3552060944.6.0
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PROJECT QUALITY CONTROL DATA
Matrix Spike - Cont.

Analyte	Orig. Val.	MS Val	Q	Units	Spike Conc	% Rec.	Target Range	Batch	Sample Spiked	Analyzed Date/Time
TCLP Volatile Organic Compounds by EPA Method 1311/8260B										
7022079-MS1										
2-Butanone	ND	238		ug/L	250	95%	58 - 139	7022079	NQB0763-01	02/14/07 07:54
Carbon Tetrachloride	ND	44.8		ug/L	50.0	90%	49 - 182	7022079	NQB0763-01	02/14/07 07:54
Chlorobenzene	ND	48.7		ug/L	50.0	97%	70 - 142	7022079	NQB0763-01	02/14/07 07:54
Chloroform	ND	46.6		ug/L	50.0	93%	52 - 158	7022079	NQB0763-01	02/14/07 07:54
1,2-Dichloroethane	ND	48.1		ug/L	50.0	96%	52 - 153	7022079	NQB0763-01	02/14/07 07:54
1,1-Dichloroethene	ND	46.4		ug/L	50.0	93%	59 - 169	7022079	NQB0763-01	02/14/07 07:54
Tetrachloroethene	ND	49.2		ug/L	50.0	98%	61 - 156	7022079	NQB0763-01	02/14/07 07:54
Trichloroethene	ND	42.3		ug/L	50.0	85%	58 - 165	7022079	NQB0763-01	02/14/07 07:54
Vinyl chloride	ND	38.4		ug/L	50.0	77%	38 - 183	7022079	NQB0763-01	02/14/07 07:54
Surrogate: 1,2-Dichloroethane-d4		51.8		ug/L	50.0	104%	62 - 142	7022079	NQB0763-01	02/14/07 07:54
Surrogate: Dibromofluoromethane		45.7		ug/L	50.0	91%	78 - 123	7022079	NQB0763-01	02/14/07 07:54
Surrogate: Toluene-d8		48.2		ug/L	50.0	96%	79 - 120	7022079	NQB0763-01	02/14/07 07:54
Surrogate: 4-Bromofluorobenzene		44.8		ug/L	50.0	90%	75 - 133	7022079	NQB0763-01	02/14/07 07:54
TCLP Pesticides by EPA Method 1311/8081A										
7022153-MS1										
gamma-BHC (Lindane)	ND	0.00698		mg/L	0.0100	70%	37 - 149	7022153	NQB1046-01	02/14/07 18:01
Endrin	ND	0.00796		mg/L	0.0100	80%	32 - 169	7022153	NQB1046-01	02/14/07 18:01
Heptachlor	ND	0.00682		mg/L	0.0100	68%	28 - 138	7022153	NQB1046-01	02/14/07 18:01
Heptachlor epoxide	ND	0.00703		mg/L	0.0100	70%	43 - 140	7022153	NQB1046-01	02/14/07 18:01
Methoxychlor	ND	0.00674		mg/L	0.0100	67%	26 - 151	7022153	NQB1046-01	02/14/07 18:01
Surrogate: Tetrachloro-meta-xylene		0.00151		mg/L	0.00250	60%	46 - 127	7022153	NQB1046-01	02/14/07 18:01
Surrogate: Decachlorobiphenyl		0.00178		mg/L	0.00250	71%	25 - 144	7022153	NQB1046-01	02/14/07 18:01

TestAmerica
ANALYTICAL TESTING CORPORATION
2960 Foster Creighton Road Nashville, TN 37204 * 800-765-0980 * Fax 615-726-3404

Client	MACTEC Engineering & Consulting, Inc. (3740)	Work Order:	NQB0823
	21740 Beaumeade Circle, Suite 150	Project Name:	MACTEC
	Ashburn, VA 20147	Project Number:	3552060944.6.0
Attn	Brent Chapman	Received:	02/08/07 08:00

