Final

Remedial Action Completion Report, Swann Park, Baltimore, Maryland

Prepared for

Honeywell

101 Columbia Rd
Morristown, NJ

and

Mayor and City
Council of Baltimore

December 2008

Prepared by

CH2MHILL

Contents

Acronyms and Abbreviations ..... **vii**

Executive Summary ..... **ix**

1 Introduction **1-1**
- 1.1 Purpose 1-1
- 1.2 Site Description and Setting 1-1
- 1.3 Swann Park Remedy 1-2
- 1.4 Project Organization 1-2
- 1.5 Public Participation 1-2
- 1.6 Report Organization 1-4

2 Project Milestones **2-1**

3 Health, Safety, and the Environment **3-1**
- 3.1 Air Monitoring and Reporting 3-2
- 3.2 Personnel Protection 3-4
- 3.3 Health and Safety Compliance 3-4

4 Remedial Measures **4-1**
- 4.1 Overview of Completed Remedial Actions 4-1
- 4.2 Permitting 4-3
  - 4.2.1 Building Permit 4-3
  - 4.2.2 General Permit for Construction Activity 4-3
  - 4.2.3 Dewatering Discharge 4-3
  - 4.2.4 Tidal Wetland Permit 4-4
  - 4.2.5 Flood Plain Variance 4-5
- 4.3 Mobilization, Staging Area, and Site Preparation 4-5
  - 4.3.1 Utility Markout 4-5
  - 4.3.2 Race Street Site Access Road 4-6
  - 4.3.3 Monitoring Well Abandonment 4-6
  - 4.3.4 Clearing and Grubbing 4-6
- 4.4 Erosion and Sediment Control 4-6
- 4.5 Stormwater Management Plan 4-7
- 4.6 Critical Area Review 4-8
- 4.7 Stabilization Controls 4-8
  - 4.7.1 Shore Line Stabilization 4-8
  - 4.7.2 Sheet Shoring 4-9
- 4.8 Excavation, Transportation, and Disposal 4-9
  - 4.8.1 Soil Volume Estimates 4-9
  - 4.8.2 Characterization of Soil for Offsite Disposal 4-10
  - 4.8.3 Confirmation Sampling 4-11
  - 4.8.4 Soil Excavation and Offsite Disposal 4-12
- 4.9 Storm Drain 4-19
  - 4.9.1 New Storm Drain 4-19

4.9.2 Laterals and Drop Inlets 4-20
4.9.3 In-Place Closure of Existing Storm Drain 4-20
4.10 Site Grading 4-21
4.10.1 Submarker Layer Grading 4-21
4.10.2 Backfill, Compaction, and Surveying 4-21
4.10.3 Geotextile Marker Layer 4-22
4.10.4 Clean Backfill and Final Grading 4-22
4.10.5 Site Utilities 4-22
4.10.6 Concrete Foundations and Slabs 4-23
4.10.7 Sports Lighting 4-23
4.10.8 Stormwater Management Controls 4-24
4.10.9 Site Paths and Cul-de-sac 4-24
4.11 Final Site Restoration 4-24
4.11.1 Top Soil 4-24
4.11.2 Sodding 4-25
4.11.3 Seeding 4-25
4.11.4 Final Erosion Controls 4-25
4.12 Demobilization 4-25

5 References 5-1

Tables

2-1 Project Milestones
3-1 Air-Monitoring Action Levels
4-1 Soil Excavation Verification Data
4-2 Offsite Soil Disposal Details
4-3 Final Grading Elevation Details

Figures

1-1 Site Location and Vicinity Map
1-2 Swann Park Site Map
3-1 Air-Monitoring Station Locations
4-1 Swann Park Excavation Areas
4-2 Confirmation Soil Sampling Map

Appendixes

A Honeygo Run Reclamation TCLP Characterization Data
B Confirmation Soil Sampling Results
C As-Built Survey Drawings

Attachments (CD)

A Site Photographs
B Health and Safety Plan
C Air Monitoring Plan
D Air Monitoring Data
E Permits

E-1 Building Permit
E-2 General Permit, Notice of Intent
E-3 MDE Groundwater Discharge Approval
E-4 MDE Tidal Wetland Permit
E-5 Floodplain Variance Letter
F Water Well Abandonment Forms
G Erosion and Sediment Control Plan
H Stormwater Management Plan
I Critical Area Review Information

Acronyms and Abbreviations

AIHA	American Industrial Hygiene Association
ASTM	American Society of Testing and Materials
bgs	below ground surface
BMP	best management practice
CD	compact disc
CMP	corrugated metal pipe
COMAR	Code of Maryland Regulations
DPW	Department of Public Works
ESC	erosion and sediment control
GPS	geographic positioning system
HASP	Health and Safety Plan
HDPE	high-density polypropylene
HS&E	Health, Safety, and Environment
HSM	Health and Safety Manager
LF	linear feet
MDE	Maryland Department of the Environment
MDSPGP	Maryland State Programmatic General Permit
µg/L	micrograms per liter
mg/kg	milligram(s) per kilogram
mg/L	milligram(s) per liter
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyls
PVC	polyvinyl chloride
RCP	reinforced concrete pipe
RCRA	Resource Conservation and Recovery Act of 1976
RKK	Rummel, Klepper, and Kahl LLP
SOP	standard operating procedure
SVOC	semivolatile organic compound
SWM	Stormwater Management Plan
TCLP	Toxicity Characteristic Leaching Procedure
TPH	total petroleum hydrocarbons

VCP	Voluntary Cleanup Program
VOC	volatile organic compound
XRF	X-ray fluorescence

HONEYWELL SITE#: R35113
DOCUMENT FILE LOC: 4.15

Executive Summary

Swann Park is located at the intersection of McComas Street and Race Street, in South Baltimore. The Park opened in the early 1900s and is partially constructed on fill placed along the Middle Branch of the Patapsco River. The Park is currently closed, but was historically used by neighborhood residents, local schools, and sports groups for recreational and athletic purposes. The Park is adjacent to a former chemical facility that manufactured and blended pesticides and other agricultural chemicals. The plant was closed and demolished in 1976.

On April 24, 2007, the Maryland Department of the Environment (MDE) issued an Order to the Mayor and City Counsel of Baltimore (City) and Honeywell International Inc. (Honeywell) to investigate and propose a remedy for Swann Park. With the City's assistance, Honeywell completed a thorough investigation of environmental conditions in soil and groundwater at Swann Park in September 2007.

The City and Honeywell jointly proposed a cleanup approach protective of human health and the environment to be executed to promptly return the Park to the community for recreational use. The cleanup approach was approved by the MDE in October 2007 and the remediation of the Park was completed in October 2008.

The remedy implemented at Swann Park involved (1) excavation and offsite disposal of contaminated soil exceeding predetermined risk levels; (2) rerouting of the site storm drain and improvements to the storm drain management system; (3) over excavation of soils in utility corridors to establish a clean-fill buffer; (4) placement of an MDE-approved, robust geotextile marker and barrier fabric across the entire site and within utility corridors; and (5) backfilling with certified clean soil in accordance with MDE guidance (MDE, 2001) to establish a minimum 24-inch clean soil cover and to meet the final grade. A vegetative cover has been established to minimize erosion. The City is currently establishing land use controls in the form of a deed restriction for the Park.

This RACR documents the environmental remedial response activities completed at Swann Park pursuant to Section 5 of the Order issued by the MDE to the City of Baltimore and Honeywell. Key elements of the project included:

- Honeywell developed relationships and communicated with key stakeholders in the South Baltimore community – residents, adjacent property owners and businesses, community associations, elected officials, local community leaders, and outdoor sports organizations – throughout execution of the Swann Park remediation and redevelopment project;
- The South Baltimore Community was not exposed to airborne emissions during the project, as determined by continuous perimeter dust monitoring, through the use of engineering controls and dust mitigation measures;

- Honeywell was challenged with the removal of larger volume of impacted soil at the site than anticipated (13,140 tons vs. 7,900 tons), yet completed the project without significant delays;
- Confirmatory soil sampling was conducted in conjunction with soil excavation, including collecting and splitting soil samples with the MDE for removal verification prior to closing any of the predetermined excavation locations;
- Only certified clean common borrow, tested per MDE guidance, was used for placing a 2-foot soil layer across the Park, and a high quality, puncture resistant non-woven geotextile fabric was emplaced as marker layer beneath 2 feet of certified clean fill that across the entire 11-acre site;
- Honeywell's proactive approach and focus on safety resulted in no safety incidents over the 6-month period when construction work was performed, representing approximately 23,000 project labor hours worked without a recordable OSHA lost-time incident;
- All materials removed from the Park were transported in covered trucks and certified as having been received and disposed of in permitted off-site, non-hazardous waste disposal facilities;
- The remediation and redevelopment project was performed in compliance with all regulatory requirements and permits under the purview of the City of Baltimore, the State of Maryland and the MDE; and
- Honeywell, in working with the City, made significant investment in the installation of the park's infrastructure, including the installation of subsurface utilities and aboveground amenities including a sports lighting system.

As a result of the completed remediation work completed at Swann Park, the requirements imposed by the MDE in the Order have been met.

HONEYWELL SITE#: R35113
DOCUMENT FILE LOC: 4.15

SECTION 1

Introduction

1.1 Purpose

Maryland Department of the Environment (MDE), the Mayor and City Council of Baltimore ("City") and Honeywell International Inc. entered into an Administrative Order dated April 24, 2007, for investigation and remediation of the Swann Park site. This Remedial Action Completion Report documents the environmental remedial response activities completed at the Site pursuant to Section 5 of the Order. Work was undertaken pursuant to the MDE-approved Comprehensive Investigation Report and Remedial Alternatives Analysis (CIR-RAA; CH2M HILL, 2007).

1.2 Site Description and Setting

Swann Park is located in south-central Baltimore City (Figure 1-1). The park property currently consists of approximately 11 acres of athletic fields and associated green space (Figures 1-2). Prior to completion of the remedy, there were eight athletic fields at the park: one baseball field, three softball fields, and four fields used for soccer, football, and other sports. In conjunction with the implementation of the remedy, infrastructure improvements and reconfiguration of the park's recreational facilities were performed. As a result, there are three softball fields, one baseball field, and one football field at the renovated park.

There were no buildings on Swann Park at the onset of remedial construction. The City plans to construct a comfort station on the north-central portion of the park in the near future. The foundation for the building has been installed as part of the park renovation.

Swann Park is currently owned by the City of Baltimore and has been used as a park since circa 1905 (City of Baltimore, 1905). A stone bulkhead located along the western property boundary was constructed between 1905 and 1912, and a belowgrade storm drain which transects the center of the Site from east to west was constructed circa 1912 (City of Baltimore, 1912). The bulkhead was reinforced and the storm drain replaced as part of the remedial action for the park.

