COMPLIANCE STATUS REPORT

FOR FORMER TAX PARCEL 14-82-6-3

NORTHSIDE DRIVE LANDFILL

HAZARDOUS SITE INVENTORY SITE NO. 10222

submitted on behalf of
State of Georgia and the Georgia Department of Economic Development

to the
Georgia Environmental Protection Division

September 1, 2005

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[1] Only the Appendices marked with an asterisk are attached. The other Appendices are not attached since they are already on file at the EPD office.

Preface

Powell Goldstein LLP prepared this CSR for former Tax Parcel No. 14-82-6-3 which is part of the Northside Drive Landfill HSI Site in Atlanta, Georgia. This CSR is submitted on behalf of the Georgia Department of Economic Development ("GDEcD") acting on behalf of the State of Georgia. This CSR is a compilation of the work product of several environmental engineering firms hired by the Georgia World Congress Center Authority ("GWCCA") and the Georgia Department of Natural Resources Environmental Protection Division ("EPD"). The descriptions of those activities in this CSR are based solely on information contained in reports from those engineering firms and are not based on any first-hand observations by the State of Georgia, GDEcD, the GWCCA, or Powell Goldstein LLP. Reports and data relied on in preparing this CSR are either included in the Appendices or contained in EPD files and are referenced thereto.

By submitting this CSR, the State of Georgia, GDEcD, or the GWCCA make no admission of fact or law of any kind regarding liability in connection with any current or previous contamination at the Site, any portion thereof, or any surrounding properties.

CONCISE STATEMENT OF FINDINGS

The Northside Drive Landfill HSI Site (the "Site") is located approximately one mile northwest of downtown Atlanta, Georgia. The Site is currently owned by State of Georgia in custody of the GDEcD and is being developed as a parking lot by the GWCCA for the nearby Georgia World Congress Center ("GWCC"). A site location map is shown on Figure 1-1. The tax parcels that comprise the Site have been reconfigured and renumbered since the Site was first listed on the HSI in 1993. The original HSI Site was bordered by Kennedy Street to the north, Western Avenue to the south, Gray Street to the east, and Northside Drive to the west. John Street ran east-west through the middle of the Site. The original Site was composed of three tax parcels: Tax Parcel No. 14-82-6-8; Tax Parcel No. 14-82-6-9; and Tax Parcel No. 14-82-6-10 ("Parcel 10").[2]

This CSR addresses a small triangle-shaped .384 acre portion of the Site located south of John Street and east of Northside Drive that formerly was identified as Tax Parcel No. 14-82-6-3 (hereinafter referred as "Parcel 3") and known as 399 Northside Drive.[3] In 2004, Parcel 3 was consolidated with a number of parcels that included former Tax Parcel No. 14-82-6-10 and a number of other parcels that were not part of the original HSI site when the State of Georgia took title to these parcels. Parcel 3 is now part of the 9.4354 acre Tax Parcel No. 14-82-6-12 as shown on Figures 1-4 and 1-3.

Based on investigations performed by ERM-EnviroClean Southeast, Inc., OHM Remediation Services, Inc., Tetra Tech EM Inc. and Weston Solutions, Inc. and others land-filled wastes were/are present at the Site. Information obtained from ATEC Associates, Inc. ("ATEC") indicates that portions of the Site may have been filled with these waste materials prior to 1928 (ATEC, 1994). Some of this waste material may have been transferred to the parcels located north of John Street during the construction of the apartment buildings. The majority of the waste materials are present on Parcel 12.

The majority of the area north of John Street[4] (Tax Parcel No. 14-82-6-8) was remediated to Type 1 or Type 2 Residential Risk Reduction Standards as documented in the Compliance Status Report ("CSR") for Herndon Homes submitted to EPD on October 4, 1999 (the "1999 CSR"). This tax parcel was removed from the HSI on January 28, 2000.

The small triangle-shaped area north of John Street (Tax Parcel No. 14-82-6-9) was remediated to Type 1 or Type 2 Risk Reduction Standards as documented in a CSR Addendum submitted to EPD on August 18, 2003.

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[2] Tax parcels 14-82-6-8, 14-82-6-9 and 14-82-6-10 as originally configured are shown on Figure **1**-2.

[3] *See* Figure 1-3. Parcel 3 is also shown as Parcel 41 on that certain *Plat of Survey of Tracts of Real Property Held by State of Georgia* by Riley, Park, Hayden & Associates, Inc. recorded at Plat Book 207, Page 104 Fulton County Superior Court real estate records. *See* Figure 1-4 (showing Parcel 41).

[4] This area includes Building 29 which is north of the abandoned section of John Street and south of a drive that connects with the remaining portion of John Street.

A small area that was formerly part of Tax Parcel No. 14-82-6-8 (near Building 11) was discovered to contain land-filled waste materials during the remedial investigation. This .221 acre parcel is now Tax Parcel No. 14-82-6-11 ("Parcel 11").[5] The area just south of Building 11 was remediated along with Tax Parcel No. 14-82-6-9. However, some fill materials remain under and behind Building 11. This area will be remediated in the future and recertified.

The former Parcel 10 was remediated to Type 5 Risk Reduction Standards as documented in the CSR for Tax Parcel 14-82-6-10 submitted to EPD on April 19, 2003 and approved by EPD on September 25, 2004 (the "2003 CSR"). A bentonite slurry wall and engineered landfill cap were constructed at Parcel 12 to contain constituents of concern and prevent groundwater from leaving Parcel 10. As shown on Figure 1-6, a small portion of the bentonite slurry wall and engineered landfill cap are located on Parcel 3.

During the construction of the bentonite slurry wall and engineered landfill cap on Parcel 10, the land-filled wastes were observed to extend onto Parcel 3 and under Northside Drive. Where possible, waste materials on parcel 3 were excavated and placed within the bentonite slurry wall and engineered landfill cap. Those waste materials that could not be excavated (those near and under Northside Drive) have been contained with an engineered control structure.

GDEcD (then know as the Georgia Department of Industry, Trade & Tourism) submitted a prospective purchaser corrective action plan ("PPCAP") to the Georgia Environmental Protection Division ("EPD") on December 2, 2003 in accordance with the Georgia Hazardous Site Reuse and Redevelopment Act, O.C.G.A. § 12-8-200 *et seq.* ("HSRRA"). EPD approved the PPCAP on December 18, 2003. The work at Parcel 3 documented herein was completed pursuant to and in accordance with the approved PPCAP.

[5] *See* Figure 1-5.

Certification of Compliance with Risk Reduction Standards

I certify under penalty of law that this CSR was prepared under my direction in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of a fine and imprisonment for knowing violations.

Based on my review of the findings of this report with respect to the risk reduction standards of the Rules for Hazardous Site Response, Rule 391-3-19-.07, I have determined that former Tax Parcel No. 14-82-6-3 is in compliance with Type 5 Risk Reduction Standards.

Joan B. Sasine

Joan B. Sasine
Special Assistant Attorney General

PROFESSIONAL ENGINEER STATEMENT[6]

[6] This Certification is from the *May 2003 (Revised) Waste Excavation Closure Report Northside Drive Landfill* prepared by Weston Solutions, Inc. (*see* Appendix F).

PROFESSIONAL ENGINEER STATEMENT[5]

CERTIFICATION

I HEREBY CERTIFY THAT THE WORK INVOLVED TO COMPLETE THE EXCAVATION OF CONTAMINATED WASTE MATERIALS FROM THE AREA INDICATED ON THE DESIGN DRAWINGS ALONG NORTHSIDE DRIVE AND JOHN STREET WAS PERFORMED IN CONFORMANCE WITH THE PROJECT PLANS AND SPECIFICATIONS. THIS INFORMATION IS DETAILED IN THIS WASTE EXCAVATION CLOSURE REPORT DATED MAY, 2003.

WESTON SOLUTIONS, INC.

RICHARD A. WOODHAM, P.E.
SENIOR PROJECT ENGINEER

[5] This Certification is from the *May 2003 (Revised) Waste Excavation Closure Report Northside Drive Landfill* prepared by Weston Solutions, Inc. (see Appendix F).

I. SITE BACKGROUND AND PREVIOUS INVESTIGATIONS

A. Site Description and History

The Northside Drive Landfill HSI Site (the "Site") is located approximately one mile northwest of downtown Atlanta, Georgia. The Site is currently owned by State of Georgia in custody of the GDEcD and is being developed as a parking lot by the GWCCA for the nearby Georgia World Congress Center ("GWCC"). The Site formerly was owned by the Housing Authority of the City of Atlanta (a.k.a. "AHA")[1] and was improved with a residential multifamily development known as Herndon Homes. A site location map is shown on Figure 1-1. The tax parcels that comprise the Site have been reconfigured and renumbered since the Site was first listed on the HSI. The original HSI Site was bordered by Kennedy Street to the north, Western Avenue to the south, Gray Street to the east, and Northside Drive to the west. John Street ran east-west through the middle of the Site. The original Site was composed of three tax parcels: Tax Parcel No. 14-82-6-8; Tax Parcel No. 14-82-6-9; and Tax Parcel No. 14-82-6-10 ("Parcel 10").[2]

This CSR addresses a small triangle-shaped .384 acre portion of the Site located south of John Street and east of Northside Drive that formerly was identified as Tax Parcel No. 14-82-6-3 (hereinafter referred as "Parcel 3") and known as 399 Northside Drive.[3] In 2004, Parcel 3 was consolidated with a number of parcels that included former Parcel 10 and a number of other parcels that were not part of the original HSI site when the State of Georgia took title to these parcels. Parcel 3 is now part of the 9.4354 acre Tax Parcel No. 14-82-6-12 as shown on Figure 1-4 and 1-3 ("Parcel 12").

Based on investigations performed by ERM-EnviroClean Southeast, Inc., OHM Remediation Services, Inc., Tetra Tech EM Inc. and Weston Solutions, Inc. ("Weston") and others land-filled wastes were/are present at the Site. Information obtained from ATEC Associates, Inc. ("ATEC") indicates that portions of the Site may have been filled with these waste materials prior to 1928 (ATEC, 1994). Some of this waste material may have been transferred to the parcels located north of John Street during the construction of the apartment buildings. The majority of the waste materials are present on Parcel 12.

The majority of the area north of John Street[4] (Tax Parcel No. 14-82-6-8) was remediated to Type 1 or Type 2 Residential Risk Reduction Standards ("RRS") as documented in the Compliance Status Report ("CSR") for Herndon Homes submitted to

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[1] Tax Parcel 14-82-6-11 is still owned by AHA.

[2] Tax parcels 14-82-6-8, 14-82-6-9 and 14-82-6-10 as originally configured are shown on Figure 1-2.

[3] *See* Figure 1-3. Parcel 3 is also shown as Parcel 41 on that certain *Plat of Survey of Tracts of Real Property Held by State of Georgia* by Riley, Park, Hayden & Associates, Inc. recorded at Plat Book 207, Page 104 Fulton County Superior Court real estate records. *See* Figure 1-4 (showing Parcel 41).

[4] This area includes Building 29 which is north of the abandoned section of John Street and south of a drive that connects with the remaining portion of John Street.

EPD on October 4, 1999 (the "1999 CSR"). This tax parcel was removed from the HSI on January 28, 2000.

The small triangle-shaped area north of John Street (Tax Parcel No. 14-82-6-9) was remediated to Type 1 or Type 2 Risk Reduction Standards as documented in a CSR Addendum submitted to EPD on August 18, 2003.

A small area that was formerly part of Tax Parcel No. 14-82-6-8 (near Building 11) was discovered to contain land-filled waste materials during the remedial investigation. This .221 acre parcel is now Tax Parcel No. 14-82-6-11 ("Parcel 11").[5] The area just south of Building 11 was remediated along with Tax Parcel No. 14-82-6-9. However, some fill materials remain under and behind Building 11. This area will be remediated in the future and recertified.

The former Parcel 10 was remediated to Type 5 Risk Reduction Standards as documented in the CSR for Tax Parcel 14-82-6-10 submitted to EPD on April 19, 2003 and approved by EPD on September 25, 2004 (the "2003 CSR"). A bentonite slurry wall and engineered landfill cap were constructed at Parcel 10 to contain constituents of concern and prevent groundwater from leaving Parcel 10. As shown on Figure 1-6, a small portion of the bentonite slurry wall and engineered landfill cap are located on Parcel 3.

During the construction of the bentonite slurry wall and engineered landfill cap on Parcel 10, land-filled wastes were observed to extend onto Parcel 3 and under Northside Drive. Where possible, waste materials on parcel 3 were excavated and placed within the bentonite slurry wall and engineered landfill cap. Those waste materials that could not be excavated (those near and under Northside Drive) have been contained with an engineered control structure. *See* Appendix U for construction plans.

GDEcD (then know as the Georgia Department of Industry, Trade & Tourism) submitted a prospective purchaser corrective action plan ("PPCAP") to the Georgia Environmental Protection Division ("EPD") on December 2, 2003 in accordance with the Georgia Hazardous Site Reuse and Redevelopment Act, O.C.G.A. § 12-8-200 *et seq.* ("HSRRA"). EPD approved the PPCAP on December 18, 2003. The work at Parcel 3 documented herein was completed pursuant to and in accordance with the approved PPCAP.

B. Site Topography

Ground surface elevations at the site range from approximately 930 feet to 975 feet above mean sea level. In general, the topography at the Site slopes towards the west-central portion of the site. No streams, ponds, or other perennial bodies of water are located on the property.

[5] *See* Figure 1-5.

C. Historical Use

ATEC Associates, Inc. conducted a historical records review to identify and document previous land use at the site (ATEC, 1994). The records review showed that the Site has been owned by the Housing Authority of the City of Atlanta from 1941 until 2004. *See* Chain of Title Search – 1999 CSR Appendix A. Sanborn Fire Insurance maps (*see* 1999 CSR Appendix B) revealed that from 1911 to 1932, Parcel 10, bounded by Western Avenue on the south and John Street on the north, was vacant. A 1928 topographic map indicated that a long, narrow topographic depression ran roughly east-west across Parcel 12. No mineral production, waste management, fuel storage or heavy industries were identified as previous owners of the Site. Nearby industries, however, have included a manufactured gas plant, a foundry and fuel storage facilities.

D. Site Investigations

In December 1998, EPD retained Tetra Tech EM Inc. ("Tetra Tech") to conduct an environmental and geotechnical investigation of the Site (focusing on Parcel 12), evaluate the results and design a remedial strategy for the landfill on Parcel 12.

Tetra Tech's investigation of the Site was completed in the following phases: Phase I - Waste Delineation; Phase II - Geotechnical Investigation; Phase III - Groundwater Investigation; and Phase IV - Methane Gas Survey. A copy of the February 2001 Tetra Tech Field Investigation Report (Revision 3) is attached as Appendix A and is more fully discussed in Section II.

The investigation determined that Parcel 12 contained the majority of the coal-tar like waste material present at the Site. It was determined that the waste material was more extensive than originally anticipated and new boundaries were established for the extent of contamination on Parcel 12. Although no additional soil analysis was performed, groundwater analytical sampling was conducted at the Parcel 12, and Tetra Tech determined that the site did not impact the groundwater and detectable contaminants were below the Type 1 and 3 RRS. Additionally, Tetra Tech determined that the waste material still contained moderate to high levels of metals.

Tetra Tech used the information gathered during the investigation to design a soil-bentonite slurry-trench cutoff wall (a.k.a. the "slurry wall") in conjunction with an engineered low-permeability landfill cap, which will divert groundwater flow around the landfill area and minimize off-site transport of contaminants by preventing contact between the landfill waste and groundwater. Tetra Tech also completed a pre-design site investigation and laboratory analysis to establish performance criteria, verify implementability, and evaluate constructability and final design of a slurry wall for the landfill. A separate report--Basis of Design for Landfill Cap and Slurry Wall--detailing the slurry wall and cap design prepared in conjunction with the Field Investigation report and is attached as Appendix B. Weston was responsible for construction of the slurry wall and cap based on the Tetra Tech's specific design criteria, construction techniques, and performance criteria, which are presented in the Construction Specifications, Landfill

Cap and Slurry Wall for the Northside Drive Landfill attached as Appendix C. Weston was also responsible for construction of the engineered concrete sidewalk cap and asphalt roadbed as discussed in Section II(C).

Currently, all of the buildings located on Parcel 12 have been demolished and the debris disposed of. The site remains fenced on all four sides to prevent unauthorized access.

E. History of Remediation

EPD contracted with Weston Solutions, Inc. to conduct the remediation of Parcel 12 by installing a soil-bentonite slurry-trench cutoff wall in conjunction with a low-permeability landfill cap to divert groundwater flow around the landfill and minimize off-site transport of contaminants by preventing contact with the landfill waste and groundwater. The work is fully described in Section IV.

F. Site Specific Constituents of Concern

The site specific constituents of concern and the RRS used to guide excavation outside of the boundary of the landfill cap and slurry wall at Parcel 12 are shown in Table 1-1. Soils exhibiting concentrations of constituents of concern above these RRS were excavated and placed inside of the boundaries of the landfill cap and slurry wall as discussed on Section IV.

G. Geology

The Site is located in the Winder Slope District of the Piedmont physiographic province of Georgia (Clark and Zisa, 1976). Ground surface elevations in this district range from 700 feet to 1,000 feet and the topography is characterized as rolling. Regionally, the area near the site is underlain by a complex of late Precambrian to early Paleozoic-aged metamorphic and ingenous rocks referred to as the Atlantic Group (McConnell and Abrams, 1984). More specifically, the northwest corner of the site is underlain by the Wahoo Creek formation while the remainder of the site is underlain by the Stonewall Formation. The Wahoo Creek Formation includes slabby, medium-grained muscovite-plagioclase-quartz gneiss, amphibolite, mica schist, and epidote-calcite-diopside gneiss. The Stonewall Formation consists of fine-grained biotite gneiss, hornblende-plagioclase amphibolite, and sillianite-bioltite schist.

Bedrock in the area is mantled primarily by residual soils of varying thickness formed from the in-place weathering of the underlying rock. As such, the character of residual soil is dependent on the nature of the rock from which it is weathered. Smaller areas of alluvial soils are located in proximity to rivers and creeks. These soils formed in sediments deposited by the streams.

Rocks in the area near the site have little to no inherent primary porosity. However, rocks do have structural and stratigraphic features which create localized zones of secondary porosity. These openings include, but are not limited to, contact zones, stress

relief features, and jointing features. The size, spacing, and degree of interconnection of these voids varies with rock type and depth (Cressler, *et al.*, 1993).

The occurrence and movement of groundwater in the area near the site can occur within two separate but interconnected water-bearing zones. These include a shallow water-bearing zone which typically occurs within the residual soils and a deeper water-bearing zone which typically occurs within the bedrock. Groundwater in the shallow water-bearing zone occurs in the interstitial pore spaces between the individual grains comprising the soil and is typically under water table (i.e., unconfined) conditions. Groundwater movement in this zone typically approximates the surface topography with the direction of groundwater movement being from upland areas towards nearby systems within the shallow water-bearing zone and typically consists of numerous small groundwater basins corresponding to local drainage patterns (Cressler, *et al.*, 1983). Based upon a review of the topography and nearby drainage features, the presumed general directions of groundwater movement in the shallow water-bearing zone at the Site have been estimated. These are shown on Figure 3-13 in the 1999 CSR.

Recharge of the shallow water-bearing zone occurs as the result of infiltration of precipitation into the soil and its subsequent downward movement. This recharge is typically local in extent with small drainage features serving as localized points of groundwater discharge. Based on observations made during the installation of the storm sewer system, the water table at the site is believed to be located within 20 feet of the ground surface (Bearden, personal communication, 1994).

Groundwater in the deeper water bearing zone is associated primarily with the secondary porosity of the bedrock. Groundwater movement within this zone is controlled by the distribution and degree of interconnection of rock discontinuities. Consequently, the direction of groundwater movement in the deeper water-bearing zone is difficult to predict, particularly on a localized scale (Cressler, *et al.*, 1983).

Recharge of the deeper water-bearing zone typically occurs as the result of the downward movement of groundwater through overlying soils. In areas where bedrock is exposed at the ground surface, recharge can result from precipitation falling or flowing directly into open discontinuities. No such areas have been observed on the Site, however.

II. REMEDIAL INVESTIGATIONS

A. Tetra Tech EM Inc. -- Preliminary Investigation

Tetra Tech submitted a site assessment work plan to EPD on December 9, 1998. To expedite development of the corrective action plan, EPD asked Tetra Tech to complete a feasibility study and screen appropriate remedial alternatives during preparation of the work plan. Tetra Tech, in collaboration with EPD, considered several alternatives for remediation. However, in mid-December, EPD conducted a preliminary review of the original work plan and determined that additional field investigation would be required to evaluate the feasibility of proposed alternatives.

Therefore, Tetra Tech prepared a separate preliminary work plan for investigative work to be performed prior to selection of the final remedial alternative. In January 1999, Tetra Tech implemented the preliminary work plan that investigated the following areas of concern:

- The horizontal limit of waste as it extends north of Building 14 across John Street;
- The extent of waste adjacent to buildings 32, 38, and 50; and
- The limit of waste around the community center and its proximity to Northside Drive on Parcel 3.

The preliminary investigation was initiated with the advancement of 22 hand-auger borings to depths ranging from 8 to 10 feet, unless waste material was encountered at shallower depths. Collectively, based on visual observation, the waste material appears to extend about 100 feet (horizontally) north of John Street.

In addition to the hand-auger borings, 18 trenches were excavated south of John Street on Parcel 10, adjacent to several former residential buildings, the community center, and Northside Drive. Waste material was encountered adjacent to Buildings 32, 38, 44, and 50, on the eastern and western sides of the community center, north of the intersection of Johnson and Edwards Streets, between Buildings 47 and 54, and on the eastern edge of the Northside Drive right-of-way on Parcel 3. The report summarizing the results of the Tetra Tech investigations is attached as Appendix A (hereinafter referred to as the "2001 Tetra Tech Report").

B. Tetra Tech EM Inc. -- Phased-Approach Remedial Investigation

This section explains the sampling strategies that Tetra Tech and its subcontractors used when investigating the various contaminated media prior to formulation of the corrective action plan. The results of the sampling performed during these investigations are given in the appendices to the 2001 Tetra Tech Report. *See* Appendix A.

The Landfill investigation was completed in the following four phases:

Phase I	Waste Delineation	Trenching and Geoprobe® sampling
Phase II	Geotechnical Investigation	Investigating depth to bedrock, and soil types around the site
Phase III	Groundwater Investigation	Investigation of depth to water, hydraulic conductivity, groundwater flow and direction, rate of groundwater movement, and monitoring well installation, development, and sampling
Phase IV	Methane Gas Survey	Soil gas survey

Tetra Tech subcontracted a 24-hour security service to protect the site against unauthorized access during non-working hours. A table of witnesses, containing personnel and affiliations involved with the investigation, is included in Appendix B to the 2001 Tetra Tech Report. Detailed written and photographic documentation (*see* Appendices C and D, respectively of the 2001 Tetra Tech Report) of site activities during the investigation are included.

1. Phase I – Waste Delineation

Specific elements of Phase I included waste delineation. In an effort to characterize and delineate the extent of the waste on Parcel 12 based on the preliminary investigation, it was necessary to conduct test trenching and install Geoprobe® borings. These locations were selected in an effort to obtain information concerning the extent of the known waste material present on the southern parcel. As a result, new boundaries were established for the extent of the waste material on Parcel 12 (*see* Figure 2-1). The investigation suggests the majority of the waste is confined to Parcel 12. A portion of the landfill exists under John Street and under Northside Drive adjacent to Parcel 3. This portion of the landfill material at John Street was addressed during the excavation remedial phase of the corrective action.

a. Test Trenching

Trenching activities began on January 12, 1999 and were completed on January 15, 1999. Tetra Tech subcontracted MACTEC, Inc. to perform trenching activities. A total of 18 trenches were excavated south of John Street, in the area between Gray Street, Western Avenue, and Northside Drive (*see* Figure 2-2). Trenches were typically excavated to a depth of about 10 feet or until native soils were encountered, whichever was encountered first.

Waste material (coal-tar-like slag material, metal pieces, and glass bits) was encountered during trenching activities. Photographs were also taken to document trenching activities. Samples were collected from each trench location. Each sample collected was deemed to be representative of either the soil or waste present at the particular trench

location. All samples from the trenches were collected with the bucket of the backhoe used to dig the trenches. All sampling procedures followed EPA Region 4 Science and Ecosystems Support Division Environmental Investigation, Standard Operating Procedures and Quality Assurance Manual ("EISOPQAM"), dated May 1996. Following completion of each trench excavation, a description of the exposed soil or waste was profiled and recorded in a dedicated field logbook. Physical results of trenching activities are summarized in Table 2-1. At the request of EPD, samples were not submitted for analysis; instead, samples were archived by Tetra Tech until further direction from EPD.

Subsequently, because the waste material extended to the eastern side of Northside Drive on Parcel 3 and appeared to extend beneath it, EPD tasked Tetra Tech to conduct additional test trenching on the western side of Northside Drive on the Mr. Sweeper property. Mr. Sweeper is located directed across from Parcel 3 where Trenches H and I were located. Waste material (coal-tar-like slag material) and petroleum-based waste was encountered in the embankment and parking lot of the Mr. Sweeper property and appeared to extend from the eastern side of Northside Drive on Parcel 3 (*see* Figure 2-3). At the request of EPD, samples were not submitted for analysis; instead they were archived by Tetra Tech until further direction from EPD.

b. Geoprobe® Borings

Tetra Tech subcontracted with A&E Drilling Service, Inc. ("AE"), to conduct Geoprobe® sampling. Borings were advanced to a depth of 2 feet below the bottom of the waste, which in most cases, was less than 10 feet. AE used an all-terrain vehicle CME 550 with a Geoprobe® attachment.

Geoprobe® borings were installed along John Street to further delineate the horizontal and vertical extent of waste. A total of 24 Geoprobe® borings were advanced through asphalt and soil. Twenty-four acetate sleeves were used to collect continuous undisturbed samples. Geoprobe® locations are shown on Figure 2-4. Data collected during this investigation was used to estimate the amount of waste to be excavated and disposed of on Parcel 12 for the removal phase of the corrective action.

Waste material (coal-tar-like slag material, metal pieces, and glass bits) was encountered during Geoprobe® activities. Photographs were also taken to document Geoprobe® activities. A Geoprobe® sample was collected at each location and deemed to be representative of either the soil or waste found at that location. Each of these borings was continuously sampled and visually logged in a dedicated logbook. The results of the Geoprobe® activities are summarized in Table 2-2. All sampling procedures followed the EPA Region 4 EISOPQAM. At the request of EPD, samples were not submitted for analysis; instead, they were archived by Tetra Tech until further direction from EPD.

2. Phase II -- Geotechnical Investigation

The geotechnical investigation involved characterization of subsurface soils and bedrock at Parcel 12. To achieve this, geotechnical borings were installed along the perimeter of the Site where the proposed containment system would be installed.

a. Regional Geologic Settings

The Site is located in the Winder Slope District of the Piedmont physiographic province of Georgia (Clark and Zisa, 1976). Ground surface elevations in this district range from 700 to 1,000 feet and the topography is characterized as rolling. Regionally, the area near the site is underlain by a complex of late Precambrian to early Palcozoic-aged metamorphic and igneous rocks, referred to as the Atlantic Group (McConnell and Abrams, 1984).

b. Local Geologic Settings

The northwestern corner of the Site is underlain by the Wahoo Creek Formation, which includes slabby, medium-grained muscovite-plagioclase-quartz gneiss; amphibolites; mica schist; and epidote-calcite-diopside gneiss formations. The remainder of the site is underlain by the Stonewall Formation, which consists of fine-grained biotite gneiss, hornblende-plagioclase amphibolites, and sillimanite-biotite schist formations.

Bedrock in the area is mantled primarily by residual soils of varying thickness, formed from the in-place weathering of the underlying rock. As such, the character of the residual soil is dependent on the nature of the rock from which it weathered. Smaller areas of alluvial soils are located in proximity to rivers and creeks. These soils formed in sediments deposited by the streams.

Ground surface elevations at the site range from about 930 feet to 975 feet above mean sea level. In general, the topography at the site slopes towards the west-central portion of the site. No streams, ponds, or other perennial bodies of water are located on the property.

c. Geotechnical Borings

About 50 geotechnical borings were installed using hollow-stem auger rigs, with 3.25-inch inner-diameter augers around the perimeter of the site (*see* Figure 2-5). Borings were advanced to the top of bedrock, which ranged from 1.5 feet bgs to 60 feet bgs. Soil samples were collected using 2-foot split spoons on 5-foot centers, with all blow counts being recorded. Soil borings were logged using split spoons. Each boring was visually logged and recorded in a field logbook.

In 10 of the borings, a 3.0-inch nominal-diameter core bit was advanced through temporary casing to collect a sample rock core. The core bit was advanced a maximum

depth of 10 feet into the bedrock. The rock description, rock competency, fracture dip, and fracture spacing were logged for each core sample. Boring logs were presented in Appendix E. On-site soils vary from silty sand to sandy silt. Most of the material was visually determined to fall in the non-plastic range.

All borings were abandoned by grouting the hole using a 1.5-inch tremie pipe and injecting grout from the bottom to the top of the boring. The grout mixture was composed of a neat cement mixture, consisting of 5 percent bentonite and Type I Portland cement.

d. Geotechnical Laboratory Results

Soil samples collected during the field investigation were submitted to Golder Associates, Inc., of Atlanta, Georgia, for geotechnical laboratory testing. Five undisturbed samples (Shelby tubes) were collected from four intervals in Boring B-5 and B-46. In addition, six representative undisturbed samples Borings B-1, B-15, B-19, B-25, B-49 and B-50 were submitted for analysis. Selected samples were analyzed using the following laboratory methods:

- Water Content (American Society for Testing and Materials [ASTM] D 2216)
- Atterburg Limits (ASTM D 4318)
- Hydrometer & Sieve (ASTM D 422)
- Unconfined Compression (ASTM D 2166)

Analyses results are summarized in Table 2-4. Laboratory data is presented in Appendix F to the 2001 Tetra Tech Report.

e. Monitoring Well In-Situ Hydraulic Conductivity Testing

In situ hydraulic conductivity testing of the seven monitoring wells was performed from April 19 through 22, 1999. The "rising-head" test method was used. It consisted of purging the well to within 2 feet of a pressure transducer placed about 15 feet below the static water level, then waiting for the water level to equilibrate. The hydrostatic head was recorded using a Hermit 7 electronic hydrologic monitor linked to a pressure transducer placed in the well casing. Analysis of water-level recovery data using the Bouwer and Rice method (1989) and AQTESOLV software estimated the hydraulic conductivity for each well (*see* Appendix G to the 2001 Tetra Tech Report).

3. Phase III – Groundwater Investigation

a. Site Hydrogeology

The objective of the groundwater investigation was to determine hydrogeologic parameters governing the site, hydrogeology, and groundwater contaminant hydrology.

The following sections discuss the groundwater flow direction, rate, and contaminant migration pathways at the site.

Bedrock in the area near the site has little to no inherent primary porosity; however, the rocks do have structural and stratigraphic features that create localized zones of secondary porosity. These openings include, but are not limited to, contact zones, stress relief features, and jointing features. The size, spacing, and degree of interconnection of these voids varies with rock type and depth (Cressler, *et al.,* 1983)

The occurrence and movement of groundwater in the area near the site can occur within two separate but interconnected water-bearing zones. These include a shallow water-bearing zone ("SWBZ") which typically occurs within residual soils, and a deeper water-bearing zone ("DWBZ"), which typically occurs within the bedrock. Groundwater in the SWBZ occurs in the interstitial pore spaces, between the individual particles comprising the saprolite, and approximates surface topography, with the direction of groundwater movement being from upland areas towards nearby drainage features (such as rivers, streams, ponds, or lakes). As a result, groundwater flow systems within the SWBZ typically consist of numerous small groundwater basins corresponding to local drainage patters (Cressler, *et al.*, 1983).

Recharge of the SWBZ occurs as the result of infiltration of precipitation into the saprolite and its subsequent downward movement. This recharge is typically local in extent, with small drainage features serving as localized points of groundwater discharge.

Groundwater in the DWBZ is associated primarily with the secondary porosity of the bedrock. The distribution and degree of interconnection of rock discontinuities control groundwater movement within this zone. Consequently, the direction of groundwater movement in the DWBZ is difficult to predict, particularly on a localized scale (Cressler, *et al.*, 1983). Recharge of the DWBZ typically occurs as the result of the downward movement of groundwater through the overlying soils and saprolite. In areas where bedrock is exposed at the ground surface, recharge can result from precipitation falling or flowing directly into open discontinuities. An area like this is located at Northside Drive and Western Avenue at the site.

b. ERM Historical Well Data

ERM previously installed 10 wells on both the northern portion of the Site and on Parcel 10. Tetra Tech visually assessed the integrity of the wells early in the investigation. Only 7 of the 10 wells (MW-2, MW-3, MW-6, MW-7, MW-8, MW-8D, and MW-9) could be located during the inspection. MW-3 was consistently dry during Tetra Tech's field investigation. Additional groundwater samples were collected and analytical summary reports for the groundwater wells are included in Appendix H to the 2001 Tetra Tech Report. The water table map obtained from the ERM Preliminary Assessment Report (ERM 1996) was used to determine well locations for this remedial investigation. ERM's data depicted north-northwest groundwater flow direction.

c. Monitoring Well Installation and Development

A total of seven new monitoring wells were installed during Tetra Tech's environmental investigation. Figure 2-6 shows the locations of the monitoring wells that were grouped in clusters of three. Two existing wells were utilizing bringing the total number of wells to nine. Existing monitoring wells MW-3 and MW-7 were renamed MWC-3A and MWC-2A, respectfully. Well construction logs are presented in Appendix I to the 2001 Tetra Tech Report. The following sections describe the methods used to drill, install, develop, and conduct hydraulic conductivity testing of on-site groundwater monitoring wells.

d. Drilling

Drilling of the boreholes for the seven new monitoring wells was performing from March 11 through 26, 1999. Borings were advanced using either a CME Model 550 all-terrain vehicle drilling rig on an Acker drilling rig, using 6.25-inch, inner-diameter hollow-stem augers, which create a 10-inch-diameter borehole. This drilling method was used to install all the new wells to their predetermined depth. For the three deepest wells, this method was used until the drill rig encountered bedrock refusal. Drilling and sampling equipment was decontaminated between boreholes using Liquinox™ and high-pressure steam wash.

Air monitoring was performed during drilling and well installation activities, using a photoionization detector ("PID") in combination with a lower-explosive-level oxygen meter. Air monitoring indicated no measurable amounts of contaminants in the ambient air. No visible waste material was encountered during drilling and well installation at the site. Soil cuttings generated from borehole drilling were staged at a central location within the laydown area at the Site.

e. Monitoring Well Construction

Monitoring well construction was performed in accordance with EPD requirements and in accordance with Section 6.0 of the EPA Region 4 EISOPQAM. Monitoring wells are constructed of 2-inch-diameter, flush-jointed, Schedule 40 polyvinyl chloride (PVC) pipe. Monitoring wells have a 10-foot section of PVC well screen with 0.010-inch slot openings. A 20-30 grade silica sand filter pack was placed around the well screen, using the tremie method, to two feet above the top of the screen. A two foot seal, consisting of bentonite pellets, was installed directly above the filter pack and allowed to hydrate in accordance with manufacturer specifications. Using the tremie method, the remaining annulus space was filled with a Portland cement-bentonite grout mixture to complete the wells.

Surface completion of each well consists of a flush-mount, steel protective cover surrounding the PVC riser. The steel cover is centered in a 3 by 3-foot by 6-inch-thick concrete pad. Table 2-5 provides monitoring well construction details.

f. Monitoring Well Development

Monitoring well development was performed from April 1 through April 16, 1999. Development was performed in accordance with EPD standards and EISOPQAM standards. Development removes fine sediment from the filter pack and monitoring well. Development was performed in a three-stage process to optimize removal of the sediment and well stabilization. The initial stage of well development consisted of surging the length of the saturated portion of the screen, using a stainless-steel Grundfos™ pump. Wells that lacked adequate groundwater recharge to support pumping were bailed for the remainder of development.

Development continued until a minimum of three well borehole volumes (including saturated filter pack and well casing volumes) was removed. The water quality parameters of pH, temperature, specific conductivity, and turbidity were recorded for each well volume removed. Development continued until pH stabilized to within 0.2 Standard Units and temperature and specific conductivity stabilized to within 10 percent. Turbidity also was recorded (*see* Table 2-6).

Water purged during well development activities, in addition to water generated from equipment decontamination activities, was contained in a 4,000-gallon polyethylene tank at the site.

g. Well Surveying

W.L. Jordan, a Georgia-registered professional surveyor, surveyed the top of each casing, metal plate, and ground surface elevation for each newly installed monitoring well. Elevations were recorded to the nearest 0.01-foot relative to mean sea level. Horizontal survey measurements were recorded to the nearest foot in the Georgia State Plane coordinate system.

h. Groundwater Sampling

Tetra Tech collected groundwater samples from eight monitoring wells from May 3 through 6, 1999. The contaminants of concern are the following: PAHs and Target Analyte List metals. All groundwater samples were collected in accordance with the EPA EISOPQAM. The static water level and the total well depth were measured with a water level indicator to within one hundredth of a foot, and the volume of the water column was calculated using the following formula: $V=0.041d^2h$ where: V = the volume of the water in gallons; d = diameter of well in inches; h = height of the static water column to the nearest tenth of a foot.

Three to five well volumes were purged from each well using a Grundfos™ pump, and were containerized in 55-gallon drums. After three volumes were removed, the temperature, specific conductivity, and pH were measured and recorded until the temperature and specific conductivity varied no more than 10 percent and the pH

remained constant within 0.2 SU. Table 2-6 summarizes the water levels, field parameters, and purge volumes measured prior to groundwater sample collection.

The PID and the temperature/specific conductivity/pH meter were calibrated at the beginning of each day and at least once during the day to account for changing atmospheric conditions. All field data was recorded in a field logbook. The water level indicator was decontaminated between sampling each well, using procedures outlined in Appendix B of the EISOPQAM. All purge water was contained in 55-gallon drums, then pumped to the on-site 4,000-gallon tank pending sample analytical results.

Samples were shipped overnight delivery to Specialized Assays Laboratory at the end of the sampling event for analysis. Sample packaging and shipping procedures were performed in accordance with EISOPQAM guidelines.

i. Groundwater Analytical Results

Groundwater samples were collected from wells MWC-1A, MWC-1B, MWC-1C, MWC-2A (MW-7), MGWC-2B, MWC-2C, MWC-3A (Dry), MWC-3B, and MWC-3C. As discussed previously, these samples were analyzed for PAHs and TAL Metals. PAHs were not detected during the monitoring well sampling event, and metals did not exceed the Primary Drinking Water Standards. Complete results of the groundwater sampling event are set forth in Appendix H to the 2001 Tetra Tech Report.

4. Phase IV – Methane Gas Soil Survey

At the request of EPD, a methane gas soil survey was conducted on September 14, 1999. Tetra Tech subcontracted AE to conduct Geoprobe® boring down to 4 feet bgs. Methane field screening was performed at accessible locations on an approximate 75- by 75-ft grid scheme (*see* Figure 2-7). The following steps outline the methane gas monitoring protocol at the Landfill Site. Methane monitoring was performed after two consecutive dry days, with the exception of small rain showers (minimal accumulation). Weather conditions, were recorded prior to field activities and in the afternoons. The following steps outline the methane gas monitoring protocol at the Site.

- The field team obtained a MicroFID (or equivalent) and calibrated it to methane gas. Calibration was performed a minimum of two times a day;
- The field team advanced a borehole punch to approximately 4 feet. An initial reading and time was recorded. After obtaining field measurements, the team then placed cotton at the top of the hole to serve as plug;
- The team then moved to other sampling grid locations and followed the steps outlined above;

- About 45 minutes after the hole was punched, the field team returned to each hole, removed the cotton plug, and took a final methane reading and recorded the time; and

- A survey flag was placed at each location to mark the sample and grid number.

Results indicated that the site had no measurable amounts of methane gas present. Table 2-7 contains the methane gas sampling results.

C. Selected Remedy

EPD tasked Tetra Tech to perform a more thorough environmental and geotechnical investigation in order to design and implement a comprehensive remedial alternative for Parcel 12. The investigation of the landfill at the Site was completed in the following four phases: Phase I – Waste Delineation; Phase II – Geotechnical Investigation; Phase III – Groundwater Investigation; and Phase IV – Methane Gas Survey.

The investigation determined that Parcel 12 contained the majority of the coal-tar slag material present at the Site. However, geotechnical investigations determined that landfill material is present outside of the Site boundaries, mainly under John Street and Northside Drive. Although no additional soil or waste material analysis was performed, groundwater investigation conducted by Tetra Tech determined that the groundwater at Parcel 12 is not impacted. Detectable contaminants were below the EPD Type I RRS, even though historical data indicate that the waste material present on site contains moderate to high levels of metals and PAHs.

Tetra Tech, in conjunction with EPD, used the information gathered during this investigation to further develop the remedial activities for the site. The selected remedy is a soil-bentonite slurry-trench cutoff wall ("slurry wall") combined with an engineered cap. The waste materials located outside of the slurry wall that could not be excavated and placed within the slurry wall (i.e., wastes near Northside Drive on Parcel 3) are confined with an engineered concrete sidewalk cap and asphalt roadbed constructed per Georgia Department of Transportation ("DOT") standards. *See* Appendix U. This remedy achieves the objective of maintaining compliance with the Type 5 Standards stipulated by the state, which state that: "...measures may consist of engineering controls such as a fence, placement of a cap, installation of a slurry wall or stabilization/solidification/fixation of the waste or waste residue."

The slurry wall, in conjunction with a low-permeability cap, will divert groundwater flow around the landfill area and minimize the off-site transport of contaminants by preventing contact between the landfill waste and groundwater (*see* Figure 2-8). This remedy prevents the infiltration of storm water runoff into the waste materials. The engineered concrete sidewalk cap and asphalt roadbed will perform a similar function for the waste material next to and under Northside Drive on Parcel 3 that can not be excavated safely. The slurry wall was constructed by conventional methods that consist of narrow trench excavation into bedrock, maintenance of trench stability with a bentonite-water slurry,

backfilling with a low-permeability soil-bentonite mixture, and capping for top protection. The Tetra Tech design drawings are attached as Appendix E.

Weston Solutions, Inc. was responsible for construction of the slurry wall and cap in accordance with Tetra Tech's specific design criteria, construction techniques, and performance criteria, as set forth in the Construction Specifications, Landfill Cap and Slurry Wall for the Northside Drive Landfill (Appendix C), as well as construction of the engineered concrete sidewalk cap and asphalt roadbed on Parcel 3. The sidewalk and curb as-built engineering drawing are attached as Appendix V.

Currently, all of the buildings that were located on the Parcel 12 were demolished and the debris disposed. The site remains fenced on all four sides to prevent unauthorized access.

III. APPLICABLE RISK REDUCTION STANDARDS

A. Type 5 Risk Reduction Standards

Type 5 RRS allow, in those instances where application of Type 1-4 RRS is not appropriate under the circumstances, the use of measures to control the regulated substances at the property where regulated substances are located. The remedy chosen for Parcel 12 consists of a soil-bentonite slurry-trench cutoff wall in conjunction with a low-permeability engineered cap to divert groundwater flow around the landfill and minimize off-site transport of contaminants by preventing contact with the landfill waste and groundwater. This remedy, chosen by EPD based on the results of the remedial investigations, should eliminate or abate present and future threats to human health and the environment. Some of the waste materials on Parcel 3 could not be excavated and placed inside of the slurry wall because of their proximity to Northside Drive. These wastes were left in place and covered engineered concrete sidewalk cap and asphalt roadbed constructed as shown in Appendix V.

B. Monitoring and Maintenance Plan & Restrictive Covenant

Compliance with Type 5 RRS requires long-term monitoring and maintenance, as appropriate for implemented remedial measures, and a restrictive covenant prepared in accordance with EPD Rule 391-3-19-.08(7). A copy of the revised Northside Drive Landfill Monitoring and Maintenance Plan is attached as Appendix D. A copy of the recorded Conservation Easement with the appropriate restrictive covenants is attached as Appendix T.

IV. REMEDIAL ACTION

Weston Solutions, Inc. ("Weston") handled the construction of the slurry wall and cap based on the Tetra Tech's specific design criteria, construction techniques, and performance criteria, which are set forth in the Construction Specifications, Landfill Cap and Slurry Wall for the Northside Drive Landfill attached as Appendix C. Before the slurry wall was constructed, Weston removed the waste materials outside of the slurry wall and placed them inside the area to be bounded by the slurry wall. However, some of the waste materials near and under Northside Drive could not be excavated safely. These materials will be contained with an engineered concrete sidewalk cap and asphalt roadbed. *See* Appendix V. This remedy, chosen by EPD based on the results of the remedial investigations, should eliminate or abate present and future threats to human health and the environment.

A. Waste Excavation – Weston Solutions, Inc.

The property on which the landfill is situated is comprised of approximately 9.2 acres and is partially underlain by waste material (e.g., slag like material, cinders, scrap metal, construction rubble, etc.). Mobilization to the site occurred in March 2002. The surface of the area in which the excavation was performed was characterized by the remains of a concrete foundation of a building, miscellaneous debris and several trees. Sparse grass vegetation was the predominant ground cover (*see* Appendix C).

These sections provide the narrative and the backup documentation of the excavation and backfill activities to satisfy the requirements of the construction specification section 02111 Excavation and Handling of Contaminated Material.

Excavation of the contaminated soils and waste materials was performed in the area indicated on the as-built drawings along Northside Drive and John Street. A total volume of 26,301.2 cubic yards ("CY") of waste was excavated from this area (Phase I 11,178.4 CY; Phase II 11,271.4 CY and Phase III 3,851.4 CY).[6] All of the excavated waste materials were placed on Parcel 12 within the slurry wall and landfill cap limits except for a limited area of waste materials on Parcel 3 next to and under Northside Drive. The excavation activities began on April 29, 2002 and were substantially complete by December 13, 2002. The backfill activities were performed concurrently and were substantially complete by mid-January 2003. The restoration activities were substantially complete by mid-March 2003.

1. Quality Control Measures

a. Survey Controls

Quality controls were initiated prior to and during excavation activities to insure compliance with project requirements. Prior to excavation the horizontal and vertical

[6] Some of the excavated material was from Tax Parcel Nos. 14-82-06-8 and 14-82-06-9.

limits of excavation were transferred from the design drawings to the field by a professional surveyor registered in the State of Georgia, Q-B Engineering, Inc. This included placing and maintaining survey controls required to excavate to the lines and grades at each cross section (A through I) as shown on the design drawings. The limits of the excavation between the consecutive cross sections were established by linear interpolation. The elevations of the finished excavation were recorded by the surveyor to generate a contour map entitled, "Waste Excavation Contour Map and Sample Location As-Built Drawing". This drawing is sheet 1 of 2 located in Appendix G. The volume of excavated waste materials were calculated based on the difference between the existing ground elevations prior to excavation, (less the pavement section of John Street) and the completed excavation. The as-built drawing indicates that the limits of waste were found to generally coincide with the limits of excavation shown in the design drawings with some exceptions. These exceptions are shown on the drawing and are discussed in greater detail with in the narrative associated with each Phase of the excavation.

b. Utilities Protection

Weston protected existing underground structures and utilities throughout the excavation activities. The Georgia Utilities Protection Center was contacted to have all known utilities marked with paint and/or pin flags. These markings were renewed continuously through out the excavation to safeguard against damaging any utility structures. AHA also provided drawings of the known utilities within the Site adjacent to the John Street area.

2. Chemical and Physical Testing

Written work plans were developed and implemented to insure compliance with the project requirements for all chemical and physical testing. The results of all chemical and physical testing are provided in the appendices of the Weston Report (*see* Appendix F).

Chemical testing included confirmation sampling and analysis of the soils in the completed excavation, chemical testing of the imported borrow soils used to backfill the excavation and chemical testing of the groundwater accumulated during excavation. Chemical analysis was performed by an independent EPD-approved laboratory, Acura Analytical, Inc.

Sampling and analysis for the groundwater accumulated in the excavation was performed in accordance with the Ground Water Discharge Permit (UG-340) issued by the City of Atlanta. The groundwater was analyzed for the City of Atlanta pretreatment analytes as indicated in the permit. Results of the analysis indicated that the waters were suitable for direct-discharge to the sanitary sewer system. This information is documented in the Self-Monitoring Reports which were submitted on a monthly basis to the City of Atlanta Bureau of Pollution Control to document all sampling and analytical results associated with any accumulated waters to be discharged. A logbook was maintained at the site to document discharge activities. Copies of the monthly Self Monitoring Reports with

analytical results and a copy of the discharge log are provided in Appendix D of the Weston Report.