PROJECT QUALITY CONTROL DATA
Matrix Spike Dup

Analyte	Orig. Val.	Duplicate	Q	Units	Spike Conc	% Rec.	Target Range	RPD	Limit	Batch	Sample Duplicated	Analyzed Date/Time
TCLP Metals by 6000/7000 Series Methods												
7022074-MSD1												
Mercury	ND	0.0197		mg/L	0.0200	98%	63 - 138	6	22	7022074	NQB0819-01	02/14/07 09:33
7022124-MSD1												
Arsenic	ND	9.91		mg/L	10.0	99%	75 - 125	2	20	7022124	NQB0819-01	02/13/07 19:04
Barium	9.98	60.3		mg/L	50.0	101%	75 - 125	0.3	20	7022124	NQB0819-01	02/13/07 19:04
Cadmium	0.00700	9.62		mg/L	10.0	96%	75 - 125	3	20	7022124	NQB0819-01	02/13/07 19:04
Chromium	0.0760	47.7		mg/L	50.0	95%	75 - 125	2	20	7022124	NQB0819-01	02/13/07 19:04
Lead	ND	49.1		mg/L	50.0	98%	75 - 125	2	20	7022124	NQB0819-01	02/13/07 19:04
Selenium	0.0801	10.6		mg/L	10.0	105%	75 - 125	2	20	7022124	NQB0819-01	02/13/07 19:04
Silver	ND	9.89		mg/L	10.0	99%	75 - 125	2	20	7022124	NQB0819-01	02/13/07 19:04
Polychlorinated Biphenyls by EPA Method 8082												
7021466-MSD1												
PCB-1242	ND	0.132	R2	mg/kg dry	0.174	76%	52 - 155	41	35	7021466	NQB0604-07	02/12/07 12:22
Surrogate: Tetrachloro-meta-xylene		0.0150		mg/kg dry	0.0174	86%	63 - 132			7021466	NQB0604-07	02/12/07 12:22
Surrogate: Decachlorobiphenyl		0.0132		mg/kg dry	0.0174	76%	39 - 108			7021466	NQB0604-07	02/12/07 12:22
TCLP Chlorinated Herbicides by EPA Method 8151												
7022156-MSD1												
2,4-D	ND	0.836		mg/L	1.00	84%	10 - 173	0.5	50	7022156	NQB0823-04	02/15/07 01:27
2,4,5-TP (Silvex)	ND	0.653		mg/L	1.00	65%	10 - 154	27	50	7022156	NQB0823-04	02/15/07 01:27
Surrogate: Dichloroacetic Acid		0.523		mg/L	1.00	52%	27 - 153			7022156	NQB0823-04	02/15/07 01:27
7024277-MSD1												
2,4-D	ND	0.814		mg/L	1.00	81%	10 - 173	11	50	7024277	NQB0823-03	02/27/07 00:07
2,4,5-TP (Silvex)	ND	0.739		mg/L	1.00	74%	10 - 154	6	50	7024277	NQB0823-03	02/27/07 00:07
Surrogate: Dichloroacetic Acid		0.548		mg/L	1.00	55%	27 - 153			7024277	NQB0823-03	02/27/07 00:07
Volatile Organic Compounds by EPA Method 8021B												
7021981-MSD1												
Benzene	0.000490	0.0510		mg/kg dry	0.0596	85%	10 - 147	0.4	48	7021981	NQB0842-05	02/13/07 15:56
Ethylbenzene	ND	0.0442		mg/kg dry	0.0596	74%	10 - 138	0.5	46	7021981	NQB0842-05	02/13/07 15:56
Toluene	0.000717	0.0466		mg/kg dry	0.0596	77%	10 - 138	0.2	50	7021981	NQB0842-05	02/13/07 15:56
Xylenes, total	ND	0.0896		mg/kg dry	0.119	75%	10 - 142	0.3	50	7021981	NQB0842-05	02/13/07 15:56
Surrogate: a,a,a-Trifluorotoluene		27.4		ug/L	30.0	91%	59 - 159			7021981	NQB0842-05	02/13/07 15:56
TCLP Volatile Organic Compounds by EPA Method 1311/8260B												
7022079-MSD1												
Benzene	ND	46.2		ug/L	50.0	92%	58 - 160	3	33	7022079	NQB0763-01	02/14/07 08:19
2-Butanone	ND	224		ug/L	250	90%	58 - 139	6	24	7022079	NQB0763-01	02/14/07 08:19
Carbon Tetrachloride	ND	48.5		ug/L	50.0	97%	49 - 182	8	44	7022079	NQB0763-01	02/14/07 08:19

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	21740 Beaumeade Circle, Suite 150	Project Name:	MACTEC
	Ashburn, VA 20147	Project Number:	3552060944.6.0
Attn	Brent Chapman	Received:	02/08/07 08:00

PROJECT QUALITY CONTROL DATA

Matrix Spike Dup - Cont.