Land use on immediately adjacent properties is summarized below:

- The Middle Branch of the Patapsco River (Middle Branch) bounds Swann Park to the west;
- The Western Maryland Railroad bounds Swann Park to the south;
- The Schuster Concrete facility bounds Swann Park to the east (south of McComas Street); and,
- A building being redeveloped for use as a canine boarding facility and veterinary clinic (200 McComas Street) bounds Swann Park to the east.

- The property immediately to the north of Swann Park (2000 Race Street) is covered with an engineered asphalt and clay cap, over which two elevated spans of Interstate 95 are located. This site was formerly the Allied Chemical Race Street plant that was closed and demolished in 1976. Historically, the plant manufactured and blended pesticides and other agricultural chemicals.

Seven residential row houses are located east of Swann Park between McComas Street and the Schuster Concrete facility (Figure 1-2).

1.3 Swann Park Remedy

Major work elements included in the MDE-approved remedy implemented at Swann Park involved (1) excavation and offsite disposal of contaminated soil exceeding predetermined risk levels; (2) rerouting of the site storm drain and improvements to the storm drain management system; (3) overexcavation of soils in utility corridors to establish a clean-fill buffer; (4) placement of an MDE-approved geotextile marker fabric across the entire site and within utility corridors; and, (5) backfilling with clean soil in accordance with MDE guidance (MDE, 2001) to establish a minimum 24-inch clean soil cover and to meet the final grade. A vegetative cover has been established to minimize erosion. The City is currently establishing land use controls in the form of a deed restriction. Remedial measures are further detailed in Section 4.

1.4 Project Organization

MDE provided regulatory oversight of the remedial action activities to ensure compliance with the CIR-RAA, State permitting, and regulatory requirements. Representatives of Honeywell and the City provided oversight throughout the design and construction activities to ensure compliance with requirements of the Order, technical specifications, and in the case of the City, City permitting requirements. CH2M HILL managed and provided construction oversight during the implementation of all phases of the remediation and construction work performed at Swann Park. Marcor Remediation, Inc. was retained as the prime subcontractor and was responsible for retaining specialty contractors as required.

1.5 Public Participation

Honeywell has developed relationships with key stakeholders – residents, community associations, elected officials, local community leaders, and outdoor sports organizations – in the South Baltimore community as part of a comprehensive public engagement program tied to its remedial activities. In April 2007, the company, in coordination with the City of Baltimore, initiated a public information process to keep the community informed about the investigation and restoration of Swann Park. Throughout the outreach efforts Honeywell updated Baltimore City and MDE about its activities.

Over the past 20 months Honeywell has:

- Attended community association meetings and continued to update interested groups including the Riverside Neighborhood Association and the South Baltimore Improvement Committee;
- Worked with Swann Park user groups, including SOBO Sports and the Kickball League of Baltimore, to distribute information to their members;
- Continued to keep local elected officials informed;
- Launched and continually updated a Swann Park website containing the health and safety plan, data from air monitoring, and progress on the work schedule. As of November 2008, there have been approximately 4,000 new visitors to the website www.baltimoreswannparkcleanup.com;
- Distributed a Swann Park e-newsletter, as well as updates, to more than 800 neighbors and key stakeholders;
- Mailed letters to 2,400 area households (November 2007 and May 2008);
- Developed and distributed a Swann Park restoration fact sheet;
- Provided an onsite bulletin board with work schedules and air monitoring results;
- Kept residents and businesses along McComas Street, adjacent to the park, up-to-date on truck routes and work schedules; and,
- Provided a public affairs representative, who worked out of Honeywell's McComas Street office, to respond to any questions.

Meetings were held prior to, and during, the park remediation:

- November 1, 2007: The MDE held a public meeting to outline the proposed Swann Park remedy and restoration. Honeywell presented its work schedule; health and safety plan, including air monitoring; truck routes; site security measures; and, a commitment to park improvements outside the scope of remediation;
- April 28, 2008: Honeywell's remediation director met with the Baltimore Riverside Neighborhood Association;
- May 3, 2008: Baltimore City and Honeywell held a press conference at Swann Park to announce the restoration work. Residents, elected officials and local sports teams, including Digital Harbor High School's baseball coach and members of the Defenders baseball team, attended;
- May 6, 2008: Honeywell's remediation director met with members of the South Baltimore Improvement Committee, which represents residents closest to Swann Park; and,
- June 19, 2008: CH2M HILL presented the Swann Park health and safety plan to hundreds of Baltimore Gas & Electric (BGE) company employees at their Health and Safety Fair. The BGE Spring Gardens Complex is located next to Swann Park.

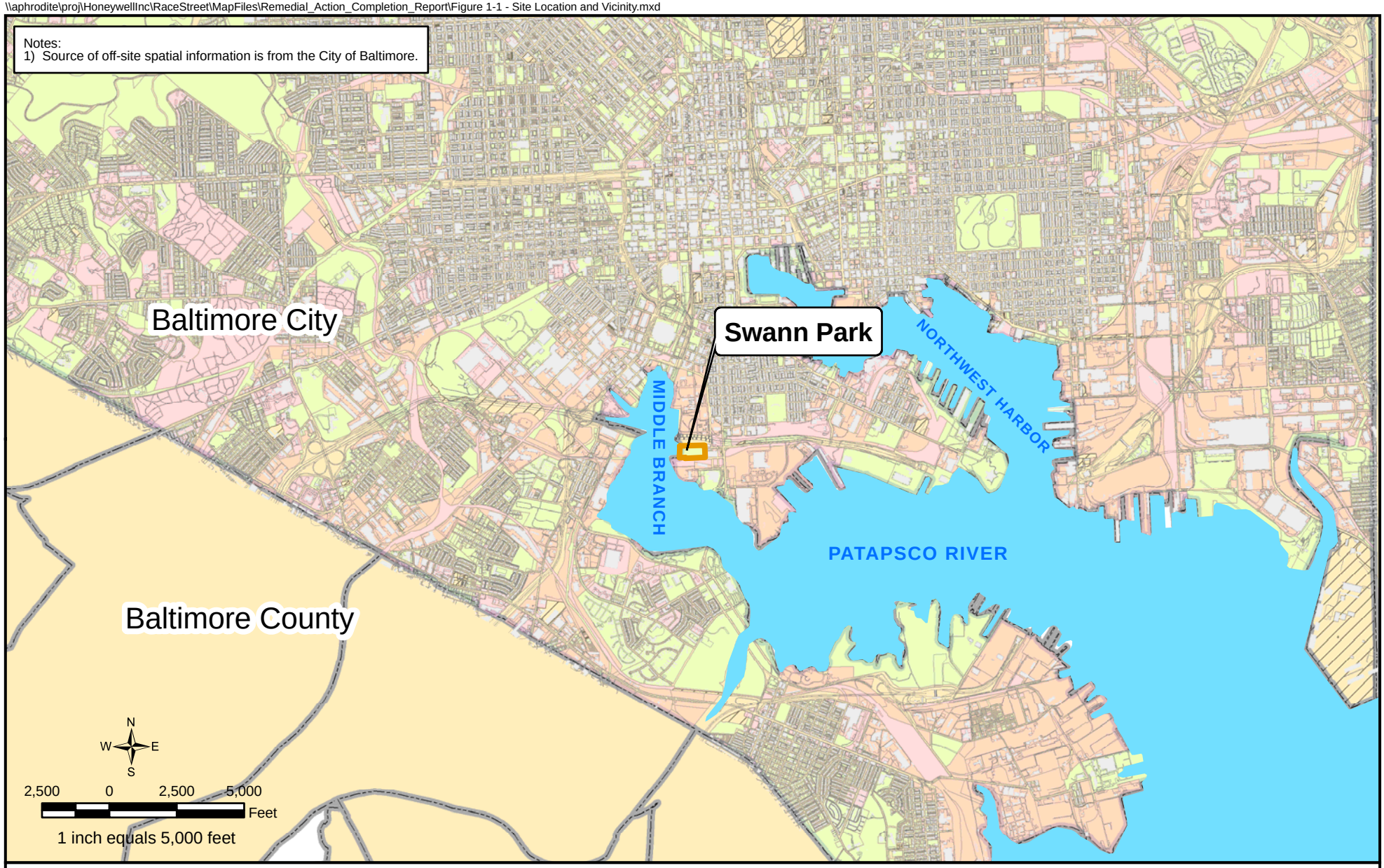
1.6 Report Organization

This report is prepared to document that the required remedial actions were completed in accordance with MDE's Order and with the approved design specifications for the project. Section 2 outlines major project milestones. Section 3 provides an overview of the health and safety measures undertaken pursuant to the project-specific Health and Safety Plan (HASP). Section 4 provides a detailed overview of the remedial measures undertaken at the site.

Appendices and attachments to this report include information collected during remedial construction activities that documents and certifies the completion of the remedy, including the excavation, transportation, and disposal of contaminated soil; verification testing data demonstrating attainment of soil cleanup levels; certification of backfill materials; photographic documentation; status reports; and, the final as-built grade elevations.

Relevant information cited in this report is provided in the appendices, whereas supporting documentation (e.g., work plans, permits, and waste disposal documentation) is provided on an accompanying compact disc (CD).

\\aphrodite\proj\HoneywellInc\RaceStreet\MapFiles\Remedial_Action_Completion_Report\Figure 1-1 - Site Location and Vicinity.mxd



Legend

- Edge of Pavement
- Stream/River
- Buildings
- Swann Park Approximate Boundary

Land Use

- Unknown
- Commercial
- Recreation
- Industrial

Figure 1-1
Site Location and Vicinity
Remedial Action Completion Report
Swann Park
Baltimore, Maryland

CH2MHILL

V:\\aphrodite\proj\HoneywellInc\RaceStreet\MapFiles\Remedial_Action_Completion_Report\Figure 1-2 - Swann Park Site Map.mxd

Legend

- Drop Inlet
- Manhole
- Storm Water Line
- Fence/Approximate Property Boundary
- Approximate Limits of I-95
- Edge of Pavement
- Storm Manhole
- Below Ground Stormwater Conveyance System
- Concrete Column
- Concrete Footer

N
W E
S

100 0 100 Feet

1 inch equals 100 feet

Figure 1-2
Swann Park Site Map
Remedial Action Completion Report
Swann Park
Baltimore, Maryland

CH2MHILL

SECTION 2

Project Milestones

Project milestones and corresponding start and completion dates are listed in Table 2-1. Specific details describing the corrective measures are presented in Section 4. The project was divided into several phases that consisted of excavation, offsite transportation, and disposal of arsenic-impacted soils; site stabilization and subcap grading; import and placement of selected clean fill; park infrastructure improvements; and, placement and grading of top soil and seeding of the park property.

Site photographs are provided in Attachment A (on CD).