Physical testing was performed on the imported borrow soils to verify the suitability of the material and that it was installed with the minimum required compactive effort. Compaction testing was also performed on the waste material placed within the landfill limits. An independent geotechnical consultant, S&ME, Inc., performed the physical testing.

3. Field Screening for VOCs

Field screening readings were taken using real time monitoring equipment to monitor for air borne organic vapors which may have been liberated during intrusive activities. This was done to insure the appropriate level of personal protection for the workers and to check for the potential of off site migration of organic vapors. Field screening readings were taken using the TVA 1000. This monitoring was performed on a routine basis during excavation activities. Constituents of concern and action levels were based on previous site investigation results. BTEX were identified at the site prior to intrusive construction activities. Action levels were based on the potential for benzene to exist in concentrations in excess of the action level established in the Site Specific Health and Safety Plan. This level was based on the ACGIH TLV/TWA for gasoline of 300 ppm. A worst-case scenario assumed 5% benzene by volume. A reading of 10 units on a PID or FID would then trigger compound specific monitoring using colorimetric tubes for benzene to determine if the level of protection would require upgrading.

The TVA 1000 measured VOC levels at 10 units on July 9, 2002 in the eastern portion of the Phase II area during excavation activities. EPD informed Weston that this was a location of an old underground storage tank. Compound specific colorimetric tubes indicated 0.25 ppm of Benzene, which was below the action level of 0.5 ppm. Continued screening during that day indicated that this area of elevated volatiles was confined to a localized area. The results of all other field screening indicated little or no VOCs in the breathing zone above action levels identified in the SSHASP. The daily logs showing the results of the field screen readings are presented in Appendix F of the Weston Report.

4. Documentation

Documentation for all aspects of the work was collected throughout the excavation activities. This documentation includes daily logs, air monitoring data (field screening), survey data to define the limits of excavation, elevation of ground water encountered, confirmation sampling results, photographs, records of waters analyzed and discharged from the excavation, clean soil material backfill conformance test results, backfill compaction test results and the waste profile sheet for the soiled PPE sent for off-site disposal and the associated manifest. Copies of all the documentation are presented in the appendices to the Weston Report. Much of this information has been submitted to the EPD as attachments to the daily construction activity reports. Daily excavation logs were maintained for Phase III and a portion of the Phase II area. These are presented in Appendix E of the Weston Report. The remainder of the logs were lost when an on-site

computer was stolen from the office trailer. The pertinent information to document the excavation activities for the Phase II and Phase I areas was collected through the survey data, confirmation sampling activities and with photographs.

5. Excavation Procedures And Findings

a. General

The information presented in this section is common to all three phases of the excavation. Detailed information specific to each phase is presented in the following narrative sections. The excavation of contaminated soils began in Phase III, proceeded through Phase II and was completed in Phase I. The surface of the areas to be excavated were cleared and grubbed of vegetation and debris prior to excavation activities. A track excavator with a 2.5 CY bucket was used to perform the majority of the excavation. A smaller rubber tire backhoe was also used in areas limited by space. Excavated spoils were either stockpiled adjacent to the excavation or hauled by an off road 25-ton dump truck. Areas of asphalt and concrete flat work associated with John Street were removed as the work progressed into these areas. It was found that the waste material was covered with a layer of visually clean fill, which varied in thickness from 6-inches to 4-feet from the ground surface. The cover appeared as a sandy-silt with traces of construction debris. This cover material was placed with in the landfill limits. The waste material underlying the soil cover was characterized as a black granular ash with slag and glass fragments with a minor amount of stamped sheet metal scrap. The visually clean soils beyond the limits of the waste appeared as a sandy-silt with trace amounts of clay. The visually clean soils appeared as non-virgin backfill.

The excavation in all phases was taken to the design limits of excavation indicated on the drawings. Once the design limits were reached the surface of the excavation was inspected for visual evidence of the waste materials. All visual evidence of additional waste material was removed with the exception of the western side slope of the excavation in Phase III adjacent to Northside Drive on Parcel 3 and a portion of the north sidewall of the excavation in Phase I directly in front of building 11 on Parcel 11. These areas of waste remained as directed by EPD in accordance with the construction specifications. The side slope in the Phase III area on Parcel 3 was left intact because of the proximity of the roadbed of Northside Drive. The visually identifiable waste in the Phase I area was left in place to avoid disturbing the foundation of building 11. A more detailed description of these areas is included in the excavation narrative for Phases III and I respectively.

Confirmation sampling was performed grid by grid in the Phase II and Phase I areas to the north of the slurry wall along John Street after excavation activities were completed. The results of the confirmation sampling are discussed in detail in Section 6 of this CSR.

Backfill of the excavation proceeded after the confirmation sampling was done. The backfill was comprised of the excavated waste material and the clean imported borrow soils. All of the excavated waste material was backfilled with in the landfill limits. The landfill limits are defined as the area of the excavation inside a vertical line 3-feet inside

the slurry wall and including the contour layer. The only offsite disposal for the excavation area was for the spent personal protective equipment ("PPE"). The PPE was disposed of at the BFI Hickory Ridge facility as non-hazardous waste. A copy of the waste profile sheet and the manifest is attached in Appendix G of the Weston Report. There was no onsite storage or shipment of hazardous waste.

All imported soil materials for the clean backfill came from the G&M borrow source. Two clean borrow material sources were tested prior to delivery to the site for the physical and chemical parameters listed in the specifications. Both sources were approved but the borrow source owned and operated by G&M, Inc. on Oakdale Road, Atlanta, Georgia was selected. Some onsite materials were also tested for the required physical and chemical parameters to be used for general fill purposes. The results of this testing are presented in Appendix B of the Weston Report.

Placement of all backfill materials was performed in 8-inch loose lifts and compacted with a smooth drum or a pad foot roller. A hand operated mechanical tamp was used adjacent to utility structures. Compaction testing was performed by an independent geotechnical consultant, S&ME, Norcross, Georgia. The results of the compaction testing indicate that the backfill was placed to meet the 90% minimum based on a standard proctor. The imported backfill was also sampled and tested for conformance every 5,000 CY for grain size, Atterburg Limits and proctor as required by the specifications to confirm the physical characteristics of the imported material were consistent with the project requirements. The results of the compaction and conformance testing are presented in Appendix C of the Weston Report.

b. Phase III Excavation Narrative

The excavation began at the southern edge of the Phase III area as shown on the plans and proceeded northward. The design limits of excavation were reached in all areas of this phase according to the design cross sections A through D. Inspection of the excavation indicated that additional visual contamination was evident at the southern end wall and along the 1.5 (horizontal): 1 (vertical) west slope of the excavation. These areas were inspected by EPD. EPD directed the removal of the visual contamination beyond the design limits of excavation from the southern end wall area in accordance with the specification. The waste extended southward for approximately an additional 25 feet and terminated against a substantial bedrock outcropping which was continuous from the ground surface to the full depth of the excavation. The waste in the western slope on Parcel 3 was left in place because of the proximity of this side slope of the open excavation to the roadbed of Northside Drive (State Route 3). The top of the 1.5 (horizontal): 1 (vertical) slope was approximately 4 feet from the sidewalk along Northside Drive on Parcel 3. The visual evidence of the waste along the west slope appeared as a black granular ash with slag and glass fragments. The vertical thickness of the waste lens is visually evident along the slope and varies in thickness from 2-feet to 4-feet in the south end to 6-feet to 8-feet thick in the north end. The horizontal extent of the waste material begins generally from the southern edge of the design excavation limits northward to the intersection of Northside Drive and John Street on Parcel 3. The visual evidence of waste material along the floor of the Phase III area was excavated to clean

soil conditions. The appearance of the soil remaining in the floor of the excavation was a tan, sandy-silt with traces of clay. No confirmation sampling was performed in the Phase III area in accordance with the construction specification section 02111.

Groundwater was encountered at an elevation of approximately 940' above mean sea level. A volume of groundwater accumulated in the northern end of the Phase III area. The waters were sampled and tested for the constituents listed in the City of Atlanta discharge permit. The analytical results indicated that groundwater met the discharge criteria. A total of 25,364 gallons of water were discharged from the waters collected from this area on May 22 and 23, 2002. The Self Monitoring Report and the analytical data were sent to the City of Atlanta to document this event. *See* Appendix D of the Weston Report.

The excavation was backfilled with the clean imported soil material from the approved borrow source. The backfill was placed in 8-inch loose lifts and compacted with a smooth drum roller. Compaction testing was taken by an independent geotechnical consultant, S&ME, Norcross, Georgia. Results of the compaction testing indicate that the placement of the backfill meets the 90% compaction requirement based on a modified proctor. The compaction testing results are provided in Appendix C of the Weston Report.

c. Phase II Excavation Narrative

Excavation of the Phase II area had to be performed in segments because the existing 6-inch ductile iron water main had not been relocated by the City of Atlanta's contractor, United Water, according to schedule. There were also numerous unmarked gas lines which slowed excavation activities. The southern half of the Phase II area was excavated first from west to east. The northern portion was excavated in the same manner after the water line was relocated outside of the excavation limits. Each portion was backfilled separately as the confirmation sampling progressed. The depth of waste in this phase was typically found to extend below the elevations indicated on the drawings. The depth at which the waste encountered at cross-section E varied from 943' to 938' above mean sea level. The depth of waste at cross section G was approximately 940' above mean sea level. The horizontal limits of waste along the northern edge of the excavation were found to terminate at or with in the design limits. The elevation of the groundwater varied widely across the bottom of the excavation. Groundwater was found at approximate elevations of 939' above mean sea level at cross section E, elevation 937' above mean sea level at cross section F and G and elevation 942' above mean sea level at cross section H. This phase of the excavation was completed by August 12, 2002. Confirmation samples were collected and analyzed throughout the excavation in areas where all visual indications of waste were removed and that were above groundwater elevations. The backfill of this phase also proceeded as analytical results indicated constituents below the project clean up criteria. Areas above the 60-inch brick sewer line were backfilled using an angular number 89 stone. All backfill materials were placed in lifts and compacted. Compaction was tested by the independent geotechnical consultant.

A volume of ground water accumulated in the central area near cross section F of the Phase II area. The waters were sampled and tested for the constituents listed in the City of Atlanta discharge permit. The analytical results indicated that ground water met the discharge criteria. A total of 321,100 gallons of water were discharged from the waters collected from this area on October 26 and 27, 2002. The Self Monitoring Report and the analytical data were sent to the City of Atlanta to document this event.

d. Phase I Excavation Narrative

The Phase I area was excavated in a similar manner and concurrently with Phase II due to the delayed relocation of the 6-inch ductile iron water main by the City of Atlanta. The horizontal limits of waste were found to lie with in the design limits with the exception of one area in front of building 11. Excavation was temporarily halted until an additional study could be made of the extent of waste in this area due to the proximity of the excavation to the building. Additional borings were performed by EPD between the temporary limits of excavation and building 11. Weston performed an engineering analysis to determine a safe distance between the open excavation and the building foundation. The results indicate that the waste in front of building 11 is too close to the soils supporting the foundation to safely remove all waste with out potentially compromising the integrity of the building foundation. Excavation resumed in mid December 2002 to remove the remainder of the waste materials to the extent possible. Ground water was encountered at an approximate elevation of 942' above mean sea level at cross section H and I and at 944' above mean sea level in the area in front of building 11. Confirmation samples were taken from the side slopes of the excavation and the area was backfilled with clean imported borrow soils. The results of the confirmation sampling indicate that constituents above the clean up criteria remain in the soil material in front of building 11. The results of the confirmation sampling are discussed in greater detail in Section 3. Groundwater elevation was encountered at an elevation of 942' above mean sea level in the Phase I area.

6. Confirmation Sampling

a. Summary

Confirmation samples were collected from the sidewalls and bottom of each finished excavation. The samples were analyzed to determine if residential RRS (*see* Table 4-1, same as 1-1) had been met. Soil cleanup concentrations are those specified in Section 02111, Excavation and Handling of Contaminated Material, Attachment A of the Tetra Tech Construction Specifications, Revision 4. If the results of the analytical testing indicated constituent levels above the clean up criteria, additional excavation was performed to remove the contamination and a second round of confirmation samples was collected and analyzed. The exception to this procedure occurred in the northeast portion of the Phase I area in front of building 11 (sample grids 21 through 25) on Parcel 11. Seven confirmation samples in this area were above the clean up criteria when the excavation was backfilled. The waste material represented by these samples had to be left in place because of the close proximity of the building foundation to the 18-foot deep open excavation. A summary of the analytical test results for all confirmation samples

taken is presented in Table 4-2. The following details the confirmation sampling performed at Parcel 12.

b. Sample Locations

A 25-foot sampling grid was established as a reference for the sampling locations. The grid extends across the as-built limits of the excavation for the Phase II and Phase I areas on the north side of the slurry wall. The sampling grid and the location of the samples are shown on the "Waste Excavation Contour Map and Sample Location As-Built Drawing" Sheet 1 of 2 located in Appendix F.

The grids were labeled alphanumerically. The east-west grids are numbered consecutively 1 to 26, and the north-south grids designated alphabetically, "A" through "D". Confirmation samples were designated as either a bottom sample or a sidewall sample depending on the final contour of the completed excavation with in the grid. Bottom samples were collected as a grab sample from the center of the grid or as a composite sample which is comprised of three or five aliquots equally spaced across the grid. Sidewall samples were taken from the 1.5:1 side slopes on the north side of the excavation along John Street. Sidewall samples were taken generally from the center of the 25-foot long grid. One sidewall sample was collected from the mid-point of the sidewall for grids with a sidewall height of less than 8 feet. Two samples were collected at the one-third points for sidewalls that were greater than 8 feet in height. Soil samples were not collected from the bottom of grids where groundwater was encountered. The elevation at which groundwater was encountered is indicated on the As-Built Drawing Sheet 2 of 2 in Appendix F.

c. Sampling Procedure

Surface soil samples were taken from the surface of the excavated area to six inches below the surface. Stainless steel scoops and bowls were used to collect each sample. The samples were homogenized and quartered before being containerized. Soil samples were placed into 8-ounce clear glass containers with Teflon® lids. Samples were preserved with ice shortly after collection prior to transportation to the laboratory. All samples shipped to the laboratory were accompanied by a chain of custody.

d. Analytical Methods

Confirmation samples were collected and analyzed for semivolatile organic compounds (SW-846 8270C) metals (SW-846 6010B, and 7471), and cyanide constituents (SW-846 9014). Soil RRS are those specified in Section 02111, Excavation and Handling of Contaminated Material, Attachment A of the Construction Specifications, Revision 4. *See* Table 4-1. An EPD approved lab, Accura Analytical, Inc, performed the analysis on the samples. The laboratory was requested to provide a turnaround time of 48-hr for confirmation samples.

e. Sample Nomenclature

Samples were differentiated as two types: bottom samples and sidewall samples. The type of sample taken depended on the surface contours within a specific grid. The location of all samples taken and the sample identification is shown on the Waste Excavation Contour Map and Sample Location As-Built Drawing Sheet 1 of 2 in Appendix F.

The bottom sample identification nomenclature was determined as follows using the following example:

Bottom Sample ID: **NL-B16-G-06**

NL designates the name of the project, Northside Drive Landfill; **B16** represents the alphanumeric grid location from which the sample was collected. The sample grid is shown on the Waste Excavation Contour Map and Sample Location As-Built Drawing. Sample locations with in a grid on the bottom of the excavation were designated with the letters A, B, or C, depending on the distance from the slurry wall. Grid A extended from 0 to 25 feet northward from the slurry wall; B extended between 25 feet to 50 feet, and C from between 50 feet to 75 feet. **CS** indicates a composite sample. A composite sample was made up of five grab samples equally spaced across the flat bottom portion of the grid. **G** indicates a grab sample. Grab samples were taken at the center of the grid. The numbers, **06**, represent the range in depth from the ground surface that the sample was collected. All bottom samples were collected from the 0 to 6 inch interval below the surface of the excavation.

For samples collected from the sidewalls of the excavation, sample identification nomenclature was determined as follows using the following example:

Sidewall Sample ID: **NL-SW15-G-6**

NL designates the name of the project, Northside Drive Landfill; **SW15** indicates that the sample is a sidewall sample and the grid number in which the sample was collected. **G** indicates a grab sample. The number, **6**, represent the height, in feet, from the top of the excavation that the sample was collected along the side wall. All sidewall samples were collected from the 0 to 6 inch interval below the surface of the excavation.

In addition, "**(2)**" following the grid number indicates that this is a second round confirmation sample. A second round sample is indicated for the areas that required additional excavation due to the analytical results indicated constituents above the clean up criteria for the first sample taken after the initial excavation. Finally, "***dup***" indicates a duplicate sample was taken for quality control purposes. The entire sample ID is italicized for the three duplicate samples taken.

f. Sample Collection Data

Samples were collected as previously mentioned. Table 4-3 summarizes the dates, times and the analysis performed for each of the sample events.

g. Chain-Of-Custody Forms

Weston used chain of custody ("COC") forms to track the shipment of all samples delivered to the laboratory for analytical testing. The COC forms were provided by Accura Analytical Laboratory, Inc. Copies of the COC forms are included in Appendix A of the Weston Report.

7. Analytical Results

a. Summary of Confirmation Sampling

A total of 87 confirmation soil samples and duplicates were collected from the Phase I and II areas of the excavation. Twenty samples were taken as bottom of grid samples; 64 samples were collected from the side walls of the excavation and three samples were duplicates. One sample (NL-C19(2)-G-06) was a redundant sample inadvertently collected during the excavation.

A total of 19 of the 87 samples indicated levels of constituents above the residential RRS. These samples are shown in bold in this section and in Table 4-3. The grid areas represented by 5 of the 19 samples were re-excavated and second round samples were taken which indicated levels of constituents within the residential RRS. The following table summarizes these 5 samples along with the second round samples that were taken after re-excavation that indicated the contamination had been removed in these grids.

1st Round Sample ID *(above cleanup criteria)*	Grid ID	2nd Round Sample ID *(below cleanup criteria)*
NL-SW7-G-06	7B	NL-SW(2)-G-06
NL-SW15-G-06	15C	NL-SW15(2)-G-06
NL-SW17-G-04	17D	NL-SW18-G-05 and NL SW18-G-10
NL-SW17-G-10	17D	NL-SW17/18-G-06
NL-SW17-G-06	19C	NL-SW19(2)-G-06

The grid represented by 1 of the 19 samples-**NL-A14CS-06** (above cleanup criteria)-was re-excavated to remove all visual evidence of contamination. The additional excavation resulted in the finished surface of the excavation at an elevation below the water table. Therefore, no second round sample was taken in grid A14 after re-excavation.

Eight of the 19 samples above the clean up criteria were collected from a temporary side slope of the Phase I excavation in grids B21, B22, B23 and B24. Although visual

indications of waste material were evident in the side slope during sampling of these grids, the excavation was temporarily halted at this location from proceeding northward. This was done to allow an engineering assessment to determine the safe limit of excavation to avoid compromise of the foundation of building 11.

Sample ID	*Grid ID*
NL-SW21-G-5	21B
NL-SW21-G-10	21B
NL-SW22-G-08	22B
NL-SW22-G-16	22B
NL-SW23-G-07	23B
NL-SW23-G-14	23B
NL-SW24-G-03	24B
NL-SW24-G-07	24B

The waste material represented by these samples was removed as the excavation proceeded northward with the exception of NL-SW21-G-5 and NL-SW21-G10. The bottom of the grids 22, 23, 24 and 25 were below the groundwater elevation and therefore no samples were taken of the bottom of these grids.

The following samples were taken along this final side slope of the excavation. The following 5 of 8 samples taken along the final side slope were above the residential RRS. No additional excavation was performed and the excavation was backfilled with clean material.

Sample ID	Grid ID
NL-SW23-G-12	23C
NL-SW24-G-06	24C
NL-SW24-G-12	24C
NL-SW25-G-05	25C
NL-SW25-G-10	25C

Seven of the 87 samples remained above the residential RRS in the vicinity of building 11 (located on Parcel 11) after the excavation activities were completed. This area will be remediated in the future and recertified. The following seven sample IDs indicate constituents above the residential RRS on Tax Parcel No. 14-82-6-8 and are listed in the table below.

Sample ID	Grid ID
NL-SW21-G-5	21B
NL-SW21-G-10	21B
NL-SW23-G-12	23C
NL-SW24-G-06	24C
NL-SW24-G-12	24C
NL-SW25-G-05	25C
NL-SW25-G-10	25C

The analytical results of all soil confirmation sampling is presented in Appendix A of the Weston Report. Table 4-2 summarizes the analytical results of all of the confirmation samples taken.

b. Quality Assurance/Quality Control Samples

Duplicate and equipment blank samples were collected as part of the quality assurance/quality control (QA/QC) requirements. This data is included in the confirmation sample results in Appendix A of the Weston Report.

c. Duplicate Samples

A duplicate sample is a sample collected at the same location as the original sample. Duplicate samples are collected simultaneously or in immediate succession, using identical recovery techniques, and treated in an identical manner during storage, transportation, and analysis. The sample containers are assigned an identification number in the field such that they cannot be identified (blind duplicate) as duplicate samples by laboratory personnel performing the analysis. Three duplicate field samples were collected during the excavation activities. The Percent Relative Difference ("RPD") for the samples and their respective duplicates were determined to be acceptable following review.

d. Equipment Blank and Field Blank Samples

An equipment blank is a sample of ASTM Type II reagent grade water poured into or over or pumped through the sampling device, collected in a sample container, and transported to the laboratory for analysis. Equipment blanks are used to assess the effectiveness of equipment decontamination procedures. Seven equipment blanks were collected and analyzed. Four field blanks of the reagent grade water used to generate equipment blanks were also collected and analyzed. The results of the analyses indicated that the decontamination procedures were adequate and the reagent grade water did not affect the confirmation sample results.

B. Landfill Cap & Slurry Wall Construction

Weston handled the construction of the slurry wall and cap based on the Tetra Tech's specific design criteria, construction techniques, and performance criteria, which are set forth in the Construction Specifications, Landfill Cap and Slurry Wall for the Northside Drive Landfill attached as Appendix C. Appendices G through R contain the construction documents. Appendix S contains the final as-built engineering drawings for the slurry wall and landfill cap.

C. Engineered Concrete Sidewalk Cap and Asphalt Roadbed Construction on Parcel 3

Weston handled construction of the engineered concrete sidewalk cap and asphalt roadbed on Parcel 3 in accordance with the plans prepared by Williams-Russell & Johnson and according to Georgia DOT specifications. *See* Appendix U. Appendix V contains the final as-built engineering drawings for the engineered concrete sidewalk cap and asphalt roadbed.

V. Potentially Responsible Parties

Pursuant to O.C.G.A. § 12-8-92(9) and § 12-8-92.1(a), the following are potentially responsible parties: the current owner/operator of a facility, the owner/operator of a facility at the time of disposal, any party who arranged for disposal of hazardous substances at the facility and any party who transported hazardous substances to the facility.

Owner/Operator of Site:

- The State of Georgia,
  in custody of the Georgia Department of Economic Development
  c/o Denise E. Whiting-Pack, Esq.
  Department of Law
  State of Georgia
  40 Capitol Square
  Atlanta GA 30334-1300

  Business Phone: (404) 656-3360

Because the State of Georgia is the current owner and operator of Parcel 12, the State of Georgia is considered a liable party under HSRA. However, GDEcD (then know as the Georgia Department of Industry, Trade & Tourism) submitted a prospective purchaser corrective action plan ("PPCAP") to the Georgia Environmental Protection Division ("EPD") on December 2, 2003 in accordance with the Georgia Hazardous Site Reuse and Redevelopment Act, O.C.G.A. § 12-8-200 *et seq.* ("HSRRA"). EPD approved the PPCAP on December 18, 2003. The work on Parcel 3 documented herein was completed pursuant to and in accordance with the approved PPCAP. Accordingly, the State of Georgia has qualified for the limitation of liability set forth in HSRRA which provides that the State of Georgia is not liable to the state or any third party for any preexisting release on Parcel 3.

Other potentially responsible parties include:

- Atlanta Gas Light Company
  P.O. Box 4569
  Atlanta, Georgia 30302
  Telephone: (404) 584-4000

- Georgia Power Company
  333 Piedmont Avenue
  Atlanta, Georgia 30308
  Telephone: (404) 506-6526

It appears that manufactured gas plant waste may have been disposed of at the site until the 1930's. From the mid-1800's until the 1950's, manufactured gas plants were widely used in Atlanta for producing gas from coal or oil. Many of the chemicals found at the site, including naphthalene, acenaphthylene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, chrysene, benzo(a)pyrene and ideno(1,2,3-cd)pyrene are derived from coal tar. A report relating to the above parties was provided to EPD and the Georgia Attorney General's Office. *See* Appendix EE to the 1999 CSR.

- Norfolk Southern Railway Company
  Three Commercial Place
  Norfolk, Virginia 23510
  Telephone: (757) 664-5021

Southern Railroad Yards operated a facility, including a boiler house, a machine shop and a round house across Gray Street. Some of the waste material found at the site appears to be related to these types of operations. In 1987, Southern Railroad Company merged with Norfolk & Western to form the Norfolk Southern Corporation.

VI. Receptor Survey

Exposure of nearby residents to regulated substances has been substantially eliminated by the construction of the landfill cap and slurry wall on Parcels 12 and 3 and the engineered concrete sidewalk cap and asphalt roadbed on Parcel 3. No drinking water wells or surface water bodies are present at Parcels 12 or 3. The Conservation Easement and Monitoring and Maintenance Plan will provide a mechanism to maintain the effectiveness of the Type V remedy.

VII. Public Participation

As required by the Georgia Rules for Hazardous Site Response, r. 391-3-19-.06(5), a Public Notice was published in the Fulton County Daily Report and the Atlanta Journal Constitution on September 9, 2005 indicating that the public may submit comments to EPD on the CSR within thirty (30) days.

VIII. References

1. ATEC Associates, Inc. 1994. *Final Site Environmental History and Records Review – Revision 1.* Herndon Homes Renovation, Atlanta, Fulton County, Georgia. ATEC Project No. 32-07-00717-02.

2. Soil & Environmental Testing Services, Inc. 1993. *Site Investigation Data.*

3. ERM-EnviroClean Southeast, Inc. January 1996. *Preliminary Site Assessment Report.*

4. Bearden, Sam. Clerk of the Works. Herndon Homes Modernization, Atlanta Housing Authority. *Personal Communication 1994.*

5. McPherson, Mike. Site Engineering, Inc. *Personal Communication 1994.*

6. Clark, William Z. and Arnold C. Zisa. 1976. *Physiographic Map of Georgia.* Georgia Department of Natural Resources.

7. McConnell, Keith I. and Charlotte E. Abrams. 1984. *Geology of the Greater Atlanta Region. Bulletin 96.* Georgia Department of Natural Resources.

8. Cressler, C.W., C.J. Thurmond and W.G. Hester. 1983. *Ground Water in the Greater Atlanta Region Georgia. Information Circular 63.* Georgia Geologic Survey.

9. Bouwer, H. and R.C. Rice, 1976. *A slug test method for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells.* Water Resources Research, Vol. 12. No. 3, pp. 423-428.

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TABLE 1-1

Cleanup Criteria

Constituent	Cleanup Concentrations (mg/kg)
Arsenic	20 (III-2)
Chromium	234
Copper	2,902
Cyanide	1,564
Lead	400
Mercury	0.5 (III-2)
Zinc	23,464
Acenaphthene	4,693
Acenaphthylene	130 (NC)
Anthracene	23,464
Benzo (a) anthracene	12
Benzo (b) fluoranthene	12
Benzo (k) fluoranthene	125
Benzo (g, h, i) perylene	DL
Benzo (a) pyrene	1.6 (NC)
Bis (2-ethylhexyl) phthalate	652
Butylbenzylphthalate	15,643
Chrysene	1,235
Dibenz (a, h) anthracene	2 (Cancer)
Di-n-Butylphthalate	DL
Fluoranthene	3,129
Fluorene	3,129
Indeno (1,2,3-cd) pyrene	12
Napthalene	100 (NC)
Phenanthrene	110 (NC)
Pyrene	2,346

TABLE 2-1

SUMMARY OF TRENCHING ACTIVITIES
NORTHSIDE DRIVE LANDFILL SITE
ATLANTA, FULTON COUNTY, GEORGIA

Trench	Date	Depth	Results
A	1/12/99	8 -10 ft	There were no visible signs of waste or slag debris in the excavation.
B	1/12/99	8 -10 ft	At approximately 6 ft the soil contained construction debris i.e., brick, mortar, etc., and at about 8 ft light slag debris was encountered.
C	1/12/99	8 - 10 ft	There was no visible sign of waste or slag debris in the excavation.
D	1/12/99	4 - 6 ft	Heavy slag debris was encountered at approximately 2-5 ft bgs and contained chunks of metal and glass. A clay layer extended beneath the slag to approximately 6 ft.
E	———		Not Excavated
F	1/12/99	10 - 12 ft	Heavy slag waste was encountered at approximately 5-7 ft bgs and contained metal and glass. A clay layer extended beneath the slag to approximately12 ft
G	———		Not Excavated
H	1/15/99	6-8 ft	Heavy slag was encountered at approximately 2-4 ft bgs. Slag layer on the west side of the excavation appears to extend beneath Northside Drive and the slag layer on the east side of the excavation appears to extend beneath the Lounge building.
I	1/15/99	6-8 ft	Heavy slag was encountered at approximately 1-4 ft bgs. Slag layer on the west side of the excavation appears to extend beneath Northside Drive and the slag layer on the east side of the excavation appears to extend beneath the Community/ Maintenance building.
J	1/15/99	6-8 ft	There was no visible sign of waste or slag debris in the excavation.
K	1/13/99	6 -8 ft	Heavy slag was encountered at approximately 3-5 ft bgs. Slag layer appears to extend beneath building 44.
L	1/14/99	8-10 ft	Heavy slag was encountered at approximately 3-4 ft bgs. Slag layer appears to extend beneath building 32.
M	1/14/99	3-4 ft	Heavy slag was encountered at approximately 2-3 ft bgs. Slag layer appears to extend beneath building 44. The depth of excavation was limited because of the presence of sheet metal at approximately 4 ft bgs.
N	1/14/99	6-8 ft	There was no visible sign of waste or slag debris in the excavation.
O	1/14/99	6-8 ft	Heavy slag was encountered at approximately 3-4 ft bgs. Slag layer appears to extend beneath building 47.
P	1/14/99	6-8 ft	Heavy slag was encountered at approximately 1-2 ft bgs. Slag layer appears to extend beneath building 54.
Q	1/14/99	6-8 ft	Heavy slag was encountered at approximately 2-3 ft bgs. Rock was encountered at about 5 ft bgs. Slag layer appears to extend beneath building 52.
R	1/14/99	8-10 ft	Heavy slag was encountered at approximately 1-6 ft bgs. Slag layer appears to extend beneath Community/ Maintenance building. This location is the thickest layer of slag waste encountered.

TABLE 2-2

SUMMARY OF GEOPROBE BORINGS
NORTHSIDE DRIVE LANDFILL SITE
ATLANTA, FULTON COUNTY, GEORGIA

Geoprobe Borings	Total Depth (bgs)	Approximate Slag Interval (bgs)
GPT –1	10 ft	1.2 – 5.8 ft
GPT-2	10.8 ft	.8 – 6.8 ft
GPT-3	8.2 ft	NA
GPT-4	26.5 ft	4 – 6.5 ft
GPT-5	12 ft	2 – 10 ft
GPT-6	6 ft	NA
GPT-7	8 ft	NA
GPT-8	8 ft	NA
GPT-9	2 ft	1 – 2 ft; encountered auger refusal at 2 ft bgs
GPT-10	8 ft	There were no visible signs of waste or slag debris in the excavation.
GPT-11	10.9 ft	3 – 6 ft
GPT-12	10.8 ft	4 – 6 ft
GPT-13	10.8 ft	2.5 – 6 ft
GPT-14	10.9 ft	7 – 8 ft
GPT-15	17 ft	7 – 11 ft
GPT-16	8.8 ft	There were no visible signs of waste or slag debris in the excavation.
GPT-17	8.9 ft	.6 – 1 ft
GPT-18	9.9 ft	There were no visible signs of waste or slag debris in the excavation.
GPT-19	8.9 ft	2 – 5 ft
GPT-20	8.10 ft	3.8 – 4.10 ft
GPT-21	8.9 ft	There were no visible signs of waste or slag debris in the excavation.
GPT-22	8.9 ft	There were no visible signs of waste or slag debris in the excavation.
GPT-23	8.0 ft	There were no visible signs of waste or slag debris in the excavation.
GPT-24	9.0 ft	There were no visible signs of waste or slag debris in the excavation.
GPN-1	15 ft	7 – 12 ft
GPMS-1	10-12	No traces of slag was encountered. However, the soil in this area (4.4 – 8.4 ft bgs) appears to be saturated with petroleum products.
GPMS-2	10-12	Heavy slag was encountered at approximately 2 – 2.5 ft bgs. Debris layer appeared to extend 2.5 – 4.5 ft bgs; and the soil in this area (4.5 – 10 ft bgs) also appears to be saturated with petroleum products
GPMS-3	10-12	Heavy slag was encountered at approximately 1 – 6.5 ft bgs; and the soil in this area (2.5 – 10.5 ft bgs) also appears to be saturated with petroleum products
GPMS-4	10-12	Heavy slag and debris was encountered at approximately 1 – 4 ft bgs; and the soil in this area (3 – 9 ft bgs) also appears to be saturated with petroleum products
GPMS-5	8-10	Heavy slag was encountered at approximately 1 – 5 ft bgs; and the soil in this area (5 – 7 ft bgs) also appears to be saturated with petroleum products
GPMS-6	8-10	There were no visible signs of waste or slag debris in the geoprobe sample. However, the soil in this area (5 – 8.5 ft bgs) also appears to be saturated with petroleum products

Notes: bgs – below ground surface
NA – not applicable, could not penetrate the ground
ft - foot

TABLE 2-3

GEOTECHNICAL BORING SUMMARY
NORTHSIDE DRIVE LANDFILL SITE
ATLANTA, FULTON COUNTY, GEORGIA

Boring Number	Surface Elevation	Depth to Bedrock*	Elevation Top of Bedrock
B-1	963.8	60.0	903.8
B-2	963.5	56.0	907.5
B-3	963.6	52.0	911.6
B-4	964.1	54.0	910.1
B-5	965.3	49.0	916.3
B-6	966.8	48.0	918.8
B-7	968.5	52.5	916.0
B-8	969.6	57.5	912.1
B-9	972.4	47.5	924.9
B-10	975	40.0	935.0
B-11	975	41.0	934.0
B-12	973.7	35.5	938.2
B-13	973.2	36.0	937.2
B-14	971.5	38.5	933.0
B-15	971.7	35.0	936.7
B-16	971.5	36.0	935.5
B-17	971.1	39.0	932.1
B-18	972.4	42.0	930.4
B-19	972.6	41.0	931.6
B-19A	972.6	35.0	937.6
B-20	973.2	32.0	941.2
B-21	NC	NC	NC
B-22	976.2	23.0	953.2
B-23	976.6	30.0	946.6
B-24	NC	NC	NC
B-25	980.1	42.5	937.6
B-26	976.9	42.5	934.4
B-27	976.6	12.5	964.1
B-28	971.7	1.5	970.2
B-29	965.4	7.0	958.4
B-30	959.4	43.0	916.4
B-31	955.9	38.0	917.9
B-32	953.3	35.0	918.3
B-33	950.8	27.0	923.8
B-34	948.6	NC	NC
B-35	942.9	14.0	928.9
B-36	943.9	21.0	922.9

TABLE 2-3

GEOTECHNICAL BORING SUMMARY
NORTHSIDE DRIVE LANDFILL SITE
ATLANTA, FULTON COUNTY, GEORGIA

Boring Number	Surface Elevation	Depth to Bedrock*	Elevation Top of Bedrock
B-37	949.8	34.0	915.8
B-38	952.3	39.0	913.3
B-39	953.4	40.0	913.4
B-40	955.5	51.0	904.5
B-41	957.3	44.0	913.3
B-42	957.7	47.0	910.7
B-43	957.9	45.5	912.4
B-44	959.6	43.5	916.1
B-44A	960	44.0	916.0
B-45	960.6	34.0	926.6
B-46	960	49.0	911.0
B-47	966.1	35.0	931.1
B-48	965.9	33.5	932.4
B-49	965	39.0	926.0
B-50	964.4	36.5	927.9

Notes:

* Depth to bedrock determined by auger refusal and measured in feet below ground surface.

** Borehole was cored beyond the bedrock depth

NC - Not Completed

Most boring locations about 40 feet apart. In some cases borings were installed between the 40 foot interval borings They are numbered B-__A

TABLE 2-4

GEOTECHNICAL LABORATORY RESULTS
NORTHSIDE DRIVE LANDFILL SITE
ATLANTA, FULTON COUNTY, GEORGIA

Sample Identification		Sample Type	Sample Depth	Soil Classification	Natural Moisture %	Atterberg Limits				Grain Size Distribution			Unit Weight		Additional Tests Conducted (See Notes)
						LL	PL	PI	LI	% Finer No. 4 Sieve	% Finer No. 200 Sieve	% Finer .005 mm	Moisture %	Dry (lb/cuft)	
B-5	ST-1	UD	5.0-7.0'	ML	26.2	NP	NP	NP	NP	99.9	51.5	20.2	26.2	88.3	U
B-5	ST-2	UD	15.0-17.0'	SM	27.4	37	35	2	4.01	99.9	48.3	18.0	27.4	90.0	U
B-5	ST-3	UD	25.0-27.0'	SM	27.2	NP	NP	NP	NP	99.7	33.6	7.0	-	-	-
B-5	ST-4	UD	30.0-32.0'	SM	29.9	32	31	1	1.48	98.5	38.8	11.0	-	-	-
B-46	ST-5	UD	22.0-24.0'	SM	11.3	NP	NP	NP	NP	100.0	37.9	7.0	-	-	-
B-1	SS-3	Bag	45.0-47.0'	SM	21.9	NP	NP	NP	NP	98.3	28.3	7.4	-	-	-
B-15	SS-2	Bag	5.0-7.0'	MH	29.3	53	36	17	0.39	100.0	63.6	40.5	-	-	-
B-19	SS-4	Bag	35.0-37.0'	SM	26.1	NP	NP	NP	NP	99.6	28.3	5.3	-	-	-
B-25	SS-5	Bag	20.0-22.0'	SM	10.5	NP	NP	NP	NP	99.9	39.5	11.0	-	-	-
B-49	SS-6	Bag	25.0-27.0'	SM	17.5	NP	NP	NP	NP	99.2	30.1	6.0	-	-	-
B-50	SS-1	Bag	10.0-12.0'	SM	40.5	NP	NP	NP	NP	99.5	47.9	13.0	-	-	-

Abbreviations:
Liquid Limit (LL)
Plastic Limit (PL)
Plasticity Index (PI)
Liquid Index (LI)

Notes:
U = Unconfined Compression Test
UD= Undisturbed
Bag = Sample was stored in ziplock bag for geotechnical sampling
ML = Inorganic silt and very fine sands, silty or clayey fine sands
SM = silty sands, sand silt mixtures
MH = inorganic silts, micaceous or diatomaceous fine sand or silty soils
NP = No plasticity

TABLE 2-5

MONITORING WELL CONSTRUCTION DETAILS
NORTHSIDE DRIVE LANDFILL SITE
ATLANTA, FULTON COUNTY, GEORGIA

Well	Date Installed (mo/day/yr)	Borehole Total Depth (ft bgs)	Top of Casing Elevation (ft msl)	Bentonite Seal Interval (ft bgs)	Filter Pack Interval (ft bgs)	Screened Interval (ft bgs)	Well Casing Total Depth (ft bgs)
MWC-1A	03/19/99	19	961.1	4	7	8	18.80
MWC-1B	03/23/99	57	960.8	42	44	46	55.81
MWC-1C	03/23/99	77	960.4	62	65	67	77.61
MWC-2B	03/15/99	44	973.6	29	30.8	33	43.58
MWC-2C	03/26/99	56	---	41	44	45	56.41
MWC-3B	03/11/99	24	944.8	10.5	12	13	24.91
MWC-3C	03/23/99	30	943.1	15.5	17.5	20	29.32

Notes:

ft bgs	feet below the ground surface
mo/day/yr	month, day, and year
ft msl	feet above mean sea level

TABLE 2-6

GROUNDWATER FIELD PARAMETERS SUMMARY
NORTHSIDE DRIVE LANDFILL SITE
ATLANTA, FULTON COUNTY, GEORGIA

Sample Location	Well Diam (in)	Well Depth (ft)	Static Water Level (ft)	Water Column (ft)	Volume in Well Casing (gal)	Volume Purged (gal)	Field Parameters			
							pH (s.u.)	Cond (micros/cm)	Temp (°C)	PID (ppm)
MWC-1A	2	18.8	12.50	6.30	1.02	5.0	4.78	178.00	65.90	NA
MWC-1B	2	65.81	12.03	43.78	7.13	22.0	6.00	311.00	68.40	NA
MWC-1C	2	77.61	11.43	66.18	10.78	32.5	6.42	516	69.2	NA
MWC-2A (MW-7)	2	25.4	21.72	3.66	0.62	3.0	4.81	126.00	73.50	NA
MWC-2B	2	43.56	22.20	21.38	3.63	11.0	6.01	389.00	76.80	NA
MWC-2C	2	56.41	21.81	34.60	5.83	17.0	6.20	618.00	69.70	NA
MWC-3B	2	24.91	10.22	14.69	2.39	8.0	7.35	584.00	69.30	NA
MWC-3C	2	29.32	10.14	19.18	3.12	11.0	6.75	604.00	70.40	NA

Notes:

[1] Measured from the top of the PVC well casing.

[2] Calculated using the multiplier of 0.163 gallons per foot of water for 2-inch diameter well or 0.653 per foot for a 4-inch diameter well.

[3] The value presented is an average of three readings.