Analyte	Orig. Val.	Duplicate	Q	Units	Spike Conc	% Rec.	Target Range	RPD	Limit	Batch	Sample Duplicated	Analyzed Date/Time
TCLP Volatile Organic Compounds by EPA Method 1311/8260B												
7022079-MSD1												
Chlorobenzene	ND	50.5		ug/L	50.0	101%	70 - 142	4	36	7022079	NQB0763-01	02/14/07 08:19
Chloroform	ND	47.2		ug/L	50.0	94%	52 - 158	1	29	7022079	NQB0763-01	02/14/07 08:19
1,2-Dichloroethane	ND	47.5		ug/L	50.0	95%	52 - 153	1	28	7022079	NQB0763-01	02/14/07 08:19
1,1-Dichloroethene	ND	49.0		ug/L	50.0	98%	59 - 169	5	38	7022079	NQB0763-01	02/14/07 08:19
Tetrachloroethene	ND	51.9		ug/L	50.0	104%	61 - 156	5	43	7022079	NQB0763-01	02/14/07 08:19
Trichloroethene	ND	45.4		ug/L	50.0	91%	58 - 165	7	39	7022079	NQB0763-01	02/14/07 08:19
Vinyl chloride	ND	40.4		ug/L	50.0	81%	38 - 183	5	34	7022079	NQB0763-01	02/14/07 08:19
Surrogate: 1,2-Dichloroethane-d4		50.9		ug/L	50.0	102%	62 - 142			7022079	NQB0763-01	02/14/07 08:19
Surrogate: Dibromofluoromethane		45.1		ug/L	50.0	90%	78 - 123			7022079	NQB0763-01	02/14/07 08:19
Surrogate: Toluene-d8		47.4		ug/L	50.0	95%	79 - 120			7022079	NQB0763-01	02/14/07 08:19
Surrogate: 4-Bromofluorobenzene		44.9		ug/L	50.0	90%	75 - 133			7022079	NQB0763-01	02/14/07 08:19
TCLP Pesticides by EPA Method 1311/8081A												
7022153-MSD1												
gamma-BHC (Lindane)	ND	0.00724		mg/L	0.0100	72%	37 - 149	4	33	7022153	NQB1046-01	02/14/07 18:16
Endrin	ND	0.00867		mg/L	0.0100	87%	32 - 169	9	29	7022153	NQB1046-01	02/14/07 18:16
Heptachlor	ND	0.00700		mg/L	0.0100	70%	28 - 138	3	38	7022153	NQB1046-01	02/14/07 18:16
Heptachlor epoxide	ND	0.00751		mg/L	0.0100	75%	43 - 140	7	23	7022153	NQB1046-01	02/14/07 18:16
Methoxychlor	ND	0.00685		mg/L	0.0100	68%	26 - 151	2	27	7022153	NQB1046-01	02/14/07 18:16
Surrogate: Tetrachloro-meta-xylene		0.00169		mg/L	0.00250	68%	46 - 127			7022153	NQB1046-01	02/14/07 18:16
Surrogate: Decachlorobiphenyl		0.00184		mg/L	0.00250	74%	25 - 144			7022153	NQB1046-01	02/14/07 18:16

TestAmerica
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Client	MACTEC Engineering & Consulting, Inc. (3740)	Work Order:	NQB0823
	21740 Beaumeade Circle, Suite 150	Project Name:	MACTEC
	Ashburn, VA 20147	Project Number:	3552060944.6.0
Attn	Brent Chapman	Received:	02/08/07 08:00

CERTIFICATION SUMMARY

TestAmerica - Nashville, TN

Method	Matrix	AIHA	Nelac	Virginia
ASTM D4982B	Soil	N/A		
EPA 170.1	Soil			
SW846 1311/6010B	Soil	N/A	X	N/A
SW846 1311/7470A	Soil	N/A	X	N/A
SW846 1311/8081A	Soil	N/A	X	N/A
SW846 1311/8151A	Soil	N/A	X	N/A
SW846 1311/8260B	Soil	N/A	X	N/A
SW846 1311/8270C	Soil	N/A	X	N/A
SW846 1311	Soil	N/A	X	N/A
SW846 8015B	Soil	N/A	X	N/A
SW846 8021B	Soil	N/A	X	N/A
SW846 8082	Soil	N/A	X	N/A
SW846 9045D	Soil			
SW-846	Soil			

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	21740 Beaumeade Circle, Suite 150	Project Name:	MACTEC
	Ashburn, VA 20147	Project Number:	3552060944.6.0
Attn	Brent Chapman	Received:	02/08/07 08:00

TCLP REGULATORY LIMITS

Analyte	Regulatory Limit
1,1-Dichloroethene	0.7
1,2-Dichloroethane	0.5
1,4-Dichlorobenzene	7.5
2,4,5-TP (Silvex)	1
2,4,5-Trichlorophenol	2
2,4,6-Trichlorophenol	400
2,4-D	10
2,4-Dinitrotoluene	0.13
2-Butanone	200
Arsenic	5
Barium	100
Benzene	0.5
Cadmium	1
Carbon Tetrachloride	0.5
Chlordane	0.03
Chlorobenzene	100
Chloroform	6
Chromium	5
Cresol(s)	200
Endrin	0.02
gamma-BHC (Lindane)	0.4
Heptachlor	0.008
Heptachlor epoxide	0.008
Hexachlorobenzene	0.13
Hexachlorobutadiene	0.5
Hexachloroethane	3
Lead	5
Mercury	0.2
Methoxychlor	10
Nitrobenzene	2
Pentachlorophenol	100
Pyridine	5
Selenium	1
Silver	5
Tetrachloroethene	0.7
Toxaphene	0.5
Trichloroethene	0.5
Vinyl chloride	0.2

TestAmerica
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Client	MACTEC Engineering & Consulting, Inc. (3740)	Work Order:	NQB0823
	21740 Beaumeade Circle, Suite 150	Project Name:	MACTEC
	Ashburn, VA 20147	Project Number:	3552060944.6.0
Attn	Brent Chapman	Received:	02/08/07 08:00