TABLE 2-1
Project Milestones
Swann Park, Baltimore, MD

Milestone	Start Date	Completion Date
Preconstruction Meeting	5/6/08	5/6/08
Mobilization	5/7/08	5/27/08
Erosion and Sediment Control Measures	5/12/08	5/23/08
Installation of Race Street Cap Stabilization Measures	5/26/08	6/12/08
Excavation and Load-out of Contaminated Soil	5/14/08	7/10/08
Backfill Excavated Areas	5/19/08	7/21/08
West Bulkhead Wall Stabilization	6/17/08	7/4/08
Installation of New 42-Inch Storm Drain	7/1/08	8/5/08
Installation of Laterals and Drop Inlets	8/5/08	8/21/08
Abandon Existing 42-Inch Storm Drain	8/21/08	8/21/08
Grade Site/Create Clean Corridors	6/23/08	9/30/08
Fill Site with Select Fill/Top Soil	6/24/08	10/7/08
Facility Installations/Park Improvements	7/22/08	10/17/08
Seed/Sod Installation	9/25/08	10/17/08
Demobilization	10/20/08	10/24/08

SECTION 3

Health, Safety, and the Environment

All CH2M HILL and subcontractor employees were responsible for complying with Occupational Safety and Health Administration (OSHA) rules and regulations, Honeywell's Health and Safety Program, CH2M HILL's Health, Safety and Environment Program and the site specific HASP. Health and safety contractual concerns included zero incidents, reporting of and learning from near misses, training on first aid, and complete documentation of any safety incidents.

In an effort to promote a safe work environment, the following requirements were implemented on this project:

- Site-specific health and safety plan
- Daily safety meetings
- Project health and safety chartering
- Site-specific training
- Safe work permits
- Job hazard analyses
- Team observations and interventions
- Material safety data sheets
- Health and safety audit
- Employee background verification

The following tasks on this project were regulated under the Occupational Health and Safety Administration (OSHA), 1910.120—HAZWOPER:

- Excavating loading, and transporting offsite soils with arsenic at concentration greater than 454 mg/kg;
- Conducting confirmatory XRF soil sampling in conjunction with the excavation of arsenic-impacted soil from the site;
- Filling excavated areas and regrading of site;
- Digging below-grade utility trenches for the installation of sanitary sewer and water supply line and of electrical conduits;
- Placing geotextile layer inside utility trenches, installing utilities, filling of utility trenches;
- Placing the geotextile fabric marker over entire site;
- Placing 2 feet of clean fill material across the site; and,
- Perform site prep work such as concrete pad placement and seeding ball fields.

A Health and Safety Manager (HSM) was assigned to this project and reviewed and approved any changes to the site-specific HASP that was prepared for this project. The HSM

also designated a site Safety Coordinator, who was present at the site during all field activities and was familiar with the SOPs contained in the HS&E Program Manual and the contents of this plan. The project-specific HASP for the Swann Park project is provided as Attachment B (on CD).

3.1 Air Monitoring and Reporting

An air monitoring program was developed and implemented to minimize and monitor dust that may be generated during the excavation of arsenic-impacted soil and other construction activities at Swann Park. An Air Monitoring Plan which presented the details of the air monitoring approach was prepared and provided to subcontractor personnel prior to the mobilization to the site. The Air Monitoring Plan is provided in Attachment C (on CD).

Construction activities occurred over an approximately 6-month period, from May through October 2008. During the first six weeks of the project, site activities primarily involved the excavation and removal of approximately 13,200 tons of impacted soil, followed by site regrading, placement of a geotextile marker layer, placement of a 2-foot layer of clean soil across the entire site, and installation of subgrade utility infrastructure (e.g., storm sewer, water supply lines, electrical conduits, and sanitary sewer lines).

Dust has the potential of being generated when soil is excavated or otherwise disturbed during construction. The observation of airborne dust in an excavation area was used by onsite project personnel as the primary action indicator. If dust was visible in a localized area, dust suppression methods were immediately implemented. The air-monitoring and dust control measures that were used during the project included:

- Spraying soils with water to minimize the generation of dust;
- Collecting dust-monitoring and weather data during the construction to confirm successful dust control and mitigation and to evaluate the need to initiate actions to mitigate dust generation on a real-time basis, as the construction activities were performed;
- Monitoring and documenting airborne particulate levels near the active excavation areas and at the property boundaries; and,
- Providing the dust-monitoring data to the public on a real-time basis by posting the data on a bulletin board at the site and to the Swann Park Cleanup Web site (www .baltimoreswannparkcleanup.com).

Throughout the excavation activities, air monitoring consisting of visual observations and use of direct-reading "real-time" particulate monitors was undertaken. The particulate air monitors (e.g., DataRAM 4) were equipped with an omnidirectional air intake device and a PM_{10} impactor head to monitor dust levels throughout the entire 6-month project. (The PM_{10} monitors measure dust concentrations of particles less than 10 microns in diameter). The monitors were operated each workday including weekend work days. The monitors were calibrated by the equipment manufacturer before being used at the site.

A combination of fixed and mobile monitoring equipment, including monitoring stations adjacent to excavation areas and at the property boundaries (north, south, east, and west), was

deployed throughout the project site. A monitor was also placed on McComas Street, to the east of Swann Park. The locations of the air-monitoring stations are illustrated in Figure in 3-1.

The air-monitoring program at the Swann Park property consisted of a combination of perimeter, work zone, and personnel (worker) monitoring for particulates (dust) and arsenic. Table 3-1 below outlines the various action levels to be adhered to during the Swann Park project.

TABLE 3-1
Air-Monitoring Action Levels
Swann Park, Baltimore, MD

Air-Sampling Instrument (Real Time)	Action Level	Action Taken When Action Level Is Met or Exceeded
Perimeter dust (PM_{10})	0.228 mg/m^3 (TWA 15 min)	Dust control will be implemented and onsite construction management personnel will be alerted if or when dust levels are at the "alert" level.
Perimeter dust (PM_{10})	0.455 mg/m^3 (TWA 15 min)	Operations that directly impact the generation of dust as measured at the perimeter monitoring stations will be temporarily suspended until dust minimization actions are taken.
Work zone dust (total)	0.91 mg/m^3 (TWA 15 min)	Additional dust control methods will be implemented and construction activities responsible for generating the dust may be temporarily suspended if dust control is not effective. Respirators may be worn by workers in the exclusion zone represented by the air-sampling results.
Work zone arsenic (total)	0.01 mg/m^3 (TWA 8 hours)	Results from personal arsenic sampling will be used to assess if respiratory protection for worker protection and safety is required.

TWA, time-weighted average.

During the 6 months when onsite construction work was performed, there was only one dust event which resulted in air monitors detecting dust. This occurred during a brief storm event where high winds generated dust levels that temporarily exceeded the action level at one of the five perimeter dust-monitoring stations. This event occurred on Saturday, August 23, 2008. Work was immediately suspended until MDE was notified, and the results were posted on the Swann Park Cleanup web site (www.baltimoreswannparkcleanup.com). The air-monitoring data collected during the project are provided in Attachment D (on CD).

Review of the air-monitoring data recorded at the time of the brief wind event determined that the dust levels at the two air-monitoring stations located closest to the adjacent residences on West McComas Street were below the action level. Dust control measures were being performed at the time of the event, and onsite activities at the time involved grading of clean soil being brought to the park from the Honeygo Run Reclamation site. The excavation and removal of contaminated soil had been completed on July 10, 2008, more than one month prior to the event.

3.2 Personnel Protection

While dust suppression measures were used during all soil-handling activities, air monitoring was also performed to quantify levels of dust within disturbed areas and at the perimeter of the property. Occupation Safety and Health Administration (OSHA)–approved personal compliance monitoring (air sampling) of construction workers was performed by subcontractor health and safety personnel for arsenic and total dust concentrations to assess worker exposure levels.

Personal air-sampling devices were worn by select field personnel to evaluate the dust levels within excavation zones. Arsenic and total dust were analyzed by an American Industrial Hygiene Association (AIHA)–approved laboratory. Personnel working within the excavation zone were equipped with Level C personal protection until data from personal air-sampling devices indicated that it was not needed.

No elevated levels of arsenic or total dust concentrations were detected during the excavation of impacted soil from the site. As a result, use of personal air-sampling devices was discontinued once the phases of work involving excavation, loading, and transport of the contaminated soil had been completed.

3.3 Health and Safety Compliance

Bill Berlett, CH2M HILL's Health and Safety Manager for Honeywell projects, conducted a health and safety audit of the Swann Park project site on May 25-26, 2008. Mr. Berlett reported that work was being performed in accordance with the site-specific health and safety plan and all other applicable plans including the Air Monitoring Plan and project specifications.

After the completion of the contaminated soil excavation activities, the onsite Safety Coordinator and Construction Manager held a scheduled safety stand-down to recalibrate the project team's focus on safety for upcoming work elements. At the time, there had not been any near misses during the several thousand hours of onsite work that had been completed.

The objective of the stand-down was to focus the team on the transition from the excavation activities in localized areas of the site to heavy-equipment intensive work elements, including site regrading and filling in excavated areas, off-loading and spreading of clean fill being transported to the site, and the excavation of subsurface utility corridors, which would be performed concurrently across the entire 11-acre site.

Because of this proactive approach and focus on safety, no significant incidents occurred during the performance of the remediation and redevelopment activities. Over the 6-month period when construction work was performed, approximately 23,000 project labor hours were worked (including CH2M HILL and its subcontractors) without a recordable OSHA lost-time incident.

Legend

- Drop Inlet
- Manhole
- Storm Water Line
- Fence/Approximate Property Boundary
- Air Monitoring Stations
- Weather Station Location
- Approximate Limits of I-95
- Edge of Pavement
- Storm Manhole
- Below Ground Stormwater Conveyance System
- Concrete Column
- Concrete Footer

N
W E
S

100 0 100 Feet

1 inch equals 100 feet

Figure 3-1
Air Monitoring Stations
Remedial Action Completion Report
Swann Park
Baltimore, Maryland

CH2MHILL

SECTION 4

Remedial Measures

This section details the remedial steps and construction activities that were completed in support of the remediation and redevelopment of the Swann Park site. Methods involved for each component of the project are described followed by a description of activities which demonstrate that work was performed and met the project design and specification requirement. Photographs documenting construction process and completion are provided in Attachment A (on CD).