Acronyms and Abbreviations

Cond = Conductivity

gal = Gallon

°F = Degrees Fahrenheit

NM = Not Measured

NA = Not Applicable

micros/cm = Microsiemens per Centimeter

PID = Photoionization Detector

ft = Feet

Temp = Temperature

in = Inches

s.u. = Standard Units

METHANE SAMPLING
NORTHSIDE DRIVE LANDFILL SITE
ATLANTA, FULTON COUNTY, GEORGIA

Sampling Location	Initial Time	Initial Methane (ppm)	Final Time	Final Methane (ppm)
MM-A9	n/a	0.00%	1005	0.00%
MM-A8	n/a	0.00%	1010	0.00%
MM-B9	n/a	0.00%	1020	0.70%
MM-B8	n/a	0.00%	1011	0.00%
MM-A7	830	0.00%	1104	0.00%
MM-A6	855	0.00%	1102	0.00%
MM-A5	910	0.00%	1100	0.00%
MM-A4	1010	0.00%	1057	0.00%
MM-A3	955	0.00%	1055	0.00%
MM-A2	940	0.00%	1050	0.00%
MM-B4	1000	0.00%	1108	0.00%
MM-B3	1030	0.00%	1110	0.00%
MM-B6	1120	0.00%	1300	0.00%
MM-B7	1140	0.00%	1305	0.10%
MM-C7	1331	0.10%	1400	0.00%
MM-C6	1342	0.10%	1412	0.10%
MM-C5	1348	0.00%	1415	0.10%
MM-C4	1355	0.00%	1425	0.00%
MM-C3	1405	0.00%	1436	0.00%
MM-C2	1415	0.00%	1445	0.10%
MM-D4	1500	0.00%	1535	0.00%
MM-E4	1510	0.10%	1540	0.10%
MM-D5	1525	0.10%	1602	0.00%
MM-D6	1527	0.00%	1607	0.00%
MM-D7	1533	0.00%	1608	0.00%
MM-D8	1555	0.10%	1625	0.00%
MM-D9	1600	0.10%	1630	0.00%
MM-E9	1612	0.00%	1645	0.00%
MM-E8	1615	0.00%	1650	0.00%
MM-E7	1620	0.00%	1652	0.00%
MM-E6	1627	0.00%	1657	0.10%
MM-E5	1640	0.00%	1710	0.00%
MM-C9	NA	NA	1015	0.00%
MM-C8	NA	NA	1013	0.00%

TABLE 4-1

Cleanup Criteria

Constituent	Cleanup Concentrations (mg/kg)
Arsenic	20 (III-2)
Chromium	234
Copper	2,902
Cyanide	1,564
Lead	400
Mercury	0.5 (III-2)
Zinc	23,464
Acenaphthene	4,693
Acenaphthylene	130 (NC)
Anthracene	23,464
Benzo (a) anthracene	12
Benzo (b) fluoranthene	12
Benzo (k) fluoranthene	125
Benzo (g, h, i) perylene	DL
Benzo (a) pyrene	1.6 (NC)
Bis (2-ethylhexyl) phthalate	652
Butylbenzylphthalate	15,643
Chrysene	1,235
Dibenz (a, h) anthracene	2 (Cancer)
Di-n-Butylphthalate	DL
Fluoranthene	3,129
Fluorene	3,129
Indeno (1,2,3-cd) pyrene	12
Napthalene	100 (NC)
Phenanthrene	110 (NC)
Pyrene	2,346

TA[redacted] 4-2

Northside Drive Landfill
Confirmation Sample Results

Constituent	Cleanup Concentrations (mg/kg)	1	2	3	4	5	6	7
		NL-A13-CS-06	NL-A14-CS-06	NL-A16-G-06	NL-SW25-G-12	NL-SW24-G-12	NL-SW23-G-12	NL-SW25-G-6
Arsenic	20 (III-2)	<6.9	[redacted]	<6.8	<6.3	<6.1	<6.1	<6.5
Chromium	234	<6.9	<33	7.7	<6.3	<6.1	8.4 B	8.1 B
Copper	2,902	16	85	19	23	14	440	53
Cyanide	1,564	<0.53	<0.56	<0.54	<0.50	<0.49	<049	<0.52
Lead	400	<6.9	[redacted]	<6.8	26	<6.1	62	<6.5
Mercury	0.5 (III-2)	<0.28	<0.33	<0.27	<0.25	<0.24	<0.24	<0.26
Zinc	23,464	<140	<670	<140	<130	<120	150	<130
Acenaphthene	4,693	<0.460	<0.440	<0.450	<0.420	<0.410	<0.410	<0.430
Acenaphthylene	130 (NC)	<0.460	<0.440	<0.450	<0.420	<0.410	<0.410	<0.430
Anthracene	23,464	<0.460	<0.440	<0.450	<0.420	<0.410	<0.410	<0.430
Benzo(a)anthracene	12	<0.460	<0.440	<0.450	<0.420	<0.410	0.460	<0.430
Benzo(b)fluoranthene	12	<0.460	<0.440	<0.450	<0.420	<0.410	<0.410	<0.430
Benzo(k)fluoranthene	125	<0.460	<0.440	<0.450	<0.420	<0.410	<0.410	<0.430
Benzo(g,h,i)perylene	DL	<0.460	<0.440	<0.450	<0.420	<0.410	<0.410	<0.430
Benzo(a)pyrene	1.6 (NC)	<0.460	<0.440	<0.450	<0.420	<0.410	<0.410	<0.430
Bis(2-ethylhexyl)phthalate	652	<0.460	<0.440	<0.450	<0.420	<0.410	<0.410	<0.430
Butylbenzylphthalate	15,643	<0.460	<0.440	<0.450	<0.420	<0.410	<0.410	<0.430
Chrysene	1,235	<0.460	<0.440	<0.450	<0.420	<0.410	<0.410	<0.430
Dibenz(a,h)anthracene	2 (Cancer)	<0.460	<0.440	<0.450	<0.420	<0.410	<0.0410	<0.430
Di-n-Butylphthalate	DL	<0.460	<0.440	<0.450	<0.420	<0.410	0.560	<0.430
Fluoranthene	3,129	<0.460	<0.440	<0.450	<0.420	<0.410	<0.410	<0.430
Fluorene	3,129	<0.460	<0.440	<0.450	<0.420	<0.410	<0.410	<0.430
Indeno(1,2,3-cd)pyrene	12	<0.460	<0.440	<0.450	<0.420	<0.410	<0.410	<0.430
Napthalene	100 (NC)	<0.460	<0.440	<0.450	<0.420	<0.410	0.490	<0.430
Phenanthrene	110 (NC)	<0.460	<0.440	<0.450	<0.420	<0.410	0.530	<0.430
Pyrene	2,346	<0.460	<0.440	<0.450	<0.420	<0.410		

NL - Northside Drive Landfill
SW - Sidewall
G - Grab
CS - Composite

Northside Drive Landfill
Confirmation Sample Results

Constituent	Cleanup Concentrations (mg/kg)	8	9	10	11	12	13	14
		NL-SW24-G-6	NL-SW23-G-6	NL-SW2-G-8	NL-SW2-G-4	NL-SW3-G-5	NL-SW3-G-10	NL-SW4-G-16
Arsenic	20 (III-2)	<5.6	<5.9	<6.4	<6.2	<6.0	<6.9	<6.3
Chromium	234	<5.6	7.8	12	9.0	19	49	28
Copper	2,902	32	32	14	14	11	46	18
Cyanide	1,564	<0.45	<0.47	<0.51	<0.49	<0.48	<0.56	<0.51
Lead	400	69	<5.9	18	<6.2	<6.0	<6.9	18
Mercury	0.5 (III-2)	<0.22	<0.24	<0.26	<0.25	<0.24	<0.28	<0.25
Zinc	23,464	<110	<120	<130	<120	200	<140	<130
Acenaphthene	4,693	<0.370	<0.390	<0.430	<0.410	<0.400	<0.460	<0.420
Acenaphthylene	130 (NC)	<0.370	<0.390	<0.430	<0.410	<0.400	<0.460	<0.420
Anthracene	23,464	<0.370	<0.390	<0.430	<0.410	<0.400	<0.460	<0.420
Benzo(a)anthracene	12	<0.370	<0.390	<0.430	<0.410	<0.400	<0.460	<0.420
Benzo(b)fluoranthene	12	<0.370	<0.390	<0.430	<0.410	<0.400	<0.460	<0.420
Benzo(k)fluoranthene	125	<0.370	<0.390	<0.430	<0.410	<0.400	<0.460	<0.420
Benzo(g,h,i)perylene	DL	<0.370	<0.390	<0.430	<0.410	<0.400	<0.460	<0.420
Benzo(a)pyrene	1.6 (NC)	<0.370	<0.390	<0.430	<0.410	<0.400	<0.460	<0.420
Bis(2-ethylhexyl)phthalate	652	<0.370	<0.390	<0.430	<0.410	<0.400	<0.460	<0.420
Butylbenzylphthalate	15,643	<0.370	<0.390	<0.430	<0.410	<0.400	<0.460	<0.420
Chrysene	1,235	<0.370	<0.390	<0.430	<0.410	<0.400	<0.460	<0.420
Dibenz(a,h)anthracene	2 (Cancer)	<0.370	<0.390	<0.430	<0.410	<0.400	<0.460	<0.420
Di-n-Butylphthalate	DL	<0.370	<0.390	<0.430	<0.410	<0.400	<0.460	<0.420
Fluoranthene	3,129	<0.370	<0.390	<0.430	<0.410	<0.400	<0.460	<0.420
Fluorene	3,129	<0.370	<0.390	<0.430	<0.410	<0.400	<0.460	<0.420
Indeno(1,2,3-cd)pyrene	12	<0.370	<0.390	<0.430	<0.410	<0.400	<0.460	<0.420
Napthalene	100 (NC)	<0.370	<0.390	<0.430	<0.410	<0.400	<0.460	<0.420
Phenanthrene	110 (NC)	<0.370	<0.390	<0.430	<0.410	<0.400	<0.460	<0.420
Pyrene	2,346	<0.370	<0.390	<0.430	<0.410	<0.400	<0.460	<0.420

NL - Northside Drive Landfill
SW - Sidewall
G - Grab
CS - Composite

Northside Drive Landfill
Confirmation Sample Results

Constituent	Cleanup Concentrations (mg/kg)	15	16	17	18	19	20	21
		NL-SW5-G-10	NL-SW6-G-9.5	NL-SW7-G-13	NL-SW7-G-6	NL-SW15-G-6	NL-SW15-G-13	NL-SW8-G-10.5
Arsenic	20 (III-2)	<5.6	<8.8	<5.9	<5.5	<6.2	<6.3	<5.9
Chromium	234	15	16	<5.9	20	7.9	<6.3	27
Copper	2,902	82	50	24	160	50	25	57
Cyanide	1,564	<0.45	<0.0088	<0.0059	<0.0055	<0.49	<0.51	<0.47
Lead	400	200	<8.8	<5.9	450	38	<6.3	48
Mercury	0.5 (III-2)	<0.22	<0.35	<0.24	<0.28	[redacted]	<0.25	<0.24
Zinc	23,464	260	<180	120	560	<120	<130	<0.330
Acenaphthene	4,693	<0.370	<0.330	<0.330	<0.330	<0.410	<0.420	<0.330
Acenaphthylene	130 (NC)	<0.370	<0.330	<0.330	<0.330	<0.410	<0.420	<0.330
Anthracene	23,464	<0.370	<0.330	<0.330	<0.330	<0.410	<0.420	<0.330
Benzo(a)anthracene	12	<0.370	<0.330	<0.330	<0.330	<0.410	<0.420	<0.330
Benzo(b)fluoranthene	12	<0.370	<0.330	<0.330	<0.330	<0.410	<0.420	<0.330
Benzo(k)fluoranthene	125	<0.370	<0.330	<0.330	<0.330	<0.410	<0.420	<0.330
Benzo(g,h,i)perylene	DL	<0.370	<0.330	<0.330	<0.330	<0.410	<0.420	<0.330
Benzo(a)pyrene	1.6 (NC)	<0.370	<0.330	<0.330	<0.330	<0.410	<0.420	<0.330
Bis(2-ethylhexyl)phthalate	652	<0.370	<0.330	<0.330	<0.330	<0.410	<0.420	<0.330
Butylbenzylphthalate	15,643	<0.370	<0.330	<0.330	<0.330	<0.410	<0.420	<0.330
Chrysene	1,235	<0.370	<0.330	<0.330	<0.330	<0.410	<0.420	<0.330
Dibenz(a,h)anthracene	2 (Cancer)	<0.370	<0.330	<0.330	<0.330	<0.410	<0.420	<0.330
Di-n-Butylphthalate	DL	<0.370	<0.330	<0.330	<0.330	<0.410	<0.420	<0.330
Fluoranthene	3,129	<0.370	<0.330	<0.330	0.420	0.420	<0.420	<0.330
Fluorene	3,129	<0.370	<0.330	<0.330	<0.330	<0.410	<0.420	<0.330
Indeno(1,2,3-cd)pyrene	12	<0.370	<0.330	<0.330	<0.330	<0.410	<0.420	<0.330
Napthalene	100 (NC)	<0.370	<0.330	<0.330	<0.330	<0.410	<0.420	<0.330
Phenanthrene	110 (NC)	<0.370	<0.330	<0.330	<0.330	<0.410	<0.420	<0.330
Pyrene	2,346	<0.370	<0.330	<0.330	0.560	0.560	<0.420	0.400

NL - Northside Drive Landfill
SW - Sidewall
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CS - Composite

Northside Drive Landfill
Confirmation Sample Results

Constituent	Cleanup Concentrations (mg/kg)	22	23	24	25	26	27	28
		NL-SW8-G-21	NL-SW9-G-12.5	NL-SW9-G-25	NL-SW10-G-12	NL-SW10-G-24	NL-SW11-G-11	NL-SW11-G-23
Arsenic	20 (III-2)	<6.8	<5.6	<5.7	<5.9	<7.2	<5.7	<6.0
Chromium	234	43	6	<5.7	33	<7.2	<5.7	6.0
Copper	2,902	19	7.3	5.7	19	<7.2	10	13
Cyanide	1,564	<0.54	<0.44	<0.45	<0.47	<0.58	<0.45	<0.48
Lead	400	<6.8	<5.6	<5.7	<5.9	<7.2	<5.7	<6.0
Mercury	0.5 (III-2)	<0.27	<0.22	<0.23	<0.24	<0.29	<0.23	<0.24
Zinc	23,464	<0.330	<0.330	<0.330	<0.330	<0.330	<110	<120
Acenaphthene	4,693	<0.330	<0.330	<0.330	<0.330	<0.330	<0.380	<0.400
Acenaphthylene	130 (NC)	<0.330	<0.330	<0.330	<0.330	<0.330	<0.380	<0.400
Anthracene	23,464	<0.330	<0.330	<0.330	<0.330	<0.330	<0.380	<0.400
Benzo(a)anthracene	12	<0.330	<0.330	<0.330	<0.330	<0.330	<0.380	<0.400
Benzo(b)fluoranthene	12	<0.330	<0.330	<0.330	<0.330	<0.330	<0.380	<0.400
Benzo(k)fluoranthene	125	<0.330	<0.330	<0.330	<0.330	<0.330	<0.380	<0.400
Benzo(g,h,i)perylene	DL	<0.330	<0.330	<0.330	<0.330	<0.330	<0.380	<0.400
Benzo(a)pyrene	1.6 (NC)	<0.330	<0.330	<0.330	<0.330	<0.330	<0.380	<0.400
Bis(2-ethylhexyl)phthalate	652	<0.330	<0.330	<0.330	<0.330	<0.330	<0.380	<0.400
Butylbenzylphthalate	15,643	<0.330	<0.330	<0.330	<0.330	<0.330	<0.380	<0.400
Chrysene	1,235	<0.330	<0.330	<0.330	<0.330	<0.330	<0.380	<0.400
Dibenz(a,h)anthracene	2 (Cancer)	<0.330	<0.330	<0.330	<0.330	<0.330	<0.380	<0.400
Di-n-Butylphthalate	DL	<0.330	<0.330	<0.330	<0.330	<0.330	<0.380	<0.400
Fluoranthene	3,129	<0.330	<0.330	<0.330	<0.330	<0.330	<0.380	<0.400
Fluorene	3,129	<0.330	<0.330	<0.330	<0.330	<0.330	<0.380	<0.400
Indeno(1,2,3-cd)pyrene	12	<0.330	<0.330	<0.330	<0.330	<0.330	<0.380	<0.400
Napthalene	100 (NC)	<0.330	<0.330	<0.330	<0.330	<0.330	<0.380	<0.400
Phenanthrene	110 (NC)	<0.330	<0.330	<0.330	<0.330	<0.330	<0.380	<0.400
Pyrene	2,346	<0.330	<0.330	<0.330	<0.330	<0.330	<0.380	<0.400

NL - Northside Drive Landfill
SW - Sidewall
G - Grab
CS - Composite

Northside Drive Landfill
Confirmation Sample Results

Constituent	Cleanup Concentrations (mg/kg)	29	30	31	32	33	34	35
		NL-SW12-G-9	NL-SW12-G-18	NL-SW7(2)-G-6	NL-A12-G-06	NL-B12-G-06	NL-SW13-G-3	NL-SW13-G-7
Arsenic	20 (III-2)	<6.1	<6.0	<5.6	<32	<6.3	<5.8	<5.7
Chromium	234	10	6.6	14	35	14	5.9	<5.7
Copper	2,902	35	43	11	33	24	16	21
Cyanide	1,564	<0.49	<0.48	<0.44	<0.51	<0.50	<0.47	<0.46
Lead	400	<6.1	50	<5.6	<32	<6.3	<5.8	<5.7
Mercury	0.5 (III-2)	<0.24	<0.24	<0.22	<0.25	<0.25	<0.23	<0.23
Zinc	23,464	200	140	<110	<630	160	<120	<110
Acenaphthene	4,693	<0.410	<0.400	<0.370	<0.420	<0.420	<0.390	<0.380
Acenaphthylene	130 (NC)	<0.410	<0.400	<0.370	<0.420	<0.420	<0.390	<0.380
Anthracene	23,464	<0.410	<0.400	<0.370	<0.420	<0.420	<0.390	<0.380
Benzo(a)anthracene	12	<0.410	<0.400	<0.370	<0.420	<0.420	<0.390	<0.380
Benzo(b)fluoranthene	12	<0.410	<0.400	<0.370	<0.420	<0.420	<0.390	<0.380
Benzo(k)fluoranthene	125	<0.410	<0.400	<0.370	<0.420	<0.420	<0.390	<0.380
Benzo(g,h,i)perylene	DL	<0.410	<0.400	<0.370	<0.420	<0.420	<0.390	<0.380
Benzo(a)pyrene	1.6 (NC)	<0.410	<0.400	<0.370	<0.420	<0.420	<0.390	<0.380
Bis(2-ethylhexyl)phthalate	652	<0.410	<0.400	<0.370	<0.420	<0.420	<0.390	<0.380
Butylbenzylphthalate	15,643	<0.410	<0.400	<0.370	<0.420	<0.420	<0.390	<0.380
Chrysene	1,235	<0.410	<0.400	<0.370	<0.420	<0.420	<0.390	<0.380
Dibenz(a,h)anthracene	2 (Cancer)	<0.410	<0.400	<0.370	<0.420	<0.420	<0.390	<0.380
Di-n-Butylphthalate	DL	<0.410	<0.400	<0.370	<0.420	<0.420	<0.390	<0.380
Fluoranthene	3,129	<0.410	<0.400	<0.370	<0.420	<0.420	<0.390	<0.380
Fluorene	3,129	<0.410	<0.400	<0.370	<0.420	<0.420	<0.390	<0.380
Indeno(1,2,3-cd)pyrene	12	<0.410	<0.400	<0.370	<0.420	<0.420	<0.390	<0.380
Napthalene	100 (NC)	<0.410	<0.400	<0.370	<0.420	<0.420	<0.390	<0.380
Phenanthrene	110 (NC)	<0.410	<0.400	<0.370	<0.420	<0.420	<0.390	<0.380
Pyrene	2,346	<0.410	<0.400	<0.370	<0.420	<0.420	<0.390	<0.380

NL - Northside Drive Landfill
SW - Sidewall
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Northside Drive Landfill
Confirmation Sample Results

Constituent	Cleanup Concentrations (mg/kg)	36	37	38	39	40	41	42
		NL-SW14-G-3	NL-SW14-G-7	NL-B14-G-06	NL-B15-G-06	NL-B16-G-06	NL-C15-G-06	NL-C16-G-06
Arsenic	20 (III-2)	<5.4	<5.8	<6.2	<7.0	<7.4	<5.9	<6.2
Chromium	234	<5.4	<5.8	<6.2	<7.0	<7.4	<5.9	<6.2
Copper	2,902	20	24	11	16	24	14	16
Cyanide	1,564	<0.43	<0.47	<0.49	<0.56	<0.59	<0.47	<0.49
Lead	400	<5.4	<5.8	<6.2	<7.0	<7.4	<5.9	<6.2
Mercury	0.5 (III-2)	<0.22	<0.23	<0.25	<0.28	<0.29	<0.24	<0.25
Zinc	23,464	<110	<120	<120	<140	<150	230	<120
Acenaphthene	4,693	<0.360	<0.390	<0.410	<0.470	<0.490	<0.390	<0.410
Acenaphthylene	130 (NC)	<0.360	<0.390	<0.410	<0.470	<0.490	<0.390	<0.410
Anthracene	23,464	<0.360	<0.390	<0.410	<0.470	<0.490	<0.390	<0.410
Benzo(a)anthracene	12	<0.360	<0.390	<0.410	<0.470	<0.490	<0.390	<0.410
Benzo(b)fluoranthene	12	<0.360	<0.390	<0.410	<0.470	<0.490	<0.390	<0.410
Benzo(k)fluoranthene	125	<0.360	<0.390	<0.410	<0.470	<0.490	<0.390	<0.410
Benzo(g,h,i)perylene	DL	<0.360	<0.390	<0.410	<0.470	<0.490	<0.390	<0.410
Benzo(a)pyrene	1.6 (NC)	<0.360	<0.390	<0.410	<0.470	<0.490	<0.390	<0.410
Bis(2-ethylhexyl)phthalate	652	<0.360	<0.390	<0.410	<0.470	<0.490	<0.390	<0.410
Butylbenzylphthalate	15,643	<0.360	<0.390	<0.410	<0.470	<0.490	<0.390	<0.410
Chrysene	1,235	<0.360	<0.390	<0.410	<0.470	<0.490	<0.390	<0.410
Dibenz(a,h)anthracene	2 (Cancer)	<0.360	<0.390	<0.410	<0.470	<0.490	<0.390	<0.410
Di-n-Butylphthalate	DL	<0.360	<0.390	<0.410	<0.470	<0.490	<0.390	<0.410
Fluoranthene	3,129	<0.360	<0.390	<0.410	<0.470	<0.490	<0.390	<0.410
Fluorene	3,129	<0.360	<0.390	<0.410	<0.470	<0.490	<0.390	<0.410
Indeno(1,2,3-cd)pyrene	12	<0.360	<0.390	<0.410	<0.470	<0.490	<0.390	<0.410
Napthalene	100 (NC)	<0.360	<0.390	<0.410	<0.470	<0.490	<0.390	<0.410
Phenanthrene	110 (NC)	<0.360	<0.390	<0.410	<0.470	<0.490	<0.390	<0.410
Pyrene	2,346	<0.360	<0.390	<0.410	<0.470	<0.490	<0.390	<0.410

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Northside Drive Landfill
Confirmation Sample Results

Constituent	Cleanup Concentrations (mg/kg)	43	44	45	46	47	48	49
		NL-SW15(2)-G-6	NL-SW16-C-6	NL-SW16-G-12	NL-SW17-G-4	NL-SW17-G-10	NL-C18-G-06	NL-C17-G-06
Arsenic	20 (III-2)	NA	<6.0	<6.1	[redacted]	<7.6	<6.1	<6.7
Chromium	234	NA	<6.0	<6.1	<28	25	<6.1	<6.7
Copper	2,902	NA	13	19	[redacted]	390	10	15
Cyanide	1,564	NA	<0.48	<0.49	<0.45	<6.1	<0.49	<0.53
Lead	400	NA	<6.0	<6.1	[redacted]	[redacted]	<6.1	<6.7
Mercury	0.5 (III-2)	<0.29	<0.24	<0.24	[redacted]	[redacted]	<0.24	0.30
Zinc	23,464	NA	<120	<120	2,000	330	<120	<130
Acenaphthene	4,693	NA	<0.400	<0.410	<0.370	<0.500	<0.410	<0.450
Acenaphthylene	130 (NC)	NA	<0.400	<0.410	<0.370	<0.500	<0.410	<0.450
Anthracene	23,464	NA	<0.400	<0.410	<0.370	0.910	<0.410	<0.450
Benzo(a)anthracene	12	NA	<0.400	<0.410	<0.370	6.500	<0.410	<0.450
Benzo(b)fluoranthene	12	NA	<0.400	<0.410	<0.370	5.000	<0.410	<0.450
Benzo(k)fluoranthene	125	NA	<0.400	<0.410	<0.370	5.600	<0.410	<0.450
Benzo(g,h,i)perylene	DL	NA	<0.400	<0.410	<0.370	[redacted]	<0.410	<0.450
Benzo(a)pyrene	1.6 (NC)	NA	<0.400	<0.410	<0.370	[redacted]	<0.410	<0.450
Bis(2-ethylhexyl)phthalate	652	NA	<0.400	<0.410	<0.370	<0.500	<0.410	<0.450
Butylbenzylphthalate	15,643	NA	<0.400	<0.410	<0.370	<0.500	<0.410	<0.450
Chrysene	1,235	NA	<0.400	<0.410	<0.370	6.900	<0.410	<0.450
Dibenz(a,h)anthracene	2 (Cancer)	NA	<0.400	<0.410	<0.370	<0.500	<0.410	<0.450
Di-n-Butylphthalate	DL	NA	<0.400	<0.410	<0.370	<0.500	<0.410	<0.450
Fluoranthene	3,129	NA	<0.400	<0.410	<0.370	8.300	<0.410	<0.450
Fluorene	3,129	NA	<0.400	<0.410	<0.370	<0.500	<0.410	<0.450
Indeno(1,2,3-cd)pyrene	12	NA	<0.400	<0.410	<0.370	3.300	<0.410	<0.450
Napthalene	100 (NC)	NA	<0.400	<0.410	<0.370	0.670	<0.410	<0.450
Phenanthrene	110 (NC)	NA	<0.400	<0.410	<0.370	4.800	<0.410	<0.450
Pyrene	2,346	NA	<0.400	<0.410	<0.370	9.90	<0.410	<0.450

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Northside Drive Landfill
Confirmation Sample Results

Constituent	Cleanup Concentrations (mg/kg)	50	51	52	53	54	55	56
		NL-SW18-G-4.5	NL-SW18-G-9	NL-B17-G-06	NL-C19-G-06	NL-SW19-G-3	NL-SW19-G-6	NL-SW20-G-4
Arsenic	20 (III-2)	<5.8	<6.2	<6.3	<6.3	<5.8	<5.9	<5.8
Chromium	234	<5.8	<6.2	9.2	<6.3	19	11	<5.8
Copper	2,902	57	17	37	12	43	32	5.9
Cyanide	1,564	<0.47	<0.49	<0.51	<0.51	<0.47	<0.47	<0.47
Lead	400	230	9.6	82	<6.3	<5.9	47	<5.8
Mercury	0.5 (III-2)	0.33	<0.25	<0.25	<0.25	<0.23	[redacted]	<0.23
Zinc	23,464	650	<120	290	<130	<120	140	<120
Acenaphthene	4,693	<0.390	<0.410	<0.420	<0.420	<0.390	<0.390	<0.390
Acenaphthylene	130 (NC)	<0.390	<0.410	<0.420	<0.420	<0.390	<0.390	<0.390
Anthracene	23,464	<0.390	<0.410	<0.420	<0.420	<0.390	<0.390	<0.390
Benzo(a)anthracene	12	<0.390	<0.410	<0.420	<0.420	<0.390	<0.390	<0.390
Benzo(b)fluoranthene	12	<0.390	<0.410	<0.420	<0.420	<0.390	<0.390	<0.390
Benzo(k)fluoranthene	125	<0.390	<0.410	<0.420	<0.420	<0.390	<0.390	<0.390
Benzo(g,h,i)perylene	DL	<0.390	<0.410	<0.420	<0.420	<0.390	<0.390	<0.390
Benzo(a)pyrene	1.6 (NC)	<0.390	<0.410	<0.420	<0.420	<0.390	<0.390	<0.390
Bis(2-ethylhexyl)phthalate	652	<0.390	<0.410	<0.420	<0.420	<0.390	<0.390	<0.390
Butylbenzylphthalate	15,643	<0.390	<0.410	<0.420	<0.420	<0.390	<0.390	<0.390
Chrysene	1,235	<0.390	<0.410	<0.420	<0.420	<0.390	<0.390	<0.390
Dibenz(a,h)anthracene	2 (Cancer)	<0.390	<0.410	<0.420	<0.420	<0.390	<0.390	<0.390
Di-n-Butylphthalate	DL	<0.390	<0.410	<0.420	<0.420	<0.390	<0.390	<0.390
Fluoranthene	3,129	<0.390	<0.410	<0.420	<0.420	<0.390	<0.390	<0.390
Fluorene	3,129	<0.390	<0.410	<0.420	<0.420	<0.390	<0.390	<0.390
Indeno(1,2,3-cd)pyrene	12	<0.390	<0.410	<0.420	<0.420	<0.390	<0.390	<0.390
Napthalene	100 (NC)	<0.390	<0.410	<0.420	<0.420	<0.390	<0.390	<0.390
Phenanthrene	110 (NC)	<0.390	<0.410	<0.420	<0.420	<0.390	<0.390	<0.390
Pyrene	2,346	0.420	<0.410	<0.420	<0.420	<0.390	<0.390	<0.390

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Northside Drive Landfill
Confirmation Sample Results

Constituent	Cleanup Concentrations (mg/kg)	57	58	59	60	61	62	63
		NL-SW20-G-8	NL-B20-G-06	NL-A21-G-06	NL-B21-G-06	NL-SW22-G-16	NL-SW23-G-14	NL-SW24-G-7
Arsenic	20 (III-2)	<6.3	<6.8	<6.5	<7.5	<6.4	<6.2	<5.7
Chromium	234	<6.3	<6.8	<6.5	<7.5	43	9.4	13
Copper	2,902	8.5	8.4	7.1	<7.5	130	200	500
Cyanide	1,564	<0.50	<0.55			<0.40	<0.40	<0.40
Lead	400	<6.3	<6.8	<6.5	<7.5	[redacted]	[redacted]	[redacted]
Mercury	0.5 (III-2)	<0.25	<0.27	<0.26	<0.30	[redacted]	[redacted]	[redacted]
Zinc	23,464	<130	<140	<130	<150	1,400	450	<110
Acenaphthene	4,693	<0.420	<0.460	<0.430	<0.500	<0.430	<0.410	<0.380
Acenaphthylene	130 (NC)	<0.420	<0.460	<0.430	<0.500	<0.430	<0.410	<0.380
Anthracene	23,464	<0.420	<0.460	<0.430	<0.500	<0.430	0.720	<0.380
Benzo(a)anthracene	12	<0.420	<0.460	<0.430	<0.500	<0.430	<0.580	<0.380
Benzo(b)fluoranthene	12	<0.420	<0.460	<0.430	<0.500	<0.430	0.550	<0.380
Benzo(k)fluoranthene	125	<0.420	<0.460	<0.430	<0.500	<0.430	<0.410	<0.380
Benzo(g,h,i)perylene	DL	<0.420	<0.460	<0.430	<0.500	<0.430	0.620	<0.380
Benzo(a)pyrene	1.6 (NC)	<0.420	<0.460	<0.430	<0.500	<0.430	<0.410	<0.380
Bis(2-ethylhexyl)phthalate	652	<0.420	<0.460	<0.430	<0.500	<0.430	<0.410	<0.380
Butylbenzylphthalate	15,643	<0.420	<0.460	<0.430	<0.500	<0.430	0.750	<0.380
Chrysene	1,235	<0.420	<0.460	<0.430	<0.500	<0.430	<0.410	<0.380
Dibenz(a,h)anthracene	2 (Cancer)	<0.420	<0.460	<0.430	<0.500	<0.430	<0.410	<0.380
Di-n-Butylphthalate	DL	<0.420	<0.460	<0.430	<0.500	<0.430	1.500	<0.380
Fluoranthene	3,129	<0.420	<0.460	<0.430	<0.500	<0.430	<0.410	<0.380
Fluorene	3,129	<0.420	<0.460	<0.430	<0.500	<0.430	<0.410	<0.380
Indeno(1,2,3-cd)pyrene	12	<0.420	<0.460	<0.430	<0.500	<0.430	<0.410	<0.380
Napthalene	100 (NC)	<0.420	<0.460	<0.430	<0.500	<0.430	0.940	0.510
Phenanthrene	110 (NC)	<0.420	<0.460	<0.430	<0.500	0.500	1.400	<0.380
Pyrene	2,346	<0.420	<0.460	<0.430	<0.500			

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Northside Drive Landfill
Confirmation Sample Results

Constituent	Cleanup Concentrations (mg/kg)	64	65	66	67	68	69	70
		NL-A23-G-06	NL-SW22-G-8	NL-SW23-G-7	NL-SW24-G-3	NL-SW21-G-5	NL-SW21-G-10	NL-C19(2)-G-06
Arsenic	20 (III-2)	<7.0	[redacted]	<7.6	6.7	[redacted]	<5.6	<6.3
Chromium	234	<7.0	<40	39	22	<31	9	<6.3
Copper	2,902	62	1,800	1,000	350	550	120	37
Cyanide	1,564	<0.40	<0.40	<0.40	<0.40	0.48	<0.40	NA
Lead	400	<7.0	[redacted]	[redacted]	[redacted]	[redacted]	310	<6.3
Mercury	0.5 (III-2)	<0.28	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	<0.25
Zinc	23,464	<140	3,300	4,300	160	1,200	150	<130
Acenaphthene	4,693	<0.470	<0.540	<0.500	<0.380	<0.420	<0.330	NA
Acenaphthylene	130 (NC)	<0.470	<0.540	<0.500	<0.380	<0.420	<0.330	NA
Anthracene	23,464	<0.470	<0.540	<0.500	<0.380	<0.420	<0.330	NA
Benzo(a)anthracene	12	<0.470	1.100	<0.500	<0.380	0.460	<0.330	NA
Benzo(b)fluoranthene	12	<0.470	0.950	<0.500	<0.380	0.440	<0.330	NA
Benzo(k)fluoranthene	125	<0.470	0.830	<0.500	<0.380	<0.420	<0.330	NA
Benzo(g,h,i)perylene	DL	<0.470	[redacted]	<0.500	<0.380	0.500	<0.330	NA
Benzo(a)pyrene	1.6 (NC)	<0.470	1.000	<0.500	<0.380	<0.420	<0.330	NA
Bis(2-ethylhexyl)phthalate	652	<0.470	<0.540	<0.500	<0.380	<0.420	<0.330	NA
Butylbenzylphthalate	15,643	<0.470	<0.540	<0.500	<0.380	0.470	<0.330	NA
Chrysene	1,235	<0.470	1.200	<0.500	<0.380	<0.420	<0.330	NA
Dibenz(a,h)anthracene	2 (Cancer)	<0.470	<0.540	<0.500	<0.380	<0.420	<0.330	NA
Di-n-Butylphthalate	DL	<0.470	<0.540	<0.500	<0.380	0.600	<0.330	NA
Fluoranthene	3,129	<0.470	2.100	<0.500	<0.380	<0.420	<0.330	NA
Fluorene	3,129	<0.470	<0.540	<0.500	<0.380	<0.420	<0.330	NA
Indeno(1,2,3-cd)pyrene	12	<0.470	<0.540	<0.500	<0.380	<0.420	<0.330	NA
Napthalene	100 (NC)	<0.470	<0.540	<0.500	<0.380	<0.420	<0.330	NA
Phenanthrene	110 (NC)	<0.470	<0.540	<0.500	0.400	0.650	<0.330	NA
Pyrene	2,346	<0.470	2.700	<0.500				

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Northside Drive Landfill
Confirmation Sample Results

Constituent	Cleanup Concentrations (mg/kg)	71	72	73	74	75	76	77
		NL-SW19(2)-G-8	NL-SW17-G-4	NL-SW17-G-7	NL-SW18-G-5	NL-SW18-G-10	NL-17/18-G-06	NL-SW22-G-6
Arsenic	20 (III-2)	NA	<6.1	<6.1	<6.1	<6.7	<5.8	<6.0
Chromium	234	NA	<6.1	<6.1	<6.1	8	<5.8	12
Copper	2,902	NA	11	47	19	7.5	7.5	11
Cyanide	1,564	NA	<1.2	<1.0	<1.2	<1.3	<1.2	<1.0
Lead	400	NA	<6.1	52	<6.1	<6.7	<5.8	15
Mercury	0.5 (III-2)	<0.20	<0.24	<0.24	<0.24	<0.25	0.25	0.3
Zinc	23,464	NA	<120	300	<120	<130	150	<120
Acenaphthene	4,693	NA	<0.400	<0.400	<0.410	<0.440	<0.400	<0.330
Acenaphthylene	130 (NC)	NA	<0.400	<0.400	<0.410	<0.440	<0.400	<0.330
Anthracene	23,464	NA	<0.400	<0.400	<0.410	<0.440	<0.400	<0.330
Benzo(a)anthracene	12	NA	<0.400	<0.400	<0.410	<0.440	<0.400	<0.330
Benzo(b)fluoranthene	12	NA	<0.400	<0.400	<0.410	<0.440	<0.400	<0.330
Benzo(k)fluoranthene	125	NA	<0.400	<0.400	<0.410	<0.440	<0.400	<0.330
Benzo(g,h,i)perylene	DL	NA	<0.400	<0.400	<0.410	<0.440	<0.400	<0.330
Benzo(a)pyrene	1.6 (NC)	NA	<0.400	<0.400	<0.410	<0.440	<0.400	<0.330
Bis(2-ethylhexyl)phthalate	652	NA	<0.400	<0.400	<0.410	<0.440	<0.400	<0.330
Butylbenzylphthalate	15,643	NA	<0.400	<0.400	<0.410	<0.440	<0.400	<0.330
Chrysene	1,235	NA	<0.400	<0.400	<0.410	<0.440	<0.400	<0.330
Dibenz(a,h)anthracene	2 (Cancer)	NA	<0.400	<0.400	<0.410	<0.440	<0.400	<0.330
Di-n-Butylphthalate	DL	NA	<0.400	<0.400	<0.410	<0.440	<0.400	<0.330
Fluoranthene	3,129	NA	<0.400	<0.400	<0.410	<0.440	<0.400	<0.330
Fluorene	3,129	NA	<0.400	<0.400	<0.410	<0.440	<0.400	<0.330
Indeno(1,2,3-cd)pyrene	12	NA	<0.400	<0.400	<0.410	<0.440	<0.400	<0.330
Napthalene	100 (NC)	NA	<0.400	<0.400	<0.410	<0.440	<0.400	<0.330
Phenanthrene	110 (NC)	NA	<0.400	<0.400	<0.410	<0.440	<0.400	<0.330
Pyrene	2,346	NA	<0.400	<0.400	<0.410	<0.440	<0.400	<0.330

NL - Northside Drive Landfill
SW - Sidewall
G - Grab
CS - Composite

Northside Drive Landfill
Confirmation Sample Results

Constituent	Cleanup Concentrations (mg/kg)	78	79	80	81	82	83	84
		NL-SW22-G-12	NL-SW23-G-6	NL-SW23-G-12	NL-SW24-G-6	NL-SW24-G-12	NL-SW25-G-5	NL-SW25-G-10
Arsenic	20 (III-2)	<6.3	<6.1	<6.4	[illegible]	[illegible]	<6.5	<7.5
Chromium	234	13	11	<6.4	<70	140	37	[illegible]
Copper	2,902	9.7	38	9.9	1500	250	500	320
Cyanide	1,564	<1.1	<1.1	<1.1	<1.3	<1.5	<1.2	<1.4
Lead	400	<6.3	52	<6.4	[illegible]	[illegible]	[illegible]	[illegible]
Mercury	0.5 (III-2)	<0.25	0.48	<0.26	[illegible]	[illegible]	[illegible]	[illegible]
Zinc	23,464	<130	<120	<130	2600	1200	1300	710
Acenaphthene	4,693	<0.330	<0.330	<0.330	<0.430	<0.630	<0.400	<0.490
Acenaphthylene	130 (NC)	<0.330	<0.330	<0.330	<0.430	<0.630	<0.400	<0.490
Anthracene	23,464	<0.330	<0.330	1.000	<0.430	<0.630	<0.400	0.720
Benzo(a)anthracene	12	<0.330	<0.330	2.300	<0.430	<0.630	<0.400	0.690
Benzo(b)fluoranthene	12	<0.330	<0.330	1.100	<0.430	<0.630	<0.400	0.640
Benzo(k)fluoranthene	125	<0.330	<0.330	1.400	<0.430	<0.630	<0.400	[illegible]
Benzo(g,h,i)perylene	DL	<0.330	<0.330	[illegible]	<0.430	<0.630	<0.400	0.840
Benzo(a)pyrene	1.6 (NC)	<0.330	<0.330	[illegible]	<0.430	<0.630	<0.400	<0.490
Bis(2-ethylhexyl)phthalate	652	<0.330	<0.330	<0.330	<0.430	<0.630	<0.400	<0.490
Butylbenzylphthalate	15,643	<0.330	<0.330	<0.330	<0.430	<0.630	<0.400	0.500
Chrysene	1,235	<0.330	<0.330	2.000	<0.430	<0.630	<0.400	<0.490
Dibenz(a,h)anthracene	2 (Cancer)	<0.330	<0.330	0.400	<0.430	<0.630	<0.400	<0.490
Di-n-Butylphthalate	DL	<0.330	<0.330	<0.330	<0.430	<0.630	<0.400	1.100
Fluoranthene	3,129	<0.330	<0.330	5.200	<0.430	<0.630	<0.400	<0.490
Fluorene	3,129	<0.330	<0.330	<0.330	<0.430	<0.630	<0.400	<0.490
Indeno(1,2,3-cd)pyrene	12	<0.330	<0.330	0.640	<0.430	<0.630	<0.400	0.730
Napthalene	100 (NC)	<0.330	<0.330	<0.330	<0.430	<0.630	<0.400	<0.490
Phenanthrene	110 (NC)	<0.330	<0.330	3.600	<0.430	<0.630	<0.400	<0.490
Pyrene	2,346	<0.330	<0.330	3.800	<0.430	<0.630	<0.400	<0.490

NL - Northside Drive Landfill
SW - Sidewall
G - Grab
CS - Composite

TABLE 4-3

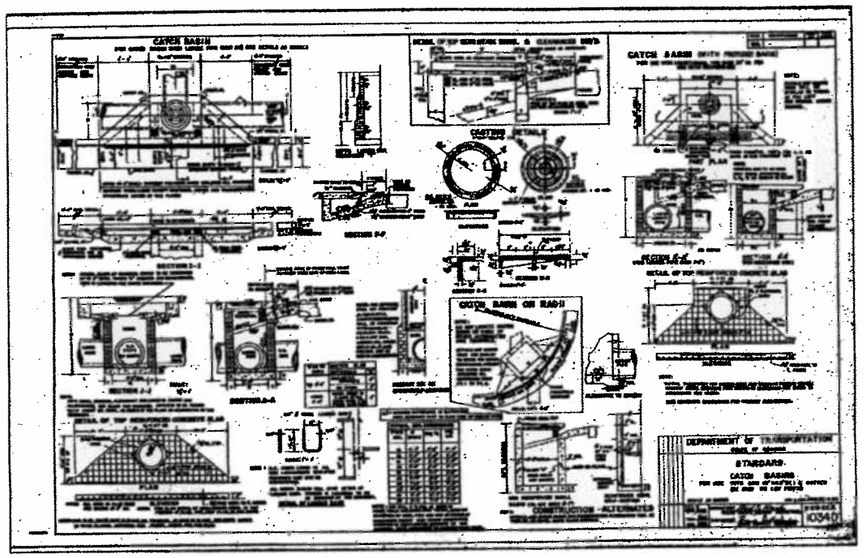
Sample Collection Data

Sample ID	Date and Time of Collection		Analyses
NL-A13-CS-06	06/06/02	15:00	SVOC, Metals, CN-
NL-A14-CS-06	06/06/02	17:00	SVOC, Metals, CN-
NL-A16-G-06	06/07/02	13:50	SVOC, Metals, CN-
NL-SW25-G-12	06/14/02	15:10	SVOC, Metals, CN-
NL-SW24-G-12	06/14/02	15:15	SVOC, Metals, CN-
NL-SW23-G-12	06/14/02	15:20	SVOC, Metals, CN-
NL-SW25-G-6	06/14/02	15:25	SVOC, Metals, CN-
NL-SW24-G-6	06/17/02	14:20	SVOC, Metals, CN-
NL-SW23-G-6	06/17/02	14:30	SVOC, Metals, CN-
NL-SW2-G-8	07/02/02	14:10	SVOC, Metals, CN-
NL-SW2-G-4	07/02/02	14:15	SVOC, Metals, CN-
NL-SW3-G-5	07/02/02	15:20	SVOC, Metals, CN-
NL-SW3-G-10	07/02/02	15:10	SVOC, Metals, CN-
NL-SW4-G-16	07/03/02	15:40	SVOC, Metals, CN-
NL-SW5-G-10	07/09/02	15:50	SVOC, Metals, CN-
NL-SW6-G-9.5	07/09/02	16:00	SVOC, Metals, CN-
NL-SW7-G-13	07/09/02	16:10	SVOC, Metals, CN-
NL-SW7-G-6	07/09/02	16:15	SVOC, Metals, CN-
NL-SW15-G-6	07/10/02	13:50	SVOC, Metals, CN-
NL-SW15-G-13	07/10/02	14:00	SVOC, Metals, CN-
NL-DUP1-G	07/10/02	14:05	SVOC, Metals, CN-
NL-SW8-G-10.5	07/12/02	11:45	SVOC, Metals, CN-
NL-SW8-G-21	07/12/02	11:00	SVOC, Metals, CN-
NL-SW9-G-12.5	07/12/02	11:35	SVOC, Metals, CN-
NL-SW9-G-25	07/12/02	11:10	SVOC, Metals, CN-
NL-SW10-G-12	07/12/02	11:30	SVOC, Metals, CN-
NL-SW10-G-24	07/12/02	11:20	SVOC, Metals, CN-
NL-SW11-G-11	07/12/02	17:25	SVOC, Metals, CN-
NL-SW11-G-23	07/12/02	17:15	SVOC, Metals, CN-
NL-SW12-G-9	07/12/02	17:10	SVOC, Metals, CN-
NL-SW12-G-18	07/12/02	17:05	SVOC, Metals, CN-
NL-A12-G-06	07/12/02	17:40	SVOC, Metals, CN-
NL-B12-G-06	07/12/02	17:50	SVOC, Metals, CN-
NL-SW7(2)-G-6	07/15/02	15:35	SVOC, Metals, CN-
NL-SW13-G-3	07/18/02	14:15	SVOC, Metals, CN-
NL-SW13-G-7	07/18/02	14:25	SVOC, Metals, CN-
NL-SW14-G-3	07/18/02	14:30	SVOC, Metals, CN-
NL-SW14-G-7	07/18/02	14:35	SVOC, Metals, CN-
NL-B13-G-06	07/18/02	14:40	SVOC, Metals, CN-

NL-B15-G-06	07/19/02	13:35	SVOC, Metals, CN-
NL-B16-G-06	07/19/02	13:50	SVOC, Metals, CN-
NL-C15-G-06	07/19/02	13:40	SVOC, Metals, CN-
NL-C16-G-06	07/19/02	13:45	SVOC, Metals, CN-
NL-DUP2-G-06	07/19/02	13:55	SVOC, Metals, CN-
NL-SW15(2)-G-6	07/25/02	09:55	Hg
NL-SW16-G-6	07/31/02	14:30	SVOC, Metals, CN-
NL-SW16-G-12	07/31/02	14:35	SVOC, Metals, CN-
NL-SW17-G-4	08/02/02	16:00	SVOC, Metals, CN-
NL-SW17-G-10	08/02/02	16:05	SVOC, Metals, CN-
NL-C18-G-06	08/05/02	13:40	SVOC, Metals, CN-
NL-C17-G-06	08/05/02	13:50	SVOC, Metals, CN-
NL-SW18-G-4.5	08/05/02	13:55	SVOC, Metals, CN-
NL-SW18-G-9	08/05/02	14:00	SVOC, Metals, CN-
NL-B17-G-06	08/05/02	14:20	SVOC, Metals, CN-
NL-C19-G-06	08/06/02	14:20	SVOC, Metals, CN-
NL-SW19-G-3	08/06/02	14:25	SVOC, Metals, CN-
NL-SW19-G-6	08/06/02	14:30	SVOC, Metals, CN-
NL-SW20-G-4	08/07/02	14:45	SVOC, Metals, CN-
NL-SW20-G-8	08/07/02	14:55	SVOC, Metals, CN-
NL-B20-G-06	08/07/02	15:00	SVOC, Metals, CN-
NL-A21-G-06	08/08/02	13:35	SVOC, Metals, CN-
NL-B21-G-06	08/08/02	13:40	SVOC, Metals, CN-
NL-DUP3-G-06	08/08/02	13:50	SVOC, Metals, CN-
NL-SW22-G-16	08/13/02	14:35	SVOC, Metals, CN-
NL-SW23-G-14	08/13/02	14:45	SVOC, Metals, CN-
NL-SW24-G-7	08/13/02	14:50	SVOC, Metals, CN-
NL-A23-G-06	08/13/02	14:55	SVOC, Metals, CN-
NL-SW22-G-8	08/13/02	15:05	SVOC, Metals, CN-
NL-SW23-G-7	08/13/02	15:10	SVOC, Metals, CN-
NL-SW24-G-3	08/13/02	15:15	SVOC, Metals, CN-
NL-SW21-G-5	08/13/02	15:25	SVOC, Metals, CN-
NL-SW21-G-10	08/13/02	15:30	SVOC, Metals, CN-
NL-C19(2)-G-06[†]	08/13/02	15:35	SVOC, Metals, CN-
NL-SW19(2)-G-8	08/15/02	16:00	Hg
NL-SW17-G-4	12/06/02	15:40	SVOC, Metals, CN-
NL-SW17-G-7	12/06/02	14:45	SVOC, Metals, CN-
NL-SW18-G-5	12/06/02	15:55	SVOC, Metals, CN-
NL-SW18-G-10	12/06/02	16:00	SVOC, Metals, CN-
NL-17/18-G-06	12/06/02	15:50	SVOC, Metals, CN-
NL-SW22-G-6	12/16/02	11:55	SVOC, Metals, CN-
NL-SW22-G-12	12/16/02	11:50	SVOC, Metals, CN-

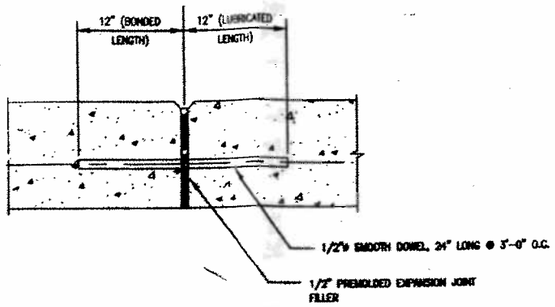
NL-SW23-G-6	12/16/02	14:25	SVOC, Metals, CN-
NL-SW23-G-12	12/16/02	14:30	SVOC, Metals, CN-
NL-SW24-G-6	12/19/02	15:15	SVOC, Metals, CN-
NL-SW24-G-12	12/19/02	14:40	SVOC, Metals, CN-
NL-SW25-G-5	12/19/02	15:05	SVOC, Metals, CN-
NL-SW25-G-10	12/19/02	14:50	SVOC, Metals, CN-

Notes: **Bold** indicates sample constitutents above clean up criteria.
(2) Indicates that this sample was taken as a 2nd Round sample after re-excavation.
Italicized sample IDs indicate QA/QC (duplicate) sample.
+Redundant sample inadvertently collected.



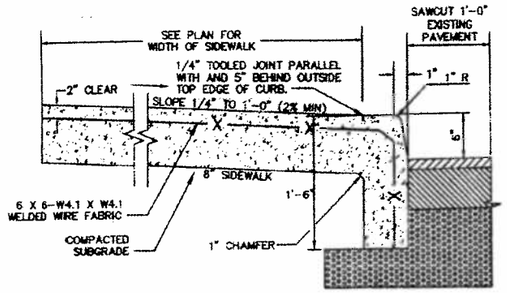
GDOT STANDARD CATCHBASIN (W/WING WALLS)

NOT TO SCALE



TYPICAL EXPANSION JOINT

NOT TO SCALE



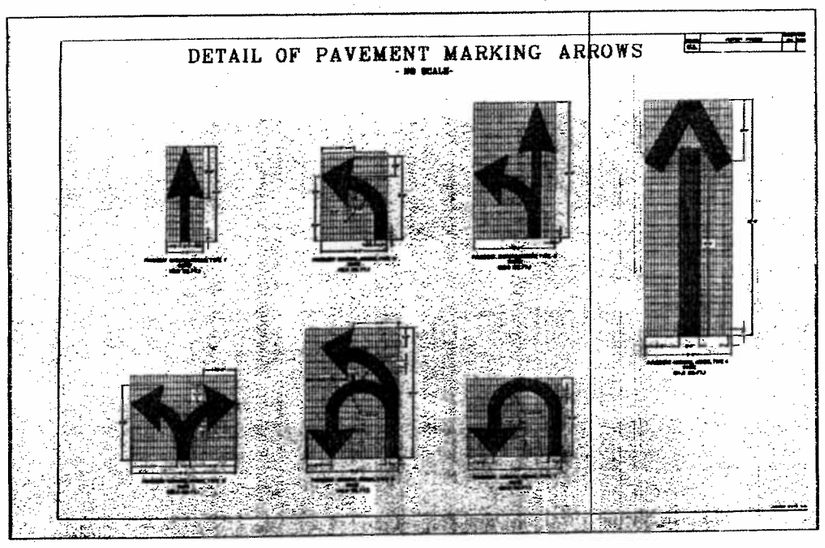
NOTE: PROVIDE SAWCUT CONTROL JOINTS AT MAX 18 Ft ON CENTER. ⅛" X 1 ½" CJ TO BE MADE WITHIN 12 HOURS OF CONCRETE POUR.

8" MONOLITHIC SIDEWALK AND CURB

NOT TO SCALE

NOTES:

1. SIDEWALK SHALL BE SCRIBED WITH TRAVERSE CONTROL JOINTS IN SQUARES EQUAL TO SIDEWALK WIDTH, BUT NOT TO EXCEED 10 FEET. ⅛" X 1-½" CONTROL JOINT TO BE MADE WITHIN 12 HOURS OF CONCRETE POUR.
2. CONCRETE SHALL BE TYPE "A" 3,000 P.S.I. MIN STRENGTH.
3. EXPANSION JOINTS SHALL EXTEND ACROSS THE FULL WIDTH OF THE SIDEWALK. CONTROL JOINTS SHALL BE LOCATED ON EACH SIDE OF A DRIVEWAY AND NOT MORE THAN 100 FEET APART.
4. PREFORMED BITUMINOUS MATERIAL SHALL BE PLACED BETWEEN ALL FIXED OBJECTS AND THE NEW CONCRETE SIDEWALK.
5. ALL CONCRETE WORK SHALL BE PER CITY OF ATLANTA STANDARD SPECIFICATIONS FOR CONSTRUCTION.
6. ¼-INCH TOOLED JOINT BETWEEN CURB AND SIDEWALK.