DATA QUALIFIERS AND DEFINITIONS

>200	>200
H8	The sample was extracted past the holding time.
HTI	The holding time for this test is immediate. The laboratory measurement, therefore, may not be suitable for compliance purposes.
M8	The MS and/or MSD were below the acceptance limits. See Blank Spike (LCS).
MNR1	There was no MS/MSD analyzed with this batch due to insufficient sample volume. See Blank Spike.
NO	No
R2	The RPD exceeded the acceptance limit.
RL1	Reporting limit raised due to sample matrix effects.
Z2	Surrogate recovery was above the acceptance limits. Data not impacted.
Z3	The sample required a dilution due to the nature of the sample matrix. Because of this dilution, the surrogate spike concentration in the sample was reduced to a level where the recovery calculation does not provide useful information.
Z5	Due to sample matrix effects, the surrogate recovery was outside acceptance limits. Secondary surrogate recovery was within the acceptance limits.

METHOD MODIFICATION NOTES

TestAmerica
ANALYTICAL TESTING CORPORATION

Nashville Division

COOLER RECEIPT FORM

BC#

NQB0823

Cooler Received/Opened On: 2/08/2007 8:00

1. Indicate the Airbill Tracking Number (last 4 digits for Fedex only) and Name of Courier below: 9660

FED-EX

Temperature of representative sample or temperature blank when opened: 4.6 **Degrees Celsius**
(indicate IR Gun ID#)

101507

3. Were custody seals on outside of cooler?..... YES...NO...NA
   a. If yes, how many and where: 2 Front
4. Were the seals intact, signed, and dated correctly?..... YES...NO...NA
5. Were custody papers inside cooler?..... YES...NO...NA

I certify that I opened the cooler and answered questions 1-5 (intial)..... WS

6. Were custody seals on containers: YES NO and Intact YES NO NA
   were these signed, and dated correctly?..... YES...NO...NA
7. What kind of packing material used? Bubblewrap Peanuts Vermiculite Foam Insert Plastic bag Paper Other_____ None
8. Cooling process: Ice Ice-pack Ice (direct contact) Dry ice Other None
9. Did all containers arrive in good condition (unbroken)?..... YES...NO...NA
10. Were all container labels complete (#, date, signed, pres., etc)?..... YES...NO...NA
11. Did all container labels and tags agree with custody papers?..... YES...NO...NA
12. a. Were VOA vials received?..... YES...NO...NA
    b. Was there any observable head space present in any VOA vial?..... YES...NO...NA

I certify that I unloaded the cooler and answered questions 6-12 (intial)..... MS

13. a. On preserved bottles did the pH test strips suggest that preservation reached the correct pH level? YES...NO...NA
    b. Did the bottle labels indicate that the correct preservatives were used..... YES...NO...NA
    If preservation in-house was needed, record standard ID of preservative used here_____
14. Was residual chlorine present?..... YES...NO...NA

I certify that I checked for chlorine and pH as per SOP and answered questions 13-14 (intial)..... [illegible]

15. Were custody papers properly filled out (ink, signed, etc)?..... YES...NO...NA
16. Did you sign the custody papers in the appropriate place?..... YES...NO...NA
17. Were correct containers used for the analysis requested?..... YES...NO...NA
18. Was sufficient amount of sample sent in each container?..... YES...NO...NA

I certify that I entered this project into LIMS and answered questions 15-18 (intial)..... [illegible]

I certify that I attached a label with the unique LIMS number to each container (intial)..... [illegible]

19. Were there Non-Conformance issues at login YES NO Was a PIPE generated YES NO #_____

BIS = Broken in shipment

TestAmerica
ANALYTICAL TESTING CORPORATION

Nashville Division
2960 Foster Creighton Drive * Nashville TN 37204
Phone: (800) 765-098 / (615) 726-0177 Fax:(615) 726-3404

Client: MACTEC Engineering & Consulting, Inc. (3740)
Address: 21740 Beaumeade Circle, Suite 150
City, State, Zip: Ashburn VA 20147
Client Invoice Contact: Ap Coordinator (inv)
Client Project Mgr: Brent Chapman
Client Telephone#: (703) 729-1416 Fax: (703) 858-1858
Sampler Name (Print): Brent Chapman
SamplerSignature:

TA Account #: 3740 PO #: 76211
Invoice to: MACTEC Engineering & Consulting (80116)
Report to: Brent Chapman
Project Name: MACTEC
Facility ID: [none]
Site Address:
City,State,Zip: Virginia
Regulatory District (CA):