4.1 Overview of Completed Remedial Actions

The MDE-approved scope of work for remediation and renovation of Swann Park included the following elements:

- Site preparation, including the installation of staging areas to support the construction activities and construction of a temporary access road across the northeast corner of the Race Street site to protect the Race Street cap;
- Markout of utilities across the entire 11-acre site and on public right-of-ways adjacent to the park property;
- Construction of a truck decontamination area equipped with a belowgrade, poly-lined collection basin for containment of truck wash water ;
- Collection, storage, and characterization of decontamination water for transport to an permitted offsite disposal facility;
- Identification of an MDE-approved certified clean soil borrow site (Honeygo Run Reclamation Center), characterization of the borrow soil consistent with MDE's Voluntary Cleanup Program (VCP) protocols, and obtaining MDE approval for obtaining soil from the Honeygo facility as clean fill material;
- Characterization soil sampling required for the acceptance of the arsenic-impacted soils excavated from the site at permitted offsite nonhazardous landfills;
- Performing continuous air monitoring at five perimeter stations while construction activities were performed at the site (results posted on a real-time basis to an onsite bulletin board and to the Swann Park Cleanup Web site (www.baltimoreswann parkcleanup.com);
- Maintaining fugitive emissions using dust controls (wetting soils and covering stock piled soils) during excavation, grading, loading and transporting of soil;
- Installation of approximately 600 linear feet (LF) of sheet shoring along the north side of the property where it abuts the Race Street site to maintain the integrity of the engineered cap on Race Street during soil excavation (The sheet piles were removed

once the excavated areas along the Park's north property boundary were filled with clean soil.);

- Installation of 203 timber plies in three off-set rows, driven to a depth of approximately 21 feet below ground surface (bgs) to provide structural support to the existing 450 LF bulkhead wall abutting the Middle Branch along the west side of the property;
- Placing 613 tons of riprap on the west side of the bulkhead wall to provide structural support for future soil filling operations;
- Excavation and disposal of 13,143 tons of arsenic-impacted soil from seven predesignated areas and 3 inches of surface soil scraped from Field 5 for offsite disposal at four permitted offsite landfills;
- Confirmatory soil sampling and analysis for arsenic to confirm the excavation of soils containing arsenic concentration in excess of 454 mg/kg, including in-field XRF screening of excavated soils, split soil sampling with the MDE for verification XRF analysis, and laboratory analysis of 100 percent of the final confirmation soil samples;
- Regrading of the site following the excavation of the arsenic-impacted soils utilizing onsite borrow from initial regrading operations as well as importing certified "clean" backfill from the Honeygo Run facility to achieve required sub-grades;
- Installation of new 42-inch high-density polypropylene (HDPE) storm drain pipe and associated manholes, laterals, and inlet structures within utility corridors lined with a MDE-approved geotextile marker fabric at the base and sidewalls, and backfilled new corridors with certified clean fill;
- In-place closure with flowable fill material of the existing 42-inch storm drain located between West McComas Street to the east of the Site and the bulkhead wall abutting the Middle Branch (The new HDPE stormwater pipe was connected to the existing stormwater outfall.);
- Excavation of trenches for the installation of belowgrade underground utilities (e.g., water supply, electrical, and wastewater) within geotextile fabric lined utility corridors
- Placing a 2-foot thick layer of certified "clean" soil cover (48,600 tons of fill soil and 1,000 tons of top soil) across the entire site, with 3 feet of clean fill placed in five designated tree-planting areas;
- Installation of City-requested improvements including 19 sport lighting poles around the perimeter of the recreational fields; foundations for stadium seating, field house, and dugouts; sub-base for asphalt walkway; cul-de-sac sub-base and curbing for the main park entrance; and, relocation of a BGE utility pole;
- Installation of clean corridors using GPS coordinates for the placement of abovegrade park improvements (e.g., fencing, backstops, and goalposts);
- Final site restoration including rough and fine grading, sod, and specialty in-field soil installation at baseball field and hydroseeding of the site;

- Performing topographic surveys to verify final fill grades and placing additional fill soil, as needed, to meet final material placement and grading specifications; and,
- Demobilization from the site, including removal of the temporary access road across the Race Street site, removal of the temporary truck-washing decontamination pad, and restoration of site fencing.

MDE was provided throughout the construction phases of the project with weekly site status reports, including a summary of completed work activities and a list of activities scheduled to be performed. Additionally, during the excavation phase of the project, the project team coordinated with the MDE for splitting soil samples for XRF testing and for the review of characterization data so that MDE could approve the closure of each excavation as laboratory verification data became available.

4.2 Permitting

The construction work performed at Swann Park was performed subject to permits issued by the City of Baltimore and MDE, as described below. Copies of all permits are provided in Attachment E (on CD).

4.2.1 Building Permit

Construction activities such as those performed at Swann Park are required to be performed under a building permit issued by the City of Baltimore. The building permit was issued by the City of Baltimore, Department of Housing and Community Development, Division of Construction and Building Inspection, to the City of Baltimore, Recreation and Parks Department, on August 14, 2008. The permit was posted in the onsite construction trailer throughout the project. A copy of this permit is provided in Attachment E-1 (on CD).

4.2.2 General Permit for Construction Activity

A General Permit for Construction Activity (General Permit) is required for site construction work performed in Maryland for projects where the planned total disturbance is 1 acre or more. The General Permit is issued subject to the federal National Pollutant Discharge Elimination System (NPDES) stormwater program to control runoff associated with industrial activity, including construction. Conditions of the permit include compliance with provisions presented in Erosion and Sediment Control Plan (ESCP) and a Stormwater Management Plan (SWMP), as discussed in Section 4.4.

A Notice of Intent (NOI) to comply with the General Permit conditions was submitted to the MDE. The MDE's Water Management Administration issued a general permit (Notice of Intent #08BC0026) to the City of Baltimore, Department of Recreation and Parks, authorizing the discharge of stormwater associated with the construction activities at Swann Park. A copy of the MDE letter of authorization is provided in Attachment E-2 (on CD).

4.2.3 Dewatering Discharge

Remedial actions performed at Swann Park were subject to the General Permit issued by the MDE as stated in Section 4.2.2. The General Permit for Swann Park addresses the Erosion and Sediment Control and Stormwater Management Plan submittals, which are provided to

the City of Baltimore, Department of Public Works, Storm Water Management Group for review and approval.

In addition to the management of surface water during construction activities, the General Permit addresses the discharge of water generated during site dewatering. The General Permit requires the use of Best Management Practices (BMPs) for the removal of sediment via filtering, which was performed during dewatering at Swann Park. For solids removal using BMPs, no effluent monitoring is required under the General Permit, according to the City's Storm Water Management Group, Department of Public Works.

Soil removal from the seven excavation areas and trenching and the installation of a new 42-inch stormwater drain (transect the property from McComas Street to the existing bulk head wall and storm water outfall at the Middle Branch of the Patapsco River) required localized dewatering. Additionally, because the new HDPE 42-inch storm drain was located partially in the groundwater table, groundwater extraction was performed when the drain was being installed. The extracted water was discharged into the existing 42-inch stormwater drain and outfall while the new drain was being installed, except when the storm drain line was being connected to the existing outfall at the bulkhead wall. Approximately 806,000 gallons of water were extracted and discharged during site dewatering activities.

Surface water discharges to the waters of the state are regulated by the MDE under COMAR 26.08.02.03-2 (Numerical Criteria for Toxic Substances in Surface Waters). The freshwater standard for arsenic is 340 µg/L, and this standard applies to the extracted groundwater discharged to the Middle Branch from the site during construction. This standard is based on a dissolved metal concentration. Arsenic concentrations in groundwater samples collected and analyzed from three onsite groundwater-monitoring wells in the general proximity to where the new 42-inch storm drain was installed were an order-of-magnitude lower in concentration than MDE's Acute Fresh Water Standards as summarized below.

Designation	Arsenic (µg/L)	Well Location
SP-MW-002	15	West side of property, near Middle Branch
SP-MW-005	20.3	Midpoint of property
SP-MW-006	32.4	East side of property, near McComas Street

Given that arsenic concentrations previously detected in groundwater at the site were below the freshwater standard, the need to treat the extracted groundwater prior to its discharge to remove dissolved-phase arsenic was not required. The MDE concurred with this approach as indicated in a letter from MDE to Honeywell dated May 5, 2008, provided in Attachment E-3 (on CD).

4.2.4 Tidal Wetland Permit

A tidal wetlands permit was required for construction activities that were performed along the shoreline of the Middle Branch of the Patapsco River which abuts the western boundary of Swann Park. As a means to stabilize the existing stone bulkhead wall (constructed circa 1905–1912) and provide erosion control along the shoreline, approximately 613 tons of riprap was placed within 10 feet of the shoreline along the 650 LF of the shoreline abutting the Middle Branch.

The MDE, Tidal Wetlands Division, issued a General Tidal Wetlands License (08-GL-1303) and Maryland State Programmatic General Permit (MDSPGP) (authorization No. 200861763) to the City of Baltimore, Department of Recreation and Parks, to emplace 450 LF of stone armor (riprap) within a maximum of 10 feet channelward of the existing bulkhead wall and mean tide line. The permit was issued on May 27, 2008. A copy of the wetlands permit is provided in Attachment E-4 (on CD).

4.2.5 Flood Plain Variance

Pursuant to City Code Article 7, §3-12 (b), a floodplain variance was required (City Code Article 7, §5-1 through §5-9) for the Swann Park construction activities because implementation of MDE's approved remedy required the placement of more than 600 cubic yards of clean fill per acre within the 100-year flood plain at Swann Park. Additionally, redevelopment of the Site's recreational areas required regrading and placement of additional clean fill within the western portion of the Site, which is within the 100-year floodplain.

The Land Use Division and Urban Planning, Department of Planning, City of Baltimore, performed the review of floodplain variance documentation as part of the Storm Water Management Plan review and approval process. The Department of Planning notified the Department of Recreation and Parks of their approval of the floodplain variance on April 4, 2008, and subsequently provided signed design drawings that were submitted for approval with the Stormwater Management Plan. The floodplain variance documentation is provided in Attachment E-5 (on CD).

4.3 Mobilization, Staging Area, and Site Preparation

Personnel and equipment were mobilized the first week of May 2008 to the site at the beginning of the onsite construction activities, which included the setup of storage areas and base of operations, dust and environmental impact mitigation barriers; construction of an equipment decontamination pad; and, setup of an office work trailer, an equipment storage trailer, and temporary sanitary facilities. Key work elements performed as part of site mobilization are presented in the following sections.

4.3.1 Utility Markout

A sitewide utility markout survey was performed to verify and demarcate the location of subsurface utilities within the onsite work areas and the public-right-of-ways that immediately abut the property. Utilities that were identified included (1) a BGE electrical trunk line along the southern and eastern limits of the site; (2) a 42-inch storm drain system that ran from West McComas Street to the bulkhead wall along the Middle Branch of the Patapsco River (including a buried stormwater pipeline access manhole in the center of the site); and, (3) water supply and sanitary sewer lines at the northeast corner of the site. The location of the utility tie-ins for water, sewer, and electrical service on and adjacent to the site were also identified (sewer and water service are available within the West McComas Street right-of-way).

4.3.2 Race Street Site Access Road

An engineering evaluation was performed to assess the effect of constructing a temporary haul road across the engineered asphalt cap on the Race Street site for use by trucks hauling soil to and from the site. Construction of the temporary roadway consisted of the placement of gravel within Jersey barrier walls placed 24 feet apart so that the access road was wide enough to allow two-way truck traffic. The Jersey barriers were placed to prevent truck traffic from leaving the roadway onto the Race Street site. Additionally, as an erosion and surface water control measure, a geotextile fabric was placed along the interior sides and bottom of the temporary roadway (between the Jersey walls) before it was filled with 2 feet of crushed rock base.