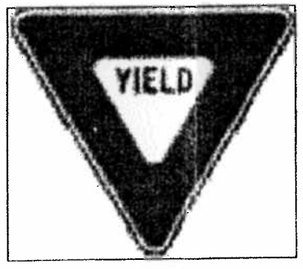
PAVEMENT MARKINGS DETAIL

NOT TO SCALE

24" x 24"

R8-3a SIGN (NO PARKING)

NOT TO SCALE



36" x 36" x 36"

R8-3a SIGN (NO PARKING)

NOT TO SCALE

18" x 24"

KEEP RIGHT SIGN

NOT TO SCALE

18" x 24"

RIGHT TURN ONLY SIGN

NOT TO SCALE

NOTE: ALL TRAFFIC SIGNS MUST MEET MUTCD CODE.

Revisions:

No.	Date	

ALTAMIRA
DESIGN AND COMMON SENSE, INC

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Seal

GEORGIA REGISTERED PROFESSIONAL ENGINEER 5/8/2006 JOHN K MILLER

GEORGIA WORLD CONGRESS CENTER

JONES AVENUE PARKING, PHASE II

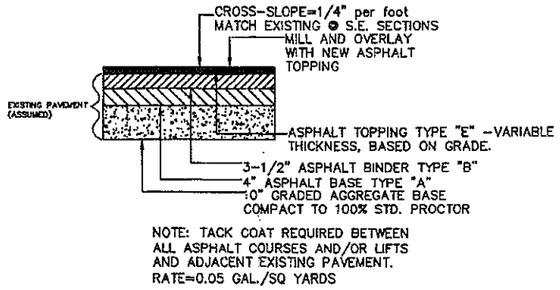
Project No.:	4270
Designed By:	JKM
Drawn By:	JKM
Checked By:	JKM
Issue Date:	4/27/2006
Drawing Scale:	AS SHOWN

Drawing Title:

CIVIL DETAILS

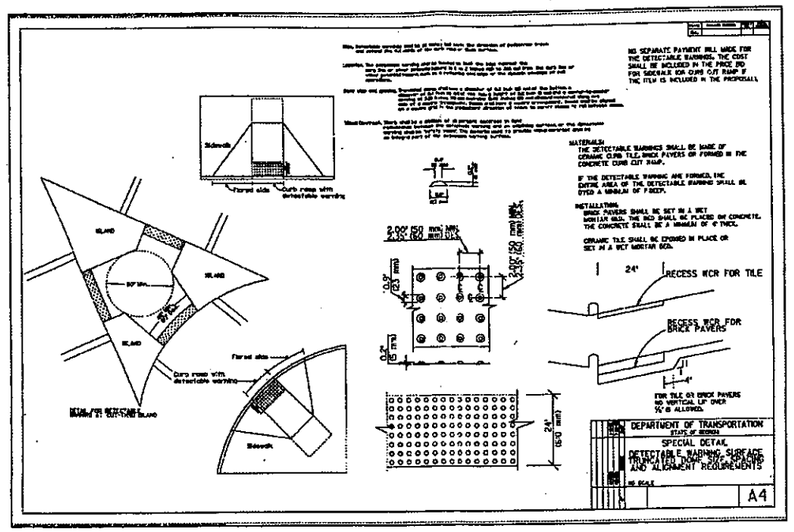
Drawing No.

CM1.2



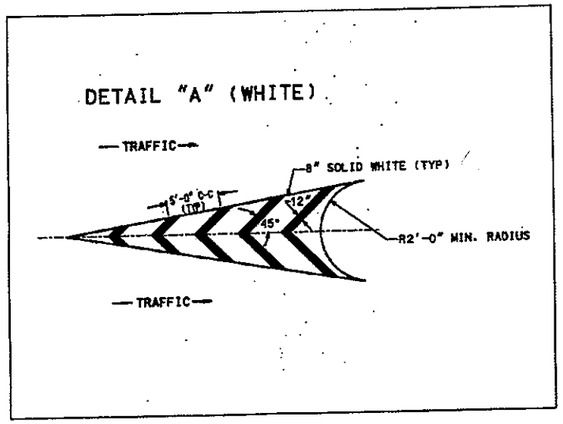
PAVEMENT SECTION (FOR OVERLAY)

NOT TO SCALE



DETECTABLE WARNING SURFACE

NOT TO SCALE

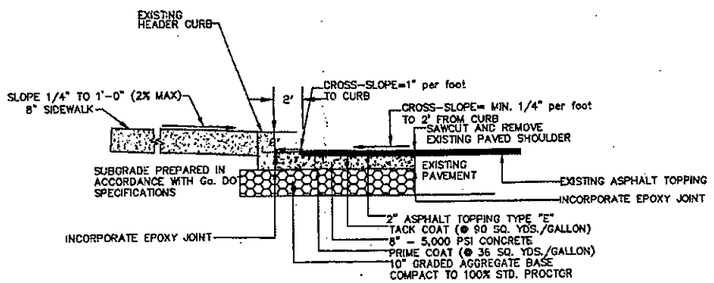


GORE DETAIL

NOT TO SCALE

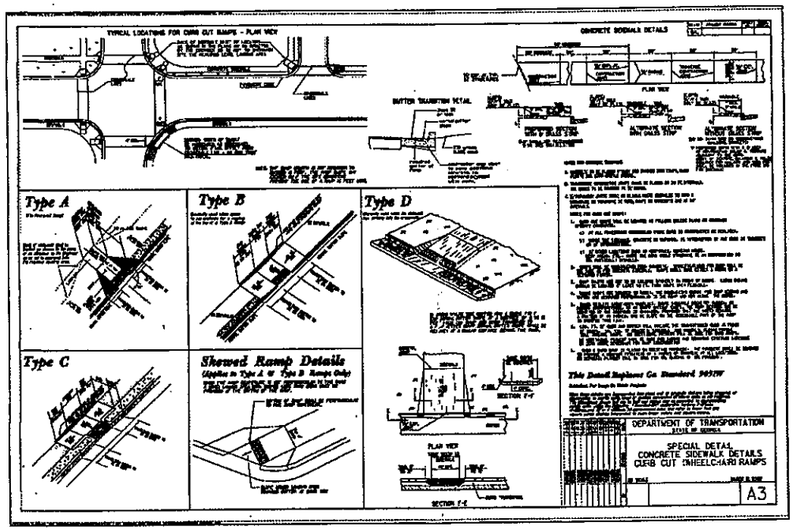
NOTES:

1. CONCRETE SHALL BE 5,000 P.S.I. MIN STRENGTH.
2. CONCRETE SLAB SHALL BE INCORPORATED AS A SINGLE MONOLITHIC POUR.
3. EPOXY JOINTS SHALL BE APPLIED AT EXISTING PAVEMENT/PROPOSED PAVEMENT AND CURB/ PROPOSED PAVEMENT INTERFACES.



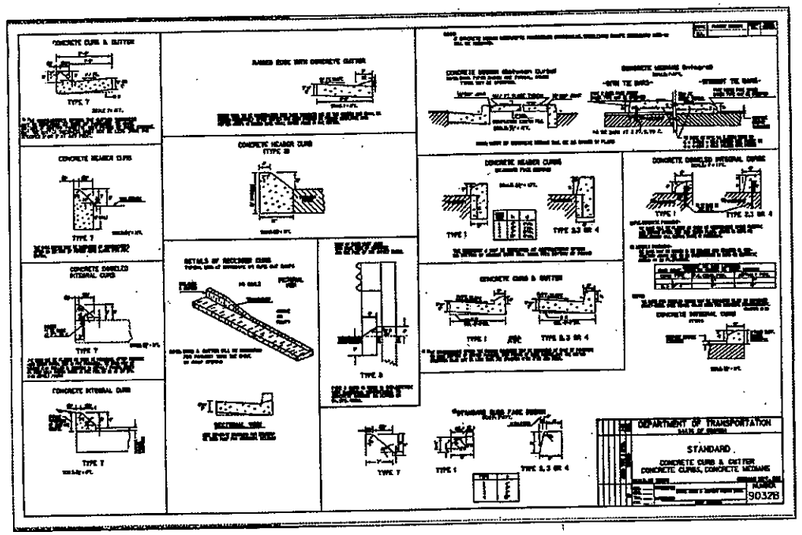
PAVEMENT SECTION W/8" - 5,000 PSI CONCRETE

NOT TO SCALE



GDOT SPECIAL DETAIL WHEELCHAIR RAMP

NOT TO SCALE



GDOT HEADER CURB DETAIL

NOT TO SCALE

Revisions:

No.	Date	

ALTAMIRA
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Seal

REGISTERED PROFESSIONAL ENGINEER JOHN K. MAUREY 5/16/2005

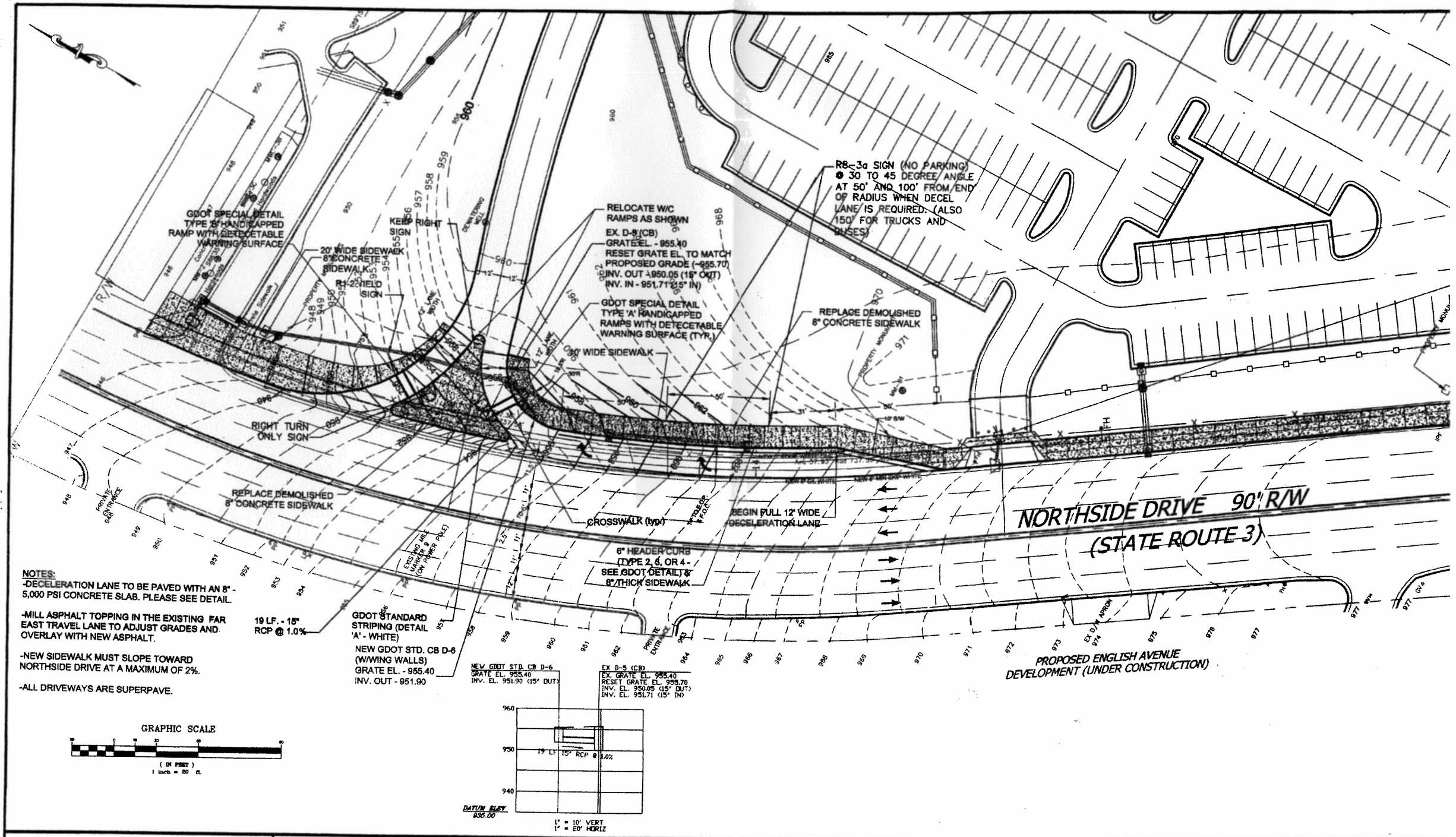
GEORGIA WORLD CONGRESS CENTER

JONES AVENUE PARKING, PHASE II

Project No.:	4276
Designed By:	JKM
Drawn By:	JKM
Checked By:	JKM
Issue Date:	4/27/2005
Drawing Scale:	AS SHOWN

Drawing Title: **CIVIL DETAILS**

Drawing No. **CM1.1**



NOTES:

-DECELERATION LANE TO BE PAVED WITH AN 8" - 5,000 PSI CONCRETE SLAB. PLEASE SEE DETAIL.

-MILL ASPHALT TOPPING IN THE EXISTING FAR EAST TRAVEL LANE TO ADJUST GRADES AND OVERLAY WITH NEW ASPHALT.

-NEW SIDEWALK MUST SLOPE TOWARD NORTHSIDE DRIVE AT A MAXIMUM OF 2%.

-ALL DRIVEWAYS ARE SUPERPAVE.

GRAPHIC SCALE

(IN FEET)
1 inch = 20 ft.

Revisions:

No.	Date	

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Seal

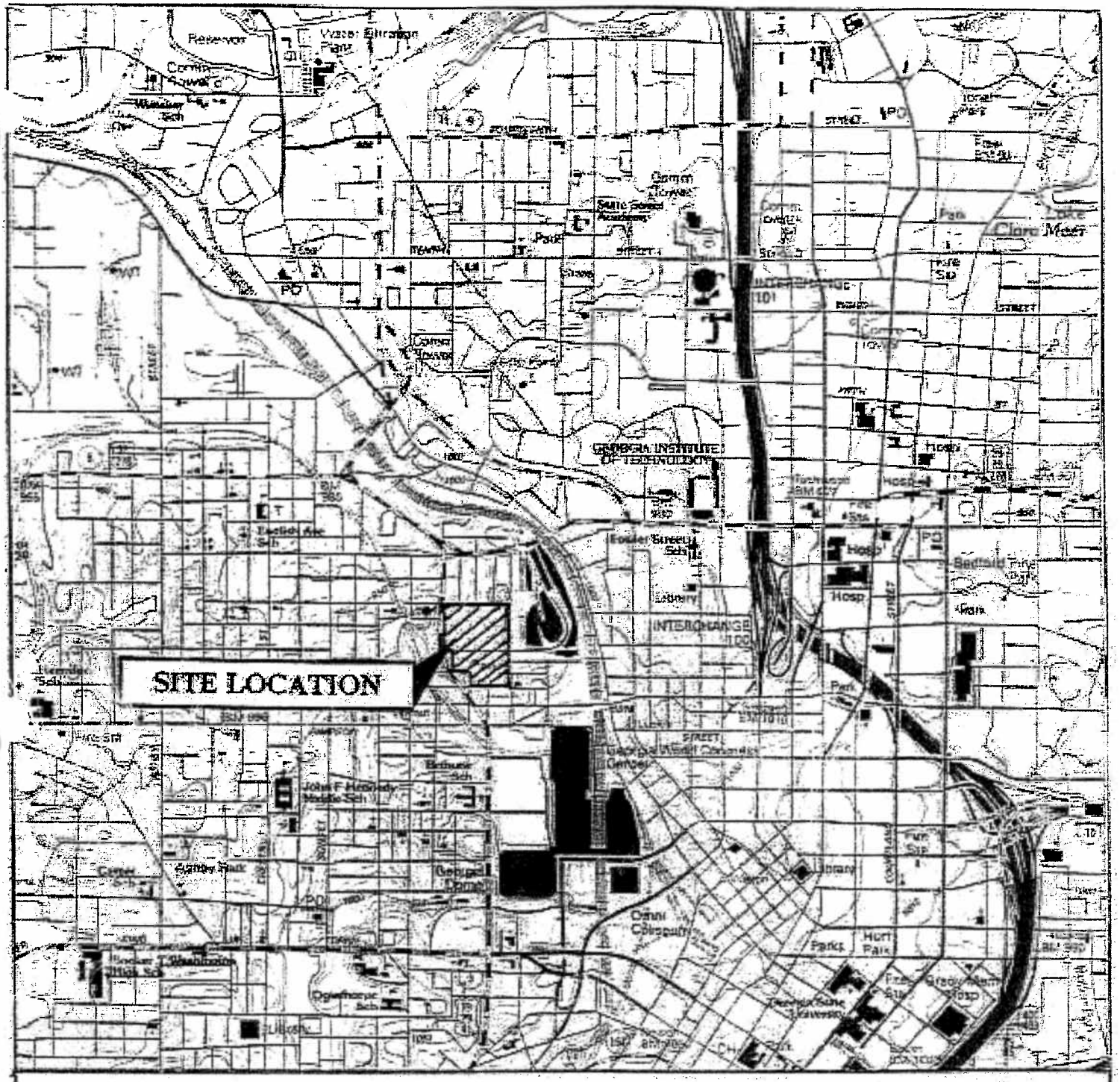
GEORGIA WORLD CONGRESS CENTER

JONES AVENUE PARKING, PHASE II

Project No.:	6270
Designed By:	JKM
Drawn By:	JKM
Checked By:	JKM
Issue Date:	4/27/2006
Drawing Scale:	AS SHOWN

Drawing Title: **CONSTRUCTION PLAN**

Drawing No. **C1.1**

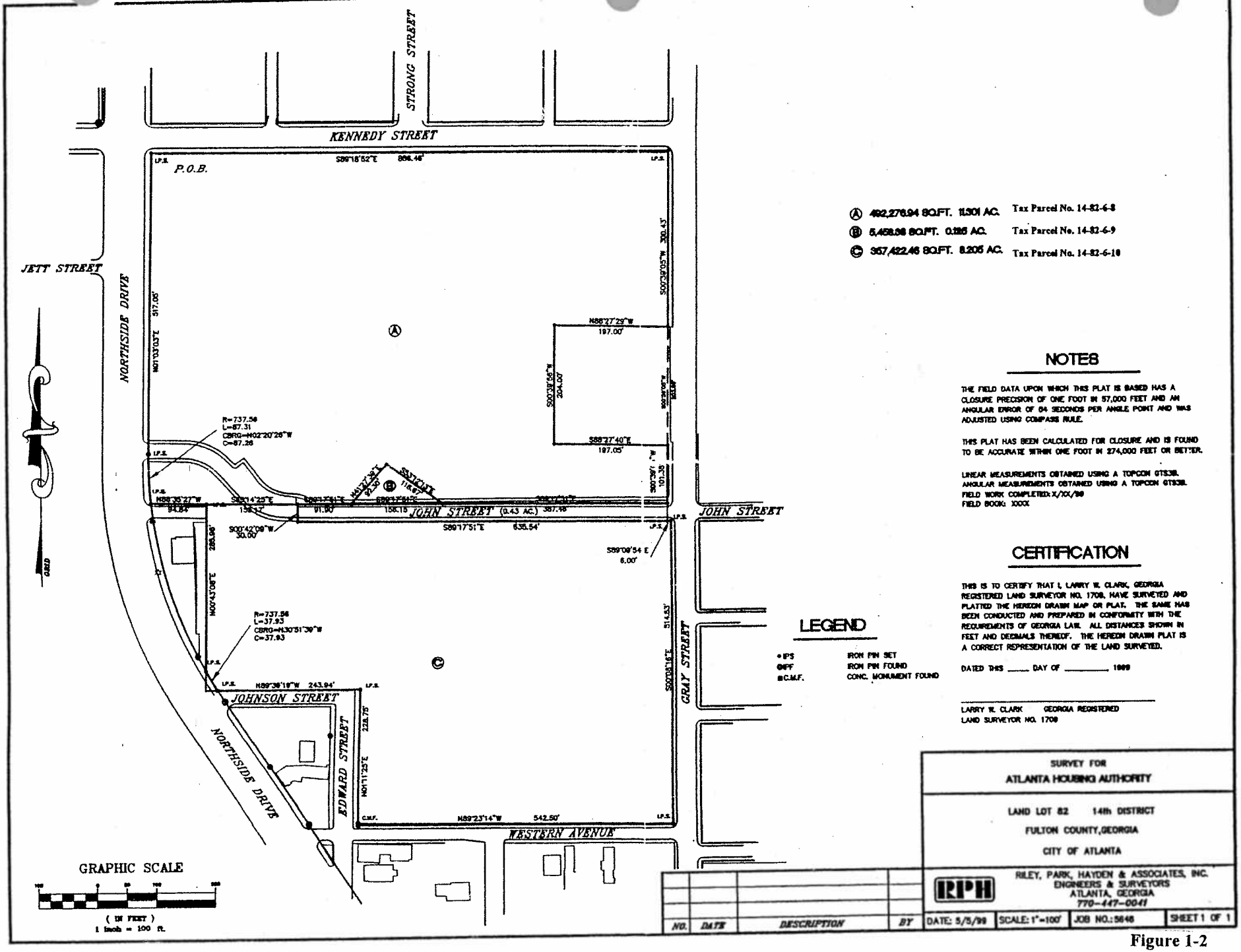


NORTHSIDE DRIVE LANDFILL
ATLANTA, FULTON COUNTY, GEORGIA

FIGURE 1-1

GENERAL SITE LOCATION

Tetra Tech EM Inc.



Ⓐ 492,276.94 SQ.FT. 11.301 AC. Tax Parcel No. 14-82-6-8

Ⓑ 5,458.98 SQ.FT. 0.125 AC. Tax Parcel No. 14-82-6-9

Ⓒ 357,422.46 SQ.FT. 8.205 AC. Tax Parcel No. 14-82-6-10

NOTES

THE FIELD DATA UPON WHICH THIS PLAT IS BASED HAS A CLOSURE PRECISION OF ONE FOOT IN 57,000 FEET AND AN ANGULAR ERROR OF 04 SECONDS PER ANGLE POINT AND WAS ADJUSTED USING COMPASS RULE.

THIS PLAT HAS BEEN CALCULATED FOR CLOSURE AND IS FOUND TO BE ACCURATE WITHIN ONE FOOT IN 274,000 FEET OR BETTER.

LINEAR MEASUREMENTS OBTAINED USING A TOPCON GTS3B.
ANGULAR MEASUREMENTS OBTAINED USING A TOPCON GTS3B.
FIELD WORK COMPLETED: X/XX/99
FIELD BOOK: XXXX

CERTIFICATION

THIS IS TO CERTIFY THAT I, LARRY W. CLARK, GEORGIA REGISTERED LAND SURVEYOR NO. 1709, HAVE SURVEYED AND PLATTED THE HEREON DRAWN MAP OR PLAT. THE SAME HAS BEEN CONDUCTED AND PREPARED IN CONFORMITY WITH THE REQUIREMENTS OF GEORGIA LAW. ALL DISTANCES SHOWN IN FEET AND DECIMALS THEREOF. THE HEREON DRAWN PLAT IS A CORRECT REPRESENTATION OF THE LAND SURVEYED.

DATED THIS _____ DAY OF _____, 1999

_____
LARRY W. CLARK GEORGIA REGISTERED
LAND SURVEYOR NO. 1709

LEGEND

● IPS	IRON PIN SET
⊕ IPF	IRON PIN FOUND
■ C.M.F.	CONC. MONUMENT FOUND

SURVEY FOR
ATLANTA HOUSING AUTHORITY

LAND LOT 82 14th DISTRICT
FULTON COUNTY, GEORGIA
CITY OF ATLANTA

RPH
RILEY, PARK, HAYDEN & ASSOCIATES, INC.
ENGINEERS & SURVEYORS
ATLANTA, GEORGIA
770-447-0041

NO.	DATE	DESCRIPTION	BY

DATE: 5/5/99 | SCALE: 1"=100' | JOB NO.: 5648 | SHEET 1 OF 1

Figure 1-2

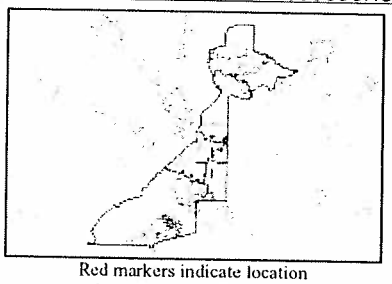
FIGURE 1-3

Report for Tax Digest 2005

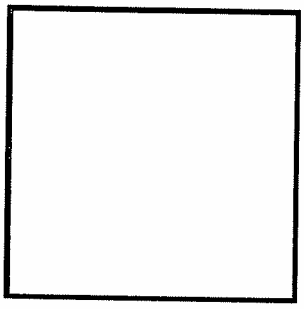
Tax Digest 2005

Tax Digest	2005
Parcel Id Number	14 -0082-0006-012-1
Property Address	JOHN ST
Owner Name	STATE OF GEORGIA
Mailing Address	270 WASHINGTON ST SW ATLANTA GA 30334
Tax District	05Z (Atlanta TAD)
Market Value	$ 0
Assessment	$ 0
City of Atlanta Tax Bill	$ .00
Fulton County Tax Bill	$ .00
City of Atlanta Taxes Due	$ .00
Fulton County Taxes Due	$ .00
City of Atlanta Exemption Code	
Fulton County Exemption Code	
City of Atlanta Exempt Amount	$ .00
Fulton County Exempt Amount	$ .00
Land Assessment	$ 0
Improvement Assessment	$ 0

More info from www.fultonassessor.org



Red markers indicate location of property in Fulton County



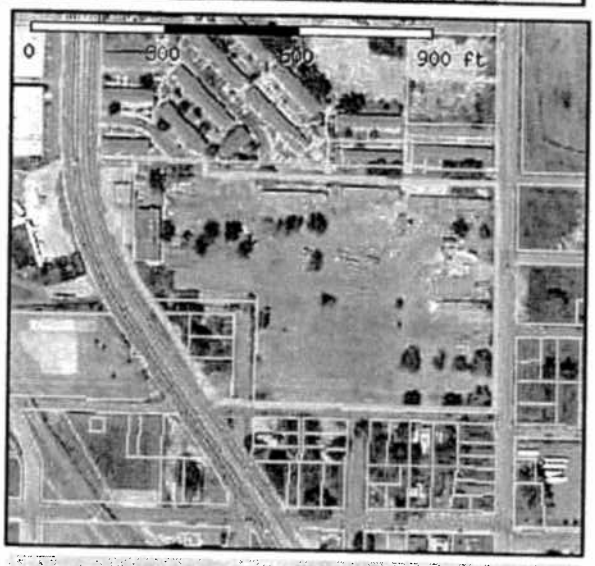


Image not available

Information provided by the
Fulton County Board of Assessors

FIGURE 1-4

SURVEY NOTES

EQUIPMENT USED:
A TOPCON 223 TOTAL STATION WAS USED TO OBTAIN ANGULAR MEASUREMENTS AND DISTANCE MEASUREMENTS.

CLOSURE STATEMENT:
THIS PLAT HAS BEEN CALCULATED FOR CLOSURE AND IS ACCURATE WITHIN ONE FOOT IN 851,620 FEET.

THE FIELD DATA UPON WHICH THIS PLAT IS BASED HAD A CLOSURE OF ONE FOOT IN 151,857 FEET AND AN ANGULAR ERROR OF 1" PER ANGLE POINT AND WAS ADJUSTED USING THE COMPASS RULE.

THE BEARINGS SHOWN ON THIS SURVEY ARE COMPUTED ANGLES BASED ON A GRID BEARING (GEORGIA WEST ZONE).

INFORMATION REGARDING THE REPUTED PRESENCE, SIZE, CHARACTER, AND LOCATION OF EXISTING UNDERGROUND UTILITIES AND STRUCTURES IS SHOWN HEREON. THERE IS NO CERTAINTY OF THE ACCURACY OF THIS INFORMATION AND IT SHALL BE CONSIDERED IN THAT LIGHT BY THOSE USING THIS DRAWING. THE LOCATION AND ARRANGEMENT OF UNDERGROUND UTILITIES AND STRUCTURES SHOWN HEREON MAY BE INACCURATE AND UTILITIES AND STRUCTURES NOT SHOWN MAY BE ENCOUNTERED. THE OWNER, HIS EMPLOYEES, HIS CONSULTANTS, HIS CONTRACTORS, AND/OR HIS AGENTS SHALL HEREBY DISTINCTLY UNDERSTAND THAT THE SURVEYOR IS NOT RESPONSIBLE FOR THE CORRECTNESS OR SUFFICIENCY OF THIS INFORMATION SHOWN HEREON AS TO SUCH UNDERGROUND INFORMATION.

THIS PLAT WAS PREPARED FOR THE EXCLUSIVE USE OF THE PERSON, PERSONS OR ENTITY NAMED HEREON. THIS PLAT DOES NOT EXTEND TO ANY UNNAMED PERSON, PERSONS OR ENTITY WITHOUT THE EXPRESS CERTIFICATION BY THE SURVEYOR NAMING SAID PERSON, PERSONS OR ENTITY.

TERRAMARK LAND SURVEYING, INC. DOES NOT WARRANT THE EXISTENCE OR NON-EXISTENCE OF ANY WETLANDS OR HAZARDOUS WASTE IN THE SURVEY AREA.

FIELD WORK FOR THIS PROPERTY WAS COMPLETED ON JANUARY 15, 2004.

TITLE NOTES

ACCORDING TO THE "FIRM" (FLOOD INSURANCE RATE MAP) OF FULTON COUNTY, PANEL NUMBER 13121C0243 E, DATED JUNE 22, 1998. NO PORTION OF THIS PROPERTY LIES WITHIN A SPECIAL FLOOD HAZARD AREA.

THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A TITLE REPORT, WHICH COULD REVEAL ENCUMBRANCE NOT SHOWN ON THIS SURVEY.

SUBJECT PROPERTY HAS ACCESS TO PREVIOUSLY DEDICATED RIGHT OF WAY OF KENNEDY STREET, NORTHSIDE DRIVE, WESTERN AVENUE, JOHN STREET, AND GRAY STREET.

LEGEND

—X— FENCE	TRANSFORMER BOX (TX)
STORM SEWER	FLAG POLE (FP)
—SS— SANITARY SEWER	CALCULATED POINT
—FM— FORCE MAIN	FIRE HYDRANT (FH)
—W— WATER LINE	WATER VALVE (WV)
—G— GAS LINE	WATER METER (WM)
—P— UNDERGROUND POWER LINE	LIGHT POLE (LP)
OVERHEAD POWER LINE	GAS METER (GM)
—T— TELEPHONE LINE	GAS VALVE (GV)
—FO— FIBER OPTIC	HEAD WALL (HW)
—TV— CABLE TELEVISION	CURB AND GUTTER (C&G)
100 TOPOGRAPHIC CONTOUR	x 123.4 SPOT ELEVATION
PROPERTY LINE	ELECTRIC METER (EM)
CATCH BASIN (DRCB)	POWER POLE (PP)
CATCH BASIN (SWCB)	SIGN
DROP INLET (DI)	BM BENCHMARK
JUNCTION BOX (JB)	CLEANOUT (CO)
SS MANHOLE (MH)	MONITORING WELL

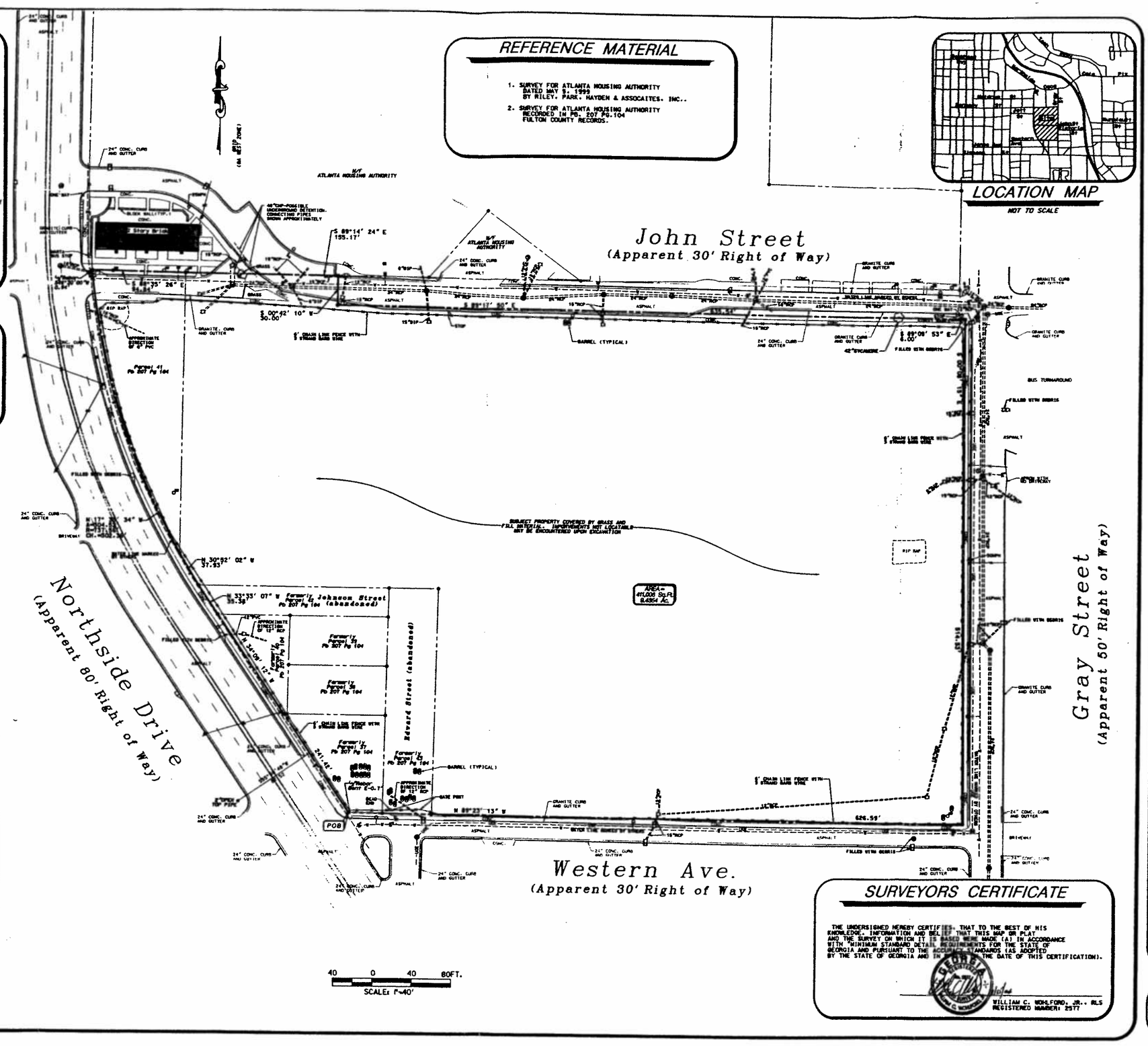
LEGAL DESCRIPTION

All that tract or parcel of land lying and being in Land Lot 82 of the 14th District, Fulton County, Georgia, being more particularly described as follows:

BEGINNING at the intersection of the easterly right of way of Northside Drive (apparent 80' right-of-way) and the northerly right of way of Western Avenue (apparent 30' right-of-way); thence along the easterly right of way of Northside Drive the following courses and distances: North 34° 08' 12" West, 241.42 feet to a point; thence North 31° 33' 07" West, 358.38 feet to a point; thence North 30° 52' 02" West, 37.93 feet to a point; thence along a curve to the right having an arc distance of 304.52 feet with a radius of 737.56 feet being subtended by an chord with a bearing of North 17° 35' 38" West with a chord distance of 302.38 feet; thence leaving said right of way and continuing South 89° 35' 26" East, 84.84 feet along the abandoned northerly right of way of John Street (formerly having a 30' right of way); thence continuing along said abandoned right of way South 89° 14' 24" East, 195.17 feet to a point at the intersection of the abandoned northerly right of way of John Street with the existing northerly right of way of John Street (having an apparent 30' right of way); thence leaving the said right of way South 00° 42' 10" West, 30.00 feet to a point on the southerly right of way of said John Streets; thence continuing along the said right of way the following: South 89° 17' 50" East, 635.54 feet to a point; thence South 89° 09' 53" East, 6.00 feet to a point at the intersection of the easterly right of way of John Street with the westerly right of way of Gray Street (having an apparent 50' right of way); thence continuing along the westerly right of way of Gray Street South 00° 08' 15" East, 514.53 feet to a point at the intersection of the westerly right of way of Gray Street with the northerly right of way of Western Avenue (having a 30' right of way); thence continuing along the said right of way North 89° 23' 13" West, 626.59 feet to a point at the intersection of the northerly right of way of Western Avenue with the easterly right of way of Northside Drive (having an apparent 80' right of way) and the point of BEGINNING.
Said parcel contains 9.4354 acres more or less and is subject to all right of ways and easements both recorded and unrecorded.
Said parcel is the same as that shown on a survey by William C. Markford, RLS No. 2577, dated January 19, 2004 and is thus incorporated as a part of this description.

REFERENCE MATERIAL

1. SURVEY FOR ATLANTA HOUSING AUTHORITY DATED MAY 9, 1999 BY RILEY, PARK, HAYDEN & ASSOCAITES, INC..
2. SURVEY FOR ATLANTA HOUSING AUTHORITY RECORDED IN PB. 207 PG.104 FULTON COUNTY RECORDS.



40 0 40 80FT.
SCALE: 1"=40'

LOCATION MAP

NOT TO SCALE

SURVEYORS CERTIFICATE

THE UNDERSIGNED HEREBY CERTIFIES THAT TO THE BEST OF HIS KNOWLEDGE, INFORMATION AND BELIEF THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE (A) IN ACCORDANCE WITH "MINIMUM STANDARD DETAIL REQUIREMENTS FOR THE STATE OF GEORGIA AND PURSUANT TO THE ACCURACY STANDARDS (AS ADOPTED BY THE STATE OF GEORGIA AND IN EFFECT ON THE DATE OF THIS CERTIFICATION).

GEORGIA REGISTERED LAND SURVEYOR

WILLIAM C. MARKFORD, JR., RLS
REGISTERED NUMBER# 2577

TerraMark, Inc.
1600 C SUGARLOAF PARKWAY, INTERNATIONAL BLVD
KENNESAW, GEORGIA 30152
Phone No. (770) 421-1822
Fax. No (770) 421-0452

TerraMark Professional Land Surveying

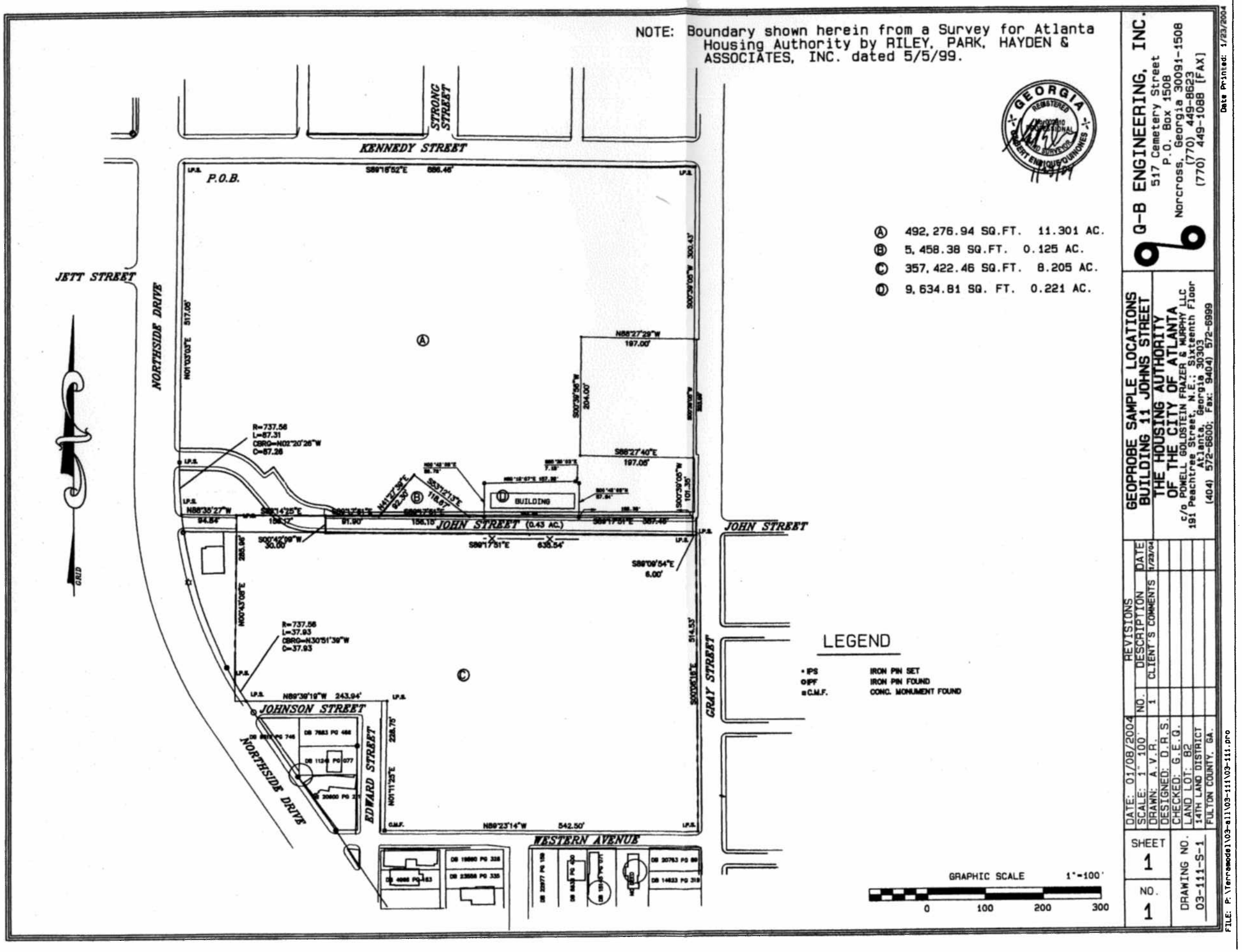
Project No.	2003-184	No	Revision	Date
Survey Date	1/5	#1	ATTORNEY COMMENTS	01/21/04
Drawn By	SEB	#2		
Approved By	WCM	#3		
		#4		
Date	01/19/04	#5		
		#6		
Scale	1"=40'	#7		

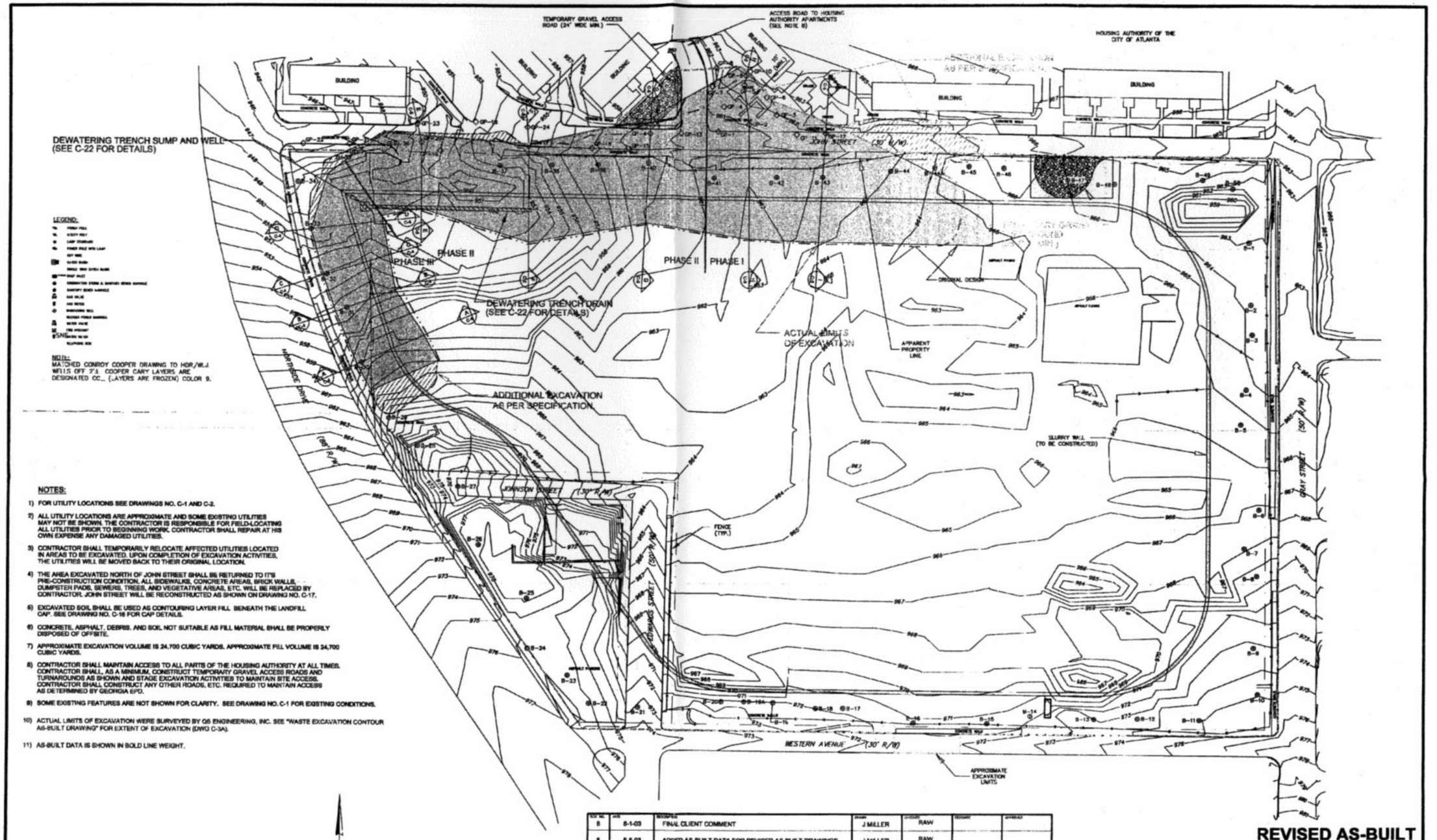
BOUNDARY SURVEY FOR GEORGIA WORLD CONGRESS CENTER AUTHORITY, ACTING AS AGENT FOR THE STATE OF GEORGIA, DEPARTMENT OF INDUSTRY, TRADE AND TOURISM
LOCATED IN
LAND LOT 82, 14TH DISTRICT
FULTON COUNTY, GEORGIA

SHEET NO. 1/1

DRAWING# TM30-155

FIGURE 1-5


NOTE: Boundary shown herein from a Survey for Atlanta Housing Authority by RILEY, PARK, HAYDEN & ASSOCIATES, INC. dated 5/5/99.
GEORGIA
REGISTERED
PROFESSIONAL
LAND SURVEYOR
KENNEDY STREET
STRONG STREET
JETT STREET
NORTHSIDE DRIVE
P.O.B.
S89°15'52"E 886.46'
N01°33'03"E 517.05'
N88°27'29"W 197.00'
S00°36'05"W 204.00'
S88°27'40"E 197.05'
S00°25'05"W 101.35'
S00°36'05"W 300.43'
R=737.56
L=87.31
CBRG=N02°20'26"W
C=87.26
N88°35'27"W 94.84'
S89°14'25"E 156.17'
S53°21'37"E 118.47'
BUILDING
JOHN STREET (0.43 AC.)
S89°17'51"E 635.54'
S89°17'51"E 357.46'
S00°42'09"W 30.00'
S88°09'54"E 6.00'
N00°43'06"E 285.06'
R=737.56
L=37.93
CBRG=N30°51'39"W
C=37.93
N89°39'19"W 243.94'
JOHNSON STREET
EDWARD STREET
N01°11'25"E 228.75'
NORTHSIDE DRIVE
G.M.F.
N89°23'14"W 542.50'
WESTERN AVENUE
GRAY STREET
S00°06'18"E 514.53'
JOHN STREET
A 492,276.94 SQ.FT. 11.301 AC.
B 5,458.38 SQ.FT. 0.125 AC.
C 357,422.46 SQ.FT. 8.205 AC.
D 9,634.81 SQ. FT. 0.221 AC.
LEGEND
• IPS IRON PIN SET
O IPF IRON PIN FOUND
■ C.M.F. CONC. MONUMENT FOUND
GRAPHIC SCALE 1"=100'
0 100 200 300
Q-B ENGINEERING, INC.
517 Cemetery Street
P.O. Box 1508
Norcross, Georgia 30091-1508
(770) 449-8623
(770) 449-1088 [FAX]
GEOPROBE SAMPLE LOCATIONS
BUILDING 11 JOHNS STREET
THE HOUSING AUTHORITY
OF THE CITY OF ATLANTA
c/o POWELL GOLDSTEIN FRAZER & MURPHY LLC
191 Peachtree Street, N.E.; Sixteenth Floor
Atlanta, Georgia 30303
(404) 572-6600; Fax: 9404) 572-6999
REVISIONS
NO. DESCRIPTION DATE
1 CLIENT'S COMMENTS 1/23/04
DATE: 01/08/2004
SCALE: 1" 100'
DRAWN: A.V.R.
DESIGNED: O.R.S.
CHECKED: G.E.Q.
LAND LOT: 82
14TH LAND DISTRICT
FULTON COUNTY, GA.
SHEET 1
NO. 1
DRAWING NO. 03-111-S-1
Date Printed: 1/23/2004
FILE: P:\Terramodel\03-all\03-111\03-111.pro



SEQ. NO.	DATE	DESCRIPTION	DRAWN	CHECKED	DESIGNED	APPROVED
6	8-1-03	FINAL CLIENT COMMENT	J.MILLER	RAW		
5	5-5-03	ADDED AS-BUILT DATA FOR REVISED AS-BUILT DRAWINGS	J.MILLER	RAW		
4	8-10-01	ADDED DEWATERING TRENCH	I. GRIFFITH			
3	8-12-01	TURNAROUND LOCATION CHANGED	J.WIGGINS	CFB	PEO	PEO
2	4-30-01	ISSUED FOR PERMITTING	I. GRIFFITH	CFB	PEO	PEO
1	4-4-01	ISSUED FOR REGULATORY REVIEW	J.WIGGINS	CFB	PEO	PEO
0	12-12-00	ISSUED FOR CLIENT REVIEW	J.WIGGINS	CFB	PEO	PEO

VERIFY SCALE
0 1"
BAR IS ONE INCH ON ORIGINAL DRAWING

REVISED AS-BUILT

CONTAMINATED SOIL EXCAVATION PLAN
NORTHSIDE DRIVE LANDFILL - ATLANTA, GEORGIA
STATE OF GEORGIA
ENVIRONMENTAL PROTECTION DIVISION

TETRA TECH EM INC.