NQB0823
02/22/07 23:59

Sample ID	Date Sampled	Time Sampled	# Containers Shipped	Grab	Composite	Field Filtered	Preservative: Methanol	Sodium Bisulfate	(Blue Label) HCL	(Orange Label) NaOH	(Yellow Label) Plastic H2SO4	(Yellow Label) Glass H2SO4	(Red Label) HNO3	(Black Label) None	Matrix: Groundwater	Wastewater	Drinking Water	Sludge	Soil	(specify) Other	Analyze: 8021B BTEX	8081A TCLP Pesticides	8082 PCBs	8151A TCLP Herbicides	8260B TCLP Volatiles	8270C TCLP BNAs	Ignitability of Solids ASTM D498	Metals, TCLP ICP 6010B	pH 9045C (+T)	Solids Percent Dry Weight	TPH-Diesel Range SW8015	TPH-Gasoline Range SW8015				RUSH TAT (Pre Schedule)*
TP-5 (0-10')	2/7/07	9:45	2		X																X										X	X			01	
TP-8 (0-6')	2/7/07	10:30	2		X																X										X	X			2	
PILE 1 Composite	2/7/07	12:30	6		X																X	X	X	X	X	X	X	X	X	X	X	X			3	
PILE 2 Composite	2/7/07	12:40	6		X																X	X	X	X	X	X	X	X	X	X	X	X		✓	4	

COMMENTS: All turn around times are calculated from the time of receipt at TestAmerica.
* Pre-Arrangements must be made AT LEAST 48 Hours in ADVANCE to receive results with RUSH turn around time commitments;additional charges may be assessed.
There may be a charge assessed for TestAmerica disposing of sample remainders.

NOTES/SPECIAL INSTRUCTIONS: *BO # 1009*
Project: 3552060944.6.0.

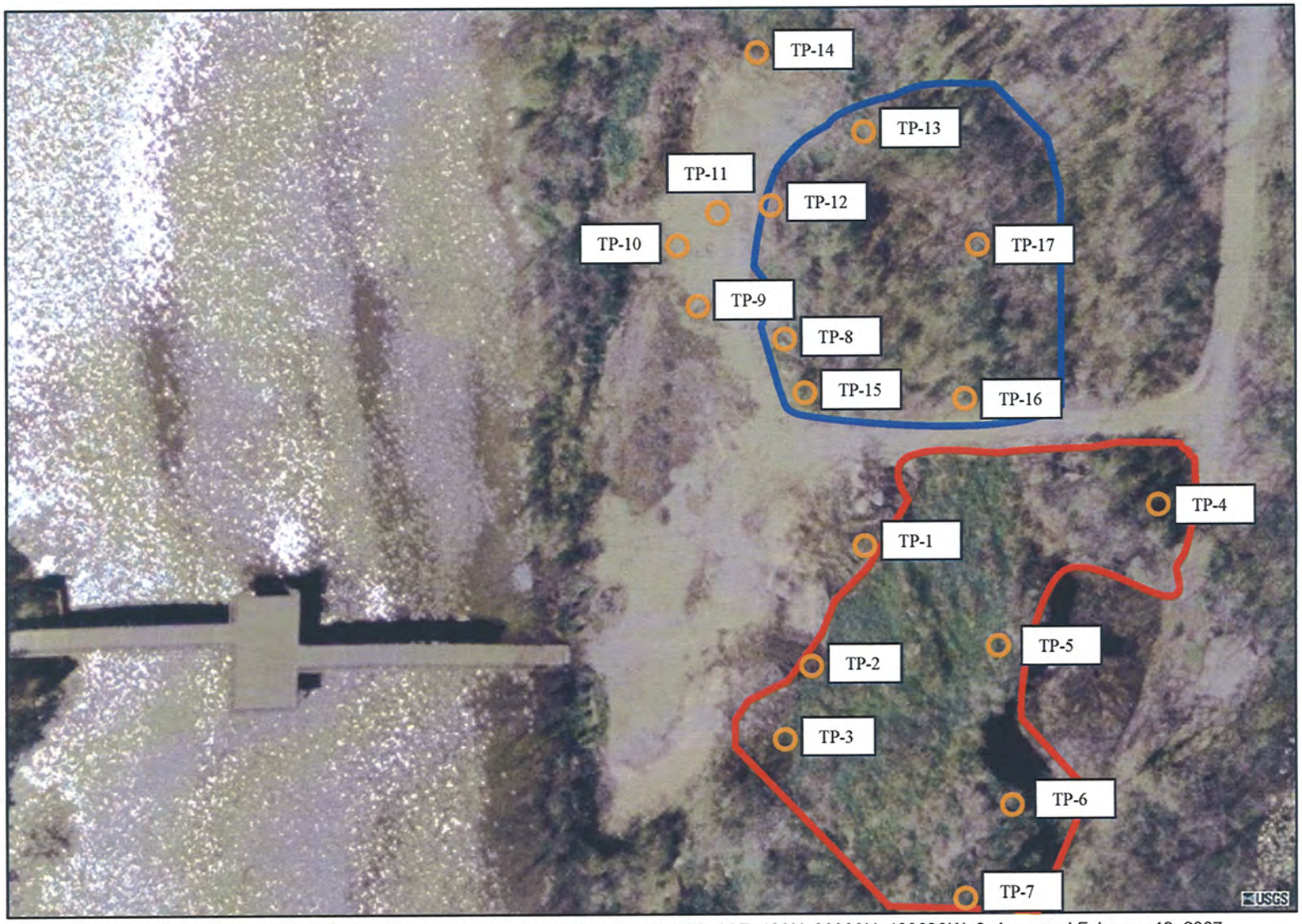
Relinquished by:	Date:	Time:	Received by:	Date:	Time:	Relinquished by:	Date:	Time:
	2/7/07	1:00 pm						