The constructed roadway conformed to the project design drawings and the erosion and sediment control plan specifications. The constructed roadway was maintained throughout the construction phases of onsite work. During this time, no construction equipment or haul trucks were driven or parked on the Race Street site.

4.3.3 Monitoring Well Abandonment

The eight onsite groundwater-monitoring wells (SP-MW-001, SP-MW-002, SP-MW-003, SP-MW-004, SP-MW-005, SP-MW-006, SP-MW-007, and SP-MW-008) installed at the Site as part of the CIR-RAA were abandoned so that soil excavation and site regrading could be accomplished. Well abandonment involved removing the well casing, grouting the boreholes, and submitting the Water Well Abandonment—Sealing Report form to MDE. Copies of the water well abandonment forms are provided in Attachment F (on CD).

4.3.4 Clearing and Grubbing

A swath of large trees greater than 6 inches in diameter that bordered the southern perimeter of the site were cleared and grubbed. The cleared areas varied from approximately 10 to 50 feet wide (10 feet wide on the east side of the site and 50 feet wide on the west side of the site). Light vegetation across the entire site was also cleared as required to complete site grading, excavation, and redevelopment activities. Approximately 1 acre of the site required heavy clearing and grubbing while the remainder of the site required only light clearing. Cleared vegetation material such as roots and stumps were removed and staged onsite until they were transported offsite for disposal with the soil removed from the seven excavations.

Existing onsite structures, including back stops and benches for the existing softball and baseball fields were demolished, and the football scoreboard was removed prior to site clearing and grubbing being completed.

4.4 Erosion and Sediment Control

As a condition of the issuance of the General Permit for Construction Activity, which is issued subject to the federal NPDES stormwater program, an approved erosion and sediment control (ESC) plan and a stormwater management plan were prepared and implemented to prevent the uncontrolled discharge of surface water, groundwater,

sediment, and soil and migration of contaminants from work areas into surrounding areas of the site and offsite.

The ESC plan involved the preparation of site plans and specifications for the installation of erosion and sediments controls during the onsite construction. Key ESC measures are summarized below:

- Installed materials to stabilize the construction entrance for the temporary haul road where it entered the park from the Race Street site;
- Installed a portable sediment trap in the truck decontamination area, which was located at the entrance of the temporary haul road where it entered onto Swann Park from the Race Street site;
- Installed soil erosion control measures, including a liner covering the entire base of the material-handling and soil-staging areas that prevented run-on or run-off of contaminated soil and potentially contaminated water in the vicinity of staged soil. A 6-mil plastic-sheeting cover was placed over staged soils when active loading of soil for offsite transport and disposal were not being performed. The material handling and staging area was decommissioned and dismantled following removal and offsite disposal of all materials;
- Installed 400 LF of silt fence and super silt fence/hay bales as erosion control measures at the site;
- Installed various erosion control measures, including 950 LF of earthen dikes, 13 at-grade inlets, sediment trap baffles, eight stone check dams at the bulk head wall, erosion control matting within surface water drainage swales, and riprap outlet settlement traps; and,
- Applied stabilization material for vegetative materials and turf grass establishment.

The ESC Plan was submitted to the City of Baltimore, Department of Public Works. As discussed in Section 4.2.2, the MDE Water Management Administration approved the ESC Plan and issued a General Permit (Notice of Intent #08BC0026) to the City of Baltimore, Department of Recreation and Parks. Modifications to the ESC Plan were submitted to the Department of Public Works in May 2008. The first modification concerned deferring stabilization of the construction entrance to Swann Park from McComas Street since final site grading was being performed and the entrance was in active use. The second modification involved construction modifications to the entrance to Swann Park from the Race Street site which involved increasing the depth and width of the temporary access road to accommodate a 4-foot change in elevation between the properties. A City representative (C. Cook) signed the original set of ESC plans (ESD # 5673) on April 4, 2008. ESC documentation is provided in Attachment G (on CD).

4.5 Stormwater Management Plan

As a condition of the General Permit for Construction Activity, a Stormwater Management Plan (SWM plan) was prepared by Rummel, Klepper, and Kahl LLP (RKK), on behalf of the

Department of Recreation and Parks. The SWM plan was submitted to the City's Department of Public Works (DPW) for review and approval.

The SWM plan addressed stormwater management controls to be constructed as part of the Park's remediation and redevelopment to address water quality requirements for the Site, including the construction of two swales. A waiver for groundwater discharge was obtained because stormwater was not to be directed into the subsurface because a 2-foot certified clean soil cap was to be placed across the site. A waiver for SWM quality controls was also obtained because stormwater from the Site discharges to tidal waters. The plan was approved by the DPW (sign-off on the engineering drawings). A copy of the SWM Plan submitted to the DPW and approved by DPW is provided in Attachment H (on CD).

4.6 Critical Area Review

As part of the SWM plan evaluation and preparation, RKK performed a Critical Area Review pursuant to the Chesapeake Bay Critical Area requirements. This review involved the evaluation of stormwater pollutant removal using BMPs. The current conditions were compared with postdevelopment stormwater loads and the potential for impacts within the 100-foot Critical Area buffer in order to accommodate the Park's layout postdevelopment and forest-clearing mitigation. As a result of this review, the City of Baltimore will be required to identify and implement an offsite "Buffer Offset" (70,974 ft^3 of plantings). This requirement did not effect obtaining permit approval for the remediation and redevelopment measures performed at Swann Park. Information from RKK's Critical Area review and correspondence from the State of Maryland, Critical Area Commission, Chesapeake and Atlantic Coastal Bays, is provided in Attachment I (on CD).

4.7 Stabilization Controls

Stabilization controls consisting of the installation of timber piles along the entire length of the existing stone bulkhead wall (west side of the property where it abuts the Middle Branch of the Patapsco River) was performed prior to placing the 2-foot clean cover soil across the site. Sheet piling was also installed along portions of the north property boundary as a protective measure to maintain the integrity of the engineered cap covering the Race Street site.

4.7.1 Shore Line Stabilization

The shoreline stabilization installation consisted of the installation of 203 timber piles, placed as three offset rows of timber piles including a front row of 101 timber piles and two staggered rows of piles with 51 piles each. The piles consisted of 10- to 12-inch-diameter treated timbers driven to the medium dense sandy layer or refusal at an average depth of 20 feet bgs. The first rows of piles were installed approximately 10 feet behind the back of the existing stone bulkhead wall for the entire 450-foot length of the bulkhead wall. The piles on the front row were spaced 4 feet center to center. The piles were placed such that the spacing between the three rows of piles was approximately 5 feet. The piles in the back two rows were spaced 8 feet center to center within the rows and were staggered from the adjacent row of piles.

The timber piles were pushed, vibrated, and hammered into the subsurface until refusal occurred at an average depth of 20 feet bgs, indicating that a dense soil layer was encountered. At the point of refusal, approximately 12 to 18 inches of each pile extended above the ground surface. The piles were then cut off so that the pile tops would be buried below the geotextile marker layer and the 2 feet of clean fill cover.

Stabilization measures for the west side of the bulkhead wall (Middle Branch shoreline) consisted of the installation of a 16-oz. geotextile membrane over the sediments within 10 feet of the mean tide line. Prior to the placement of the membrane, trash and other debris along the Swann Park water front with the Middle Branch were removed. Approximately 613 tons of Class II riprap was then placed over the geotextile membrane along the entire 450-foot length of the bulkhead wall.

4.7.2 Sheet Shoring

Stabilization of the north property boundary of Swann Park involved driving interlocking sheet piling to the north of three excavations (E-1, E-4, and E-6) where they abutted the Race Street engineered cap. Sheet shoring was driven over a distance of approximately 600 LF, which included 450 LF of shoring from E-1 (northwest corner of Swann Park) extending just beyond E-4 (center of north property boundary), and 150 LF of sheeting along the north side of E-6. The sheeting was installed using direct-push and vibratory methods to a depth of 15 to 20 feet bgs.

The depth to groundwater at the northwest corner of the Site is less than 3 feet bgs (CH2M HILL, 2007). During the installation of the sheet shoring in this portion of the site, soft soils were encountered, and groundwater emerged into the open excavation. To prevent the potential for undermining the integrity of the Race Street cap, self-compacting stone was placed between the southern face of the Race Street engineered cap and interlocking sheet wall extending over the 450-foot length of sheeting installed within the northwest corner (north of E-1 and E-4). Placement of the stone was observed to be effective in maintaining the integrity of the Race Street cap.

The sheeting was removed, decontaminated, and trucked from the site once the soil excavation activities were completed and MDE approved the closure of excavations E-1, E-4, and E-6 based on their review of the verification soil-sampling results.

4.8 Excavation, Transportation, and Disposal

A confirmation sampling plan for excavation activities dated March 2008 was submitted to and approved by MDE for the waste characterization and verification soil sampling to be performed in conjunction with excavation activities at the site. A copy of this plan was submitted to the MDE in January 2008 and approved before soil excavation activities commenced in May 2008.

4.8.1 Soil Volume Estimates

The extent of the contaminated soil to be removed from the Site was estimated based on the distribution of soil exceeding the cleanup objective (454 mg/kg) using soil sampling results from 82 analytical samples collected from 32 boreholes from the ground surface to depths of

approximately 5 feet bgs. Geologic layers were assumed to be coincident with sample depths: 0 to 3 inches bgs; 3 to 9 inches bgs, 9 to 24 inches bgs; and, 24 to 60 inches bgs.

Excavation volumes included soil overlying contaminated soil (overburden) and a selected amount of overexcavation. The estimate includes overburden excavated with an approximate 2:1 horizontal–to-vertical excavation slope. The excavation volume was limited vertically to the groundwater table using water level measurements collected in May 2007 from site monitoring wells. These measurements represent low water table conditions due to the dry weather conditions prior to this monitoring event.

Soil excavation volume estimates were based on exceedances of the risk-based cleanup criteria for arsenic for the adult recreator and construction worker. The estimated extent of arsenic in soil at Swann Park at concentrations greater than 454 mg/kg is illustrated in Figure 4-1.

The estimated volume of impacted soil located above the groundwater table for concentrations 454 mg/kg was 4,500 cubic yards. This estimate was revised to 4,655 cubic yards to accommodate the digging of additional utility corridors associated with the installation of City requested park improvements. Using a conversion of 1.7 tons/cubic yard, the estimated number of tons of soil to be excavated for offsite disposal was approximately 7,900.