CONTRACT NO. 661778-06
JOB NO. 515A
SCALE AS SHOWN
DRAWING NO. C-3
REV. 6
SHEET 1 of 1

CAD FILE NO./DATE: 515A8005.dgn/8-13-01

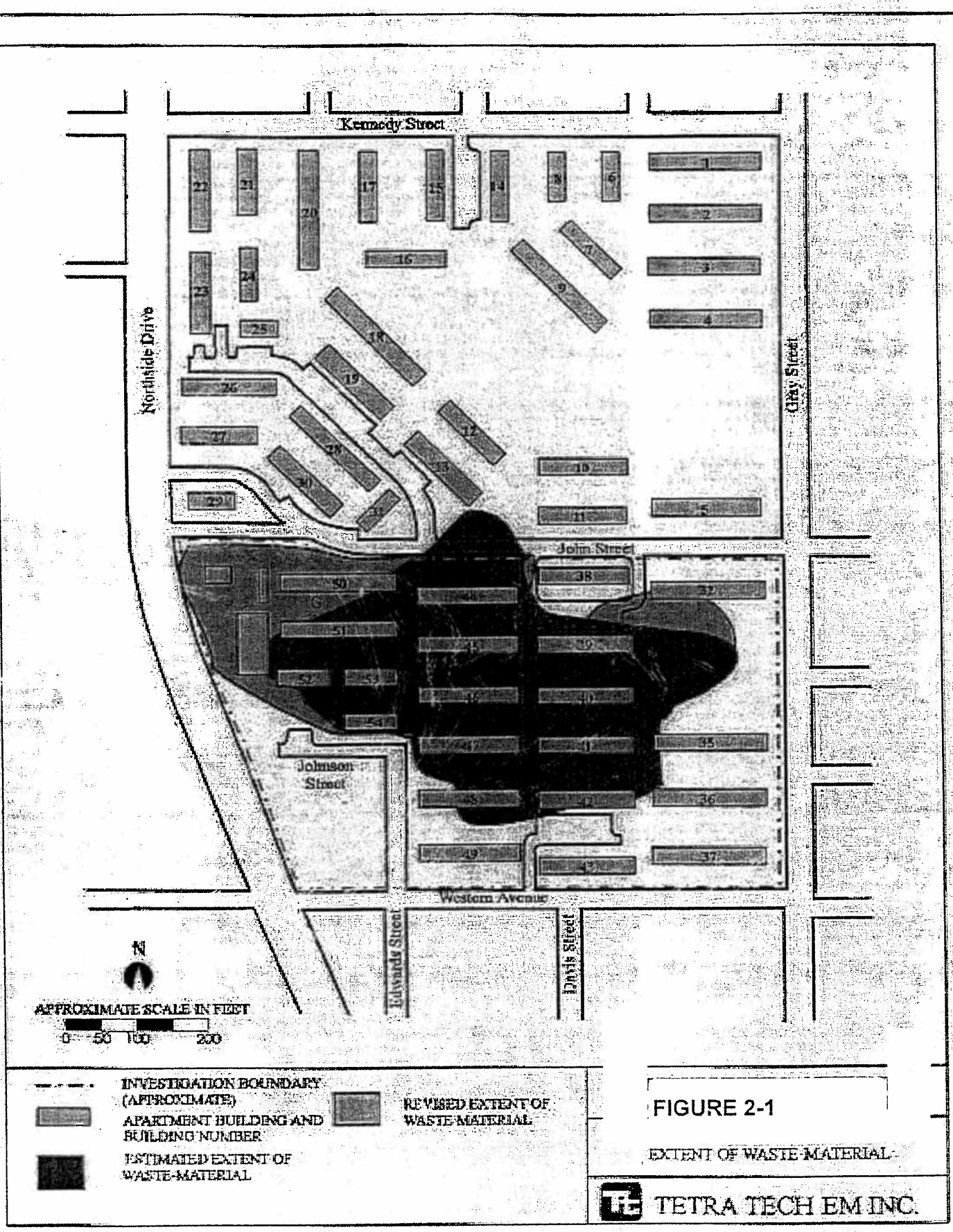


FIGURE 2-1

EXTENT OF WASTE MATERIAL

TETRA TECH EM INC.

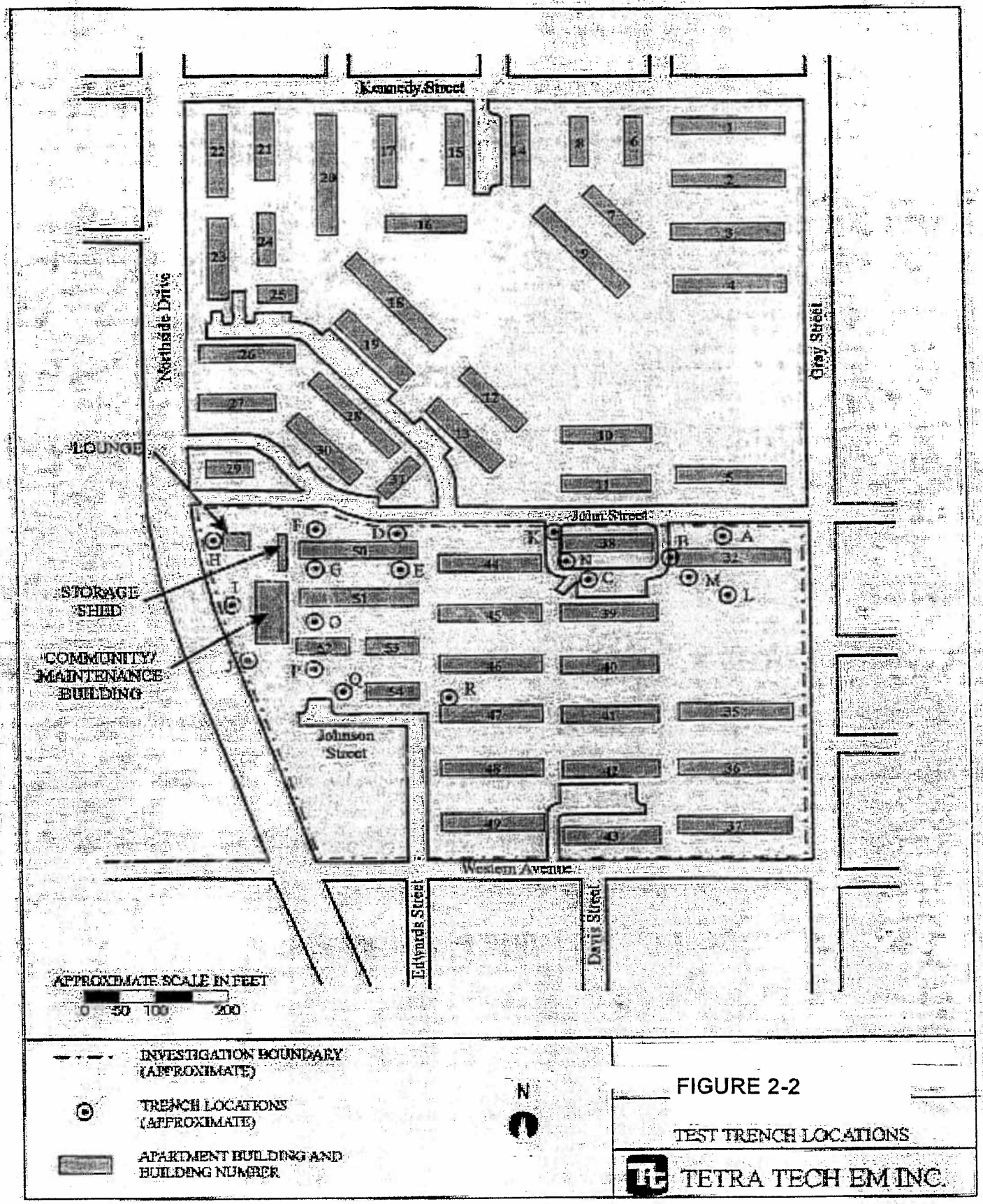


FIGURE 2-2

TEST TRENCH LOCATIONS

TETRA TECH EM INC.

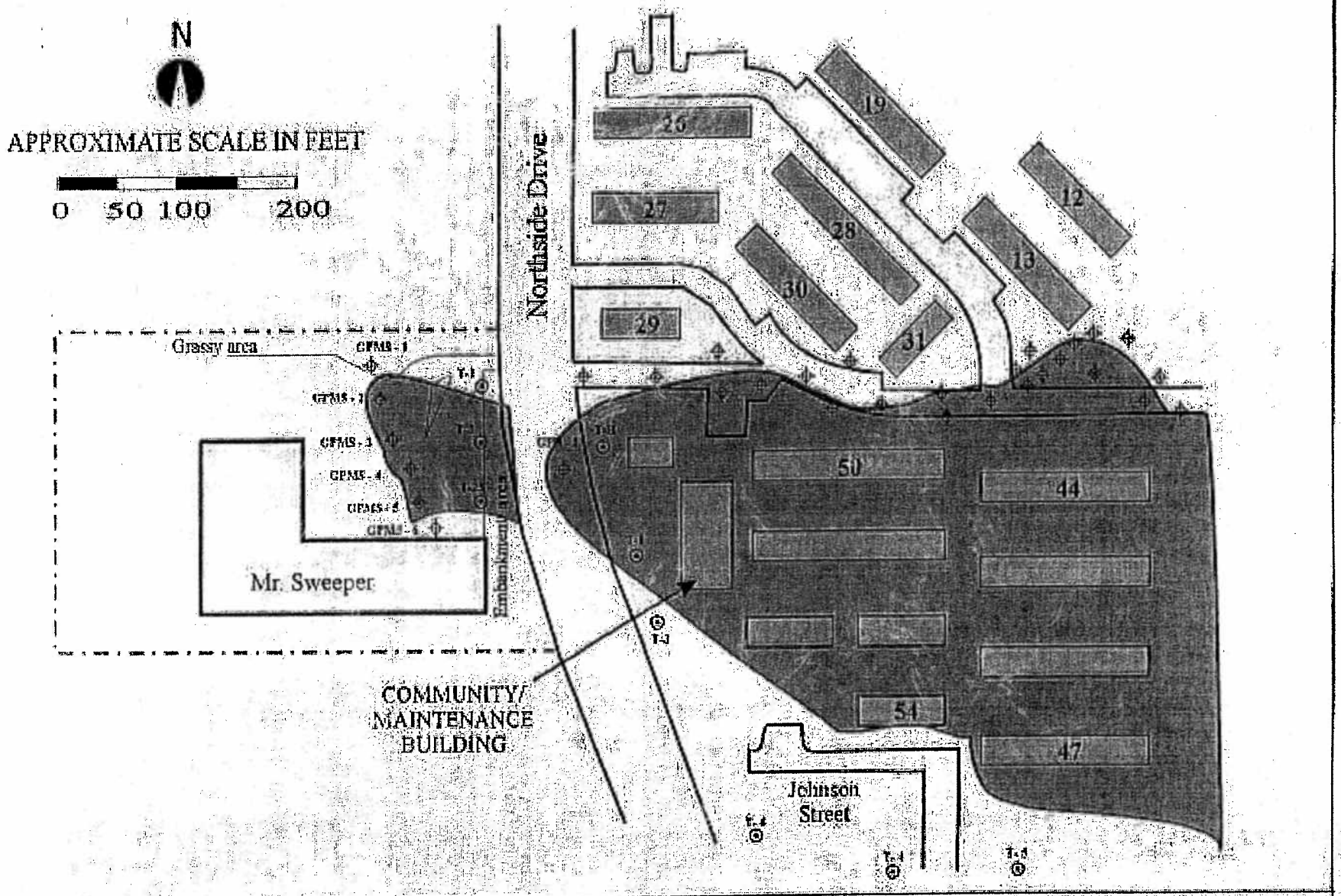


FIGURE 2-3

TEST TRENCHING AND GEOPROBE LOCATIONS AT MR. SWEEPER

TETRA TECH EM INC.

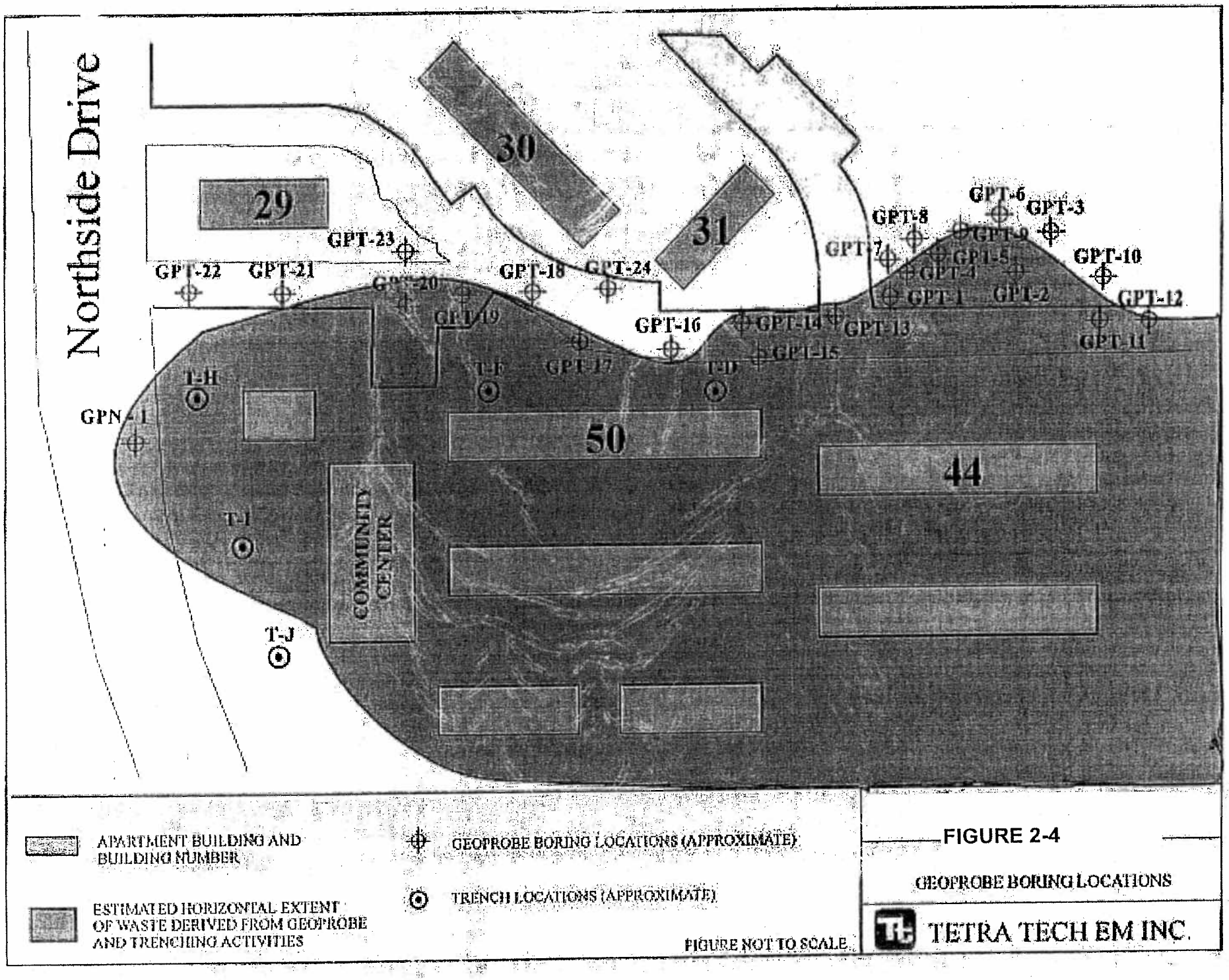


FIGURE 2-4

GEOPROBE BORING LOCATIONS

TETRA TECH EM INC.

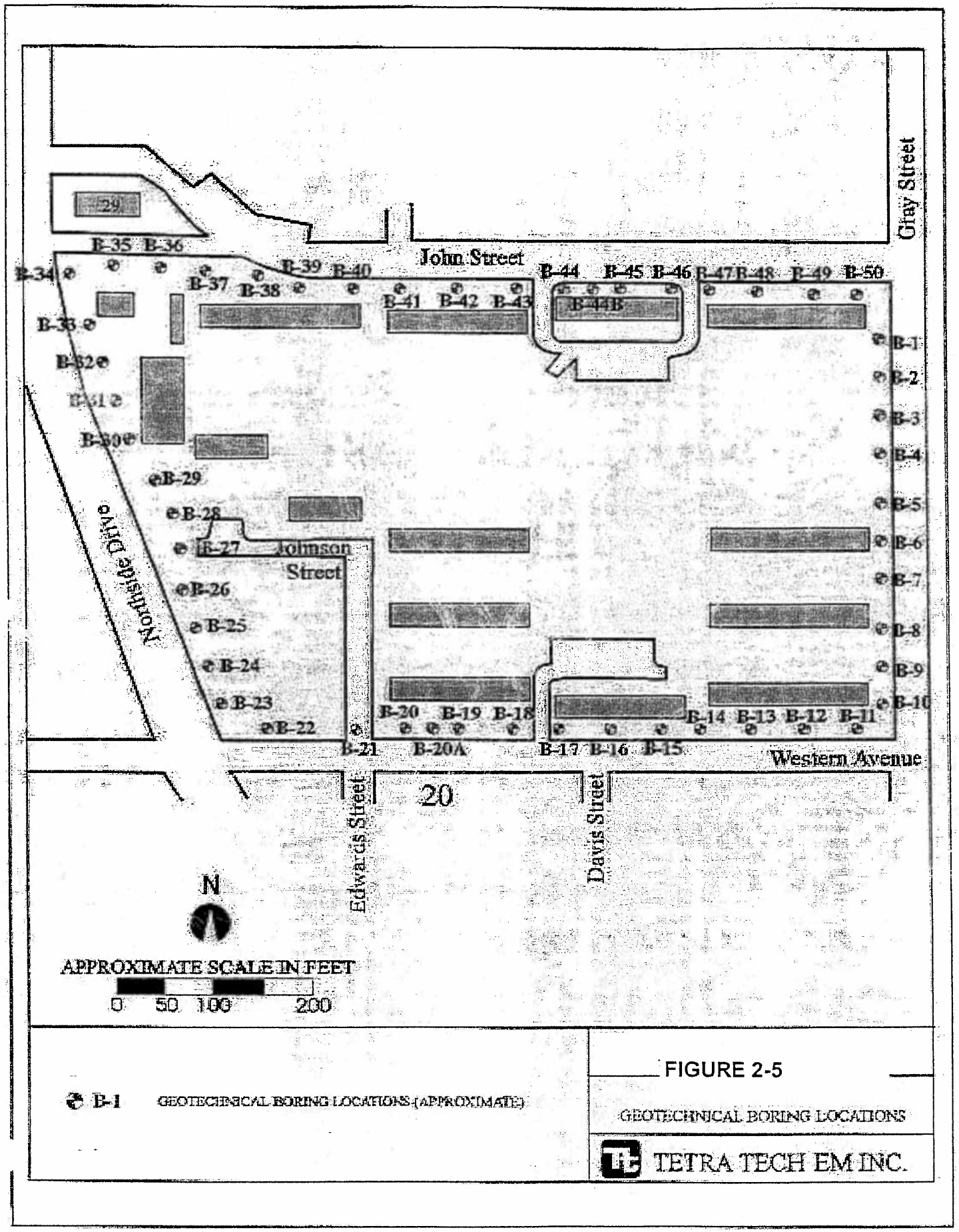


FIGURE 2-5

GEOTECHNICAL BORING LOCATIONS

TETRA TECH EM INC.

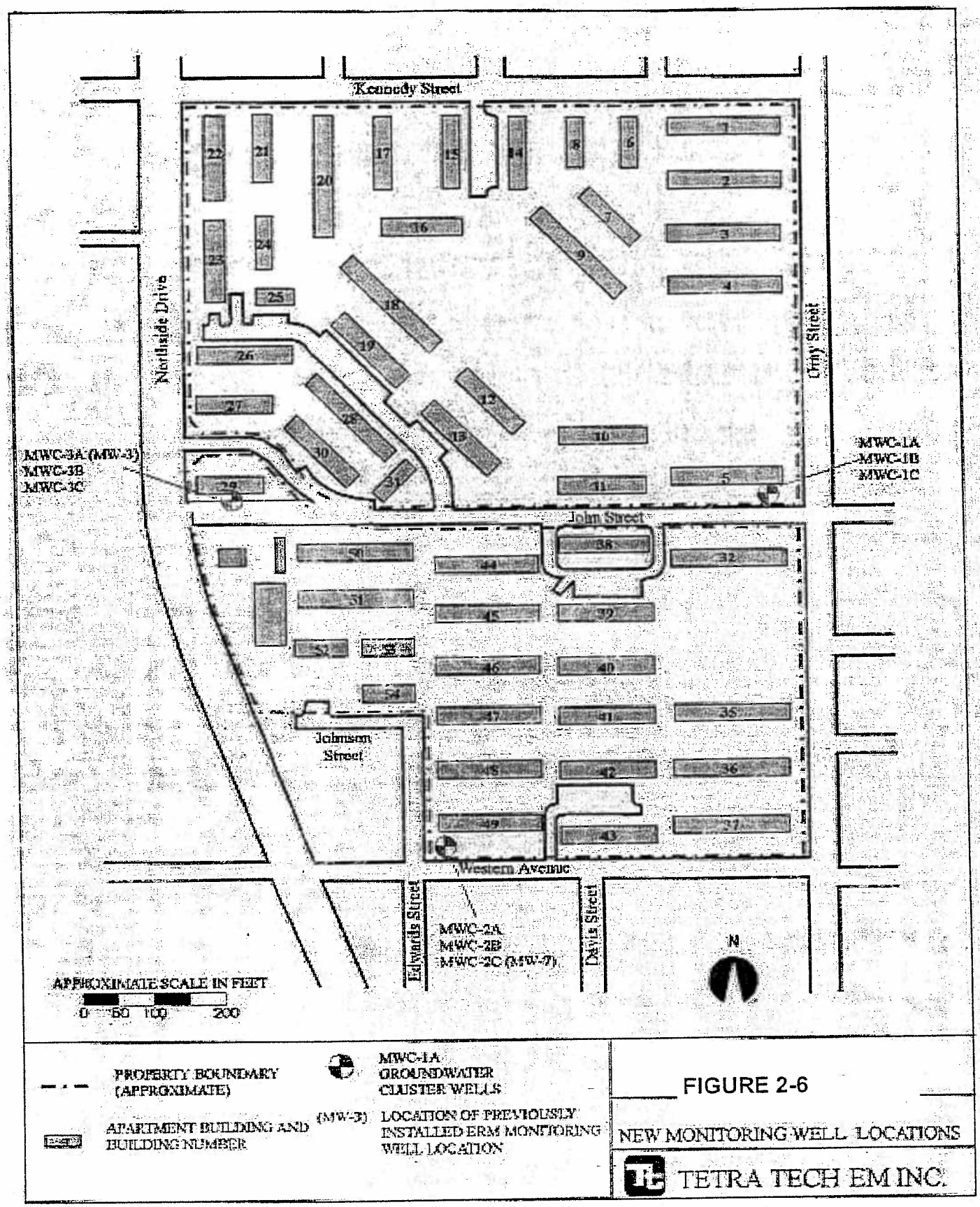
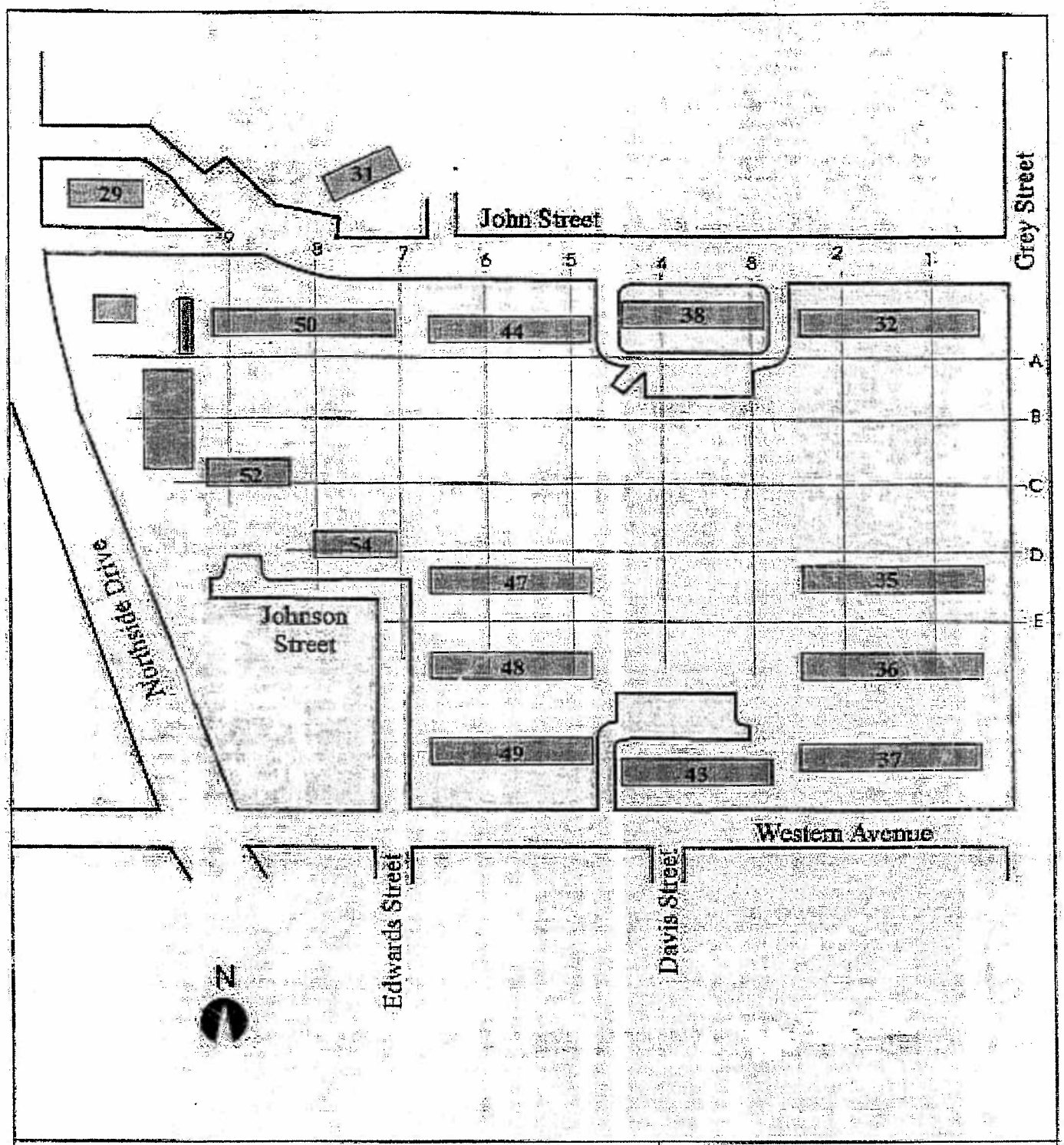


FIGURE 2-6

NEW MONITORING WELL LOCATIONS

TETRA TECH EM INC.

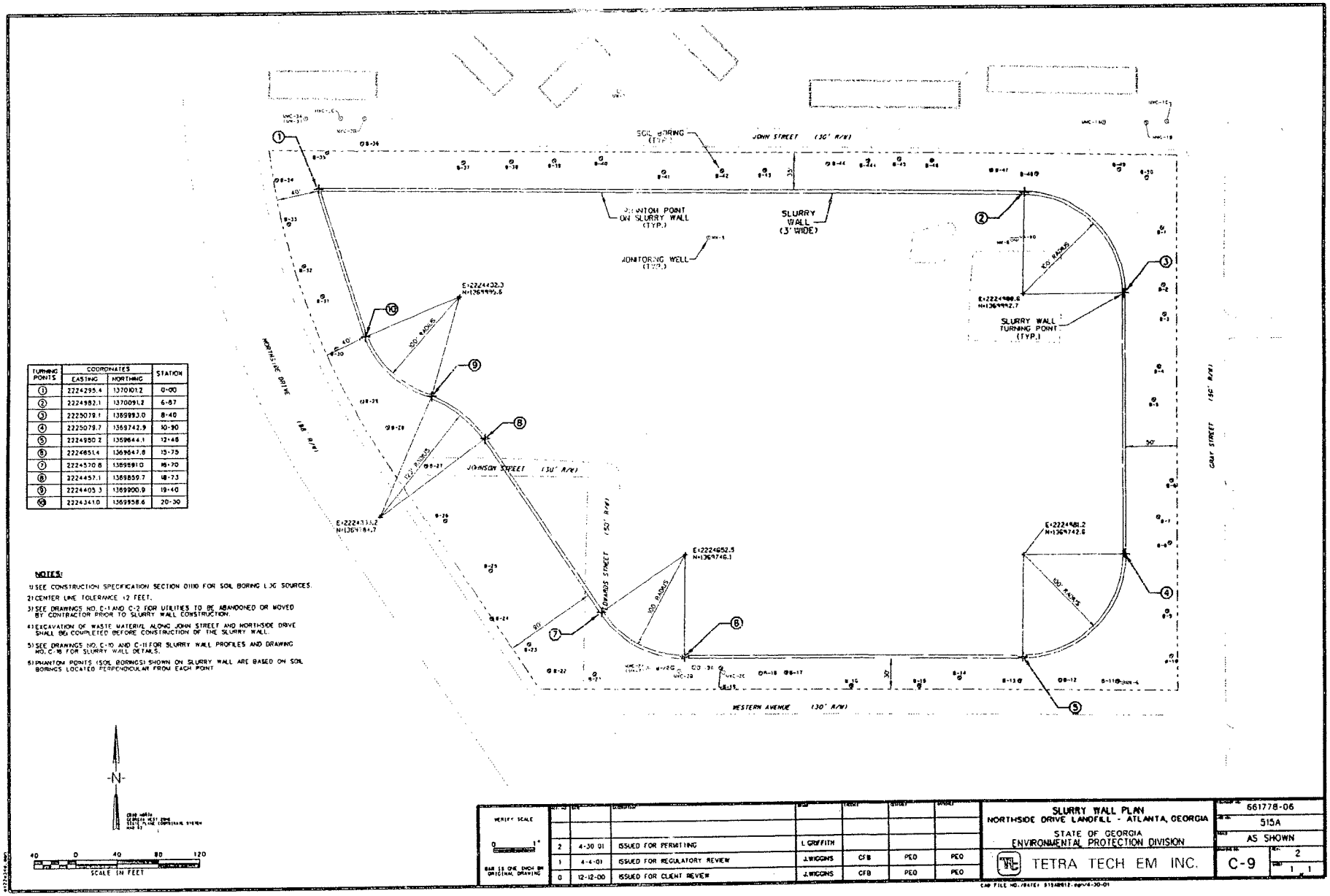


METHANE GAS MONITORING GRID SYSTEM

FIGURE 2-7

METHANE GAS SURVEY

TETRA TECH EM INC.



TURNING POINTS	COORDINATES		STATION
	EASTING	NORTHING	
①	2224295.4	1370101.2	0+00
②	2224982.1	1370091.2	6+87
③	2225078.1	1369993.0	8+40
④	2225078.7	1369742.9	10+90
⑤	2224950.2	1369644.1	12+48
⑥	2224651.4	1369647.8	15+75
⑦	2224570.8	1369891.0	16+70
⑧	2224457.1	1369859.7	18+73
⑨	2224405.3	1369900.9	19+40
⑩	2224341.0	1369958.6	20+30

NOTES:

1) SEE CONSTRUCTION SPECIFICATION SECTION 01110 FOR SOIL BORING LOG SOURCES.
2) CENTER LINE TOLERANCE ±2 FEET.
3) SEE DRAWINGS NO. C-1 AND C-2 FOR UTILITIES TO BE ABANDONED OR MOVED BY CONTRACTOR PRIOR TO SLURRY WALL CONSTRUCTION.
4) EXCAVATION OF WASTE MATERIAL ALONG JOHN STREET AND NORTHSIDE DRIVE SHALL BE COMPLETED BEFORE CONSTRUCTION OF THE SLURRY WALL.
5) SEE DRAWINGS NO. C-10 AND C-11 FOR SLURRY WALL PROFILES AND DRAWING NO. C-18 FOR SLURRY WALL DETAILS.
6) PHANTOM POINTS (SOIL BORINGS) SHOWN ON SLURRY WALL ARE BASED ON SOIL BORINGS LOCATED PERPENDICULAR FROM EACH POINT.

NO.	DATE	DESCRIPTION	DRAWN	CHECKED	DESIGNED	APPROVED
2	4-30-01	ISSUED FOR PERMITTING	L GRIFFITH			
1	4-4-01	ISSUED FOR REGULATORY REVIEW	J.WIGGINS	CFB	PEO	PEO
0	12-12-00	ISSUED FOR CLIENT REVIEW	J.WIGGINS	CFB	PEO	PEO

VERIFY SCALE — BAR IS ONE INCH ON ORIGINAL DRAWING

SLURRY WALL PLAN
NORTHSIDE DRIVE LANDFILL - ATLANTA, GEORGIA
STATE OF GEORGIA
ENVIRONMENTAL PROTECTION DIVISION

TETRA TECH EM INC.

661778-06	
515A	
AS SHOWN	
C-9	2
	1 1

CAD FILE NO. /DATE: 515A0912-rev4-30-01

FIGURE 2-8

Georgia Department of Natural Resources
2 Martin Luther King, Jr. Drive, SE, Suite 1462 East, Atlanta, Georgia 30334
Noel Holcomb, Commissioner
Environmental Protection Division
Carol A. Couch, Ph.D., Director
Hazardous Waste Management Branch
404/657-8600

August 4, 2005

CERTIFIED MAIL
Return Receipt Requested

Mr. Jerry Lewis
Director of Engineering
Georgia World Congress Center Authority
285 International Blvd., N.W.
Atlanta, Georgia 30313-1591

Re: Northside Drive Landfill
HSI Site 10222
Atlanta, (Fulton County), Georgia
Revised Amendment to Perspective Purchaser Corrective Action Plan
Former Tax Parcel 14-82-6-3-0 (Consolidated into Tax Parcel 14-82-6-12-1)

Dear Mr. Lewis:

The Georgia Environmental Protection Division (EPD) has completed its review of the above referenced document dated July 11, 2005 as amended through July 26, 2005, submitted by Powell Goldstein, LLP on behalf of the State of Georgia and the Georgia Economic Development Authority. The document, including a revised Monitoring and Maintenance Plan for Type 5 Risk Reduction Standards (M&M Plan) was submitted for the above referenced site pursuant to O.C.G.A. 12-8-207(b)(5) of the Hazardous Site Reuse and Redevelopment Act (Act). The document serves as a revised amendment to the Prospective Purchaser Corrective Action Plan (PPCAP), dated December 2, 2003, which was approved by EPD in a letter dated December 18, 2003.

EPD notes Paragraph 2 of the above referenced document is revised to state, *"The driveway and deceleration lane will be constructed of 5,000 psi reinforced concrete, while the sidewalk and median will be constructed of 3,000 psi reinforced concrete per Georgia Department Of Transportation specifications."* EPD approves the revised amendment to the above referenced PPCAP pursuant to Section 12-8-207 of the Act.

Additionally, in a letter dated February 28, 2005, a request was made for additional time to submit the compliance status report (CSR), required by O.C.G.A. 12-8-207(b)(6) of the Act, for former Tax Parcel 14-82-6-3-0. Per the schedule provided to EPD in a letter dated April 19, 2004, the CSR will be submitted to EPD sixty (60) days following completion of construction of the surface parking lot at the above referenced site. As construction completion was delayed due to weather per a letter to EPD dated February 28, 2005, EPD approves the request for an extension, and anticipates receipt of the CSR by September 1, 2005.

If you have any questions regarding this matter, please contact Ms. Antonia Beavers at 404/ 657-8600.

Sincerely,

Carol A. Couch, Ph.D.
Director

c: Joan Sasine, Powell Goldstein, LLP
Leona Miles, Tetra Tech, Inc.

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MONITORING AND MAINTENANCE PLAN FOR TYPE 5 RISK REDUCTION STANDARDS

NORTHSIDE DRIVE LANDFILL
Atlanta, Georgia

December 2003
(Revised July 2005)

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Attachment
As-built drawings

TABLE

1.0 INTRODUCTION

The Northside Drive Landfill (NDL) site is listed on the State of Georgia's Hazardous Site Inventory pursuant to the Georgia Hazardous Site Response Act, Official Code of Georgia Annotated (O.C.G.A.) § 12-8-90 and associated Rules for Hazardous Site Response, Chapter 391-3-19. The landfill portion of the NDL site (landfill) was remediated using engineering and institutional controls. The engineering controls involved the installation of a soil-bentonite slurry wall and an engineered control cap as illustrated in the approved As-Built Drawings dated October 2003 and supporting documents. A second engineering control was developed which consisted of a concrete cap placed adjacent to and running parallel with Northside Drive. The concrete cap was designed to address contaminated soils that persisted at the property boundary along Northside Drive (former Tax Parcel 14-82-6-3-0). The institutional controls implemented were a deed notice and conservation easement that includes this Monitoring and Maintenance (M&M) Plan.

A notification was submitted to the Georgia Environmental Protection Division (GA EPD) on March 7, 2005 regarding the change in use of the landfill. The use of the landfill effective July 1, 2005 will be that of a surface parking lot.

This M&M plan contains six sections, 3 appendices, and an attachment. Section 2.0 describes the current landfill monitoring and control systems. Section 3.0 presents the groundwater-monitoring plan. Section 4.0 contains the landfill maintenance and inspection plan. Section 5.0 describes land use of the landfill portion of the NDL site. References are presented in Section 6.0. The appendices are as follows: Appendix A contains descriptions of potential statistical data evaluation methods; Appendix B contains a figure; and Appendix C contains forms. As-built drawings of the landfill portion of the NDL site are presented in the Attachment.

2.0 LANDFILL MONITORING AND CONTROL SYSTEMS

2.1 LANDFILL ENGINEERING CONTROLS

The engineering controls consist of a three foot wide soil-bentonite slurry wall which extends from the surface to bedrock around the landfill wastes and covered with an engineered control cap consisting of a geosynthetic clay liner, LLDPE liner, geocomposite drainage layer with two feet of select fill.

The following nine (9) groundwater monitoring wells and a dewatering well are located in and around the landfill as show in Figure 1, Appendix B:

- MWC-l A, MWC-1B, and MWC-1 C, (located on the southeastern corner of Tax Parcel No. 14-82-68 at the corner of John and Gray Streets)
- MWC-3B, MM-02, and MWC-3C (located on the southwestern corner of Tax Parcel No. 14-82-6-8 at the corner of John Street and Northside Drive)
- Dewatering well (located within the limits of the engineering controls of the landfill at the northwest corner of the landfill)
- MM-03 (located midway along John Street)
- MM-01 (located midway along Northside Drive between Western Avenue and John Street)
- MM-04 which is the upgradient, background groundwater monitoring well (located near the corner of Western Avenue and Gray Street)

These wells are used to identify and/or evaluate the following conditions:

- Release of regulated substances from the landfill above background and/or the risk reduction standards of Section 391-3-19-.07 of the Rules
- Migration and/or expansion of regulated substances located outside of the landfill
- Measure groundwater levels inside and outside the slurry wall

2.2 CONCRETE CAP

Additional engineering controls consist of an 8-foot wide, 8-inch deep concrete cap, which extends from the property boundary adjacent to and running parallel with Northside Drive (see Figure 2, Appendix B). A portion of the concrete cap will be covered with a 2-inch layer of asphalt per Georgia Department of Transportation specifications. The concrete cap is shown in C1.1, CM1.1, and CM1.2 of the construction plans (collectively referred to as Figure 2).

3.0 GROUNDWATER-MONITORING PLAN

This section summarizes the regulated substances to be measured, sampling and analysis requirements including the sampling and analysis plan, data evaluation (statistical methods), and reporting requirements. No natural surface water drainage features are present; therefore, a plan to monitor surface water is not included in this M&M Plan.

3.1 GROUNDWATER STANDARDS

The Georgia Type 1 risk reduction standards (Section 391-3-19-.07 of the Rules) forregulated substances will be used as the groundwater standards for the groundwater-monitoring plan.

3.1.1 Regulated Substances

The regulated substances for the NDL site include polynuclear aromatic hydrocarbons (PAH) and metals. Table 1 lists the regulated substances, the frequency at which they will be monitored, the Type 1 risk reduction standards (RRS), and the analytical methods that will be used. The selected analytical method must have detection limits at or below the Type 1 RRS listed in Table 1. Detection limit is the practical quantitation limit (PQL), defined in the Rules as the lowest concentration, for an approved analytical test method and for a given sample matrix, at which the quantity of a regulated substance can be measured with a stated degree of confidence under routine laboratory operating conditions. Monitoring for regulated substances at the frequencies given in Table 1 must be conducted for all monitoring wells including the background-monitoring well (See 3.1.2 for more detail). In addition, field parameters must be recorded at the same frequencies, as part of the monitoring plan. Field parameters include water level, pH, specific conductance, temperature, and turbidity. Section 3.2.2 (Sample Collection) gives a detailed explanation of the procedures to accurately evaluate and record field parameters.

3.1.2 Monitoring Frequency

Upon notification by the Georgia Environmental Protection Division (EPD) to initiate the groundwater-monitoring plan, groundwater-monitoring sampling shall be initiated within sixty (60) days of receipt of notification. The groundwater-monitoring plan will consist of the following activities:

- Measurements of field parameters (total depth of the well, water level, pH, specific conductance, temperature, and turbidity) for all groundwater monitoring wells and the dewatering well; and
- Sampling for the regulated substances included in Table 1 from all of the groundwater-monitoring wells.

The frequency of monitoring is provided in Table 1. The quarterly sampling will be based on calendar quarters ending March 31, June 30, September 30 and December 31. Reports must be submitted to EPD within forty-five (45) days of the end of the calendar quarter for which the sampling was performed. The quarterly sampling will be performed for two years to establish existing conditions and background data that could be used for statistical analysis, if warranted. After two years of quarterly sampling and unless notified otherwise by EPD, the frequency of groundwater sampling will be reduced to once annually with the annual report due to EPD within forty-five (45) days of the end of the quarter for which the sampling was performed. An M&M review report must be submitted to EPD within sixty (60) days from the close of every fifth year that summarizes and evaluates groundwater trends discerned through that time period and make recommendations as appropriate.

Table 1
Regulated Substances for Groundwater
Northside Drive Landfill

Regulated Substance	Frequency of Groundwater Monitoring*	Type 1 RRS (mg/L)	Analytical Method
Organics			
Acena hthene	Quarterly for 2 years, then annually	2	**SW846 8310**
Acena hth lene	Quarterly for 2 years, then annually	PQL[a]: 0.023	SW846 8310
Anthracene	Quarterly for 2 years, then annually	PQL[a]: 0.0066	SW846 8310
Benzo(a)anthracene	Quarterly for 2 years, then annually	0.0001	SW846 8310
Benzo(k)fluoranthene	Quarterly for 2 years, then annually	PQL[a]: 0.00017	SW846 8310
Benzo(b)fluoranthene	Quarterly for 2 years, then annually	0.0002	SW846 8310
Benzo(g,h,i)perylene	Quarterly for 2 years, then annually	PQL[a]: 0.00076	SW846 8310
Benzo(a)pyrene	Quarterly for 2 years, then annually	0.0002	SW846 8310
Chrysene	Quarterly for 2 years, then annually	0.0002[b]	SW846 8310
Dibenz(a,h)anhracene	Quarterly for 2 years, then annually	0.0003	SW846 8310
Fluoranthene	Quarterly for 2 years, then annually	1	SW846 8310
Fluorene	Quarterly for 2 years, then annually	1	SW846 8310
Indeno(1,2,3-cd)pyrene	Quarterly for 2 years, then annually	0.0004	SW846 8310
Naphthalene	Quarterly for 2 years, then annually	0.02	SW846 8310
Phenanthrene	Quarterly for 2 years, then annually	PQL[a]: 0.0064	SW846 8310
Pyrene	Quarterly for 2 years, then annually	1	SW846 8310
Metals			
Beryllium	Quarterly for 2 years, then annually	0.004	SW846 6010B
Lead	Quarterly for 2 years, then annually	0.015	**SW846 6010B**
Mercury	Quarterly for 2 years, then annually	0.002	SW846 7470A

Notes:

* Frequency of groundwater monitoring may be modified only upon receipt of EPD's approval.

a The PQL presented is the value provided in SW846 Method 8310 for a typical groundwater matrix in the absence of interference. Interference may cause the PQL value to increase. As such, this PQL value is provided for guidance and may not always be achieved.

b The health based drinking water criterion for this substance/analyte is lower than the lowest c currently achievable and available detection limit. According to Rule 391-3-19.07(4)(e), the detection limit or background must be the Type I groundwater concentration criterion for this s substance/analyte.

mg/L Milligrams per liter
PQL Practical quantitation limit
SW 846 U.S. EPA. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. Including updates I, 11, IIA, IIB, III, and IIIA to the Third Edition. September 1986 through 1998.

3.2 SAMPLING AND ANALYSIS PLAN

This section provides the methodology for groundwater sampling and analysis of both background and detection monitoring wells.

The regulated substances to be measured and the frequency at which samples must be collected appear in Table 1. Field parameters include total depth of the well, water level, specific conductance, pH, temperature, and turbidity. Regulated substances and field parameters must be monitored quarterly for the first 2 years and then annually thereafter unless notified otherwise by EPD. An M&M review report must be submitted to EPD within sixty (60) days from the close of every fifth year that summarizes and evaluates groundwater trends discerned through that time period and make recommendations as appropriate.

Water levels must be measured on a quarterly basis from the monitoring wells and the dewatering well to record the fluctuations of the water table due to seasonal effects. High water table conditions typically occur during the winter and spring, due to precipitation. Low water table conditions predominate in the summer and fall due to lower relative precipitation. Water level, other field parameter measurements and first-year quarterly sampling events must be timed so that two quarterly events are conducted during high water table conditions and two quarterly events are conducted during low water table conditions.

The following sections describe procedures for measuring water levels and field parameters and collecting groundwater samples. Water level measurements for a well must be completed before presample purging of the well is conducted. Water level measurement and sample collection must be conducted at the background well first, followed by detection wells and finally the dewatering well. Powderless latex gloves must be worn during water level measurements and groundwater sampling and must be changed between wells. The water level indicator must be decontaminated between wells. All information collected in association with water level measurement, other field parameters and groundwater sampling must be recorded on the groundwater sampling data sheets (Appendix C) and in

a logbook. All activities associated with measurements of water levels and field parameters and collection of groundwater samples must be performed in accordance with the most recent edition of the EPA's Environmental Investigation Standard Operating Procedures and Quality Assurance Manual (EISOPQAM).