Shipped Via: FedX
Shipped Via:

Received for TestAmerica by: Date: 2/7/07 Time: 5:00
Temperature Upon Receipt:
Sample Containers Intact? Y N
VOCs Free of Headspace? Y N

QC Deliverables (Please Circle One) :
Level 2 Level 3 Level 4 Site Specific
(If site specific, please pre-schedule w/ TestAmerica Project Manager or attach specific instructions)

Date Due of Report:



Key:

- Test Pit
- Fill Mound No. 1
- Fill Mound No. 2

- N -

SCALE : Graphical

m 10 20 30 40
yds 15 30 45

Source: USGS 2002, Available online: http://terraserver-usa.com/usgsentry.aspx?T=4&S=9&Z=18&X=3296&Y=43068&W=3, Accessed February 19, 2007

Kingman Island Washington, DC	MACTEC 21740 Beaumeade Circle, Suite 150 Ashburn, Virginia 20147	Test Pit Location Map Project 3552-06-0944.6.0 Figure 3

Test Pit Summary Log				
Date	Test Pit No.	Depth (feet bgs)	Test Pit Soil Descriptions	PID Results (ppm)
2/7/2007	TP-1	0-4.5	FILL - topsoil with trace to some trash/debris and sand, black, some plastic, metal cans and gravel with wood, leaves and composte material	0.2
		4.5-5.0	FILL - Original ground, Silty Gravel - Clayey Gravel (GM-GC), gray, with some sand, apparent dredge spoils, some well rounded quartz gravels and quartz gravels and cobbles, moist to very moist	0
			Pit Terminated at 5.0 feet bgs. No ground water encountered.	
2/7/2007	TP-2		(*Excavated into hillside at mound)	
		0-17	FILL - topsoil and composte with tree limbs, leaves, mostly organics - onlytrace plastic	0
			FILL - original ground, (SM) Silty sand with some gravel (GM), trace clay, moist, light grey to brown, dredge spoils	0
			Pit Terminated at 18.0 feet bgs. No ground water encountered.	
2/7/2007	TP-3		(10+ year old tree on side of mound)	
		0-6	FILL - topsoil and organics with some brown silty sand, trace gravel, slightly moist	0
		6-7	FILL - original ground becomes (GM) silty gravel with sand	
			Pit Terminated at 7.0 feet bgs. No ground water encountered.	
2/7/2007	TP-4		(Adjacent to the road)	
		0-7.5	FILL - topsoil with some silty sand, black and brown, some gravel and trash (cans, plastic, metal, tin) concrete rubble, glass bottles, paper	0
		7.5-8	FILL - orignal ground(GM) Silty gravel - sandy gravel, grey, some iron staining, well rounded gravel, slightly moist	0
			Pit Terminated at 8.0 feet bgs. No ground water encountered.	
2/7/2007	TP-5		(Adjacent to top of mound in center of pile)	
		0-10	FILL - topsoil, black, moist to wet, trace of plastic, composte (leaves, wood, organics, trace to some silt and only trace of debris/garbage	0.4
				0
			Pit Terminated at 10.0 feet bgs. No ground water encountered.	
2/7/2007	TP-6		(Into side of mound - by iron pin with yellow flag)	
		0-18	FILL - Topsoil- Compost and organics with some silt and sand, trace plastic, burlap, decayed leaves and twigs, small piece of electrical wire, trace paper, wood, mostly organics, trace paper, wood, mostly organics	0
		18-19	FILL - originial ground, sandy clay with gravel, grey, moist	0
			Pit Terminated at 19.0 feet bgs. No ground water encountered.	
2/7/2007	TP-7		(By road adjacent to large boulder)	
		0-22	FILL - Brown silty sand with well rounded gravel, moist, no organics, trace metal-wire cable, concrete, trace to no garbage	0.2
			Pit Terminated at 22.0 feet bgs. No ground water encountered.	
2/7/2007	TP-8	0-6	FILL - light brown silty sand with gravel, trace organics and well rounded agate gravels, trace tin cans, paper, cobbles, increase with depth	0
			Asphalt and concrete at base	
			Pit Terminated at 6.0 feet bgs. No ground water encountered.	
2/7/2007	TP-9	0-4	(Isolated small mound)	0
			FILL -topsoil, plastic, tin cans, brick, organics, sand	
			Pit Terminated at 4.0 feet bgs. No ground water encountered.	