4.8.2 Characterization of Soil for Offsite Disposal

During sampling performed as part the CIR-RAA in May 2007, four soil samples collected at multiple depth intervals were analyzed for Toxicity Characteristic Leaching Procedure (TCLP) laboratory analyses to assist with evaluating potential future remedial actions and to obtain approval for the disposal of the excavated soil at offsite landfill facilities. The TCLP sampling locations were selected based on soil sampling results from April 2007, which indicated where elevated arsenic concentrations were present at the site. The May 2007 analyses for waste characterization included a full suite of TCLP analytes including volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), metals, mercury, ignitability/flashpoint, pH (corrosivity), reactive sulfide, and reactive cyanide.

TCLP VOCs, SVOCs, and herbicides were not detected in any of the soil samples collected from the four sampling locations. One pesticide, heptachlor, and six TCLP metals were detected (TCLP arsenic concentrations ranged from 0.0194 mg/L to 2.21 mg/L). The TCLP results were compared with hazardous waste criteria as defined in the Code of Maryland Regulations (COMAR) 26.13.02.09, Criteria for Listing Hazardous Waste. Based on the May 2007 sampling results, soils at Swann Park do not have the constituent levels or waste characteristics representative of a characteristic hazardous waste. The TCLP results are included as an attachment to the Confirmation Sampling Plan for Excavation Activities provided in Attachment J (on CD).

The TCLP results were provided to Waste Management, a solid waste management company, to obtain bid pricing and approval for the disposal of the excavated soils. Waste Management accepted the waste characterization results and approximately 12,442 tons of excavated soil from Swann Park were disposed of at Waste Management–owned landfills.

There was a positive soil balance resulting from final grading operations during the filling of the site. Approximately one-third of this 700-ton stockpiled soil was clean fill imported from Republic Services' Honeygo Run Reclamation facility which was commingled with the positive balance soil for site-grading activities. To expedite removal of the surplus material, a request was submitted to the Honeygo Run Reclamation facility for disposal of the material in their landfill, a separate area from the clean borrow portion of Honeygo's site. This landfill is permitted by the MDE and was undeveloped property before its present use as sources of certified-clean borrow material on a portion of the property and for the disposal of nonhazardous waste in another area of the site.

The results from the initial rounds of TCLP soil sampling and analysis results for RCRA metals, VOCs, SVOCs, and pesticides/ herbicides were provided to Republic Services. Republic Services requested that two additional soil samples be collected and analyzed for TCLP arsenic. TCLP analysis of these two soil samples collected from the 700-ton soil stockpile indicated non-detectable levels of arsenic. These analytical results are provided in Appendix A.

4.8.3 Confirmation Sampling

Confirmatory soil sampling activities were conducted in conjunction with excavation of the seven predetermined locations and scraping of Field 5, beginning on May 30, 2008, and ending the week of July 1, 2008. The soil-sampling activities were performed in accordance with the "Confirmation Sampling Plan for Excavation Activities, Swann Park, Baltimore, Maryland," which was finalized, submitted to and approved by the MDE in March 2008. As described in the sampling plan, the confirmatory sampling task involved (1) field screening of the soil samples using a portable X-ray fluorescence (XRF) analyzer; (2) collecting split soil samples at all sample locations with a subset of the split soil samples provided to the MDE for XRF verification analysis at their facility; and, (3) final laboratory analysis of soil samples for locations where XRF analysis indicated that the arsenic concentration was below 454 mg/kg.

Prior to excavating, sample collection locations were staked out along the perimeter and floor of each the seven excavations. As soil excavation proceeded, soil samples were collected using the excavator bucket and mixed using disposable sampling equipment. With the exception of the excavation sidewalls that bound the northern property boundary with the 2000 Race Street Site, one soil sample was collected from the midpoint depth of each sidewall of the excavations. Additional sidewall samples were collected at 50-foot intervals where the sidewall lengths exceed 50 feet. One floor sample was collected at each of the smaller excavations (E-2, E-3, and, E-7) and multiple floor samples were collected on an approximate 50-foot grid spacing for the larger excavation areas (E-1, E -5, E-6, and E-7). Floor samples were not collected across that portion of E-1 that was excavated to the groundwater table.

As soil removal proceeded at each excavation, discrete soil samples were collected from the proposed horizontal excavation limits and from the floor of the excavation at an approximate depth interval ranging from 2 to 3 feet below grade. The soil samples were then bagged, thoroughly homogenized, and screened using the portable XRF unit. If the

sample screening returned an arsenic concentration that was below an acceptable level,[1] then the soil sample was retained and submitted to the laboratory for analysis of total arsenic (EPA Method SW-846 6010B). If the XRF screening result exceeded 454 mg/kg or was within 20 percent below this value, additional soil was excavated and additional XRF field screening was performed until the targeted arsenic concentration was achieved. The lateral expansion of some excavation boundaries (e.g., E-1, E-2, E-4, and E-6) was directed because XRF field screening indicated that additional soil removal was required.

Analytical results confirm the lateral and vertical extent of each excavation because the laboratory-determined arsenic concentrations at the final boundaries do not exceed 454 mg/kg (Table 4-1; see end of section). In addition, the laboratory results correlate well with the XRF results (correlation coefficient = 0.77) and the XRF results also do not exceed 454 mg/kg (Figure 4-2).

Data tables and corresponding site plans illustrating the soil sampling locations were provided to MDE throughout the excavation phase of the project. The excavations were backfilled only after MDE reviewed the soil-sampling results and provided written concurrence on excavation closure. The MDE XRF results served to further verify the defined arsenic concentrations at select sample locations. MDE completed their XRF testing of collected soil samples on July 1, 2008.

4.8.4 Soil Excavation and Offsite Disposal

The boundaries of seven designated excavation areas (E-1 through E-7), as defined in Alternative 4 in the CIR-RAA, were staked using GPS technology on May 21, 2007. Figure 4-1 illustrates the lateral extent of these excavations which reflect the excavation of approximately 4,655 cubic yards (7,900 tons) of soil.

Soil excavation activities began on May 30, 2008, and were below grade, except excavation E-1, where the soil was removed to the groundwater table, which was encountered at approximately 2 to 4 feet below grade. The excavation limits were confirmed through XRF screening and confirmatory laboratory analysis as discussed in Section 4.8.3. Each of the excavations were deemed closed and subsequently filled after obtaining MDE written (e-mail) approval that the laboratory confirmatory results satisfactorily documented the extent of each excavation.

As illustrated in Figure 4-2, soil removal from three of the excavations (E-3, E-5, and E-7) closely matched the initial proposed excavation boundaries, while four of the excavations (E-1, E-2, E-4 and E-6) required overexcavation based on the in-field XRF soil screening. As illustrated in Figure 4-2, excavation E-1 extended southward along the bulkhead wall and northward along the property boundary until connecting with the west side of excavation E-4.

Based on truck weight ticket documentation, an estimated 13,142.5 tons (7,730 cubic yards) of soil was excavated and transported to offsite disposal facilities, as summarized in Table 4-2. Copies of the weight trip tickets documenting the offsite disposal of the soil are provided in Attachment J (on CD).

[1] Based on the correlation of the laboratory and field XRF results the acceptable field XRF screening level (approximately 300 mg/kg) was slightly lower than the defined remedial target concentration of 454 mg/kg for laboratory analysis.

TABLE 4-1
Soil Excavation Verification Data
Swann Park, Baltimore, MD

Excavation ID	Field Sample ID	Sample Date	Arsenic Concentration by Field XRF (mg/kg)	Arsenic Concentration by MDE XRF (mg/kg)	Arsenic Concentration by Laboratory Analysis[1] (mg/kg)	Comment
EX7	SP-EX7-S1-0102	5/30/2008	158.2	--	118	Results confirm excavation limit.
	SP-EX7-S2-0102	5/30/2008	7.9	8.4	9.17	Results confirm excavation limit.
	SP-EX7-S3-0102	5/30/2008	13.3	--	13.4	Results confirm excavation limit.
	SP-EX7-S4-0102	5/30/2008	87.9	17.6	67.5	Results confirm excavation limit.
	SP-EX7-S5-0203	5/30/2008	6	8.8	6.04	Results confirm excavation limit.
EX3	SP-EX3-S1-0002	5/30/2008	13.2	--	10.5	Results confirm excavation limit.
	SP-EX3-S2-0002	5/30/2008	40.1	12.6	5.38	Results confirm excavation limit.
	SP-EX3-S3-0002	5/30/2008	14.7	--	4.56	Results confirm excavation limit.
	SP-EX3-S4-0002	5/30/2008	21.2	45.4	12.3	Results confirm excavation limit.
	SP-EX3-S5-0203	5/30/2008	5.8	5	3.99	Results confirm excavation limit.
EX2	SP-EX2-S1-0002	6/2/2008	41.5	--	102	Results confirm excavation limit.
	SP-EX2-S2-0002	6/2/2008	111.6	114.5	158	Results confirm excavation limit.
	SP-EX2-S3-0002	6/2/2008	176.3	--	123	Results confirm excavation limit.
	SP-EX2-S4-0002	6/2/2008	151.6	191	106	Results confirm excavation limit.
	SP-EX2-S5-0203	6/2/2008	11.6	44.9	20.7	Results confirm excavation limit.
EX5	SP-EX5-S1-0002	6/4/2008	11	--	13.9	Results confirm excavation limit.
	SP-EX5-S2-0002	6/4/2008	23	--	20.6	Results confirm excavation limit.
	SP-EX5-S3-0002	6/4/2008	96	--	94.5	Results confirm excavation limit.
	SP-EX5-S4-0203	6/5/2008	20	--	11.3	Results confirm excavation limit.

TABLE 4-1
Soil Excavation Verification Data
Swann Park, Baltimore, MD

Excavation ID	Field Sample ID	Sample Date	Arsenic Concentration by Field XRF (mg/kg)	Arsenic Concentration by MDE XRF (mg/kg)	Arsenic Concentration by Laboratory Analysis[1] (mg/kg)	Comment
	SP-EX5-S5-0203	6/5/2008	7	6.2	5.38	Results confirm excavation limit.
	SP-EX5-S6-0203	6/5/2008	8	2.7	1.67	Results confirm excavation limit.
	SP-EX5-S7-0002	6/5/2008	29	53.6	36	Results confirm excavation limit.
	SP-EX5-S8-0203	6/17/2008	8	10	5.68	Results confirm excavation limit.
	SP-EX5-S9-0203	6/17/2008	7	13.3	7.01	Results confirm excavation limit.
	SP-EX5-S10-0002	6/17/2008	35	76.6	55.6	Results confirm excavation limit.
	SP-EX5-S11-0001	6/17/2008	23	--	28.3	Results confirm excavation limit.
	SP-EX5-S12-0102	6/17/2008	8	--	11.2	Results confirm excavation limit.
	SP-EX5-S13-0002	6/18/2008	166	--	222	Results confirm excavation limit.
	SP-EX5-S14-0102	6/17/2008	5	--	2.8	Results confirm excavation limit.
	SP-EX5-S15-0001	6/17/2008	79	--	132	Results confirm excavation limit.
	SP-EX5-S16-0102	6/17/2008	17	--	9.56	Results confirm excavation limit.
	SP-EX5-S16-0102-D	6/17/2008	17	--	7.71	Results confirm excavation limit.
	SP-EX5-S17-0102	6/17/2008	6	--	3.6	Results confirm excavation limit.
	SP-EX5-S18-0002	6/18/2008	11	--	10.1	Results confirm excavation limit.
	SP-EX5-S19-0002	6/18/2008	55	--	59.4	Results confirm excavation limit.
	SP-EX5-S20-0002	6/18/2008	143	--	71.5	Results confirm excavation limit.