3.2.1 Water Level Measurement

The equipment required for water level measurement includes:

- Electric water level indicator (probe)
- Logbook
- Well keys
- Decontamination equipment (tubs or buckets, brushes, phosphate-free laboratory-grade detergent, distilled, deionized water, wastewater container)
- Photoionization detector (PID)
- Powderless surgical gloves

After removing the protective cap and casing cap, the breathing zone must be checked for organic vapors using the PID. If elevated breathing zone vapors are encountered, the sampling team must leave the well and don the appropriate level of personal protective equipment (PPE) before continuing. Action levels and appropriate PPE must be specified in the site-specific health and safety plan. The PID must also be used to survey vapors inside the top opening of the well casing.

To measure the water level in the casing, the probe must be lowered into the casing until the light or sound alarm is activated, indicating that the probe has touched the water surface. Before the water level is measured, the probe and its cable must be physically checked against a measuring tape to verify that the water level indicator has not been cut or altered and to confirm that the indicator's reading is accurate. The static water level must be read directly from the indicator cable by holding the cable to the permanent mark at the top of the well casing and reading off the depth to the nearest 0.01 foot. The probe must be raised and lowered two more times in order to obtain two more measurements; the three readings must then be averaged and recorded in the logbook. Next, the probe must be lowered until it encounters resistance, indicating it has reached the bottom of the well casing. This depth must be read off the cable and recorded in the logbook.

The probe and cable must be washed with a phosphate-free laboratory-grade detergent after they are retrieved from the well, and rinsed in distilled, deionized water. Wash and rinse water must be contained in a wastewater container before proceeding to the next well.

PID readings, as well as general observations of the appearance and condition of the well casing and protective outer casing, must be recorded in a logbook and on the groundwater sampling data sheets.

3.2.2 Sample Collection

In addition to the equipment listed above for water level measurement, sample collection must require the following equipment:

- Sample containers and labels
- Calibrated bucket (example: 5-gallon bucket)

- Coolers, and ice
- Permanent marker
- Low-flow sampling pump (for example, bladder, variable speed, peristaltic)
- Groundwater sampling data sheets
- Instruments for measuring field parameters

All instruments used for measuring field parameters must be calibrated at the beginning of each day of sampling. The instruments response to a calibration standard must be recorded in the logbook and on the groundwater sampling data sheets for all instruments, including those not typically calibrated in the field (such as a specific conductivity meter). The makes, models, serial number, and dates of last calibration of all instruments used must be recorded in the logbook. The sources, lot numbers, and expiration dates of the standards solutions used for calibration must also be recorded in the logbook.

After measuring the water level and bottom of well casing, the water volume within the well casing must be calculated. The volume of water inside the well casing is determined by subtracting from the total depth of well casing the depth to groundwater, and multiplying the height of water in the casing by 0.163 gallons per linear foot (for a 2-inch inner diameter well).

Wells must be purged a minimum of three casing volumes and sampled with a low flow pump. Water must be discharged from the pump to a calibrated bucket that has volumes marked in increments of gallons or fractions of gallons. A sample of purge water must be discharged into a beaker or other container after each casing volume is removed from the well, for measurement of field parameters. The purge water must be contained in a wastewater container (such as a 55-gallon drum). If stability of the field parameters is not achieved within purging of 3 well volumes, the sampling team leader must make the determination whether to sample the well.

Field parameters must be measured and recorded on the groundwater sampling data sheets and in a logbook along with the associated cumulative purge volume. Observations of purge water appearance must also be entered on the groundwater sampling data sheet and in a logbook. The well must be purged until field parameters are stable between three consecutive measurements. To be considered stable, field parameters must change by no more than the following tolerance levels: pH measurements remain constant within 0.1 Standard Unit, specific conductance varies no more than 10 percent, and temperature is constant for three consecutive readings. Turbidity must also be measured and recorded. Stability is achieved when pH, specific conductance, and temperature have stabilized and the turbidity has either stabilized or is below 10 Nephelometric Turbidity Units (NTU) (EISOPQAM).

Water levels must be periodically monitored with a water level indicator while purging. The purging rate must be adjusted to avoid purging the well dry.

All preservatives must be added to containers prior to sampling. Samples collected in pre-preserved containers must not be overfilled. The order of sample collection is as follows:

1. PAHs
2. Metals

This sample order is determined largely by the volatility of the sampled constituent, with the most volatile being sampled first. Sample containers must be labeled and placed in a cooler with ice

immediately after the containers are filled. Before delivery to the analytical laboratory, all samples must be containerized and packaged to maintain sample integrity and chain of custody.

Any equipment (such as a water level indicator) that will be used to sample in more than one well must be decontaminated using a phosphate-free detergent and rinsed with distilled and deionized water. Decontamination procedures should be noted in the logbook. Any purge water and solid wastes such as PPE, etc. generated during the groundwater monitoring and sampling events must be disposed of properly within thirty (30) days of completion of the event. At no time shall empty containers be stock piled and/or stored on the NDL site.

3.2.3 Sample Labeling and Documentation

Samples must be labeled immediately after collection. At a minimum, sample labels must include sample identification (ID) number, date of collection, time of collection, preservative used, required analyses, and sampler names. The name of the well must be used as the ID number (for example, MW-1). The ID number must also be included in the logbook, chain-of-custody forms, and other records documenting sampling activities. The label must be covered with clear plastic tape to prevent damage after it is filled out.

In addition to sample labels, field-sampling activities require other forms of documentation. This additional documentation is necessary to provide an accurate record of sampling events and field observations. This information must be recorded in logbooks, groundwater sampling data sheets, and chain-of-custody forms. Example forms are provided in the Appendices.

Documentation must be completed legibly in ink. Errors must be crossed out with a single line, dated, and initialed by the sampling team member recording the information. Unused portions of logbook pages must be crossed out, and each page must be signed and dated by the sampling team member who made the entry.

3.2.4 Sample Shipment and Chain of Custody

After samples are collected, labeled, and sealed with custody seals, they must be placed in iced coolers. Inert packing materials (such as vermiculite) must be placed around sample containers to prevent breakage. Coolers must be stored in a secured location until they are shipped to the analytical laboratory. Chain-of-custody (COC) forms must be completed for all samples. Before shipment, the field sample custodian and the courier receiving the samples must sign the COC form. A copy of the COC form must be retained for the project files. After the COC form has been completed and signed, it must be inserted in a sealed plastic bag and taped inside the lid of the cooler. The cooler must be sealed with a minimum of two seals (signed and dated by the field sample custodian), so that the seals must be broken to remove the samples. The field chain of custody terminates when the laboratory receives the samples. At that time, the laboratory assumes responsibility for custody. Upon receipt at the laboratory, a laboratory representative must inspect the contents of the cooler, sign the COC form, and list the date and time.

3.2.5 Quality Control Samples

The quality assurance and quality control (QA/QC) guidance outlined in the EISOPQAM must be followed. QA/QC field samples must be collected to evaluate whether data quality has been affected by field activities or other outside events. QA/QC field samples include field duplicates, equipment blanks, and trip blanks. Additional sample volumes must also be collected for matrix spike and matrix spike duplicate (MS/MSD) samples.

Field duplicate samples are used to assess the reproducibility and representativeness of results. Field duplicate samples are collected in a manner identical to the real sample, but are submitted blind to the analytical laboratory. The well the field duplicate sample was collected from must be recorded in the logbook and on the groundwater sampling form. Field duplicate samples must be collected once for every 10 wells sampled (one every sampling event).

Equipment blanks are collected to assess the quality of decontamination procedures used on nondisposable sampling equipment (equipment used in more than one well). Equipment blanks are obtained by flushing the sampling equipment with deionized water after it has been decontaminated and air-dried. The flush water must then be containerized and analyzed for the same constituents as the groundwater samples. Equipment blanks must be collected at a frequency of one per sampling event.

Trip blanks are used to determine sample handling variability resulting in positive bias in contaminant concentration if samples were contaminated during storage and/ or transportation back to the laboratory. The sample is prepared prior to the sampling event in the actual container and is stored with the investigative samples throughout the sampling event. They are then packaged for shipment with the other samples and submitted for analysis. At no time after preparation are the sample containers to be opened before they reach the laboratory. Trip blanks must be provided at a frequency of one per sample shipment, but not for each cooler.

MS/MSD samples gauge the accuracy and precision of the data derived from sample analysis. Although spiking is an internal laboratory procedure, the laboratory typically requires that a triple volume be collected for MS/MSD samples. A triple volume of a sample chosen at the discretion of the sampling team must be collected, and each container must be labeled with the same ID number. Under the remarks or comments on the chain-of-custody form, the triple volume must be noted as collected for MS/MSD. MS/MSDs must be collected at a frequency of 1 per 20 wells sampled or at least once during every sampling event, whichever is more frequent.

3.2.6 Laboratory Analysis

A laboratory that complies with the O.C.G.A. 12-2-26, Georgia Commercial Analytical Laboratory Act and associated Rules must analyze the groundwater samples. Samples must be analyzed using the methods presented in Table 1. The analytical laboratory is required to have a QA/QC plan to assure the reliability of analytical results. Any report that submits analytical results to EPD must include a certification that complies with Chapter 391-3-26 of the Rules for Commercial Environmental Laboratories.

3.3 DATA EVALUATION

Analytical results and field parameters must be evaluated to determine if a release has occurred from the landfill to groundwater or if groundwater is infiltrating the slurry wall or engineered control cap. This data validation and evaluation process consists of data review, tabulation of qualified data, review and handling of outlying data, statistical analysis, and professional judgment screening. Analytical results from the background well and detection monitoring wells must be tabulated and evaluated separately before making any statistical comparison. Inferential statistical tests can be performed only on regulated substances detected in monitoring well samples after a year of quarterly sampling (4 sampling events).

Regulated substances not detected in background well samples, but detected in one or more detection monitoring well samples, must be evaluated using professional judgment as discussed in Section 3.3.4 to determine if the detection represents a release from the landfill or has some other plausible cause.

Professional judgment must be applied throughout the data evaluation process, but is essential for two areas in particular: data quality and statistical interpretation. Professional judgment is required for: determining that results are representative of aquifer conditions, the handling of outliers, and determining if the statistical tests were failed (reject the null hypothesis, H_o, that there is no significant difference between the data sample means for the background and detection monitoring wells) as a result of a release from the landfill.

3.3.1 Analytical Data Validation and Tabulation

To evaluate data quality, all data received from the laboratory must be subjected to the EPA's EISOPQAM data validation process. The data quality review must include a report on data quality, which must discuss among other things, detections of any regulated substances in blanks and other QA/QC results. The data must be examined for any other errors, such as those made during transcription. Any data quality issues that may affect the outcome of statistical tests must be noted. The representativeness of the results must also be reviewed and noted.

Qualified data must be tabulated in a format presenting all ID numbers, dates of sampling, and results for all analyses. Separate tables must be generated for detection monitoring well data and background well data. Data evaluation may include summary statistics tables, graphs, and concentration plots. Results from each detection monitoring well must be independently compared to background.

3.3.2 Outlier Evaluation

An unavoidable problem in the statistical analysis of environmental data is the presence of outliers. Outliers are extreme (high or low) values that are widely divergent from the main body of data (Gad and Weil 1989). Outliers may arise from mistakes such as transcription, data-coding errors, instrument breakdowns, calibration problems, and power failures. Additionally, they may arise due to the inherent spatial or temporal variability of the regulated substance (Gad and Weil 1989). Outliers disproportionately affect the statistical descriptors of the data set, biasing the mean and standard deviation toward the outlying observation. Therefore, it is important to identify and investigate outliers in the data and treat them appropriately.

Outliers can be identified by visual inspection of data, use of a scattergram (or other graph), or by a large increase in the standard deviation (if the data set is small enough, as is the case with this monitoring plan) (Gad and Well 1989). Professional judgment must be used with the above techniques to determine the presence of suspect outliers. If not obvious, a test for a single outlier, such as that described by Dixon (1953), may be applied. However, because one outlier may mask another, such tests may not identify an outlier (Gilbert 1987).

Once identified, outliers must be corrected, discarded, or retained. Outliers that are obvious mistakes must be corrected, when possible. Outliers that are not obvious mistakes must be reviewed to determine the cause. The outlier must be discarded if a cause is identified (that is not a result of geochemical variation of the landfill). Causes that might warrant discarding an outlier might include field or laboratory contamination, matrix interference, or calibration problems. If the outlier can neither be corrected nor discarded, the outlier may be retained in the data set for statistical testing. Statistical testing may be conducted with the outlier both present and absent from the data set to determine the effect on the statistical test outcome.

3.3.3 Statistical Tests

Statistical tests consistent with those required in the *Guidance for Data Quality Assessment, Practical Methods for Data Analysis* (EPA QA/G-9 QA00 Update) must be used for the data evaluation. Statistical comparisons and tests must be calculated only for regulated substances that are detected in samples collected from both background and detection monitoring wells. When a regulated substance is detected only in samples from detection monitoring wells and not in samples from background wells, it must be evaluated using professional judgment prior to verification sampling for confirming a release from the landfill.

The minimum sample size necessary for meaningful inferential statistical tests is four. This sample size must be achieved after one year of quarterly sampling. The inferential test that must be performed is determined by the distribution of data (parametric or nonparametric) and the frequency of detection. The data must first be tested to determine whether the data distribution is normal or random. If the data are normally distributed, a parametric test (for instance the Cochran's t-test) may be used to compare data sample means between detection wells and the background well. If the data are randomly distributed, a nonparametric test (for instance, a Wilcoxon Rank Sum [WRS] test) must be performed to compare data sample means between detection monitoring wells and the background well. A parametric test must be performed if data are normally distributed and regulated substances are detected at a frequency of 80 percent or greater. A nonparametric test must be used for data that are randomly distributed or are detected at a frequency of less than 80 percent. Appendix A describes normality testing, handling of non-detections, and the Cochran's Nest and the WRS test. All inferential statistical tests must be performed at a level of significance (p-value) of 0.05 (0.95 confidence level).

3.3.4 Professional Judgment

No statistical test or comparison alone can identify a release with absolute confidence. Identifying a release requires a combination of more than one statistical test and professional judgment. The identification of any regulated substance as differing from background concentrations (rejection of H_o) is subject to professional judgment. Professional judgment must be applied to prevent reporting of statistically significant evidence of a release that is at the landfill (a false positive). Professional

judgment must always be accompanied by a plausible explanation. Factors that may cause a regulated substance to be identified as statistically different from background, though not as a result of a release, include the effect of non-detects in the statistical test, Type I error rates, spatial and temporal distribution of constituents, and off-site releases. This step is similar to that taken when data are initially reviewed for influences such as field or laboratory contamination. Professional judgment must also be applied to detections in detection monitoring wells when the regulated substance is not detected in a background well.

3.3.5 Verification Procedure for Suspected Releases

Verification sampling must be conducted if statistically significant or other evidence of a release is not rejected by professional judgment. Only those detection monitoring wells in which a suspected release was detected must be resampled; however, if the next sampling event takes place prior to identifying a suspected release, this newly collected data might be used. Results from resampling must be compared to existing background data for a regulated substance that may have been released. A discrete retest (using only the newly-collected detection monitoring well data) must be performed.

3.4 REPORTING

A groundwater monitoring report including data evaluation, along with a cover letter, must be submitted to EPD.

The groundwater monitoring report must be submitted within forty-five (45) days of the end of the calendar quarter in which the sampling event occurred. The report must include tabulation of qualified analytical results and a narrative summary of the results. The report must include analysis of water level data and groundwater flow direction and gradient. The report must discuss any deviations from the M&M plan. The report must also provide the data validation report and the results of QA/QC sampling and analysis. The report should provide photographic documentation of the site including each component of the landfill system along with anything that warrants documentation such as damage to site features (i.e. monitoring wells). Each photo should include at a minimum the site name, date, photographer's name and title, and a description of the photo.

An annual groundwater monitoring report must include a narrative summarizing all the data collected within a year's monitoring events and a statistical evaluation of the data.

The groundwater monitoring report must include the following signed certifications:

> I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate that information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief true and accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Authorized Signature

I certify that I am a qualified groundwater scientist who has received a baccalaureate or postgraduate degree in the natural sciences or engineering, and have sufficient training and experience in groundwater hydrology and related fields, as demonstrated by state registration and completion of accredited university courses, that enable me to make sound professional judgments regarding groundwater monitoring and contaminant fate and transport. I further certify that this report was prepared by myself or by a subordinate working under my direction.

Georgia Registered Professional
Geologist or Engineer

An M&M review report must be submitted to EPD within sixty (60) days from the close of every fifth year that summarizes and evaluates groundwater trends discerned through that time period and make recommendations as appropriate. EPD will review, comment, respond and/or approve these reports as appropriate.

4.0 LANDFILL MAINTENANCE AND INSPECTION PLANS

This section of the M&M plan describes the methods, procedures, and processes that must be used to inspect and maintain the engineering controls of the landfill (Section 2.1) and concrete cap (Section 2.2). These components include final cover and grading; drainage system; and groundwater monitoring network. Use of the property must not disturb the integrity of the soil cap and liner system of the landfill, the concrete cap, or any other components of the containment system, or the function of the monitoring systems. Maintenance and inspection of the landfill must be performed by person(s) experienced in the maintenance and inspection of the engineering controls at the landfill through both professional training and educational experience sufficient to evaluate the condition of the landfill as it relates to the requirements set forth below. Minimum experience requires the inspector be a Georgia certified Professional Engineer with experience in the design and/or evaluation of landfills.

Maintenance and inspection activity documentation includes the M&M Inspection Log form and Maintenance Record form. Inspection logs include the date of the inspection, name of the inspector(s), component inspected, weather conditions, condition of the item inspected, notation of any damages requiring attention and indicate if the noted damage would be classified as major damage. EPD should be notified within 24 hours for each incidence of damage determined to be major damage. All damage must be addressed by contractor personnel who meet the requirements specified in the "Construction Specifications, Landfill Cap and Slurry Wall, Northside Drive Landfill, Atlanta, Fulton County, Georgia" (Construction Specifications). A copy of the M&M Inspection Log form is in Appendix C. Maintenance records include the dates repairs were initiated and completed, and the name of the person recording the information. Comments describing the severity of the damage (i.e.: major) must also be noted on the maintenance record along with a description of the repairs. A copy of the Maintenance Record form is in Appendix C.

4.1 FINAL COVER AND GRADING

It is necessary to maintain the integrity and effectiveness of the final cover (i.e. soil cap and vegetative cover, asphalt parking lot, and concrete cap), including making repairs as necessary to correct the effects of settling, subsidence, erosion, or other events, and preventing run-on and run-off from causing erosion or other damage to the final cover. The final cover must be inspected every calendar quarter. The inspection must evaluate the final cover to ensure adequate quantity and quality of the final cover and to ensure prevention of erosion and ponding. The results of the inspection must be recorded on the M&M Inspection Log form in Appendix C.

4.1.1 Soil Cap and Vegetative Cover

In those areas where vegetation is present, a satisfactory stand of grass plants will be considered a minimum of 10 grass plants per square foot and total bare spots less than two percent (2%) of the total area. The cover will be mowed a minimum of each calendar quarter during the growing season and once at the end of the growing season. More frequent mowing is required if it is determined additional mowing is required to maintain a satisfactory stand of grass plants and/or grass height exceeds eight inches (8"). During mowing, clippings must be removed if clippings will result in thatching that inhibits growth of desires grass plants. Maintenance of the cover shall include eradication of weeds, removal of trees or other woody plants, removal of trash, and fertilization if necessary.

All erosion rills must be noted during the quarterly inspection. Erosion rills must be filled with topsoil, seeded with similar grasses, mulched to prevent loss of seed, irrigated sufficiently to establish and maintain growth if needed, and if necessary, surface erosion control blankets must be installed. All areas of ponding must be noted during the quarterly inspection. Ponding areas must be regraded, seeded, mulched, irrigated sufficiently to establish and maintain growth if needed, and if necessary, surface erosion control blankets installed to provide for drainage off of and away from the cover. All maintenance of the cover must be documented in a logbook and on Maintenance Record forms.

4.1.2 Major Damage – Soil Cap and Vegetative Cover

The following conditions are considered major damage to the Soil Cap and Vegetative Cover:

- Any rill greater than one foot (1') wide and/or depth greater than three inches (3")
- An area of ponding with standing water forty-eight (48) hours after a rain event
- Holes, greater than 6 inches in diameter and 2 inches in depth, in the vegetative cover caused by digging or posting during staging events.
- Any damage to landfill liner system or slurry wall

If major damage is noted, EPD must be notified within 24 hours, and repairs must be completed within seven (7) days of discovery. Any major damage not repaired within seven (7) days must be reported in writing to EPD within nine (9) days of discovery. All other items requiring repair must be completed within thirty (30) days of discovery. Repairs must be made in accordance with the Construction Specifications and must be conducted by qualified contractors with personnel who meet the requirements specified in the Construction Specifications.

4.1.3 Asphalt Parking Lot

Upon completion of the asphalt parking lot, it will be necessary to inspect the integrity of the asphalt layer, including making repairs to the asphalt cover, to correct the effects of weather, excessive use by the public, as well as staging during events. The inspection must evaluate the asphalt cover to ensure adequate quantity and quality of the asphalt and to ensure prevention of any breach of the asphalt, including punctures, into the soil cap and cover. Cracks in the asphalt layer need to be addressed to prevent erosion to the components of the final cover. Positive drainage of stormwater must be maintained across the asphalt parking lot to prevent ponding. The results of the inspection must be recorded on the M&M Inspection Log form in Appendix C. All maintenance of the asphalt parking lot must be documented in a logbook and on Maintenance Record forms.

4.1.4 Major Damage – Asphalt Parking Lot

The following conditions are considered major damage to the Asphalt Parking Lot:

- Cracks or potholes through the depth of the asphalt parking lot that cause erosion of the underlying soil cap
- Any damage to landfill liner system or slurry wall
- Settling of asphalt parking lot more than 3 inches in depth in any 12 inch area

If major damage is noted, EPD must be notified within 24 hours, and repairs must be completed within seven (7) days of discovery. Any major damage not repaired within seven (7) days must be reported in writing to EPD within nine (9) days of discovery. All other items requiring repair must be completed within thirty (30) days of discovery. Repairs must be made in accordance with the Construction Specifications and must be conducted by qualified contractors with personnel who meet the requirements specified in the Construction Specifications.

4.1.5 Concrete Cap

It is necessary to maintain the integrity and effectiveness of the concrete cap adjacent to and running along Northside Drive, including making repairs as necessary to correct the effects of settling, cracks, weather, construction along Northside Drive or other events, and preventing infiltration of surface water run-on and run-off from causing leaching of contaminated soils to the groundwater. The concrete cap must be inspected every calendar quarter. The inspection must evaluate the concrete cap to ensure adequate quantity and quality of the concrete cap to ensure prevention of surface water infiltration. Positive drainage must be maintained across the concrete cap to prevent ponding. The results of the inspection must be recorded on the M&M Inspection Log form in Appendix C. All maintenance of the concrete cap must be documented in a logbook and on maintenance Record forms.

4.1.6 Major Damage – Concrete Cap

The following conditions are considered major damage to the Concrete Cap:

- Cracks extending through the depth of the concrete cap
- Any gross damage (i.e, cracks, breakage, removal of concrete structures)
- Failure of epoxy seal such that surface water comes in contact with contaminated soil

- Any occurrence causing leaching of contaminated soil to the groundwater

If major damage is noted, EPD must be notified within 24 hours, and repairs must be completed within seven (7) days of discovery. Any major damage not repaired within seven (7) days must be reported in writing to EPD within nine (9) days of discovery. All other items requiring repair must be completed within thirty (30) days of discovery. Repairs must be made in accordance with the Construction Specifications and must be conducted by qualified contractors with personnel who meet the requirements specified in the Construction Specifications.

4.1.7 Granite Markers

The conservation easement mandates that the NDL Site be fitted with markers identifying the Site as a "restricted area". Granite markers were placed on each corner of the property boundary with additional markers installed across the NDL Site. The structural integrity of the markers must be maintained. The granite markers are to be inspected every calendar quarter. The results of the inspection must be recorded on the M&M Inspection Log form in Appendix C. All maintenance of the granite markers must be documented in a logbook and on Maintenance Record forms.

4.1.8 Major Damage – Granite Markers

The following conditions are considered major damage to the Granite Markers:

- Crushed, broken, or defaced markers making markers unreadable
- Markers removed from any corner of the property boundary
- Damage to concrete pad, such that the marker can be removed

If major damage is noted, EPD must be notified within 24 hours, and repairs must be completed within seven (7) days of discovery. Any major damage not repaired within seven (7) days must be reported in writing to EPD within nine (9) days of discovery. All other items requiring repair must be completed within thirty (30) days of discovery. Repairs must be made in accordance with the Construction Specifications and must be conducted by qualified contractors with personnel who meet the requirements specified in the Construction Specifications.

4.2 DRAINAGE SYSTEM

4.2.1 Drainage System

The drainage system is designed to prevent run-on and run-off from compromising the integrity of the cover. Debris and vegetation may build up and block passages for drainage from the landfill. Blockage in drainage areas could increase drainage in other areas and cause erosion. All drain structures (drop inlets, check dams, berms, and drainage swales) around the site must be inspected quarterly for debris or other obstructions that may prevent proper drainage. If any debris is found, it must be removed. Debris cleaned from the structures must be properly disposed off-site. Once a year, one of the quarterly inspections must be performed during a significant rain event so that the drainage system can be evaluated.

Drainage swales must be mowed/weed whacked a minimum of each calendar quarter. Clippings must be removed if clippings will result in thatching or obstruct drainage structures. All trash must be removed.

All erosion rills must be noted during the quarterly inspection. Erosion rills must be filled with topsoil, seeded with DOT approved similar grasses, mulched to prevent loss of seed, irrigated sufficiently to establish and maintain growth if needed, and if necessary, surface erosion control blankets must be installed.

All areas of ponding must be noted during the quarterly inspection. Ponding areas must be regraded, seeded, mulched, and if necessary, surface erosion control blankets installed to provide for drainage off of and away from the cover. Check dams must be checked for excess silt or buildup of debris. Excess silt/debris must be removed. Berms must be checked for erosion or slumping. If slumping or erosion is noted, the berm must be regraded, seeded, mulched, and if necessary, surface erosion control blankets installed. All maintenance of the drainage system must be documented in a logbook and on Maintenance Record forms.

4.2.2 Major Damage – Drainage System

The following conditions are considered major damage to the Drainage System:

- Any rill greater than one foot (1') wide and/or depth greater than six inches (6")
- An area of ponding with standing water forty-eight (48) hours after a rain event is considered
- Any check dam or berm that is breached

If major damage is noted, EPD must be notified within 24 hours, and repairs must be completed within seven (7) days of discovery. Any major damage not repaired within seven (7) days must be reported in writing to EPD within nine (9) days of discovery. All other items requiring repair must be completed within thirty (30) days of discovery. Repairs must be made in accordance with the Construction Specifications and must be conducted by qualified contractors with personnel who meet the requirements specified in the Construction Specifications.

4.3 GROUNDWATER MONITORING NETWORK AND DEWATERING WELL

4.3.1 Groundwater Monitoring Network and Dewatering Well

The groundwater-monitoring network and the dewatering well at the site must be maintained and inspected quarterly. Damage to the locks, wells, and well labels could result from vandalism or weathering. Any damage of the groundwater-monitoring network must be repaired. If locks have rusted and do not function properly, they must be replaced. All wells must remain securely locked.

Wells must be observed for accumulations of silt and sand by measuring the total depth during sampling and comparing these depths to previous and original depths. If an accumulation of silt or sand is noted, the well must be redeveloped. The wells must be visually inspected for signs of grout or concrete stress or failure, and the watertight locking caps must be inspected for cracked or torn rubber seals. It is required these wells be maintained and inspected to ensure the well integrity in accordance with the EPA's Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (EISOPQAM). All maintenance of the monitoring well system and the dewatering well must be documented in a logbook and on Maintenance Record forms.

4.3.2 Major Damage – Groundwater Monitoring Network and Dewatering Well

The following conditions are considered major damage:

- Damaged well cap
- Damaged well casing inside well
- Erosion undermining concrete pad around well
- Damage or cracking of concrete pad around well
- Damage to the manhole cover, such that the manhole cover no longer functions properly or protects underlying well from damage

If major damage is noted, EPD must be notified within 24 hours, and repairs must be completed within seven (7) days of discovery. Any major damage not repaired within seven (7) days must be reported in writing to EPD within nine (9) days of discovery. All other items requiring repair must be completed within thirty (30) days of discovery. Repairs must be made in accordance with the Construction Specifications and must be conducted by qualified contractors with personnel who meet the requirements specified in the Construction Specifications.

4.4 REPORTING

A landfill maintenance and inspection report that includes each inspection event, along with a cover letter, must be submitted to EPD with the groundwater monitoring report. Annually in the cover letter for the landfill maintenance and inspection report, the name, mailing address, telephone number and facsimile number of the person EPD should contact regarding the closure requirements associated with the landfill must be provided to EPD.

The landfill maintenance and inspection report must include the following signed certifications:

> I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate that information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief true and accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.
>
> _____
> Authorized Signature
>
> I certify that I am a qualified engineer who has received a baccalaureate or post-graduate degree in engineering, and have sufficient training and experience in designing and/or evaluating landfills, as demonstrated by State registration and completion of accredited university courses, that enable me to make sound professional judgment regarding the effectiveness of engineering controls at this site. I also certify that this report meets the requirements set forth in the Monitoring and Maintenance Plan for the site. I further certify that this report was prepared by myself or by a subordinate working under my direction.

PE Signature and Seal

An M&M review report must be submitted to EPD within sixty (60) days from the close of every fifth year that summarizes and evaluates maintenance of the cover, drainage system and wells through that time period and make recommendations as appropriate. EPD will review, comment, respond and/or approve these reports as appropriate.

5.0 PLANNED USES OF PROPERTY

Any use of the landfill must preserve the integrity and effectiveness of final cover of the landfill. The landfill's initial use was that of vacant contoured ground with a vegetative cover. A notification was submitted to GA EPD on March 7, 2005 regarding the change in use of the landfill. The use of the landfill as of July 1, 2005 will be that of a surface parking lot. Any future changes in use of the landfill/ parking lot must be approved by EPD and address the continuation of repairs to the engineering controls as necessary to correct the effects of settling, subsidence, erosion, or other events, and preventing run-on and run-off from causing erosion or otherwise damage to final cover. The M&M Plan must be reviewed and revised as appropriate. If it is determined the M&M Plan must be revised, the revised M&M Plan be submitted to EPD for review and approval within sixty (60) days of the change in use.

The landfill liner system is designed to support a H20 live load with a minimum of three feet of soil and road base cover. The total load (static and dynamic) placed on the landfill liner system (geomembrane and GCL layers) shall not be more than 8.3 pounds per square inch (psi). In addition, areas where high loads may be applied over the soil-bentonite slurry wall (entrance roads, heavy truck parking areas, etc) shall be structural reinforcement or bridged during installation of the roadway or parking lot using concrete, geogrid, geotextiles, etc. to prevent significant deformation of the landfill cover over the slurry wall. The concrete cap is designed to have a minimum of eight (8) inches of concrete cover. The concrete cap shall prevent the infiltration of surface water into the contaminated soils that remain adjacent to Northside Drive. As the parking lot may on occasion act as a staging area for events, at no time will the staging activities penetrate the asphalt cover, the engineered control cap, the soil bentonite slurry wall, or concrete cap.

5.1 NON-RESIDENTIAL USE

The landfill must be inspected annually with regard to the use of the landfill. Use of the landfill must remain non-residential use.

- The inspection must verify the use of the landfill by owners, tenants, and other occupants to be consistent with non-residential use.
- All contract and lease agreements, and informal agreement must be reviewed to insure it is consistent with the non-residential use.
- The conservation easement must be reviewed annually to ensure it is in place and the uses of the property must conform to the restrictions placed on the property.

The results of the inspection must be summarized in a landfill use statement.

5.2 REPORTING

A landfill use statement regarding compliance with the non-residential use must be submitted to EPD annually with the annual groundwater monitoring report.

The landfill use statement must include the following signed certification:

> I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate that information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief true and accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

_____

Authorized Signature

6.0 REFERENCES

Bouwer, H and R.C. Rice. 1989. The Bouwer and Rice Slug Test - An Update. Ground Water, Vol. 27, No. 3. May-June. Pages 304-309.

Cressler, C. W., C. J. Thurmond, and W. G. Hester. 1983. Ground Water in the Greater Atlanta Region Georgia. Information Circular 63. Georgia Geologic Survey.

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GA EPD. 1999. "Chapter 391-3-19: HAZARDOUS SITE RESPONSE." November.

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Tetra Tech. 2001. "Construction Specifications, Landfill Cap and Slurry Wall, Northside Drive Landfill, Atlanta, Fulton County, Georgia." Prepared for GA EPD. Atlanta, Georgia.

FIGURE 1

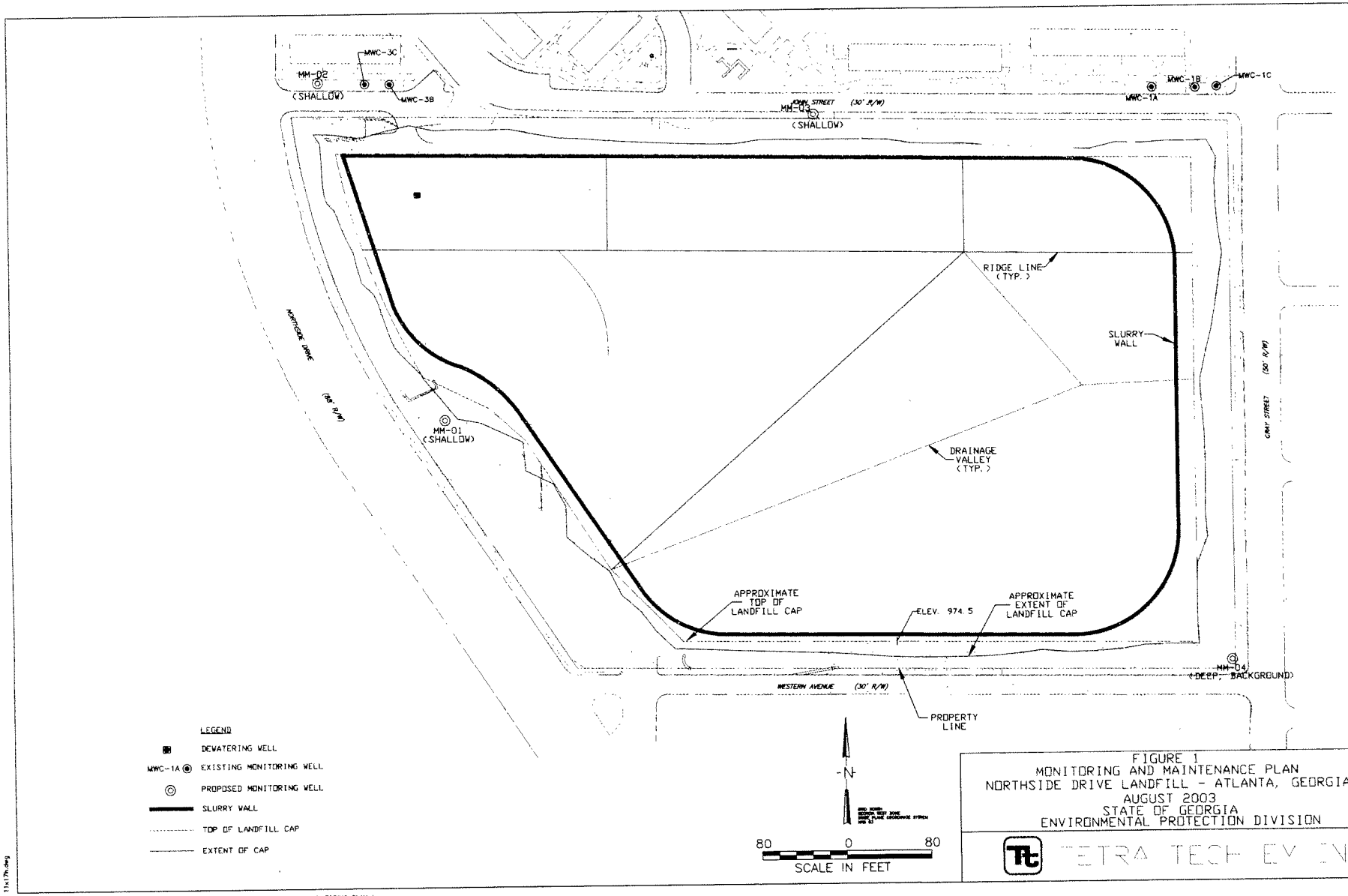

FIGURE 1
MONITORING AND MAINTENANCE PLAN
NORTHSIDE DRIVE LANDFILL - ATLANTA, GEORGIA
AUGUST 2003
STATE OF GEORGIA
ENVIRONMENTAL PROTECTION DIVISION

TETRA TECH EM INC

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CAD FILE NO./DATE: C:\GIS_WORKSPACE\Northside\Figure 2 - MAINTENANCE AND MONITORING PLAN.dwg

APPENDIX A

STATISTICAL DATA EVALUATION

A.1 Normality Testing

Determining whether the distribution of data is normal, lognormal, or that there is no underlying distribution is necessary in selecting the appropriate statistical test. Normal or lognormal distributions are usually evaluated with parametric statistical tests. Nonparametric tests are usually applied to data with no underlying distribution. This section presents the W test; however, other tests for normality or graphical evaluations may be used to determine the data distribution.

The W test, developed by Shapiro and Wilk (1965), can be used to determine whether the data distribution is normal, lognormal, or random. This test is appropriate for sample populations of less than 25. The null hypothesis (H_o) to be tested is that the population has a normal distribution. The alternative hypothesis (H_a) is the population does not have a normal distribution. The W test, as presented in Gilbert (1987), is conducted as follows:

1. Compute the denominator d of the W test statistic, using the n data.

$$d = \sum_{i=1}^{n} (x_i - \bar{x})^2 = \sum_{i=1}^{n} x_i^2 - \frac{1}{n}\left(\sum_{i=1}^{n} x_i\right)^2$$

2. Order the n data from smallest to largest to obtain the sample order statistics.

$$x_{(1)} \# x_{(2)} \# \ldots \# x_{(n)},$$

where

3. Compute k,

$$k = \frac{n}{2} \quad \text{if n is even}$$

$$k = \frac{n-1}{2} \quad \text{if n is odd}$$

4. Use Table A6 of Gilbert (1987) and for the observed n find the coefficients $a_1, a_2, \ldots, a_k$.

5. Then compute

$$W = \frac{1}{d}\left|\sum_{i=1}^{k} a_i \left(X_{[n-i+1]} - x_{[i]}\right)\right|^2$$

6. Reject H_o at the α significance level if W is less than the quantile given in Table A7 of Gilbert (1987).

If H_o is accepted, the data are normally distributed. If H_o is rejected, the data must be transformed to the log of the data. Then, the W test must be completed on the log of the data. If H_o is then accepted, the data are distributed lognormally. If H_o is rejected while performing this test on the data and the log data, the data are considered to have no underlying distribution (nonparametric).

A.2 Handling Nondetections

Many environmental data sets contain analytes that are not positively detected in each sample collected and analyzed. Instead, the data set must generally contain some samples with positive results for a particular chemical and others with nondetected results. The nondetected, or censored, results are usually reported as sample quantitation limits (SQLs). An SQL indicates that the chemical could not be detected above a particular concentration, which may vary from sample to sample. The chemical may be present at a concentration below the reported quantitation limit, or it may not be present in the sample at all. During evaluation of detection monitoring and background groundwater data, one-half the SQL must be used in statistical testing as a starting point. EPA guidance (1989) recommends using one-half the SQL. A value of zero (not detected) must be used in place of the SQL if one-half the SQL is greater than any of the detections. The effect of the SQL on statistical tests must be taken into account during the application of professional judgment.

A.3 Cochran's t-Test

The Cochran's t-test is a modified Student's t-test that is appropriate for use when the data sets have heterogeneous variances and unequal sample sizes. The criteria of normality, independence of data, complete frequency of detection, and appropriate sample size must also be met for this test to be used. However, a frequency of detection of 80 percent is being allowed.

The observed test statistic for the Cochran's t-test is calculated using the equation:

$$t_{obs} = (\bar{x}_1 - \bar{x}_2)/(W_1 + W_2)^{0.5}$$

where:

$\bar{x}_1$ = the mean of the first data set
$\bar{x}_2$ = the mean of the second data set
W_1 = the variance of the first data set divided by the sample size of the first data set
W_2 = the variance of the second data set divided by the sample size of the second data set

The t_{obs} value is compared to the expected t value (t_{exp}), which is calculated using the equation:

$$t_{exp} = (t_1 W_1 + t_2 W_2)/(W_1 + W_2)$$

where:

t_1 = t-value for the first data set taken from the t distribution table at the appropriate degree of freedom and level of significance
t_2 = t-value for the second data set taken from the t-distribution table at the appropriate degree of freedom and level of significance

The t_{obs} value is compared to the t_{exp} value; if the absolute value of t_{obs} is lower than t_{exp}, then there is no statistical difference between the two groups. The data indicate a release if t_{obs} is greater than t_{exp} and the mean of the site data is greater than the mean of the background data.

A.4 Wilcoxon Rank Sum Test

The Wilcoxon Rank Sum (WRS) test is a nonparametric version of the t-tests. The results of this test indicate when the measurements of one population are consistently higher or lower than measurements of a second population. Sample sizes need not be equal for the application of this test. However, the WRS test is somewhat sensitive to nondetect data. This test can handle a moderate number of nondetects by treating them as ties (equal in rank) (Gilbert 1987). However, if different SQLs are given for nondetects, this test may be weakened.

The WRS test is conducted by first ranking the combined site and background data from smallest to largest. Ranks are then assigned to each data point, starting with one for the lowest value and continuing until all data points have been assigned a corresponding rank. The ranks of the site data are then summed and compared to an acceptance range corresponding to a particular level of significance (0.05), the sample size of the site, and background data sets. If the sum of the ranks falls within the acceptance region, then the null hypothesis (that the site and background data are similar) is not rejected. If the rank sum exceeds the range, then the site concentrations are statistically greater than the background concentrations (Gilbert 1987, 1993). Tables found in Remington and Schork (1985) present the critical values for this test.

This approach can be used even when some data points are tied (equal in rank). In that case, the tied values are each given the mean value of the tied ranks. For example, if three data points were equal, and corresponded to the ranks of 3, 4, and 5, each of the data points would be ranked as 4 (Gilbert 1987, 1993). The next largest data point would have the rank of 6. If the number of tied ranks becomes large, however, the WRS test may not provide accurate results.

A.5 References

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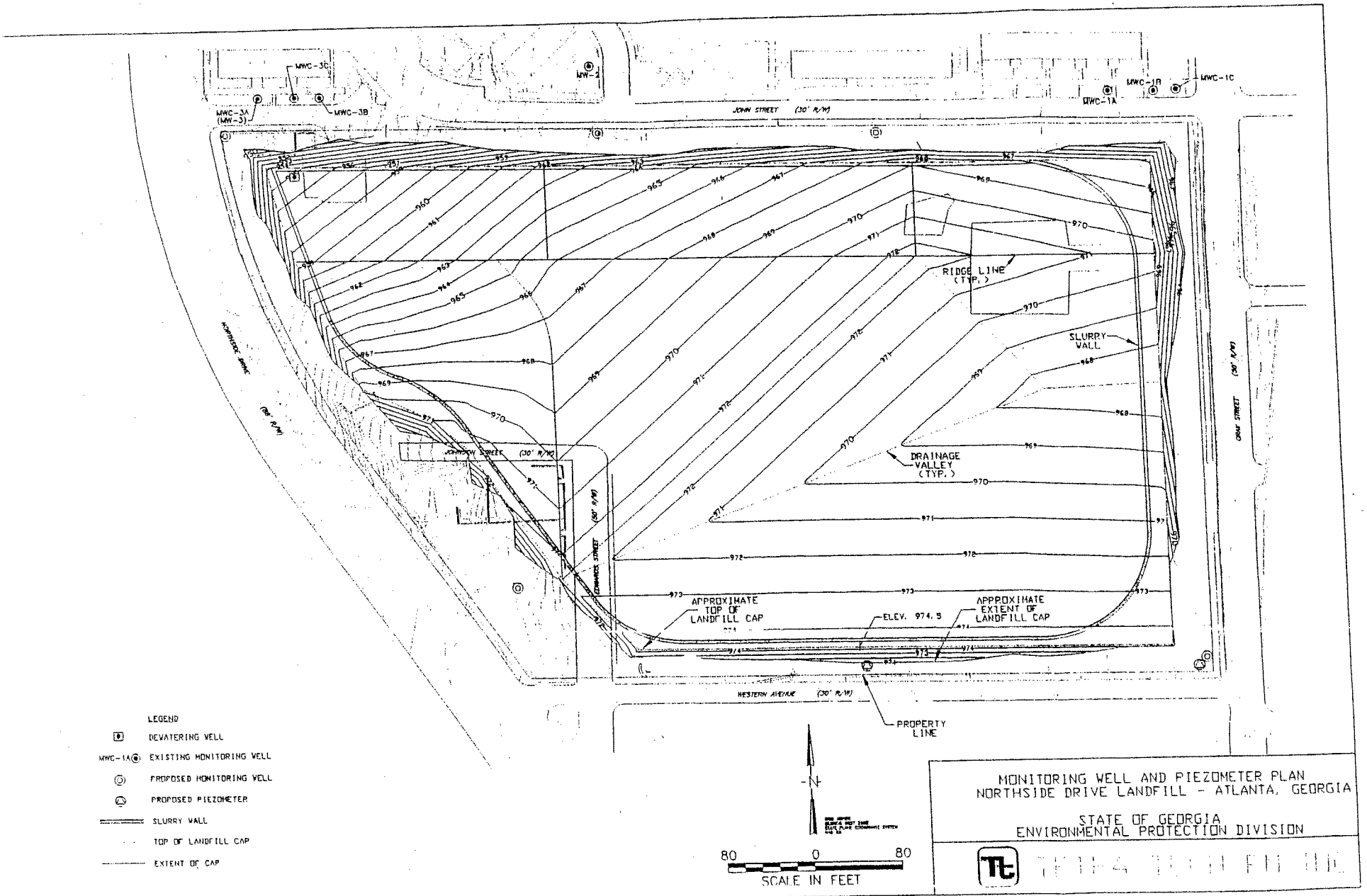
APPENDIX B

MONITORING WELL AND PIEZOMETER LOCATIONS



MONITORING WELL AND PIEZOMETER PLAN
NORTHSIDE DRIVE LANDFILL - ATLANTA, GEORGIA

STATE OF GEORGIA
ENVIRONMENTAL PROTECTION DIVISION

APPENDIX C

FORMS

NORTHSIDE DRIVE LANDFILL
ATLANTA, GEORGIA
M&M INSPECTION LOG

DATE: _____ WEATHER: _____

INSPECTOR(S): _____

Component Inspected	Condition of Component	Check if Major Damage

Comments:

NORTHSIDE DRIVE LANDFILL
ATLANTA, GEORGIA
MAINTENANCE RECORD FORM

DATE: _____ WEATHER: _____

INSPECTOR(S): _____

Component Inspected	Repair Dates		Inspector	Description of Repairs	Check if Major Damage
	Initiated	Completed			

GROUNDWATER SAMPLING DATA SHEET

SITE INFORMATION

Site Name: _____ Municipality: _____

Project Number: _____ County: _____

Personnel: _____ State: _____

Date: _____ Street or Map Location: _____

(If Off-Site): _____

WEATHER CONDITIONS AND EQUIPMENT

Temperature Range: _____ Equipment Name: _____

Precipitation: _____ Equipment Number: _____

Barometric Pressure: _____ Latest Calibration Date: _____

Tidally-Influenced [ ] Yes [ ] No

Well Number and Sample ID	Date/Time	Measurement made at top of: (PVC, casing?)	Water Level Indicator Reading (Feet)*	LNAPL or DNAPL present? (yes/no)	NAPL Description/ Thickness*

Deed Book 37106 Pg 7
Filed and Recorded Feb-24-2004 12:03pm
2004-0076090
Real Estate Transfer Tax $0.00
Juanita Hicks
Clerk of Superior Court
Fulton County, Georgia

[Space above this line for recorder's office]

After recording, return to:

Joan B. Sasine, Esq.
Powell, Goldstein, Frazer & Murphy LLP
191 Peachtree Street, 16th Floor
Atlanta, Georgia 30303

CONSERVATION EASEMENT

by and between

GEORGIA DEPARTMENT OF INDUSTRY, TRADE AND TOURISM,
on behalf of the
STATE OF GEORGIA,

GEORGIA WORLD CONGRESS CENTER AUTHORITY,

and the

STATE OF GEORGIA, DEPARTMENT OF NATURAL RESOURCES

CONSERVATION EASEMENT

THIS CONSERVATION EASEMENT Agreement (hereinafter referred to as "Agreement" or "Conservation Easement") is made this 16th day of February 2004, by and between GEORGIA DEPARTMENT OF INDUSTRY, TRADE AND TOURISM, on behalf of the STATE OF GEORGIA (hereinafter referred to as "Grantor"), and GEORGIA WORLD CONGRESS CENTER AUTHORITY an instrumentality of the State of Georgia and a public corporation (hereinafter referred to as "Holder"), and the STATE OF GEORGIA, DEPARTMENT OF NATURAL RESOURCES, a Department of the Executive Branch of the State Government of the State of Georgia, acting by and through its Environmental Protection Division (hereinafter referred to as "Enforcement Agent").