Date	Test Pit No.	Depth (feet bgs)	Test Pit Soil Descriptions	PID Results (ppm)
2/7/2007	TP-10	0-5	FILL - topsoil and silty sand, no debris Pit Terminated at 5.0 feet bgs. No ground water encountered.	0
2/7/2007	TP-11	0-5	(Isolated small mound) FILL - brown silty sand with gravel, trace organics, no debris Pit Terminated at 5.0 feet bgs. No ground water encountered.	0
2/7/2007	TP-12	0-8	FILL - orange brown, silty sand with some clay and gravel, trace concrete and tin cans, little to no trash Pit Terminated at 8.0 feet bgs. No ground water encountered.	0
2/7/2007	TP-13	0-7	FILL - orange brown silty sand with gravel and organics, trace plastic and wood, metal wire. No significant trash Pit Terminated at 7.0 feet bgs. No ground water encountered.	0
2/7/2007	TP-14	0-8	(In adjacent "large hill" mound 30' high) FILL - light brown silty sand with gravel, trace bricks, plastic, some large well rounded quartz cobbles. No significant trash Pit Terminated at 8.0 feet bgs. No ground water encountered.	0
2/7/2007	TP-15	0-6	FILL - light brown, silty sand with topsoil and gravel, trace clay, trace asphalt/concrete, no significant plastic or trash materials Pit Terminated at 6.0 feet bgs. No ground water encountered.	0
2/7/2007	TP-16	0-5	(Asphalt and concrete at surface) FILL - Light brown, silty sand with gravel and cobbles, trace bricks, concrete and asphalt, metal/ tin, some wood organics Pit Terminated at 5.0 feet bgs. No ground water encountered.	0
2/7/2007	TP-17	0-9	FILL - brown clayey sand with gravel, some cobbles No trash or debris, no topsoil Pit Terminated at 9.0 feet bgs. No ground water encountered.	0
2/7/2007	TP-18	0-3	Linear debris pile~ 3 feet high approximately 600 feet from Bridge 0-3 piles include orange 2" thick foam, compressed rubber membrane panels with silt/sand and organics Pit Terminated at 3.0 feet bgs. No ground water encountered.	0

Notes:
Test pits completed using a John Deere 310G backhoe
PID - Photo-ionization detector field headspace organic vapor reading
bgs - Below ground surface
ppm - Parts per million

Prepared/Date:
BRC 2/15/07
Checked/Date:

MACTEC

engineering and constructing a better tomorrow

March 23 2007

Mr. Jeffrey Seltzer, P.E.
Capital Projects Manager
Anacostia Waterfront Corporation
1100 New Jersey Avenue, SE, Suite 700
Washington, DC 20003

Subject: **Human Health and Ecological Risk Assessment Report Reviews and Recommendations Kingman Island Northeast, Washington, DC MACTEC Project 3552-06-0944.6.0**

Dear Mr. Seltzer:

MACTEC Engineering and Consulting, Inc. (MACTEC) completed a review of two Risk Assessment Reports provided by the Anacostia Waterfront Corporation (AWC), which are associated with future development at Kingman Island ("Site") located in Northeast, Washington, D.C. The creation of Kingman Island reportedly began in 1916 by the U.S. Army Corps of Engineers (Corps) as a result of Anacostia River dredging operations, which ceased in 1920. There is no engineering record describing the characteristics of the dredged material. Since the initial dredging, the island has been used for unofficial dumping of refuse including numerous large composting and related fill/debris mounds. MACTEC previously completed 18 backhoe-excavated test pits at the Site in April 2007, to assess the lateral and vertical extent of selected large fill mounds and their general composition. The results of the test pit excavations and associated soil analytical testing were described in MACTEC's *Fill Mound Environmental Assessment Report*, dated March 7, 2007. In addition to the MACTEC Fill Mound Assessment report, the following two risk assessment reports were reviewed:

- *Kingman Island Human Health and Ecological Risk Assessment, Washington, D.C.*, prepared by the U.S. Army Corps of Engineers, Baltimore District, dated November 2002.
- *Heritage Island Human Health and Ecological Risk Assessment, Washington, D.C.*, prepared by the U.S. Army Corps of Engineers, Baltimore District, dated December 2002.

BACKGROUND

The Corps of Engineers, Baltimore District, has been assisting the District of Columbia in the formulation and implementation of a Preferred Master Plan for the restoration of Kingman and Heritage Islands. As part of the environmental evaluation process, the Corps completed site-specific risk assessments of chemicals in soil and water on both Kingman and Heritage Islands. Subsurface and near-surface soil, sediment, surface-water and ground-water samples were collected and laboratory analyzed for suspected contaminants of concern. The Preferred Master Plan for the restoration of Kingman Island includes a variety of options to restore and enhance the island for recreational use by people, and for the support of wildlife. Habitat improvements include removal of non-native plants, clean-up of rubble and refuse, re-grading and/or capping of specific areas, extensive reforestation, and the creation of wetland and

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grassland areas. Recreational features include a nature center building, sculpture areas, playground, trail system, viewing areas, canoe dock and picnic areas.

RESULTS

The results of the risk assessment completed by the Corps provided no reason to alter the Kingman Island Master Plan. Risks to humans were found to be acceptable considering the proposed Site uses. Some risks to wildlife were identified that may translate into reduced reproductive capacity for some species. To the extent these risks are real, there appears to be no effect on overall populations. It should be recognized that any risks to wildlife are risks that currently exist and have for a long period of time. Implementation of the Preferred Master Plan will reportedly not increase risks to wildlife or worsen ecological conditions on the island. Proposed habitat enhancements should increase use of Kingman Island by wildlife species.