TABLE 4-1
Soil Excavation Verification Data
Swann Park, Baltimore, MD

Excavation ID	Field Sample ID	Sample Date	Arsenic Concentration by Field XRF (mg/kg)	Arsenic Concentration by MDE XRF (mg/kg)	Arsenic Concentration by Laboratory Analysis[1] (mg/kg)	Comment
	SP-EX1-S1-0002	6/9/2008	295	155.8	306	Results confirm excavation limit.
	SP-EX1-S2-0002	6/12/2008	195	--	280	Results confirm excavation limit.
	SP-EX1-S3-0002	6/9/2008	301		483	Additional excavation completed - see EX1-S3A-0002
EX1	SP-S3A-0002	6/12/2008	58	82.4	63.9	Results confirm excavation limit.
	SP-EX1-S4-0002	6/12/2008	272	--	300	Results confirm excavation limit.
	SP-EX1-S5-0002	6/12/2008	230	258.3	250	Results confirm excavation limit.
	SP-EX1-S6-0002	6/12/2008	135	--	175	Results confirm excavation limit.
	SP-EX1-S7-0203	6/12/2008	48	--	60.8	Results confirm excavation limit.
EX1	SP-EX1-S8-0203	6/12/2008	6	--	5.03	Results confirm excavation limit.
	SP-EX1-S9-0203	6/13/2008	14	--	9.8	Results confirm excavation limit.
	SP-EX1-S10-0203	6/13/2008	2829	--	--	Additional soil excavated to groundwater table. No lab sample.
	SP-EX1-S11-0203	6/13/2008	326	--	528	Additional soil excavated to groundwater table.
	SP-EX1-S12-0204	6/20/2008	118	--	213	Results confirm excavation limit.
	SP-EX1-S13-0002	6/20/2008	165	--	178	Results confirm excavation limit.
	SP-EX1-S14-0203	6/19/2008	15	--	4.8	Results confirm excavation limit.
	SP-EX1-S15-0002	6/19/2008	202	--	238	Results confirm excavation limit.
	SP-EX1-S16-0002	6/25/2008	147	--	472	Additional excavation

TABLE 4-1
Soil Excavation Verification Data
Swann Park, Baltimore, MD

Excavation ID	Field Sample ID	Sample Date	Arsenic Concentration by Field XRF (mg/kg)	Arsenic Concentration by MDE XRF (mg/kg)	Arsenic Concentration by Laboratory Analysis[1] (mg/kg)	Comment
						completed - see EX1-S16A-0002
	SP-EX1-S16A-0002	6/27/2008	159	--	184	Results confirm excavation limit.
	SP-EX1-S17-0203	6/20/2008	26	--	18.9	Results confirm excavation limit.
	SP-EX1-S18-0002	6/25/2008	220	--	579	Additional soil excavated. EX1 merged with EX4. No lab sample.
EX4	SP-EX4-S1-0002	6/20/2008	134	--	121	Results confirm excavation limit.
	SP-EX4-S2-0203	6/20/2008	29	33.7	39.4	Results confirm excavation limit.
	SP-EX4-S3-0002	6/23/2008	279	--	307	Results confirm excavation limit.
	SP-EX4-S4-0002	6/23/2008	186		217	Results confirm excavation limit.
	SP-EX4-S5-0203	6/23/2008	47	53.3	7.38	Results confirm excavation limit.
	SP-EX4-S6-0002	6/23/2008	87	--	118	Results confirm excavation limit.
	SP-EX4-S7-0203	6/23/2008	132	--	25.5	Results confirm excavation limit.
	SP-EX4-S8-0203	6/23/2008	157	--	181	Results confirm excavation limit.
	SP-EX4-S9-0002	6/23/2008	313	136.2	115	Results confirm excavation limit.
	SP-EX4-S10-0002	6/23/2008	9	--	13	Results confirm excavation limit.
EX6	SP-EX6-S1-0002	6/24/2008	308	--	490	Additional excavation completed - see SP-EX6-S9-0002
	SP-EX6-S2-0002	6/24/2008	374	--	457	Additional excavation completed - see SP-EX6-S10-

TABLE 4-1
Soil Excavation Verification Data
Swann Park, Baltimore, MD

Excavation ID	Field Sample ID	Sample Date	Arsenic Concentration by Field XRF (mg/kg)	Arsenic Concentration by MDE XRF (mg/kg)	Arsenic Concentration by Laboratory Analysis[1] (mg/kg)	Comment
						0002
	SP-EX6-S3-0002	6/24/2008	228	267.8	144	Results confirm excavation limit.
	SP-EX6-S4-0304	6/25/2008	7	10.5	4.87	Results confirm excavation limit.
	SP-EX6-S4-0304-D	6/25/2008	7	--	5.14	Results confirm excavation limit.
	SP-EX6-S5-0002	6/30/2008	316	--	319	Results confirm excavation limit.
	SP-EX6-S6-0203	6/30/2008	6	--	1.55	Results confirm excavation limit.
	SP-EX6-S7-0002	7/1/2008	139	--	108	Results confirm excavation limit.
	SP-EX6-S8-0203	7/1/2008	6	ND	1.57	Results confirm excavation limit.
	SP-EX6-S9-0002	7/1/2008	145	--	236	Results confirm excavation limit.
	SP-EX6-S10-0002	7/1/2008	153	--	204	Results confirm excavation limit.
	SP-EX6-S11-0203	7/1/2008	7	--	6.17	Results confirm excavation limit.
	SP-EX6-S12-0203	7/1/2008	6	15.7	15.8	Results confirm excavation limit.

Notes:

BOLD values <LOD

1 = Laboratory QC has been reviewed by CH2M HILL

TABLE 4-2
Offsite Soil Disposal Details

Disposal Company	Truck Type	Destination	Material	Truck Loads	Avg. Tons/ Truck	Tons Shipped
Waste Management	Dump/Tri-Axle	King George, in Va.	Soil	339	25.42	8,617.78
Republic Services	Dump	Modern in York, Penn.	Soil	20	23.53	470.58
Waste Management	Dump	Mountain View in Frostburg, Md.	Soil	147	22.8	3,354.13
Republic Services	Dump	Honeygo Refuse	Soil	50	14	700.00
Totals				**506**	**24.6**	**13,142.50**

4.9 Storm Drain

A new 42-inch storm drain and associated laterals, inlets, and manholes were installed at Swann Park as described below.

4.9.1 New Storm Drain

The new 42-inch-diameter storm drainage system was installed to replace the existing 42-inch-diameter reinforced concrete pipe (RCP) drain. The new storm drain system included 972 LF of HDPE pipe and six manholes. The new storm drain was installed parallel to the existing storm drain, approximately 25 feet to the south.

The sequence of construction consisted of tying the new storm drain into the existing storm drain along the eastern property line where it abuts West McComas Street. The connection to the existing storm pipe was performed by placing a “doghouse” (MH-6)–style manhole over the existing pipeline. The new storm drain pipe was set at a 45° angle oriented to the southwest and extended approximately 45 feet to MH-5. A pipe was then installed to the west of MH-5 to MH-2, with interim manholes (MH-4 and 3) located along this pipe run just prior to the football field (MH-4) and beyond the football field (MH-3). Manhole 2 is located immediately east of the bulkhead wall. At this point, the pipeline is 45° to the northwest and ties into the second “doghouse” manhole (MW-1) and tied back into the existing pipeline and outfall at the bulkhead wall located adjacent to the Middle Branch.

The pipeline excavation was lined with a geotextile fabric marker layer and 12 inches of #57 stone bedding. Stone bedding was used to backfill around the annular space around the storm drain and 1 foot above the installed storm drain. A layer of geotextile marker layer was placed over the layer of stone and the open excavation above the storm drain was filled with soil. Compaction of the fill soil was performed in 6-inch lifts using a 54-inch smooth drum roller and remote control mini-roller.

All excavated soils from trenching for the installation of the new storm drain were transported to the west side of the site and used as fill to meet the bottom of cap elevation. Dewatering of groundwater during the storm drain installation was performed as described in Section 4.2.3.

4.9.2 Laterals and Drop Inlets

Thirteen drop inlets and approximately 1,100 LF of lateral piping were installed as part of the stormwater system upgrades, including four inlets along the perimeter of the softball field areas (I-1 through I-4), seven inlets adjacent to the football field (I-5 through I-11) in the area of the end zones and along the retaining wall, one inlet (I-12) in the cul-de-sac area, and one inlet (I-13) between the convenience building foundation and north property boundary. Installed laterals consisted of 12-inch- or 15-inch-diameter HDPE piping.

The lateral and drop inlet system included the installation of the following features:

- 13 inlets
- 75 feet of 12-inch-diameter CMP
- 82 feet of 18-inch-diameter CMP
- 6 feet of 4-inch-diameter HDPE pipe
- 6 feet of 4-inch-diameter HDPE pipe
- Installation of 652 feet of 12-inch-diameter HDPE pipe
- Installation of 293 feet of 15-inch-diameter HDPE pipe
- Installation of 1,600 square yards of marker layer geotextile fabric to delineate the native/regraded soil and/or fill soil graded across the site in accordance with the contract specifications

The lateral pipe excavations were lined with geotextile fabric and 12 inches of #57 stone bedding. The stone was placed over the installed storm drain pipe which was then covered with filter fabric and backfill soil. Compaction of the fill soil was performed in 6-inch lifts using a 34-inch remote control sheepsfoot roller. Any residual excavated soils not used as backfill were transported to the western side of the site to be used as fill to meet subsurface/bottom of cap elevations.

4.9.3 In-Place Closure of Existing Storm Drain

Upon completion of the installation of the new 42-inch storm drain, associated laterals, and drop inlets and their connection to the existing storm drains, the existing 42-inch storm drain was abandoned in place. First, access openings to the “doghouse” manholes connected to the new storm drain were sealed. The existing 42-inch storm drain was then filled with approximately 300 cubic yards of flowable fill. The flowable fill was conveyed using a concrete pumping truck starting at the upgradient manhole (No. 6) and continuing toward the last manhole (No. 1) located adjacent to the bulkhead wall. The existing storm drain was accessed and opened approximately every 75 to 100 feet to determine if the

flowable fill was uniformly distributed and to release air pockets. As part of the storm drain closure, the existing manhole (No. 3) was removed as part of the abandonment operations.

4.10 Site Grading

Grading of the site was performed to fill the seven excavations, cutting and filling of the site as specified for the park's recreational fields, followed by placement of the final 2 feet of clean fill and top soil layers.