WITNESSETH THAT:

WHEREAS, Grantor is the owner in fee simple of that certain real property located in the City of Atlanta, Fulton County, Georgia, identified as Tax Parcel No. 14-0082-0006-12-1 and more particularly described on Exhibit A attached hereto and by this reference incorporated herein, hereinafter the "Property";

WHEREAS, the Property is impacted by "hazardous substances" as defined under the Georgia Hazardous Site Response Act, O.C.G.A. §12-8-90, *et seq.*, and, the Property is part of the site that, due to a release or releases of hazardous substances exceeding a reportable quantity, is listed on the Hazardous Site Inventory ("HSI") as HSI No. 10222 and has been designated as needing corrective action by the Director of the Georgia Environmental Protection Division;

WHEREAS, such corrective action has been undertaken and the State of Georgia, Custody in the Department of Industry, Trade and Tourism (hereinafter referred to as "DITT") acquired the Property after being granted a limitation on liability pursuant to O.C.G.A. 12-8-207 for environmental releases;

WHEREAS, such limitation of liability requires that the Property be subject to certain restrictions and the Grantor be subject to certain obligations;

WHEREAS, pursuant to O.C.G.A. § 44-10-1 *et. seq.* Holder desires to obtain a non-possessory interest in and impose limitations on the Property for the purpose of protecting public health and safety, the environment, and the natural resources by restricting, controlling, or otherwise limiting the use of the Property and impose affirmative obligations by providing for maintenance of engineering and institutional controls at the Property; and

WHEREAS, Enforcement Agent is willing to accept its obligations to enforce the terms of the Agreement; however, such acceptance shall not in any way be interpreted to constitute any waiver of, or limitation on, any regulatory or enforcement authority vested in Enforcement Agent pursuant to the laws and regulations of the State of Georgia or the United States of America.

NOW THEREFORE, Grantor, for and in consideration of the mutual covenants, terms, conditions and restrictions hereinafter set forth, and other good and valuable consideration, the

sufficiency of which is hereby acknowledged, has bargained, sold, granted and conveyed and by these presents does bargain sell, grant and convey onto Holder, forever and in perpetuity, and Holder hereby accepts, a Conservation Easement in, on, under, over, through and across the Property and to the extent set forth in this Agreement which easement rights shall include the right to enter the Property to inspect, monitor and enforce as well as the right of ingress and egress over adjoining land of Grantor as may be necessary to accomplish the purposes for which this Conservation Easement is granted.

ARTICLE I. PURPOSE

The purpose of this Conservation Easement is to protect public health and safety and the environment, and the natural resources by maintaining through permanent restrictions upon the use of the Property and providing that engineering and institutional controls required herein are maintained in perpetuity. This Agreement is an essential component for compliance with the Type 5 risk reduction standards at the Property to prohibit activities on the Property that may interfere with the corrective action, operation, maintenance, long-term monitoring, or other measures necessary to insure the integrity of the corrective action pursuant to Rule 391-3-19-.07(10) of Georgia Rules for Hazardous Site Response, as promulgated under the authority of the Georgia Hazardous Site Response Act, O.C.G.A. 12-8-90, *et seq.*

ARTICLE II. DEFINITIONS

A. "Hazardous Substances" shall have the same meaning as under HSRA, as hereinafter defined.

B. "HSRA" shall mean the Hazardous Site Response Act, O.C.G.A. § 12-8-90, *et seq.*

C. "Rules" shall mean the Rules for Hazardous Site Response, Chapter 391-3-19, as promulgated by the Board pursuant to the authority granted therein by O.C.G.A. 12-8-93, *et seq.*

D. "Grantor" as used herein shall include DITT, on behalf of the State of Georgia, Atlanta, Georgia, and its successors and assigns, and any other person or entity which may hereafter hold an interest in the Property, and any person or entity which acquires all or a part of the Property; provided, however, notwithstanding anything herein to the contrary, the obligations of DITT, on behalf of the State of Georgia, under this Agreement shall terminate in all respects at such time as DITT, on behalf of the State of Georgia, conveys title or otherwise transfers its possessory rights and possessory interest in the Property, or any portion of the Property, to any person or entity.

ARTICLE III. DURATION

The conservation easement created by this Agreement shall be perpetual in duration and the requirements and restrictions of this Conservation Easement are appurtenant to and run with the land, and shall be binding and enforceable against all owners of the Property including but not limited to lessees, and any trustee appointed to manage the Property. This Conservation Easement and all of the rights, interest and obligations herein shall remain in full force and

effect, in accordance with O.C.G.A. §44-5-60(c), unless and until the Director of the Environmental Protection Division ("Director") determines that the Property meets Type 1, 2, 3, or 4 risk reduction standards as defined in §391-3-19-.07 of the Rules and removes the Property from the Hazardous Site Inventory pursuant to §391-3-19-.05(4)(b) of the Rules at which time this Conservation Easement will automatically terminate without further action by the parties. Upon the Director's concurrence pursuant to §391-3-19-.06(6)(b) and removal of the Property from the HSI pursuant to §391-3-19-.05(4)(b), the Director shall provide notice to the Grantor, whereupon the Grantor may file any additional affidavit authorized pursuant to the Rules.

ARTICLE IV. RESTRICTIONS ON USE AND AFFIRMATIVE OBLIGATIONS

A. Grantor shall restrict the use of the Property to non-residential uses as defined in Section 391-3-19-.02(2)(i) of the Rules, as in effect at the time of this Agreement, which are incorporated herein by reference.

B. Grantor shall maintain the integrity of the institutional and engineering controls installed at the Property in the manner set forth in the Monitoring and Maintenance ("M & M") Plan, attached hereto and incorporated herein by reference as Exhibit "B."

C. Grantor shall delineate the restricted area by installing and maintaining permanent markers on four sides of the Property which shall have lettering of no less than half an inch in size containing the language on Exhibit "C," attached hereto and incorporated herein by this reference, Grantee shall maintain integrity of such markers.

D. Grantor shall notify Holder and Enforcement Agent in writing of the transfer of title in any portion of the Property no later than thirty (30) days after any such transfer has occurred provided that a failure of Grantor to do so will not impair the effectiveness of such transfer or the validity of the title acquired by the transferee.

E. Grantor shall provide a written report to the Holder and Enforcement Agent on July 1 of each year, certifying that the Property is in compliance with this Agreement.

F. Grantor shall record this Agreement in the real property records maintained by the Clerk of the Fulton County Superior Court and provide a copy with recordation information to the City of Atlanta, Fulton County, Holder, and Enforcement Agent.

ARTICLE V. GRANTOR'S USE

Any and all uses of the Property and any improvements thereon by the Grantor and conveyance of any and all interests in the Property and any improvements thereon shall be subject to and shall comply with the requirements and restrictions of this Agreement.

ARTICLE VI. RIGHTS OF ENFORCEMENT

A. Enforcement Agent and Holder may enter the Property for purposes of inspecting, monitoring and enforcing the institutional and engineering controls as identified in the M & M Plan. Enforcement Agent and Holder may enter areas of the Property accessible by the general

public at any time for such inspections. Enforcement Agent and Holder may enter other non-public area for such inspections only upon providing notice no later than seventy-two (72) hours before entering, unless such notice is waived by Grantor. The right of entry is limited to those areas of the Property reasonably necessary for such inspections and such entry shall not unreasonably interfere with any ongoing business located in such areas. To the extent necessary for the enforcement of this provision, the parties hereto assent to the assignment of Holder's obligations to the Enforcement Agent and their respective agents, representative, employees, and contractors.

B. Upon the discovery of a breach of any of the restrictions or obligations contained herein the discovering party shall provide notice to all other parties to this Agreement pursuant to Article VII.J no later than five (5) days after such discovery occurred and failure to do so will not constitute a waiver of any aggrieved party's rights hereunder.

C. Upon breach of any restriction or obligation contained herein and failure of the Grantor to act to remedy such breach no later than ten (10) days after receipt notice of such breach as set forth in Article VI.B, Enforcement Agent, Holder, or both may undertake any of the following:

(1) Enter the Property and pursue such legal and equitable remedies against the owner of the portion of the Property where such breach exists to abate the breach and restore the portion of the Property where such breach exists to compliance with this Agreement; if the Enforcement Agent must act, the Enforcement Agent may pursue rights of enforcement within its statutory authority, to include the seeking of civil penalties; or

(2) Enter the Property and perform activities necessary to restore the portion of the Property where such breach exists to compliance with this Agreement.

D. If the Holder becomes unwilling or unable to perform, or is ineffective in performing its obligations under this Agreement, whether by voluntary admission by Holder or by determination of the Enforcement Agent, the Enforcement Agent shall temporarily acquire, by notice to the Holder without the necessity of any further legal action, and assume the obligations of the Holder under this Agreement, until a new Holder is appointed by unanimous agreement of the Enforcement Agent and Grantor. Any admission or determination under this paragraph shall be rendered in writing to all parties to this Agreement. The appointment of a new Holder shall be documented by a written and recorded addendum to this Agreement.

E. Should the Holder become a subsequent Grantor, the Holder rights as a Holder created herein shall automatically terminate without the necessity of any further action by any party hereto and the easement rights shall automatically, without the necessity of action by any party hereto, vest in the Enforcement Agent until such time as conveyed by instrument of equal dignity to a subsequent Holder. Notice of the Holder's acquisition of the title to the Property shall be provided to the Enforcement Agent in accordance with Paragraph VII.J.

ARTICLE VII. GENERAL PROVISIONS

A. **Controlling Law.** The laws and regulations of the State of Georgia shall govern the interpretation and performance of this Agreement.

B. **Headings**. The use of headings, captions and numbers in this Agreement is solely for the convenience of identifying and indexing the various provisions in this Agreement and shall in no event be considered otherwise in construing or interpreting any provision in this Agreement.

C. **Control.** Nothing in this Agreement shall be construed as giving rise, in the absence of a judicial decree, to any right or ability of the Holder or Enforcement Agent to exercise physical or managerial control of the day to day operations of the Property, or of any of the Grantor's activities upon the Property, or to otherwise become an operator with respect to the Property.

D. **Assignment of Rights and Obligations**. Grantor may not convey title to the Property to third parties without the consent of the Holder and Enforcement Agent; such written consent shall not be unreasonably withheld. The Holder and the Enforcement Agent may not assign their respective obligations under this Agreement to third parties without the written consent of all other parties to this Agreement; such written consent shall not be unreasonably withheld.

E. **Effect of Assumption of Obligations by or Assignment of Obligations to Third Party.** No assumption or assignment of any obligation under this Agreement shall be effective to relieve any Grantor of its obligations hereunder, except where such assumption or assignment is the result of the transfer of a Grantor's possessory rights and possessory interest to the subject Property (or portion thereof).

F. **Effect of Breach by Grantor.** Subject to the limitations set forth in Paragraphs VII. D and E above, the failure of any owner of the Property, or its successor, to honor an obligation or restriction hereunder shall not relieve any other owner of the Property or its successor from the obligations or restrictions hereunder applicable to the Property.

G. **Non-Waiver.** Failure by any party to complain of any action, non-action or breach of any other party shall not constitute a waiver of any aggrieved party's rights hereunder. Waiver by any party of any right arising from any breach of any other party shall not constitute a waiver of any other right arising from a subsequent breach of the same obligation or for any other default, past, present or future.

H. **Successors.** In accordance with the terms herein, the covenants, terms, obligations and restrictions of this Agreement shall be binding upon and injure to the benefit of the parties hereto and to their respective successors and assigns, and shall continue as a servitude running in perpetuity with the Property. The terms Holder and Enforcement Agent, wherever used herein, and any pronouns used in the place thereof, shall include respectively the

appropriate above-named Holder and Enforcement Agent and their respective successors and assigns.

I. **No Forfeiture.** Nothing contained herein shall result in a forfeiture or reversion of Grantor's title in the Property in any respect.

J. **Notice.** Notice under this Agreement shall occur by delivery of written notice by regular United States Postage to the party receiving such notice at the address set forth in this document. Notice under Article IV.D shall include the address for notification to the new owner of the portion of the Property so conveyed.

K. **Property Notice.** This Property has been listed on the state's hazardous site inventory and has been designated as needing corrective action due to the presence of hazardous wastes, hazardous constituents, or hazardous substances regulated under state law. Contact the Property owner or the Georgia Environmental Protection Division for further information concerning this Property. This notice is provided in compliance with the Georgia Hazardous Site Response Act.

L. **Severability**. In the event any one or more of the provisions contained in this Agreement shall for any reason be held to be invalid, illegal or unenforceable in any respect in a final ruling or judgment of a court of competent jurisdiction from which no appeal has been or can be taken, the remainder of the provisions shall not be affected thereby and each term, condition and provision hereof shall remain valid and enforceable to the fullest extent permitted by law.

M. **Entire Agreement.** This Agreement, including all referenced attachments or exhibits, sets forth the entire agreement of the parties and supersedes all prior discussions, negotiations, understandings or agreements relating to the Agreement, all of which are merged herein. Any modifications to this Agreement, including changes to referenced attachments or exhibits, shall be in writing and recorded in the same manner as this Agreement.

IN WITNESS WHEREOF, the parties hereunto have set their hands and seals and cause these presents to be executed in their respective names by authority duly given and the respective seals affixed on the date and year above written.

[SIGNATURE PAGES ATTACHED]

DEPARTMENT OF INDUSTRY, TRADE AND TOURISM, ON BEHALF OF THE STATE OF GEORGIA

By: _____

Dan Graveline, Executive Director of the Georgia World Congress Center acting on behalf of and in his capacity as Agent for the Department of Industry, Trade and Tourism

Address: 285 INTERNATIONAL BLVD NW
ATLANTA, GA. 30313

_____
Official Witness

Barbara S. Housley
Notary Public
My Commission expires:

Notary Public, Dekalb County, Georgia
My Commission Expires Aug. 30, 2004

Notary Public, Dekalb County, Georgia
My Commission Expires Aug. 30, 2004

[SIGNATURE PAGES ATTACHED]

GEORGIA WORLD CONGRESS CENTER AUTHORITY

By: _____
Dan Graveline, Executive Director

Address: 285 INTERNATIONAL BLVD NW
ATLANTA, GA. 30313

_____
Official Witness

_____
Notary Public

My Commission Expires:

Notary Public, Dekalb County, Georgia
My Commission Expires Aug. 30, 2004

[SIGNATURE PAGES ATTACHED]

GEORGIA ENVIRONMENTAL PROTECTION DIVISION

By: _____

Its: _____

Address: _____

_____

_____
Official Witness

_____
Notary Public

My Commission Expires: MY COMMISSION EXPIRES 2/28/06

::ODMA\PCDOCS\ATL\728282\1

EXHIBIT A

[See 1 attached page]

All that tract or parcel of land lying and being in Land Lot 82 of the 14th District, Fulton County, Georgia, being more particularly described as follows:

BEGINNING at the intersection of the easterly right of way of Northside Drive (apparent 80' right-of-way) and the northerly right of way of Western Avenue (apparent 30' right-of-way): thence along the easterly right of way of Northside Drive the following courses and distances; North 34° 09' 12" West, 241.42 feet to a point; thence North 33° 33' 07" West, 35.38 feet to a point; thence North 30° 52' 02" West, 37.93 feet to a point; thence along a curve to the right having an arc distance of 304.52 feet with a radius of 737.56 feet being subtended by an chord with a bearing of North 17° 33' 34" West with a chord distance of 302.36 feet; thence leaving said right of way and continuing South 88° 35' 26" East, 94.84 feet along the abandoned northerly right of way of John Street (formerly having a 30' right of way); thence continuing along said abandoned right of way South 89° 14' 24" East, 155.17 feet to a point at the intersection of the abandoned northerly right of way of John Street with the existing northerly right of way of John Street (having an apparent 30' right of way); thence leaving the said right of way South 00° 42' 10" West, 30.00 feet to a point on the southerly right of way of said John Street; thence continuing along the said right of way the following; South 89° 17' 50" East, 635.54 feet to a point; thence South 89° 09' 53" East, 6.00 feet to a point at the intersection of the southerly right of way of John Street with the westerly right of way of Gray Street (having an apparent 50' right of way); thence continuing along the westerly right of way of Gray Street South 00° 08' 15" East, 514.53 feet to a point at the intersection of the westerly right of way of Gray Street with the northerly right of way of Western Avenue (having a 30' right of way); thence continuing along the said right of way North 89° 23' 13" West, 626.59 feet to a point at the intersection of the northerly right of way of Western Avenue with the easterly right of way of Northside Drive (having an apparent 80' right of way) and the point of BEGINNING.

Said parcel contains 9.4354 acres more or less and is subject to all right of ways and easements both recorded and unrecorded. Said parcel is the same as that shown on a survey by William C. Wohlford, RLS No. 2577, dated January 19, 2004 and is thus incorporated as a part of this description.

EXHIBIT B

[See 27 attached pages]

MONITORING AND MAINTENANCE PLAN FOR TYPE 5 RISK REDUCTION STANDARDS

NORTHSIDE DRIVE LANDFILL
Atlanta, Georgia

December 2003

TABLE OF CONTENTS

TABLE

1.0 INTRODUCTION

The Northside Drive Landfill (NDL) site is listed on the State of Georgia's Hazardous Site Inventory pursuant to the Georgia Hazardous Site Response Act, Official Code of Georgia Annotated (O.C.G.A.) §12-8-90 and associated Rules for Hazardous Site Response, Chapter 391-3-19. The landfill portion of the NDL site (landfill) was remediated using engineering and institutional controls. The engineering controls involved the installation of a soil-bentonite slurry wall and an engineered control cap as illustrated in the approved As-Built Drawings dated August 2003 and supporting documents. The institutional controls implemented were a deed notice and conservation easement that includes this Monitoring and Maintenance (M&M) Plan.

This M&M plan contains six sections, 3 appendices, and an attachment. Section 2.0 describes the current landfill monitoring and control systems. Section 3.0 presents the groundwater-monitoring plan. Section 4.0 contains the landfill maintenance and inspection plan. Section 5.0 describes land use of the landfill portion of the NDL site. References are presented in Section 6.0. The appendices are as follows: Appendix A contains descriptions of potential statistical data evaluation methods; Appendix B contains a figure; and Appendix C contains forms. As-built drawings of the landfill portion of the NDL site are presented in the Attachment.

2.0 CURRENT LANDFILL MONITORING AND CONTROL SYSTEMS

The engineering controls consist of a three foot wide soil-bentonite slurry wall which extends from the surface to bedrock around the landfill wastes and covered with an engineered control cap consisting of a geosynthetic clay liner, LLDPE liner, geocomposite drainage layer with two feet of select fill.

The following nine (9) groundwater monitoring wells and a dewatering well are located in and around the landfill as show in Figure 1, Appendix B:

- MWC-1A, MWC-1B, and MWC-1C, (located on the southeastern corner of Tax Parcel No. 14-82-6-8 at the corner of John and Gray Streets)
- MWC-3B, MM-02, and MWC-3C (located on the southwestern corner of Tax Parcel No. 14-82-6-8 at the corner of John Street and Northside Drive)
- Dewatering well (located within the limits of the engineering controls of the landfill at the northwest corner of the landfill)
- MM-03 (located midway along John Street)
- MM-01 (located midway along Northside Drive between Western Avenue and John Street)
- MM-04 which is the upgradient, background groundwater monitoring well (located near the corner of Western Avenue and Gray Street)

These wells are used to identify and/or evaluate the following conditions:

- Release of regulated substances from the landfill above background and/or the risk reduction standards of Section 391-3-19-.07 of the Rules
- Migration and/or expansion of regulated substances located outside of the landfill
- Measure groundwater levels inside and outside the slurry wall

3.0 GROUNDWATER-MONITORING PLAN

This section summarizes the regulated substances to be measured, sampling and analysis requirements including the sampling and analysis plan, data evaluation (statistical methods), and reporting requirements.

No natural surface water drainage features are present; therefore, a plan to monitor surface water is not included in this M&M Plan.

3.1 GROUNDWATER STANDARDS

The Georgia Type 1 risk reduction standards (Section 391-3-19-.07 of the Rules) for regulated substances will be used as the groundwater standards for the groundwater-monitoring plan.

3.1.1 Regulated Substances

The regulated substances for the NDL site include polynuclear aromatic hydrocarbons (PAH) and metals. Table 1 lists the regulated substances, the frequency at which they will be monitored, the Type 1 risk reduction standards (RRS), and the analytical methods that will be used. The selected analytical method must have detection limits at or below the Type 1 RRS listed in Table 1. Detection limit is the practical quantitation limit (PQL), defined in the Rules as the lowest concentration, for an approved analytical test method and for a given sample matrix, at which the quantity of a regulated substance can be measured with a stated degree of confidence under routine laboratory operating conditions. Monitoring for regulated substances at the frequencies given in Table 1 must be conducted for all monitoring wells including the background-monitoring well (See 3.1.2 for more detail). In addition, field parameters must be recorded at the same frequencies, as part of the monitoring plan. Field parameters include water level, pH, specific conductance, temperature, and turbidity. Section 3.2.2 (Sample Collection) gives a detailed explanation of the procedures to accurately evaluate and record field parameters.

3.1.2 Monitoring Frequency

Upon notification by the Georgia Environmental Protection Division (EPD) to initiate the groundwater-monitoring plan, groundwater-monitoring sampling shall be initiated within sixty (60) days of receipt of notification. The groundwater-monitoring plan will consist of the following activities:

- Measurements of field parameters (total depth of the well, water level, pH, specific conductance, temperature, and turbidity) for all groundwater monitoring wells and the dewatering well; and
- Sampling for the regulated substances included in Table 1 from all of the groundwater-monitoring wells.

The frequency of monitoring is provided in Table 1. The quarterly sampling will be based on calendar quarters ending March 31, June 30, September 30 and December 31. Reports must be submitted to EPD within thirty (30) days of the end of the calendar quarter for which the sampling was performed. The quarterly sampling will be performed for two years to establish existing conditions and background data that could be used for statistical analysis, if warranted. After two years of quarterly sampling and unless notified otherwise by EPD, the frequency of groundwater sampling will be reduced to once annually with the annual report due to EPD within thirty (30) days of the end of the quarter for which the sampling was performed. An M&M review report must be submitted to EPD within sixty (60) days from the close of every fifth year that summarizes and evaluates groundwater trends discerned through that time period and make recommendations as appropriate.

Table 1
Regulated Substances for Groundwater
Northside Drive Landfill

Regulated Substance	Frequency of Groundwater Monitoring*	Type 1 RRS (mg/L)	Analytical Method
Organics			
Acenaphthene	Quarterly for 2 years, then annually	2	SW846 8310
Acenaphthylene	Quarterly for 2 years, then annually	PQL[a]: 0.023	SW846 8310
Anthracene	Quarterly for 2 years, then annually	PQL[a]: 0.0066	SW846 8310
Benzo(a)anthracene	Quarterly for 2 years, then annually	0.0001	SW846 8310
Benzo(k)fluoranthene	Quarterly for 2 years, then annually	PQL[a]: 0.00017	SW846 8310
Benzo(b)fluoranthene	Quarterly for 2 years, then annually	0.0002	SW846 8310
Benzo(g,h,i)perylene	Quarterly for 2 years, then annually	PQL[a]: 0.00076	SW846 8310
Benzo(a)pyrene	Quarterly for 2 years, then annually	0.0002	SW846 8310
Chrysene	Quarterly for 2 years, then annually	0.0002[b]	SW846 8310
Dibenz(a,h)anthracene	Quarterly for 2 years, then annually	0.0003	SW846 8310
Fluoranthene	Quarterly for 2 years, then annually	1	SW846 8310
Fluorene	Quarterly for 2 years, then annually	1	SW846 8310
Indeno(1,2,3-cd)pyrene	Quarterly for 2 years, then annually	0.0004	SW846 8310
Naphthalene	Quarterly for 2 years, then annually	0.02	SW846 8310
Phenanthrene	Quarterly for 2 years, then annually	PQL[a]: 0.0064	SW846 8310
Pyrene	Quarterly for 2 years, then annually	1	SW846 8310
Metals			
Beryllium	Quarterly for 2 years, then annually	0.004	SW846 6010B
Lead	Quarterly for 2 years, then annually	0.015	SW846 6010B
Mercury	Quarterly for 2 years, then annually	0.002	SW846 7470A

Notes:

* Frequency of groundwater monitoring may be modified only upon receipt of EPD's approval.

a The PQL presented is the value provided in SW846 Method 8310 for a typical groundwater matrix in the absence of interference. Interference may cause the PQL value to increase. As such, this PQL value is provided for guidance and may not always be achieved.

b The health based drinking water criterion for this substance/analyte is lower than the lowest currently achievable and available detection limit. According to Rule 391-3-19.07(4)(e), the detection limit or background must be the Type I groundwater concentration criterion for this substance/analyte.

mg/L Milligrams per liter
PQL Practical quantitation limit
SW 846 U.S. EPA. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. Including updates I, II, IIA, IIB, III, and IIIA to the Third Edition. September 1986 through 1998.

3.2 SAMPLING AND ANALYSIS PLAN

This section provides the methodology for groundwater sampling and analysis of both background and detection monitoring wells.

The regulated substances to be measured and the frequency at which samples must be collected appear in Table 1. Field parameters include total depth of the well, water level, specific conductance, pH, temperature, and turbidity. Regulated substances and field parameters must be monitored quarterly for the first 2 years and then annually thereafter unless notified otherwise by EPD. An M&M review report must be submitted to EPD within sixty (60) days from the close of every fifth year that summarizes and evaluates groundwater trends discerned through that time period and make recommendations as appropriate.

Water levels must be measured on a quarterly basis from the monitoring wells and the dewatering well to record the fluctuations of the water table due to seasonal effects. High water table conditions typically occur during the winter and spring, due to precipitation. Low water table conditions predominate in the summer and fall due to lower relative precipitation. Water level, other field parameter measurements and first-year quarterly sampling events must be timed so that two quarterly events are conducted during high water table conditions and two quarterly events are conducted during low water table conditions.

The following sections describe procedures for measuring water levels and field parameters and collecting groundwater samples. Water level measurements for a well must be completed before presample purging of the well is conducted. Water level measurement and sample collection must be conducted at the background well first, followed by detection wells and finally the dewatering well. Powderless latex gloves must be worn during water level measurements and groundwater sampling and must be changed between wells. The water level indicator must be decontaminated between wells. All information collected in association with water level measurement, other field parameters and groundwater sampling must be recorded on the groundwater sampling data sheets (Appendix C) and in a logbook. All activities associated with measurements of water levels and field parameters and collection of groundwater samples must be performed in accordance with the most recent edition of the EPA's Environmental Investigation Standard Operating Procedures and Quality Assurance Manual (EISOPQAM).

3.2.1 Water Level Measurement

The equipment required for water level measurement includes:

- Electric water level indicator (probe)
- Logbook
- Well keys
- Decontamination equipment (tubs or buckets, brushes, phosphate-free laboratory-grade detergent, distilled, deionized water, wastewater container)
- Photoionization detector (PID)
- Powderless surgical gloves

After removing the protective cap and casing cap, the breathing zone must be checked for organic vapors using the PID. If elevated breathing zone vapors are encountered, the sampling team must leave the well and don the appropriate level of personal protective equipment (PPE) before continuing. Action levels and appropriate PPE must be specified in the site-specific health and safety plan. The PID must also be used to survey vapors inside the top opening of the well casing.

To measure the water level in the casing, the probe must be lowered into the casing until the light or sound alarm is activated, indicating that the probe has touched the water surface. Before the water level is measured, the probe and its cable must be physically checked against a measuring tape to verify that the water level indicator has not been cut or altered and to confirm that the indicator's reading is accurate. The static water level must be read directly from the indicator cable by holding the cable to the permanent mark at the top of the well casing and reading off the depth to the nearest 0.01 foot. The probe must be raised and lowered two more times in order to obtain two more measurements; the three readings must then be averaged and recorded in the logbook. Next, the probe must be lowered until it encounters resistance, indicating it has reached the bottom of the well casing. This depth must be read off the cable and recorded in the logbook.

The probe and cable must be washed with a phosphate-free laboratory-grade detergent after they are retrieved from the well, and rinsed in distilled, deionized water. Wash and rinse water must be contained in a wastewater container before proceeding to the next well.

PID readings, as well as general observations of the appearance and condition of the well casing and protective outer casing, must be recorded in a logbook and on the groundwater sampling data sheets.

3.2.2 Sample Collection

In addition to the equipment listed above for water level measurement, sample collection must require the following equipment:

- Sample containers and labels
- Calibrated bucket (example: 5-gallon bucket)
- Coolers, and ice
- Permanent marker
- Low-flow sampling pump (for example, bladder, variable speed, peristaltic)
- Groundwater sampling data sheets
- Instruments for measuring field parameters

All instruments used for measuring field parameters must be calibrated at the beginning of each day of sampling. The instruments response to a calibration standard must be recorded in the logbook and on the groundwater sampling data sheets for all instruments, including those not typically calibrated in the field (such as a specific conductivity meter). The makes, models, serial number, and dates of last calibration of all instruments used must be recorded in the logbook. The sources, lot numbers, and expiration dates of the standards solutions used for calibration must also be recorded in the logbook.

After measuring the water level and bottom of well casing, the water volume within the well casing must be calculated. The volume of water inside the well casing is determined by subtracting from the total depth of well casing the depth to groundwater, and multiplying the height of water in the casing by 0.163 gallons per linear foot (for a 2-inch inner diameter well).

Wells must be purged a minimum of three casing volumes and sampled with a low flow pump. Water must be discharged from the pump to a calibrated bucket that has volumes marked in increments of gallons or fractions of gallons. A sample of purge water must be discharged into a beaker or other container after each casing volume is removed from the well, for measurement of field parameters. The purge water must be contained in a wastewater container (such as a 55-gallon drum). If stability of the field parameters is not

achieved within purging of 3 well volumes, the sampling team leader must make the determination whether to sample the well.

Field parameters must be measured and recorded on the groundwater sampling data sheets and in a logbook along with the associated cumulative purge volume. Observations of purge water appearance must also be entered on the groundwater sampling data sheet and in a logbook. The well must be purged until field parameters are stable between three consecutive measurements. To be considered stable, field parameters must change by no more than the following tolerance levels: pH measurements remain constant within 0.1 Standard Unit, specific conductance varies no more than 10 percent, and temperature is constant for three consecutive readings. Turbidity must also be measured and recorded. Stability is achieved when pH, specific conductance, and temperature have stabilized and the turbidity has either stabilized or is below 10 Nephelometric Turbidity Units (NTU) (EISOPQAM).

Water levels must be periodically monitored with a water level indicator while purging. The purging rate must be adjusted to avoid purging the well dry.

All preservatives must be added to containers prior to sampling. Samples collected in pre-preserved containers must not be overfilled. The order of sample collection is as follows:

1. PAHs
2. Metals

This sample order is determined largely by the volatility of the sampled constituent, with the most volatile being sampled first. Sample containers must be labeled and placed in a cooler with ice immediately after the containers are filled. Before delivery to the analytical laboratory, all samples must be containerized and packaged to maintain sample integrity and chain of custody.

Any equipment (such as a water level indicator) that will be used to sample in more than one well must be decontaminated using a phosphate-free detergent and rinsed with distilled and deionized water. Any purge water and solid wastes such as PPE, etc. generated during the groundwater monitoring and sampling events must be disposed of properly within thirty (30) days of completion of the event. At no time shall empty containers be stock piled and/or stored on the NDL site.

3.2.3 Sample Labeling and Documentation

Samples must be labeled immediately after collection. At a minimum, sample labels must include sample identification (ID) number, date of collection, time of collection, preservative used, required analyses, and sampler names. The name of the well must be used as the ID number (for example, MW-1). The ID number must also be included in the logbook, chain-of-custody forms, and other records documenting sampling activities. The label must be covered with clear plastic tape to prevent damage after it is filled out.

In addition to sample labels, field-sampling activities require other forms of documentation. This additional documentation is necessary to provide an accurate record of sampling events and field observations. This information must be recorded in logbooks, groundwater sampling data sheets, and chain-of-custody forms. Example forms are provided in the Appendices.

Documentation must be completed legibly in ink. Errors must be crossed out with a single line, dated, and initialed by the sampling team member recording the information. Unused portions of logbook pages must be crossed out, and each page must be signed and dated by the sampling team member who made the entry.

3.2.4 Sample Shipment and Chain of Custody

After samples are collected, labeled, and sealed with custody seals, they must be placed in iced coolers. Inert packing materials (such as vermiculite) must be placed around sample containers to prevent breakage. Coolers must be stored in a secured location until they are shipped to the analytical laboratory. Chain-of-custody (COC) forms must be completed for all samples. Before shipment, the field sample custodian and the courier receiving the samples must sign the COC form. A copy of the COC form must be retained for the project files. After the COC form has been completed and signed, it must be inserted in a sealed plastic bag and taped inside the lid of the cooler. The cooler must be sealed with a minimum of two seals (signed and dated by the field sample custodian), so that the seals must be broken to remove the samples. The field chain of custody terminates when the laboratory receives the samples. At that time, the laboratory assumes responsibility for custody. Upon receipt at the laboratory, a laboratory representative must inspect the contents of the cooler, sign the COC form, and list the date and time.

3.2.5 Quality Control Samples

The quality assurance and quality control (QA/QC) guidance outlined in the EISOPQAM must be followed. QA/QC field samples must be collected to evaluate whether data quality has been affected by field activities or other outside events. QA/QC field samples include field duplicates and equipment blanks. Additional sample volumes must also be collected for matrix spike and matrix spike duplicate (MS/MSD) samples.

Field duplicate samples are used to assess the reproducibility and representativeness of results. Field duplicate samples are collected in a manner identical to the real sample, but are submitted blind to the analytical laboratory. The well the field duplicate sample was collected from must be recorded in the logbook and on the groundwater sampling form. Field duplicate samples must be collected once for every 10 wells sampled (one every sampling event).

Equipment blanks are collected to assess the quality of decontamination procedures used on nondisposable sampling equipment (equipment used in more than one well). Equipment blanks are obtained by flushing the sampling equipment with deionized water after it has been decontaminated and air-dried. The flush water must then be containerized and analyzed for the same constituents as the groundwater samples. Field duplicate must be collected at a frequency of one per sampling event.

MS/MSD samples gauge the accuracy and precision of the data derived from sample analysis. Although spiking is an internal laboratory procedure, the laboratory typically requires that a triple volume be collected for MS/MSD samples. A triple volume of a sample chosen at the discretion of the sampling team must be collected, and each container must be labeled with the same ID number. Under the remarks or comments on the chain-of-custody form, the triple volume must be noted as collected for MS/MSD. MS/MSDs must be collected at a frequency of 1 per 20 wells sampled or at least once during every sampling event, whichever is more frequent.

3.2.6 Laboratory Analysis

A laboratory that complies with the O.C.G.A. 12-2-26, Georgia Commercial Analytical Laboratory Act and associated Rules must analyze the groundwater samples. Samples must be analyzed using the methods presented in Table 1. The analytical laboratory is required to have a QA/QC plan to assure the reliability of analytical results. Any report that submits analytical results to EPD must include a certification that complies with Chapter 391-3-26 of the Rules for Commercial Environmental Laboratories.

3.3 DATA EVALUATION

Analytical results and field parameters must be evaluated to determine if a release has occurred from the landfill to groundwater or if groundwater is infiltrating the slurry wall or engineered control cap. This data validation and evaluation process consists of data review, tabulation of qualified data, review and handling of outlying data, statistical analysis, and professional judgment screening. Analytical results from the background well and detection monitoring wells must be tabulated and evaluated separately before making any statistical comparison. Inferential statistical tests can be performed only on regulated substances detected in monitoring well samples after a year of quarterly sampling (4 sampling events).

Regulated substances not detected in background well samples, but detected in one or more detection monitoring well samples, must be evaluated using professional judgment as discussed in Section 3.3.4 to determine if the detection represents a release from the landfill or has some other plausible cause.

Professional judgment must be applied throughout the data evaluation process, but is essential for two areas in particular: data quality and statistical interpretation. Professional judgment is required for: determining that results are representative of aquifer conditions, the handling of outliers, and determining if the statistical tests were failed (reject the null hypothesis, H_o, that there is no significant difference between the data sample means for the background and detection monitoring wells) as a result of a release from the landfill.

3.3.1 Analytical Data Validation and Tabulation

To evaluate data quality, all data received from the laboratory must be subjected to the EPA's EISOPQAM data validation process. The data quality review must include a report on data quality, which must discuss among other things, detections of any regulated substances in blanks and other QA/QC results. The data must be examined for any other errors, such as those made during transcription. Any data quality issues that may affect the outcome of statistical tests must be noted. The representativeness of the results must also be reviewed and noted.

Qualified data must be tabulated in a format presenting all ID numbers, dates of sampling, and results for all analyses. Separate tables must be generated for detection monitoring well data and background well data. Data evaluation may include summary statistics tables, graphs, and concentration plots. Results from each detection monitoring well must be independently compared to background.

3.3.2 Outlier Evaluation

An unavoidable problem in the statistical analysis of environmental data is the presence of outliers. Outliers are extreme (high or low) values that are widely divergent from the main body of data (Gad and Weil 1989). Outliers may arise from mistakes such as transcription, data-coding errors, instrument breakdowns, calibration problems, and power failures. Additionally, they may arise due to the inherent spatial or temporal variability of the regulated substance (Gad and Weil 1989). Outliers disproportionately affect the statistical descriptors of the data set, biasing the mean and standard deviation toward the outlying observation. Therefore, it is important to identify and investigate outliers in the data and treat them appropriately.

Outliers can be identified by visual inspection of data, use of a scattergram (or other graph), or by a large increase in the standard deviation (if the data set is small enough, as is the case with this monitoring plan) (Gad and Weil 1989). Professional judgment must be used with the above techniques to determine the presence of suspect outliers. If not obvious, a test for a single outlier, such as that described by Dixon (1953), may be applied. However, because one outlier may mask another, such tests may not identify an outlier (Gilbert 1987).

Once identified, outliers must be corrected, discarded, or retained. Outliers that are obvious mistakes must be corrected, when possible. Outliers that are not obvious mistakes must be reviewed to determine the cause. The outlier must be discarded if a cause is identified (that is not a result of geochemical variation of the landfill). Causes that might warrant discarding an outlier might include field or laboratory contamination, matrix interference, or calibration problems. If the outlier can neither be corrected nor discarded, the outlier may be retained in the data set for statistical testing. Statistical testing may be conducted with the outlier both present and absent from the data set to determine the effect on the statistical test outcome.

3.3.3 Statistical Tests

Statistical tests consistent with those required in the *Guidance for Data Quality Assessment, Practical Methods for Data Analysis* (EPA QA/G-9 QA00 Update) must be used for the data evaluation. Statistical comparisons and tests must be calculated only for regulated substances that are detected in samples collected from both background and detection monitoring wells. When a regulated substance is detected only in samples from detection monitoring wells and not in samples from background wells, it must be evaluated using professional judgment prior to verification sampling for confirming a release from the landfill.

The minimum sample size necessary for meaningful inferential statistical tests is four. This sample size must be achieved after one year of quarterly sampling. The inferential test that must be performed is determined by the distribution of data (parametric or nonparametric) and the frequency of detection. The data must first be tested to determine whether the data distribution is normal or random. If the data are normally distributed, a parametric test (for instance the Cochran's t-test) may be used to compare data sample means between detection wells and the background well. If the data are randomly distributed, a nonparametric test (for instance, a Wilcoxon Rank Sum [WRS] test) must be performed to compare data sample means between detection monitoring wells and the background well. A parametric test must be performed if data are normally distributed and regulated substances are detected at a frequency of 80 percent or greater. A nonparametric test must be used for data that are randomly distributed or are detected at a frequency of less than 80 percent. Appendix A describes normality testing, handling of non-detections, and the Cochran's t-test and the WRS test. All inferential statistical tests must be performed at a level of significance (p-value) of 0.05 (0.95 confidence level).

3.3.4 Professional Judgment

No statistical test or comparison alone can identify a release with absolute confidence. Identifying a release requires a combination of more than one statistical test and professional judgment. The identification of any regulated substance as differing from background concentrations (rejection of H_o) is subject to professional judgment. Professional judgment must be applied to prevent reporting of statistically significant evidence of a release that is at the landfill (a false positive). Professional judgment must always be accompanied by a plausible explanation. Factors that may cause a regulated substance to be identified as statistically different from background, though not as a result of a release, include the effect of non-detects in the statistical test, Type I error rates, spatial and temporal distribution of constituents, and off-site releases. This step is similar to that taken when data are initially reviewed for influences such as field or laboratory contamination. Professional judgment must also be applied to detections in detection monitoring wells when the regulated substance is not detected in a background well.

3.3.5 Verification Procedure for Suspected Releases

Verification sampling must be conducted if statistically significant or other evidence of a release is not rejected by professional judgment. Only those detection monitoring wells in which a suspected release was

detected must be resampled; however, if the next sampling event takes place prior to identifying a suspected release, this newly collected data might be used. Results from resampling must be compared to existing background data for a regulated substance that may have been released. A discrete retest (using only the newly-collected detection monitoring well data) must be performed.

3.4 REPORTING

A groundwater monitoring report including data evaluation, along with a cover letter, must be submitted to EPD.

The groundwater monitoring report must be submitted within thirty (30) days of the end of the calendar quarter in which the sampling event occurred. The report must include tabulation of qualified analytical results and a narrative summary of the results. The report must include analysis of water level data and groundwater flow direction and gradient. The report must discuss any deviations from the M&M plan. The report must also provide the data validation report and the results of QA/QC sampling and analysis.

An annual groundwater monitoring report must include a narrative summarizing all the data collected within a year's monitoring events and a statistical evaluation of the data.

The groundwater monitoring report must include the following signed certifications:

> I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate that information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief true and accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.
>
> _____
> Authorized Signature
>
> I certify that I am a qualified groundwater scientist who has received a baccalaureate or post-graduate degree in the natural sciences or engineering, and have sufficient training and experience in groundwater hydrology and related fields, as demonstrated by state registration and completion of accredited university courses, that enable me to make sound professional judgments regarding groundwater monitoring and contaminant fate and transport. I further certify that this report was prepared by myself or by a subordinate working under my direction.
>
> _____
> Georgia Registered Professional
> Geologist or Engineer

An M&M review report must be submitted to EPD within sixty (60) days from the close of every fifth year that summarizes and evaluates groundwater trends discerned through that time period and make recommendations as appropriate. EPD will review, comment, respond and/or approve these reports as appropriate.

4.0 LANDFILL MAINTENANCE AND INSPECTION PLANS

This section of the M&M plan describes the methods, procedures, and processes that must be used to inspect and maintain the engineering controls of the landfill. These components include final cover and grading; drainage system; and groundwater monitoring network. Use of the property must not disturb the integrity of the soil cap and liner system of the landfill or any other components of the containment system, or the function of the monitoring systems. Maintenance and inspection of the landfill must be performed by person(s) experienced in the maintenance and inspection of the engineering controls at the landfill through both professional training and educational experience sufficient to evaluate the condition of the landfill as it relates to the requirements set forth below. Minimum experience requires the inspector be a Georgia certified Professional Engineer with experience in the design and/or evaluation of landfills.

Maintenance and inspection activity documentation includes the M&M Inspection Log form and Maintenance Record form. Inspection logs include the date of the inspection, name of the inspector(s), component inspected, weather conditions, condition of the item inspected, notation of any damages requiring attention and indicate if the noted damage would be classified as major damage. A copy of the M&M Inspection Log form is in Appendix C. Maintenance records include the dates repairs were initiated and completed, and the name of the person recording the information. Comments describing the severity of the damage (i.e.: major) must also be noted on the maintenance record along with a description of the repairs. A copy of the Maintenance Record form is in Appendix C.

4.1 FINAL COVER AND GRADING

It is necessary to maintain the integrity and effectiveness of the soil cap and vegetative cover, including making repairs to the cover as necessary to correct the effects of settling, subsidence, erosion, or other events, and preventing run-on and run-off from causing erosion or other damage to the soil cap and vegetative cover. The cover must be inspected every calendar quarter. The inspection must evaluate the vegetative cover to ensure adequate quantity and quality of the vegetative cover, and the soil cap to ensure prevention of erosion and ponding. The results of the inspection must be recorded on the M&M Inspection Log form in Appendix C.

A satisfactory stand of grass plants will be considered a minimum of 10 grass plants per square foot and total bare spots less than two percent (2%) of the total area. The cover will be mowed a minimum of each calendar quarter during the growing season and once at the end of the growing season. More frequent mowing is required if it is determined additional mowing is required to maintain a satisfactory stand of grass plants and/or grass height exceeds eight inches (8"). During mowing, clippings must be removed if clippings will result in thatching that inhibits growth of desires grass plants. Maintenance of the cover shall include eradication of weeds, removal of trees or other woody plants, removal of trash, and fertilization if necessary.

All erosion rills must be noted during the quarterly inspection. Erosion rills must be filled with topsoil, seeded with similar grasses, mulched to prevent loss of seed, irrigated sufficiently to establish and maintain growth if needed, and if necessary, surface erosion control blankets must be installed. Any rill greater than one foot (1') wide and/or depth greater than three inches (3") is considered major damage. All areas of ponding must be noted during the quarterly inspection. Ponding areas must be regraded, seeded, mulched, irrigated sufficiently to establish and maintain growth if needed, and if necessary, surface erosion control blankets installed to provide for drainage off of and away from the cover. An area of ponding with standing water forty-eight (48) hours after a rain event is considered major damage. All maintenance of the cover must be documented in a logbook and on Maintenance Record forms.

If major damage is noted, repairs must be completed within seven (7) days of discovery. Any major damage not repaired within seven (7) day must be reported in writing to EPD within nine (9) days of discovery. All other items requiring repair must be completed within thirty (30) days of discovery.

4.2 DRAINAGE SYSTEM

The drainage system is designed to prevent run-on and run-off from compromising the integrity of the cover. Debris and vegetation may build up and block passages for drainage from the landfill. Blockage in drainage areas could increase drainage in other areas and cause erosion. All drain structures (drop inlets, check dams, berms, and drainage swales) around the site must be inspected quarterly for debris or other obstructions that may prevent proper drainage. If any debris is found, it must be removed. Debris cleaned from the structures must be properly disposed off-site. Once a year, one of the quarterly inspections must be performed during a significant rain event so that the drainage system can be evaluated.

Drainage swales must be mowed/weed whacked a minimum of each calendar quarter. Clippings must be removed if clippings will result in thatching or obstruct drainage structures. All trash must be removed. All erosion rills must be noted during the quarterly inspection. Erosion rills must be filled with topsoil, seeded with DOT approved similar grasses, mulched to prevent loss of seed, irrigated sufficiently to establish and maintain growth if needed, and if necessary, surface erosion control blankets must be installed. Any rill greater than one foot (1') wide and/or depth greater than six inches (6") is considered major damage. All areas of ponding must be noted during the quarterly inspection. Ponding areas must be regraded, seeded, mulched, and if necessary, surface erosion control blankets installed to provide for drainage off of and away from the cover. An area of ponding with standing water forty-eight (48) hours after a rain event is considered major damage. Check dams must be checked for excess silt or buildup of debris. Excess silt/debris must be removed. Berms must be checked for erosion or slumping. If slumping or erosion is noted, the berm must be regraded, seeded, mulched, and if necessary, surface erosion control blankets installed. Any check dam or berm that is breached is considered major damage. All maintenance of the drainage system must be documented in a logbook and on Maintenance Record forms.

If major damage is noted, repairs must be completed within seven (7) days of discovery. Any major damage not repaired within seven (7) day must be reported in writing to EPD within nine (9) days of discovery. All other items requiring repair must be completed within thirty (30) days of discovery.

4.3 GROUNDWATER MONITORING NETWORK AND DEWATERING WELL

The groundwater-monitoring network and the dewatering well at the site must be maintained and inspected quarterly. Damage to the locks, wells, and well labels could result from vandalism or weathering. Any damage of the groundwater-monitoring network must be repaired. If locks have rusted and do not function properly, they must be replaced. All wells must remain securely locked.

Wells must be observed for accumulations of silt and sand by measuring the total depth during sampling and comparing these depths to previous and original depths. If an accumulation of silt or sand is noted, the well must be redeveloped. The wells must be visually inspected for signs of grout or concrete stress or failure, and the watertight locking caps must be inspected for cracked or torn rubber seals. It is required these wells be maintained and inspected to ensure the well integrity in accordance with the EPA's Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (EISOPQAM). All maintenance of the monitoring well system and the dewatering well must be documented in a logbook and on Maintenance Record forms.