Although Corps-predicted lead concentrations in soil at the Site were not of concern in the blood-lead level modeling, the presence of lead concentrations over 1,000 mg/kg (the USEPA Industrial Screening Level) in soil was considered to be a concern. It was recommended by the Corps that lead concentrations of 1,000 mg/kg or greater be remediated. However, MACTEC recommends that capping of these areas be considered as a preferred alternative to active remediation.

Under the USEPA January 2001 Residential Lead Hazard Standards – TSCA Section 403, lead is considered a hazard if there are greater than 400 mg/kg of lead in bare soil in children's play areas or 1,200 mg/kg average for bare soil in the rest of the residential property. Therefore, a more conservative total lead value of 400 mg/kg should be used as a baseline concentration or cleanup guideline for areas within the Site proposed as a playground.

Although the Corps 2000 Site investigation activities included total recoverable petroleum hydrocarbons (TRPH) analysis of soil and ground-water samples, these results were not utilized in the risk assessment. However, Table 4-2 in the Kingman Island Risk Assessment report indicates the mean TPH concentration detected in surface soil was 1,128 and the maximum concentration was 6,600. The TPH result units are presented in mg/L, which is a unit of measure for liquids. In addition, the sample specific laboratory analytical reports including in Appendix D also had TPH results in mg/L, although two sediment TPH results were in mg/kg. It is possible that the TPH test method used an elutriate (mixing on-site water with soil) which would explain the results being presented in mg/L, versus in mg/kg. Based on this data, there are numerous areas at the Site with elevated TPH concentrations in soil, which may require special handling, remediation or off-site disposal, if removed from the ground during future Site development activities.

In addition, the approximate volumes of the three large fill mounds evaluated by MACTEC in 2007 were 12,000 cubic yards (Pile 1), 7,000 cubic yards (Pile 2) and 30 cubic yards (Pile 3). Most of the fill mound material was generally described as topsoil/compost or a silty sand to silty gravel, mixed with varying amounts of debris such as plastic, metal, glass, tin cans, concrete and asphalt. Based on soil composite sample TPH-DRO laboratory analytical results (ranging from 7.39 to 838 mg/kg), the soil piles appear to contain some diesel range petroleum hydrocarbons. Although DC does not have a "clean fill" standard, soil can be left in place that does not exceed the DC UST Division and related Risk-Based Corrective Action (RBCA) soil quality standard of 960 mg/kg, for TPH-DRO. However, if this soil is excavated as part of Site development activities, it must be handled and disposed of as a solid waste or in accordance with a regulatory approved CAP or Soil Management Plan.

RECOMMENDATIONS

The following recommendations were developed based on our review of the two risk assessment reports and our fill mound test pit excavations:

- Construction Specifications should developed to require a detailed Health and Safety Plan, to protect construction workers from exposure to lead (and petroleum) impacted soils and ground water, which can be controlled through the use of personal protective equipment (PPE), such as gloves and work boots.

- Additional baseline near-surface soil TPH and total lead testing should be performed in areas proposed for the playground and where significant site grading or "cut" is proposed. Where total lead exceeds 400 mg/kg in playground areas or where total lead exceeds 1,000 mg/kg in other areas, installation of a soil Cap or a related soil stabilization technology should be implemented to prevent human contact with soil following development. The use of phytoremediation (specifically phytostabilization) may be a preferred remedial alternative in areas of impact outside of the playground. Excavation with off-site disposal, electrokinetics, soil flushing, solidification/stabilization and other lead remediation technologies will not likely be cost effective. Remedial alternatives for petroleum-impacted soils which cannot be used as clean fill or as a cap such as off site disposal, bioremediation, thermal treatment, chemical oxidation, and bioventing will also not likely be cost effective alternatives.

- In the areas of the large fill mounds, mobile screening and recycling equipment (with integrated sorting lines, magnets, conveyors, screeners, grinders, etc.) can be utilized on-site to sort out concrete, rubble, trash, debris and gravel so the end product can be further tested for potential TPH and lead. This processing should reduce the overall volume (weight) of potential petroleum contaminated soil requiring off-site disposal, and possibly allow much of the organic topsoil or compost material to be utilized as cap material or as rough grading/landscaping fill, where roads and load-bearing structures are not proposed.

- Following regulatory approval, low level petroleum contaminated soils could possibly be used as Site grading material or in berm construction, providing the surface is capped or covered with at least one foot of "clean" soil, and no direct exposure pathways to human or ecological receptors are identified.

CLOSING

We appreciate the opportunity to provide our continuing environmental services to AWC on this project. If you have any questions, please do not hesitate to contact our office at (703) 729-1416.

Sincerely,

MACTEC ENGINEERING AND CONSULTING, INC.

BY WITH PERMISSION

John R. Mittauer, P.G.
Principal Geologist

Brent R. Chapman, P.G.
Principal Geologist