The following conditions are considered major damage:

- Damaged manhole cover
- Damaged well cap
- Damaged well casing inside well
- Erosion undermining concrete pad around well
- Damage or cracking of concrete pad around well

If major damage is noted, repairs must be completed within seven (7) days of discovery. Any major damage not repaired within seven (7) day must be reported in writing to EPD within nine (9) days of discovery. All other items requiring repair must be completed within thirty (30) days of discovery.

4.4 REPORTING

A landfill maintenance and inspection report that includes each inspection event, along with a cover letter, must be submitted to EPD with the groundwater monitoring report. Annually in the cover letter for the landfill maintenance and inspection report, the name, mailing address, telephone number and facsimile number of the person EPD should contact regarding the closure requirements associated with the landfill must be provided to EPD.

The landfill maintenance and inspection report must include the following signed certifications:

> I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate that information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief true and accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.
>
> _____
> Authorized Signature
>
> I certify that I am a qualified engineer who has received a baccalaureate or post-graduate degree in engineering, and have sufficient training and experience in designing and/or evaluating landfills, as demonstrated by State registration and completion of accredited university courses, that enable me to make sound professional judgment regarding the effectiveness of engineering controls at this site. I also certify that this report meets the requirements set forth in the Monitoring and Maintenance Plan for the site. I further certify that this report was prepared by myself or by a subordinate working under my direction.
>
> _____
> PE Signature and Seal

An M&M review report must be submitted to EPD within sixty (60) days from the close of every fifth year that summarizes and evaluates maintenance of the cover, drainage system and wells through that time period and make recommendations as appropriate. EPD will review, comment, respond and/or approve these reports as appropriate.

5.0 PLANNED USES OF PROPERTY

Any use of the landfill must preserve the integrity and effectiveness of the soil cap and liner system of the landfill. The landfill's current use is that of vacant contoured ground with a vegetative cover. All changes in use of the landfill must be approved by EPD and address the continuation of repairs to the engineering controls as necessary to correct the effects of settling, subsidence, erosion, or other events, and preventing run-on and run-off from causing erosion or otherwise damage to the soil cap and liner system. The M&M Plan must be reviewed and revised as appropriate. If it is determined the M&M Plan must be revised, the revised M&M Plan be submitted to EPD for review and approval within sixty (60) days of the change in use.

The landfill liner system is designed to support a H20 live load with a minimum of three feet of soil and road base cover. The total load (static and dynamic) placed on the landfill liner system (geomembrane and GCL layers) shall not be more than 8.3 pounds per square inch (psi). In addition, areas where high loads may be applied over the soil-bentonite slurry wall (entrance roads, heavy truck parking areas, etc) shall be structural reinforcement or bridged during installation of the roadway or parking lot using concrete, geogrid, geotextiles, etc. to prevent significant deformation of the landfill cover over the slurry wall.

5.1 NON-RESIDENTIAL USE

The landfill must be inspected annually with regard to the use of the landfill. Use of the landfill must remain non-residential use.

- The inspection must verify the use of the landfill by owners, tenants, and other occupants to be consistent with non-residential use.
- All contract and lease agreements, and informal agreement must be reviewed to insure it is consistent with the non-residential use.
- The conservation easement must be reviewed annually to ensure it is in place and the uses of the property must conform to the restrictions placed on the property.

The results of the inspection must be summarized in a landfill use statement.

5.2 REPORTING

A landfill use statement regarding compliance with the non-residential use must be submitted to EPD annually with the annual groundwater monitoring report.

The landfill use statement must include the following signed certification:

> I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate that information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief true and accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.
>
> _____
> Authorized Signature

6.0 REFERENCES

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APPENDIX A

STATISTICAL DATA EVALUATION

A.1 Normality Testing

Determining whether the distribution of data is normal, lognormal, or that there is no underlying distribution is necessary in selecting the appropriate statistical test. Normal or lognormal distributions are usually evaluated with parametric statistical tests. Nonparametric tests are usually applied to data with no underlying distribution. This section presents the W test; however, other tests for normality or graphical evaluations may be used to determine the data distribution.

The W test, developed by Shapiro and Wilk (1965), can be used to determine whether the data distribution is normal, lognormal, or random. This test is appropriate for sample populations of less than 25. The null hypothesis (H_o) to be tested is that the population has a normal distribution. The alternative hypothesis (H_a) is the population does not have a normal distribution. The W test, as presented in Gilbert (1987), is conducted as follows:

1. Compute the denominator d of the W test statistic, using the n data.

$$d = \sum_{i=1}^{n} (x_i - \bar{x})^2 = \sum_{i=1}^{n} x_i^2 - \frac{1}{n}\left(\sum_{i=1}^{n} x_i\right)^2$$

2. Order the n data from smallest to largest to obtain the sample order statistics.

$$x_{*1*} \# x_{*2*} \# \ldots \# x_{*n*}.$$

3. Compute k, where

$$k = \frac{n}{2} \text{ if n is even}$$

$$k = \frac{n-1}{2} \text{ if n is odd}$$

4. Use Table A6 of Gilbert (1987) and for the observed n find the coefficients $a_1, a_2, \ldots, a_k$.

5. Then compute

$$W = \frac{1}{d}\left|\sum_{i=1}^{k} a_i \left(X_{|n-i+1|} - x_{|i|}\right)\right|^2$$

6. Reject H_o at the α significance level if W is less than the quantile given in Table A7 of Gilbert (1987).

If H_o is accepted, the data are normally distributed. If H_o is rejected, the data must be transformed to the log of the data. Then, the W test must be completed on the log of the data. If H_o is then accepted, the data are distributed lognormally. If H_o is rejected while performing this test on the data and the log data, the data are considered to have no underlying distribution (nonparametric).

A.2 Handling Nondetections

Many environmental data sets contain analytes that are not positively detected in each sample collected and analyzed. Instead, the data set must generally contain some samples with positive results for a particular chemical and others with nondetected results. The nondetected, or censored, results are usually reported as sample quantitation limits (SQLs). An SQL indicates that the chemical could not be detected above a particular concentration, which may vary from sample to sample. The chemical may be present at a concentration below the reported quantitation limit, or it may not be present in the sample at all.
During evaluation of detection monitoring and background groundwater data, one-half the SQL must be used in statistical testing as a starting point. EPA guidance (1989) recommends using one-half the SQL. A value of zero (not detected) must be used in place of the SQL if one-half the SQL is greater than any of the detections. The effect of the SQL on statistical tests must be taken into account during the application of professional judgment.

A.3 Cochran's t-Test

The Cochran's t-test is a modified Student's t-test that is appropriate for use when the data sets have heterogeneous variances and unequal sample sizes. The criteria of normality, independence of data, complete frequency of detection, and appropriate sample size must also be met for this test to be used. However, a frequency of detection of 80 percent is being allowed.

The observed test statistic for the Cochran's t-test is calculated using the equation:

$$t_{obs} = (\bar{x}_1 - \bar{x}_2)/(W_1 + W_2)^{0.5}$$

where:

$\bar{x}_1$ = the mean of the first data set
$\bar{x}_2$ = the mean of the second data set
W_1 = the variance of the first data set divided by the sample size of the first data set
W_2 = the variance of the second data set divided by the sample size of the second data set

The t_{obs} value is compared to the expected t value (t_{exp}), which is calculated using the equation:

$$t_{exp} = (t_1' W_1 + t_2' W_2)/(W_1 + W_2)$$

where:

t_1' = t-value for the first data set taken from the t distribution table at the appropriate degree of freedom and level of significance
t_2' = t-value for the second data set taken from the t-distribution table at the appropriate degree of freedom and level of significance

The t_{obs} value is compared to the t_{exp} value; if the absolute value of t_{obs} is lower than t_{exp}, then there is no statistical difference between the two groups. The data indicate a release if t_{obs} is greater than t_{exp} and the mean of the site data is greater than the mean of the background data.

A.4 Wilcoxon Rank Sum Test

The Wilcoxon Rank Sum (WRS) test is a nonparametric version of the t-tests. The results of this test indicate when the measurements of one population are consistently higher or lower than measurements of a second population. Sample sizes need not be equal for the application of this test. However, the WRS test is somewhat sensitive to nondetect data. This test can handle a moderate number of nondetects by treating them as ties (equal in rank) (Gilbert 1987). However, if different SQLs are given for nondetects, this test may be weakened.

The WRS test is conducted by first ranking the combined site and background data from smallest to largest. Ranks are then assigned to each data point, starting with one for the lowest value and continuing until all data points have been assigned a corresponding rank. The ranks of the site data are then summed and compared to an acceptance range corresponding to a particular level of significance (0.05), the sample size of the site, and background data sets. If the sum of the ranks falls within the acceptance region, then the null hypothesis (that the site and background data are similar) is not rejected. If the rank sum exceeds the range, then the site concentrations are statistically greater than the background concentrations (Gilbert 1987, 1993). Tables found in Remington and Schork (1985) present the critical values for this test.

This approach can be used even when some data points are tied (equal in rank). In that case, the tied values are each given the mean value of the tied ranks. For example, if three data points were equal, and corresponded to the ranks of 3, 4, and 5, each of the data points would be ranked as 4 (Gilbert 1987, 1993). The next largest data point would have the rank of 6. If the number of tied ranks becomes large, however, the WRS test may not provide accurate results.

A.5 References

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APPENDIX B

FIGURE

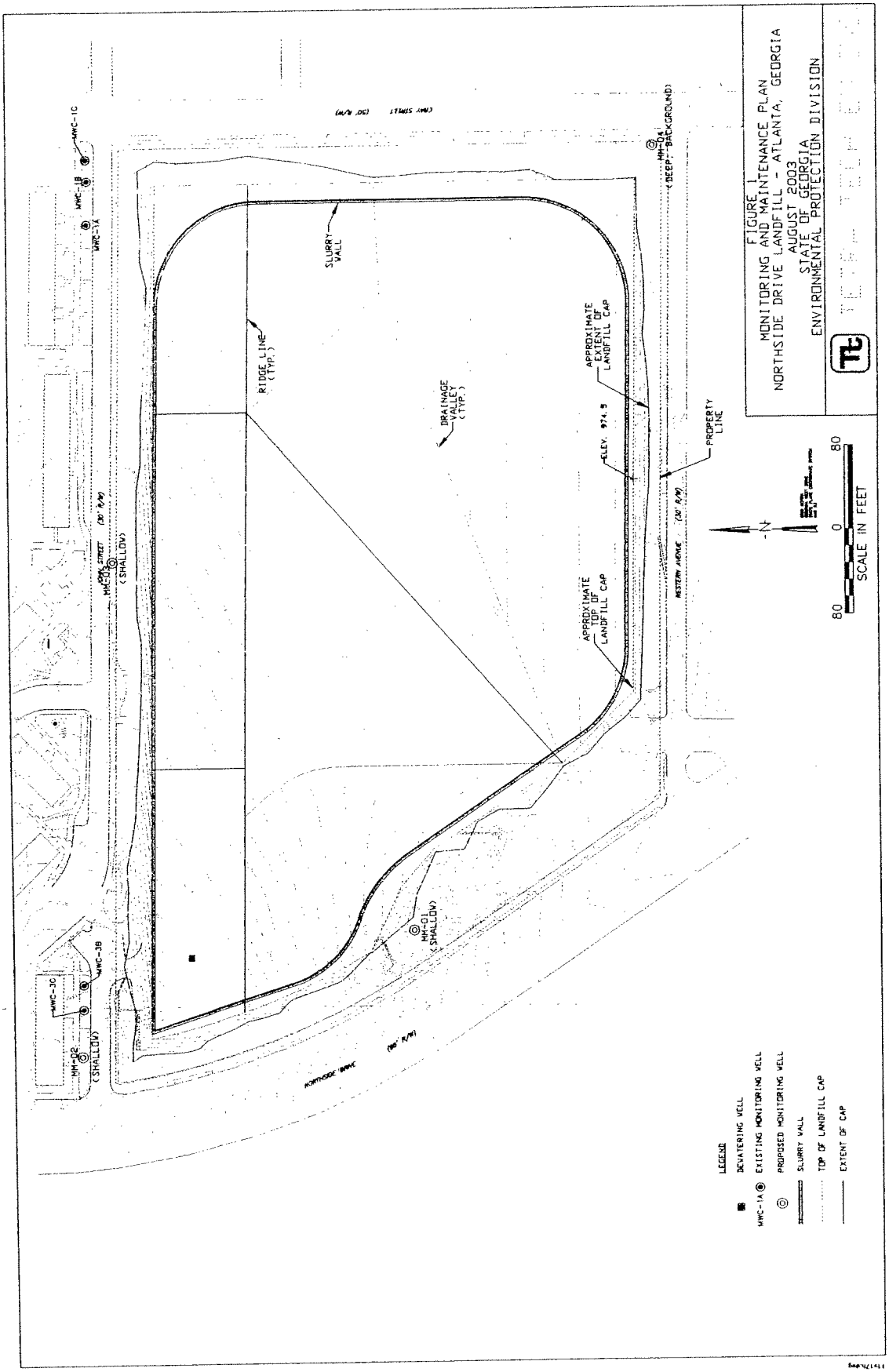


FIGURE 1
MONITORING AND MAINTENANCE PLAN
NORTHSIDE DRIVE LANDFILL - ATLANTA, GEORGIA
AUGUST 2003
STATE OF GEORGIA
ENVIRONMENTAL PROTECTION DIVISION
SCALE IN FEET
80
0
80
N
LEGEND
DEWATERING WELL
EXISTING MONITORING WELL
PROPOSED MONITORING WELL
SLURRY WALL
TOP OF LANDFILL CAP
EXTENT OF CAP
SLURRY WALL
RIDGE LINE (TYP.)
DRAINAGE VALLEY (TYP.)
APPROXIMATE EXTENT OF LANDFILL CAP
APPROXIMATE TOP OF LANDFILL CAP
ELEV. 974.5
PROPERTY LINE
MW-01 (SHALLOW)
MW-01 (DEEP, BACKGROUND)
MW-02 (SHALLOW)
MWC-1A
MWC-1B
MWC-1C
MWC-3B
MWC-3C
NORTHSIDE DRIVE
(80' R/W)
WESTERN AVENUE
(70' R/W)
(SHALLOW)

APPENDIX C

FORMS

NORTHSIDE DRIVE LANDFILL
ATLANTA, GEORGIA
M&M INSPECTION LOG

DATE: _____ WEATHER: _____

INSPECTOR(S): _____

Component Inspected	Condition of Component	Check if Major Damage

Comments:

NORTHSIDE DRIVE LANDFILL
ATLANTA, GEORGIA
MAINTENANCE RECORD FORM

DATE: _____ WEATHER: _____

INSPECTOR(S): _____

Component Inspected	Repair Dates		Inspector	Description of Repairs	Check if Major Damage
	Initiated	Completed			

GROUNDWATER SAMPLING DATA SHEET

SITE INFORMATION

Site Name: _____ Municipality: _____

Project Number: _____ County: _____

Personnel: _____ State: _____

Date: _____ Street or Map Location: _____

(If Off-Site): _____

WEATHER CONDITIONS AND EQUIPMENT

Temperature Range: _____ Equipment Name: _____

Precipitation: _____ Equipment Number: _____

Barometric Pressure: _____ Latest Calibration Date: _____

Tidally-Influenced [ ] Yes [ ] No

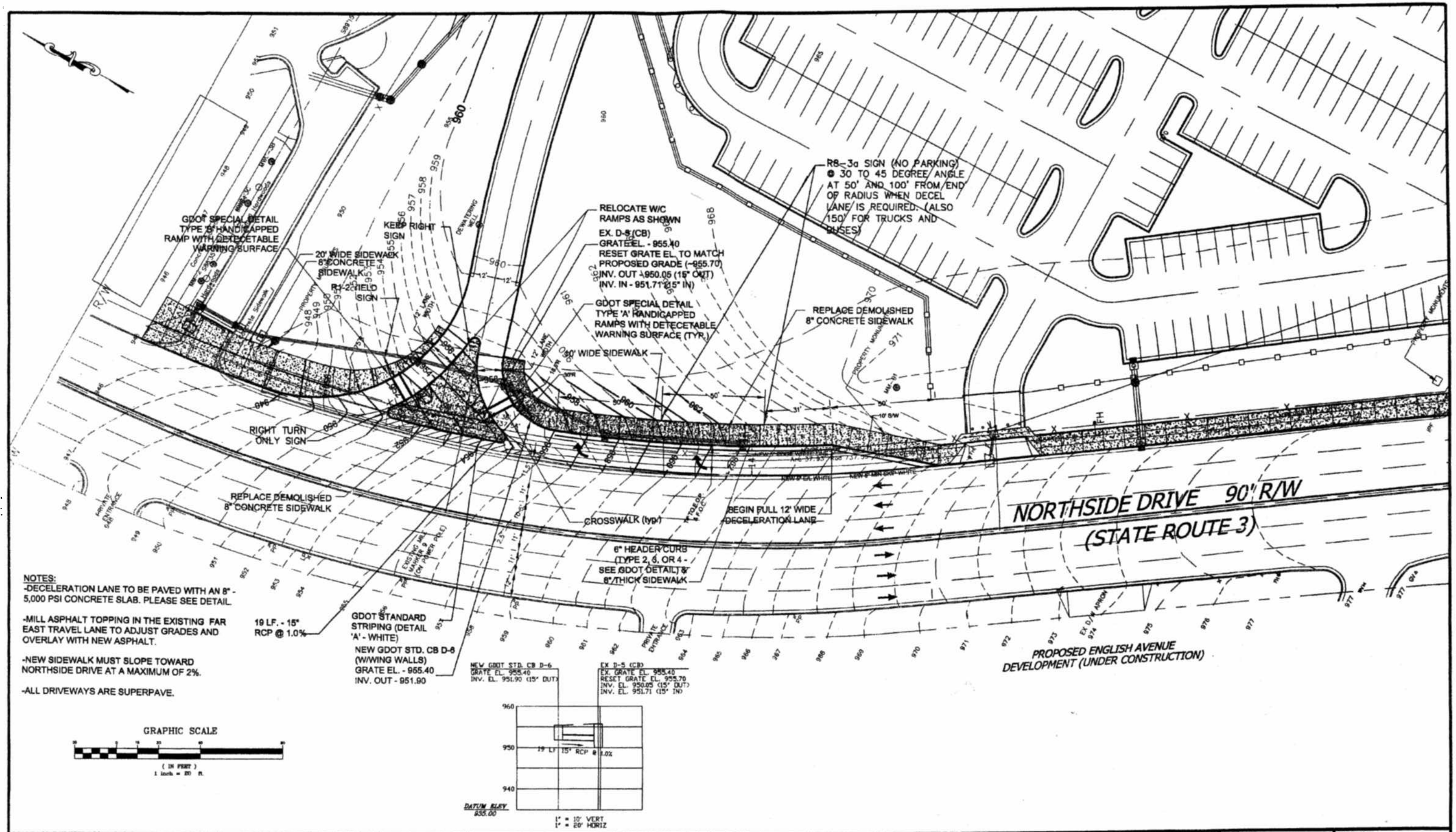
Well Number and Sample ID	Date/Time	Measurement made at top of: (PVC, casing?)	Water Level Indicator Reading (Feet)*	LNAPL or DNAPL present? (yes/no)	NAPL Description/ Thickness*

EXHIBIT C

[See 1 attached page]

RESTRICTED AREA

SUBJECT TO CONSERVATION EASEMENT
HSI #10222
CALL THE GEORGIA WORLD CONGRESS CENTER AUTHORITY
OR
THE GEORGIA ENVIRONMENTAL PROTECTION DIVISION PRIOR TO DIGGING OR COMMENCING ANY OTHER LAND DISTURBING ACTIVITY.



NOTES:
-DECELERATION LANE TO BE PAVED WITH AN 8" - 5,000 PSI CONCRETE SLAB. PLEASE SEE DETAIL.

-MILL ASPHALT TOPPING IN THE EXISTING FAR EAST TRAVEL LANE TO ADJUST GRADES AND OVERLAY WITH NEW ASPHALT.

-NEW SIDEWALK MUST SLOPE TOWARD NORTHSIDE DRIVE AT A MAXIMUM OF 2%.

-ALL DRIVEWAYS ARE SUPERPAVE.

Revisions:

No.	Date	

ALTAMIRA
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FAX: (404) 607-8890

Seal

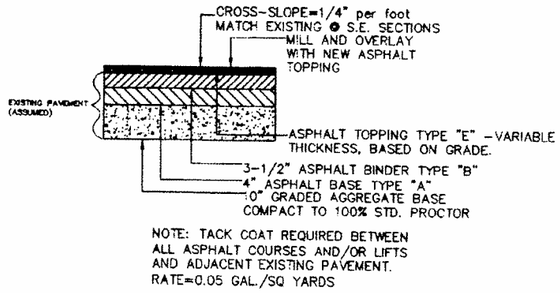
GEORGIA WORLD CONGRESS CENTER

JONES AVENUE PARKING, PHASE II

Project No.:	6270
Designed By:	JKM
Drawn By:	JKM
Checked By:	JKM
Issue Date:	4/27/2006
Drawing Scale:	AS SHOWN

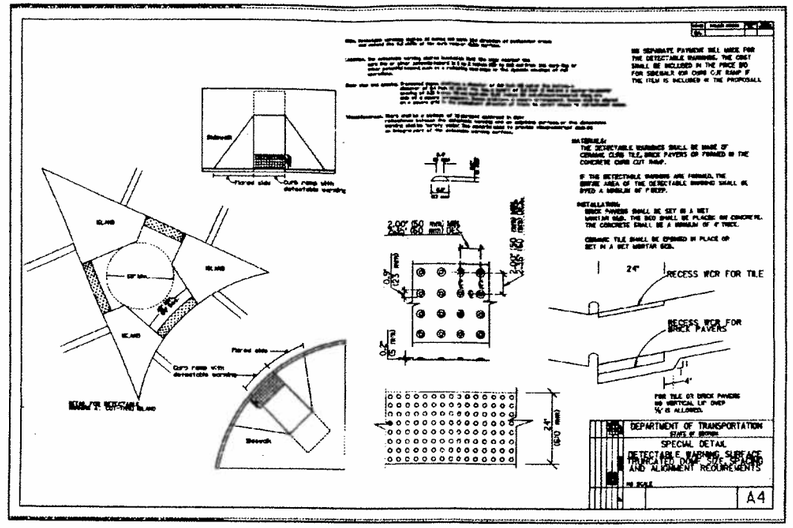
Drawing Title: **CONSTRUCTION PLAN**

Drawing No.: **C1.1**



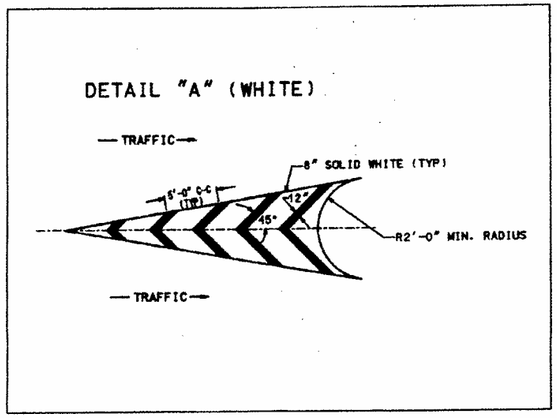
PAVEMENT SECTION (FOR OVERLAY)

NOT TO SCALE



DETECTABLE WARNING SURFACE

NOT TO SCALE

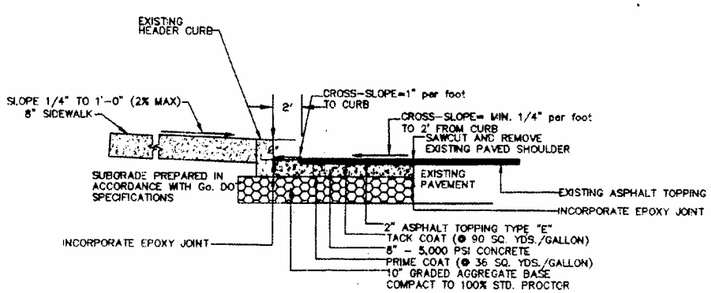


GORE DETAIL

NOT TO SCALE

NOTES:

1. CONCRETE SHALL BE 5,000 P.S.I. MIN STRENGTH.
2. CONCRETE SLAB SHALL BE INCORPORATED AS A SINGLE MONOLITHIC POUR.
3. EPOXY JOINTS SHALL BE APPLIED AT EXISTING PAVEMENT/PROPOSED PAVEMENT AND CURB/PROPOSED PAVEMENT INTERFACES.



PAVEMENT SECTION W/8" - 5,000 PSI CONCRETE

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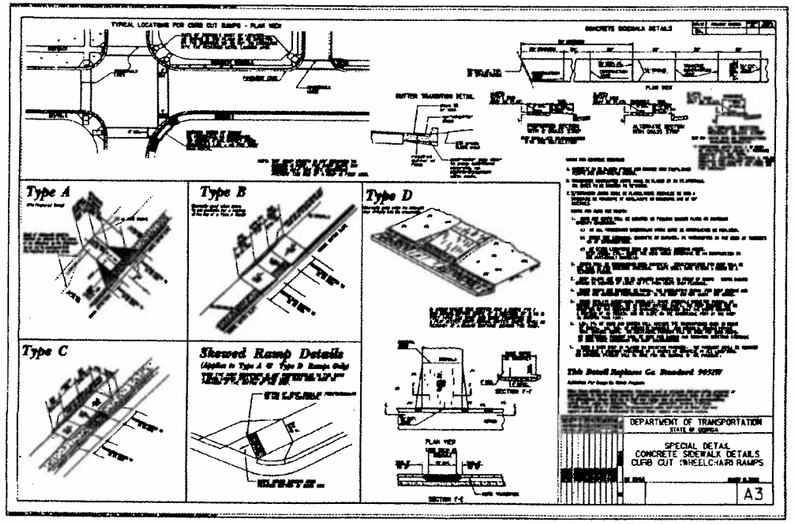
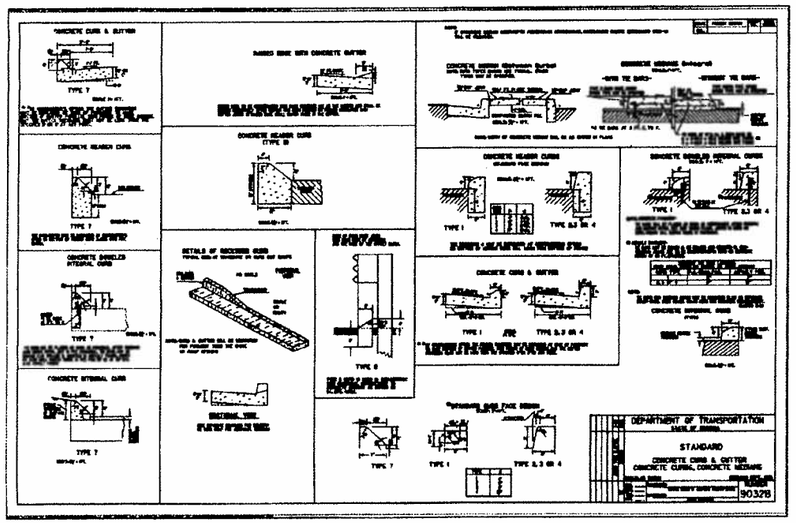


GDOT SPECIAL DETAIL WHEELCHAIR RAMP

NOT TO SCALE



GDOT HEADER CURB DETAIL

NOT TO SCALE

Revisions:

No.	Date	

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Seal

GEORGIA REGISTERED PROFESSIONAL ENGINEER JOHN K. KNOCKEY 5/18/2006

GEORGIA WORLD CONGRESS CENTER

JONES AVENUE PARKING, PHASE II

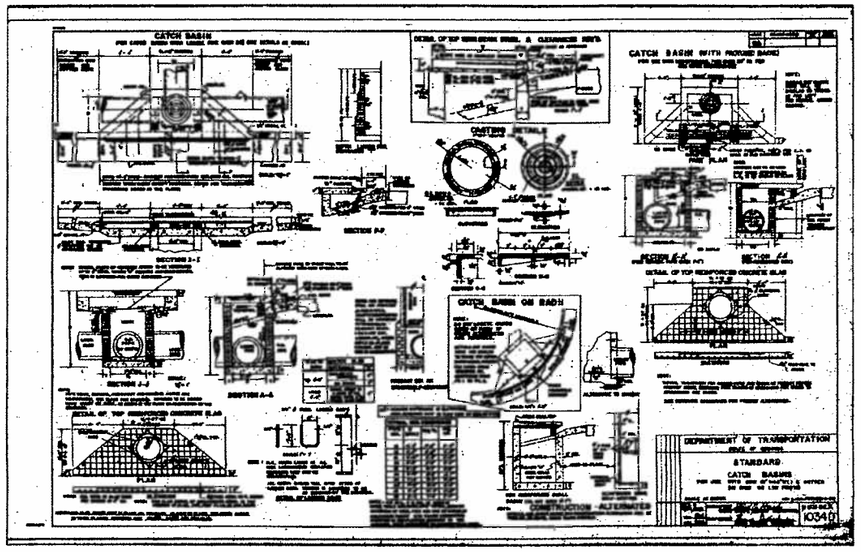
Project No.:	4270
Designed By:	JKK
Drawn By:	JKK
Checked By:	JKK
Issue Date:	4/27/2006
Drawing Scale:	AS SHOWN

Drawing Title:

CIVIL DETAILS

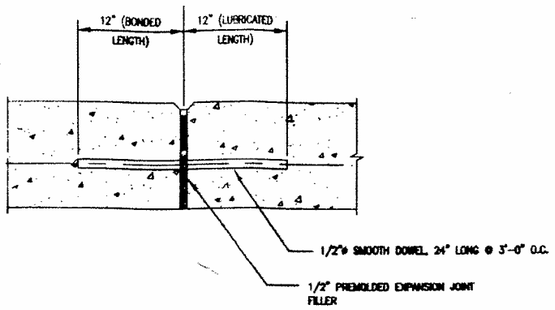
Drawing No.

CM1.1



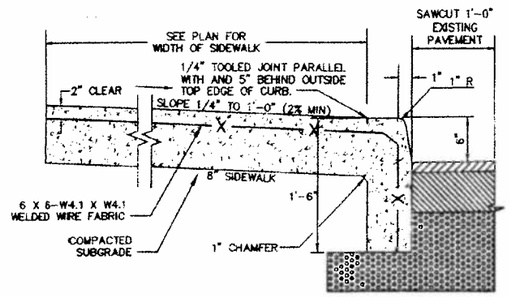
GDOT STANDARD CATCHBASIN (W/WING WALLS)

NOT TO SCALE



TYPICAL EXPANSION JOINT

NOT TO SCALE



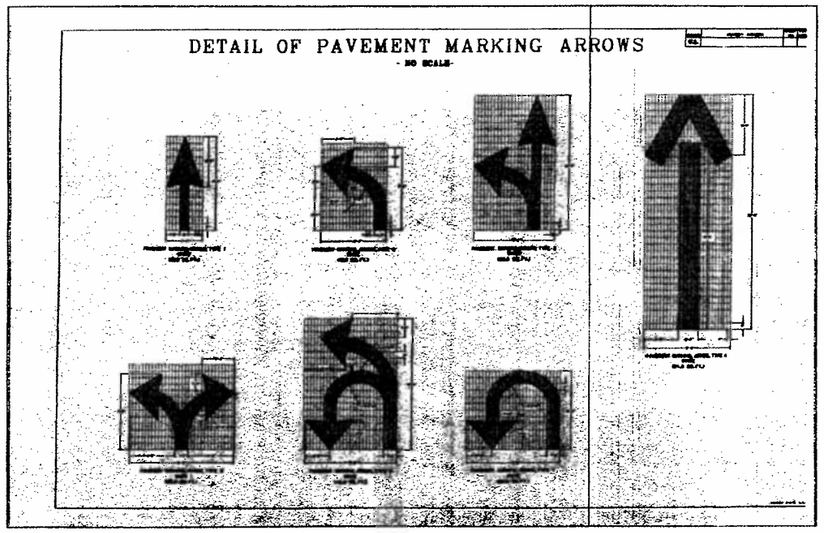
NOTE: PROVIDE SAWCUT CONTROL JOINTS AT MAX 18 Ft ON CENTER. ⅛" X 1 ½" CJ TO BE MADE WITHIN 12 HOURS OF CONCRETE POUR.

8" MONOLITHIC SIDEWALK AND CURB

NOT TO SCALE

NOTES:

1. SIDEWALK SHALL BE SCRIBED WITH TRAVERSE CONTROL JOINTS IN SQUARES EQUAL TO SIDEWALK WIDTH, BUT NOT TO EXCEED 10 FEET. ⅛" X 1-½" CONTROL JOINT TO BE MADE WITHIN 12 HOURS OF CONCRETE POUR.
2. CONCRETE SHALL BE TYPE "A" 3,000 P.S.I. MIN STRENGTH.
3. EXPANSION JOINTS SHALL EXTEND ACROSS THE FULL WIDTH OF THE SIDEWALK. CONTROL JOINTS SHALL BE LOCATED ON EACH SIDE OF A DRIVEWAY AND NOT MORE THAN 100 FEET APART.
4. PREFORMED BITUMINOUS MATERIAL SHALL BE PLACED BETWEEN ALL FIXED OBJECTS AND THE NEW CONCRETE SIDEWALK.
5. ALL CONCRETE WORK SHALL BE PER CITY OF ATLANTA STANDARD SPECIFICATIONS FOR CONSTRUCTION.
6. ½-INCH TOOLED JOINT BETWEEN CURB AND SIDEWALK.



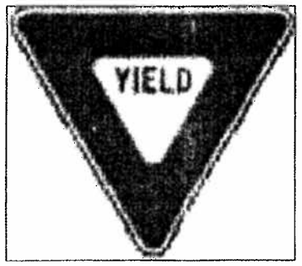
PAVEMENT MARKINGS DETAIL

NOT TO SCALE

24" x 24"

R8-3a SIGN (NO PARKING)

NOT TO SCALE



36" x 36" x 36"

R8-3a SIGN (NO PARKING)

NOT TO SCALE

18" x 24"

KEEP RIGHT SIGN

NOT TO SCALE

18" x 24"

RIGHT TURN ONLY SIGN

NOT TO SCALE

NOTE: ALL TRAFFIC SIGNS MUST MEET MUTCD CODE.

Revisions:

No.	Date	

ALTAMIRA
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REGISTERED PROFESSIONAL ENGINEER JOHN K. MAGUIRE 5/18/2006

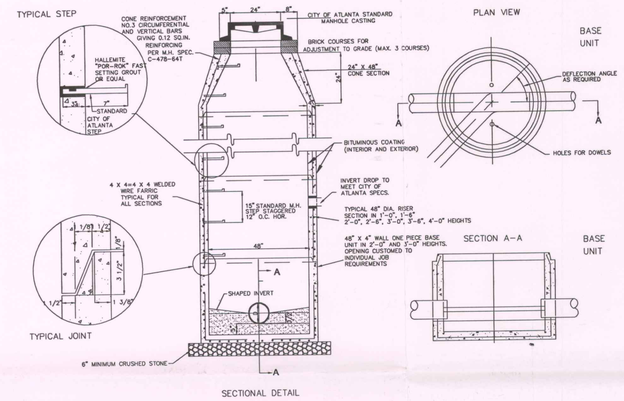
GEORGIA WORLD CONGRESS CENTER

JONES AVENUE PARKING, PHASE II

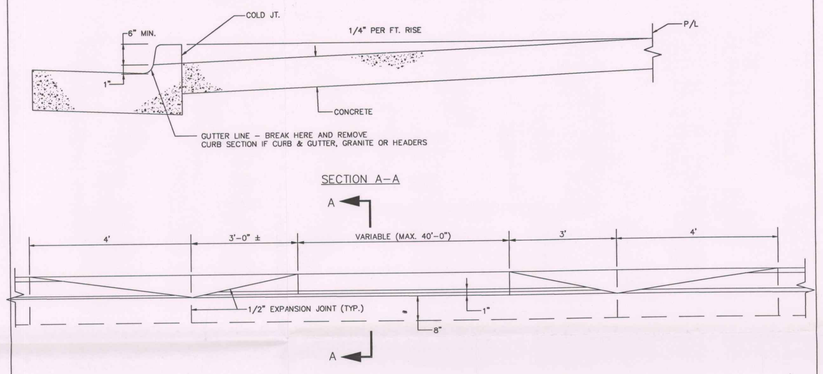
Project No.:	4270
Designed By:	JKM
Drawn By:	JKM
Checked By:	JKM
Issue Date:	4/27/2006
Drawing Scale:	AS SHOWN

Drawing Title: **CIVIL DETAILS**

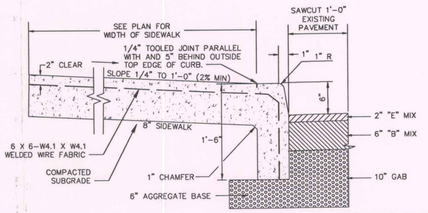
Drawing No.: **CM1.2**



1 CM1.1 PRECAST CONCRETE MANHOLE
NOT TO SCALE



3 CM1.1 STANDARD DRIVEWAY (AS BUILT)
NOT TO SCALE

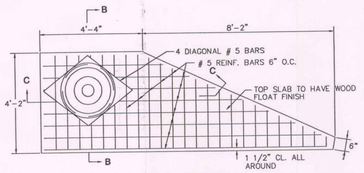


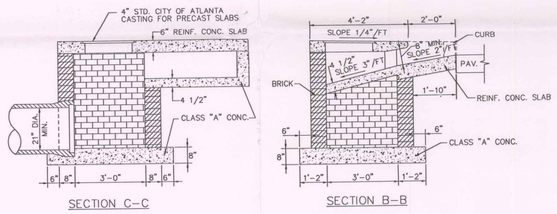
NOTE: PROVIDE SAWCUT CONTROL JOINTS AT MAX 10 FT ON CENTER. ⅛" X 1 ½" CJ TO BE MADE WITHIN 12 HOURS OF CONCRETE POUR.

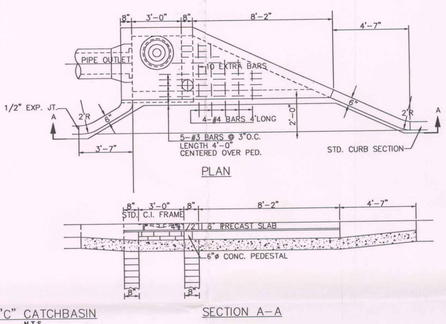
A CM1.1 MONOLITHIC SIDEWALK AND CURB
NOT TO SCALE

NOTES:

1. SIDEWALK SHALL BE SCRIBED WITH TRAVERSE CONTROL JOINTS IN SQUARES EQUAL TO SIDEWALK WIDTH, BUT NOT TO EXCEED 10 FEET. ⅛" X 1–½" CONTROL JOINT TO BE MADE WITHIN 12 HOURS OF CONCRETE POUR.
2. CONCRETE SHALL BE TYPE "A" 3,000 P.S.I. MIN STRENGTH.
3. EXPANSION JOINTS SHALL EXTEND ACROSS THE FULL WIDTH OF THE SIDEWALK. CONTROL JOINTS SHALL BE LOCATED ON EACH SIDE OF A DRIVEWAY AND NOT MORE THAN 100 FEET APART.
4. PREFORMED BITUMINOUS MATERIAL SHALL BE PLACED BETWEEN ALL FIXED OBJECTS AND THE NEW CONCRETE SIDEWALK.
5. ALL CONCRETE WORK SHALL BE PER CITY OF ATLANTA STANDARD SPECIFICATIONS FOR CONSTRUCTION.
6. ½-INCH TOOLED JOINT BETWEEN CURB AND SIDEWALK.







2 CM1.1 TYPE C CATCHBASIN
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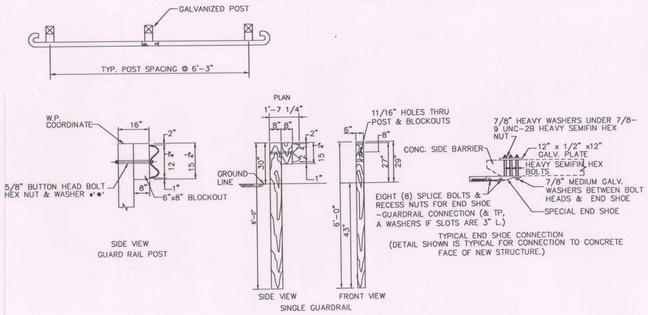
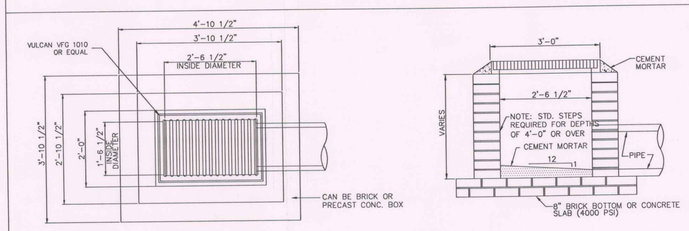
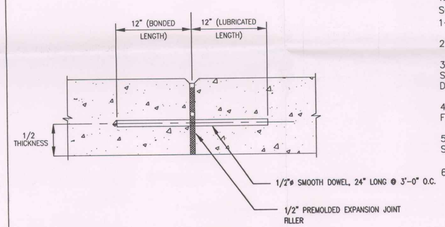


4 CM1.1 GUARDRAIL DETAIL
NOT TO SCALE



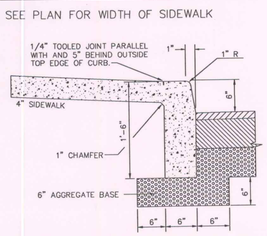
5 CM1.1 STANDARD DROP INLET
NOT TO SCALE



6 CM1.1 TYPICAL EXPANSION JOINT
NOT TO SCALE

NOTES:

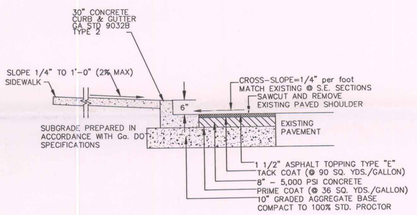
1. SIDEWALK SHALL BE SCRIBED WITH TRAVERSE CONTROL JOINTS IN SQUARES EQUAL TO SIDEWALK WIDTH, BUT NOT TO EXCEED 10 FEET. ⅛" X 1–½" CONTROL JOINT TO BE MADE WITHIN 12 HOURS OF CONCRETE POUR.
2. CONCRETE SHALL BE TYPE "A" 3,000 P.S.I. MIN STRENGTH.
3. EXPANSION JOINTS SHALL EXTEND ACROSS THE FULL WIDTH OF THE SIDEWALK. CONTROL JOINTS SHALL BE LOCATED ON EACH SIDE OF A DRIVEWAY AND NOT MORE THAN 100 FEET APART.
4. PREFORMED BITUMINOUS MATERIAL SHALL BE PLACED BETWEEN ALL FIXED OBJECTS AND THE NEW CONCRETE SIDEWALK.
5. ALL CONCRETE WORK SHALL BE PER CITY OF ATLANTA STANDARD SPECIFICATIONS FOR CONSTRUCTION.
6. ½-INCH TOOLED JOINT BETWEEN CURB AND SIDEWALK.



B CM1.1 4" MONOLITHIC SIDEWALK AND CURB
NOT TO SCALE

NOTES:

1. CONCRETE SHALL BE 5,000 P.S.I. MIN STRENGTH.
2. CONCRETE SLAB SHALL BE INCORPORATED AS A SINGLE MONOLITHIC POUR.
3. EPOXY JOINTS SHALL BE APPLIED AT EXISTING PAVEMENT/PROPOSED PAVEMENT AND CURB/ PROPOSED PAVEMENT INTERFACES.



C CM1.1 PAVEMENT SECTION W/8" – 5,000 PSI CONCRETE

Revisions:

No.	Date	
0	06/28/04	INITIAL ISSUE
1	07/23/04	ADDENDUM #1
	09/23/05	AS-BUILT

ALTAMIRA
DESIGN AND COMMON SENSE, INC
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Seal

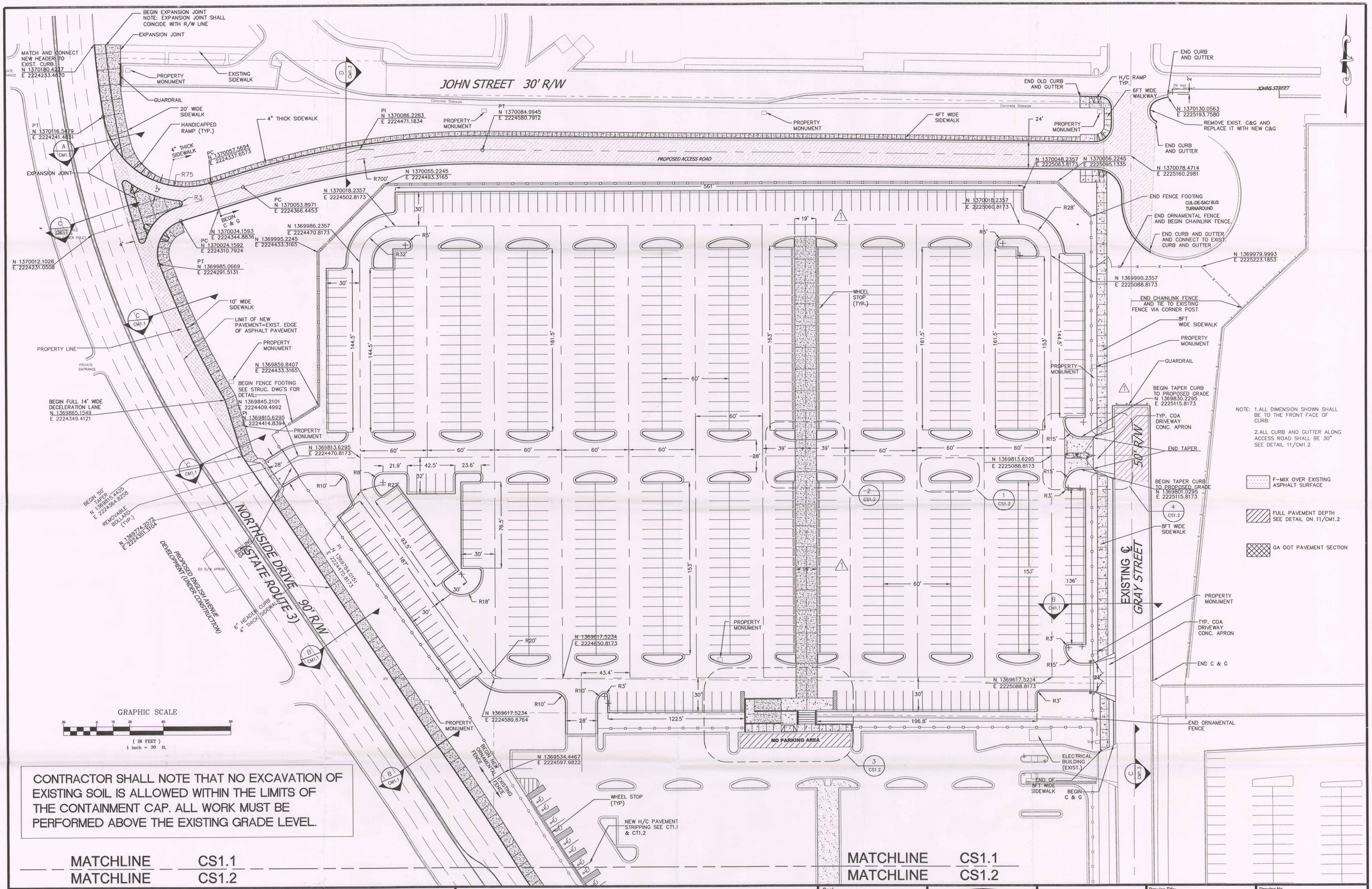
GEORGIA WORLD CONGRESS CENTER

JONES AVENUE PARKING, PHASE II
PROJECT NO. GWCC-15

Project No.:	4270
Designed By:	
Drawn By:	
Checked By:	
Issue Date:	09/27/04
Drawing Scale:	N.T.S

Drawing Title: **CIVIL DETAILS**

Drawing No. **CM1.1**



Revisions:

No.	Date	
0	06/28/04	INITIAL ISSUE
1	07/23/04	ADDENDUM #1
	09/23/05	AS-BUILT

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GEORGIA WORLD CONGRESS CENTER

JONES AVENUE PARKING, PHASE II
PROJECT NO. GWCC-15

Project No.:	4270
Designed By:	
Drawn By:	
Checked By:	
Issue Date:	09/27/04
Drawing Scale:	1"=30'

Drawing Title:

STAKING PLAN

Drawing No.

CS1.1