4.10.1 Submarker Layer Grading

The site was graded from east to west during the initial cut and fill operations to level the site into an upper field (baseball field), a central area (football field), and lower field areas (softball fields). The grading was performed using low, ground-bearing D-6 bulldozers. Grading to the submarker layer established the base of the soil cap elevation. Submarker grading also involved the excavation and construction of the clean corridors for the installation of utilities (e.g., electrical, water, stormwater, and sanitary sewer) lines.

Soft subsurface conditions were encountered in the northwest corner of the Site where the bulk head wall and the Race Street property boundary meet. There were several smaller areas along the northern property boundary but the only significant one requiring stabilization was located on the north side of the property in an area that is now the northeast corner of the football field end zone.

In order to establish the submarker and final soil-filling contours, the soft areas were addressed by first excavating the overburden soils until just above the groundwater table at a depth ranging from approximately 4 to 8 feet bgs. After the excavations were sloped back on all sides, a layer of 16-oz. geotextile fabric was placed over the excavated areas followed by the placement of approximately 12 inches of No. 3 stone. A second layer of geotextile fabric was subsequently placed over the stone base. The area was then covered by an additional 18 inches of clean soil, regraded, and compacted to achieve the required sub-base grades (less 6 inches of soil fill to accommodate the placement of the final 6-inch top soil layer).

Approximately 5,000 cubic yards of fill soil was used to establish the submarker layer grades. An additional 3,000 cubic yards of certified clean common borrow was brought onsite from the Honeygo facility to meet the installation of the clean corridor requirements.

4.10.2 Backfill, Compaction, and Surveying

During the submarker layer grading, existing soils were backfilled and compacted in 6-inch lifts using a 54-inch smooth-drum roller. Representative soil samples were collected from compacted areas of the site for geotechnical analyses to determine if the maximum dry density and optimum moisture content standards had been met. In-field testing was performed to achieve a minimum 95 percent relative compaction as determined in accordance with ASTM D698. This ASTM compaction standard was achieved for the regraded and compacted fill soil for the sub-marker layer. A bottom of cap survey was performed to establish benchmarks for measurement of the placement of the 2-foot soil layer for the park completion and final grading.

4.10.3 Geotextile Marker Layer

A 16-oz. nonwoven geotextile fabric was used for the marker layer to delineate the native and regraded submarker soil with 2 feet of certified clean fill that was placed across the entire 11-acre site. A total of 52,562 square yards of marker layer geotextile were installed across the site before being covered with the clean fill. Geotextile marker layer was also installed in all utility trenches and clean corridors before being filled with soil.

4.10.4 Clean Backfill and Final Grading

Certified clean common borrow (24,560 cubic yards) was transported from the Honeygo Reclamation site, operated by Republic Services, for use in placing a 2-foot soil layer across the Site. A portion of the Honeygo property is used for clean borrow material and another area has been used as a rubble/construction and demolition landfill since 2001. Prior to 2001, the property was undeveloped virgin land. All common borrow, select fill, and top soil is derived from new cell creation. The staging areas for common borrow, select fill, and top soil is not located adjacent to any active landfill or closed landfill cells. No hazardous or municipal solid waste has been accepted at the Honeygo site. Republic Services has provided certified clean fill to other sites per MDE's Voluntary Cleanup Program (VCP) guidance.

Representative soil samples were collected for gradation tests for compaction requirements and to comply with MDE's VCP guidance for characterization of clean fill material. Per the VCP guidance, the sampling and analysis was performed per MDE's recommended fill material sampling schedule for borrow sites with greater than 5,000 yd^3. Sampling and testing consisted of collecting 12 samples for the first 5,000 yd^3 of the imported borrow, and one sample per each additional 1,000 yd^3 of fill soil.

Soil samples from the site were collected and analyzed for total petroleum hydrocarbons (TPHs), volatile organic compounds (VOCs), Semi-volatile organic compounds (SVOCs), PCBs, asbestos content, and RCRA metals. Representative soil samples were collected for gradation tests for compaction requirements and to comply with the MDE's VCP guidance for characterization of clean fill material. All results from the soil material characterization were acceptable to the MDE. Certified clean soils were only transported to the Site after MDE's written (e-mail) approval was received.

The imported common borrow material was applied evenly across the site. Backfill was brought onto the site on a daily basis and staged in a central stockpile. Material was moved onsite using 30-cubic-yard trucks, excavators, and D-6 bulldozers. A D-3 dozer was used for fine grading.

Moisture content of the fill was controlled in an effort to enhance compaction. Backfill was installed in 9-inch lifts and field tested by an independent geotechnical company. Documentation of compaction tests and test logs were maintained on a daily basis as part of the Construction Report.

4.10.5 Site Utilities

As part of the park infrastructure improvements the following features were installed in accordance with the construction specifications.

Water

- 516 LF of ¾-inch-diameter copper piping;
- 384 LF of 1 ½-inch-diameter copper piping;
- 24 LF of 2-inch-diameter copper piping;
- 308 LF of 3-inch-diameter copper piping;
- 105 LF of 3-inch-diameter irrigation stub copper piping;
- 35 LF of 6-inch-diameter ductile iron piping;
- Football field irrigation system in accordance to Irrigation Plan, I-1 and Irrigation Details; and,
- 400 square yards of marker layer geotextile within belowgrade utility trench corridors in accordance with manufacturer's installation guidelines and project specifications.

Sewer

Sanitary sewer service improvements were installed according to construction specification

- Two sanitary sewer manholes;
- One sanitary sewer cleanout;
- 100 LF of 4-inch-diameter PVC piping; and,
- 280 LF of 6-inch-diameter PVC piping.

4.10.6 Concrete Foundations and Slabs

Concrete foundation and slab features included the installation of the following park improvements:

- Two baseball dugout slabs;
- Football field slabs for bleachers and press box;
- Four softball slabs for benches; and,
- Restroom/storage building slab foundation and piling for future columns.

All work was performed in accordance with design specifications. The foundation for the restroom/storage building included utility service to the slab including water, sanitary sewer, storm drain, and electrical.

4.10.7 Sports Lighting

The installation of the sports lighting involved the placement of the light pole foundations, light poles, electrical junction boxes, hand holes and electrical service conduit system (less electrical wiring). All work was performed in accordance with the applicable design and manufacturer's specifications and details. Installed sports lighting features included the following:

- 19 lighting stanchions and foundations;
- 3,059 LF of electrical conduit (less wiring);

- 19 electrical pull boxes; and,
- 3,333 square yards of marker layer geotextile fabric within the belowgrade utility trench corridors to delineate the native/regraded soil and/or fill soil graded before placement of the electrical system.

4.10.8 Stormwater Management Controls

Stormwater management and control features were installed in accordance with design specifications. Stormwater management and control features included the following:

- Two 12-foot-long headwalls and endwalls;
- Three 14-foot-long headwalls and endwalls; and,
- One timber check dam.

4.10.9 Site Paths and Cul-de-sac

The installation of the site paths and cul-de-sac were performed in accordance with specifications. The base for the pathways and cul-de-sac required the placement of 3,600 square yards of CR-6 aggregate. This material was placed using skid steers and rolled/compacted using a smooth drum roller.

4.11 Final Site Restoration

The MDE-approved remedy required that 2 feet of clean fill be placed across the site following the excavation of impacted soil and site regrading. The 2 feet of clean soil obtained from the Honeygo Reclamation facility consisted of 18 inches of borrow soil and 6 inches of top soil.

A topographic survey was performed following the placement of the clean soil to document that the 2 feet of clean soil was achieved across the site. This survey consisted of taking elevation measurements on an approximately 100-foot center across the site at locations where there was a corresponding baseline elevation taken following the completion of site grading. As a result of this survey, two small areas were found to have a cover thickness of less than 2 feet (by approximately 1 inch). Additional top soil was placed in these areas, and they were resurveyed to confirm that they complied with the final cover requirements.

The results of the final site topographic survey confirmed that a 2-foot soil cover was placed across the site. Final grading elevation details are provided in Table 4-3 (see end of section). As-built drawings of the site, provided in Appendix C, include the bottom of cap grade as-built and the final grading as-built.

4.11.1 Top Soil

A total of 8,700 cubic yards of topsoil (a 6-inch layer) was spread across the site to reach the proposed final elevation. The topsoil was analyzed to assure the material to be certified clean and meet the material requirements as specified in the specifications.

As the top soil was placed, the material was root raked to remove any larger-diameter debris and foreign matter. In addition, 500 tons of riprap was placed over the geotextile

fabric along the western side of the Site where it abuts the Middle Branch of the Patapsco River as a slope stabilization and erosion control measure.

4.11.2 Sodding

Sodding was performed in the infield area of the baseball field. The area was prepared with top soil to achieve a good clean base and the sod was hand placed and rolled. The area was watered on a rotating basis to establish good root growth. Sod was placed in accordance with contract specifications.

4.11.3 Seeding

Seeding was applied across the site using a seed mixture designed for athletic field applications. Application of the hydro seed commenced in a phased approach as follows:

- Baseball out field area;
- Football field in three parts;
- Lower softball fields; and,
- Final areas around the field house and walk way areas.

A total area of 52,562 square yards was seeded using a hydroseed blend of grass seed, fertilizer, and tac-mulch. All work was performed in accordance with construction specifications.

4.11.4 Final Erosion Controls

Final erosion controls included installation of silt fence along the openings within the bulkhead wall, installation of coconut matting and seeding along the drainage swales and placement of sandbags along the northern Swann Park property boundary as it intersects with the Race Street Cap area. This latter effort was to protect the drainage swales until which time the grass established itself.

4.12 Demobilization

Demobilization involved (1) removing all construction equipment, materials, and supplies; temporary office and storage trailers; temporary sanitary facilities along with any utilities; (2) reinstalling chain-line fence along the north side of the Swann Park site; and, (3) removing temporary access roadways and features.

TABLE 4-3
Final Grading Elevation Details
Swann Park, Baltimore, MD

2' Bottom Cap Position and Elevation				Final Grading Position and Elevation				
Point No.	**North**	**East**	**Elevation**	**Point No.**	**North**	**East**	**Elevation**	**Delta**
2492	582588.98	1420381.34	14.31	5031	582588.86	1420381.38	16.70	**2.39**
2494	582585.25	1420483.82	13.88	5032	582585.25	1420484.01	16.24	**2.37**
2499	582436.75	1420645.22	12.02	5363	582436.82	1420645.11	14.06	**2.04**
2502	582437.28	1420510.14	13.31	5035	582437.40	1420510.15	15.39	**2.08**
2536	582421.33	1419935.21	4.18	5023	582421.41	1419935.25	6.19	**2.01**
2539	582428.88	1419778.90	4.34	5022	582428.93	1419779.05	6.34	**2.00**
2551	582563.99	1419951.06	6.44	5024	582563.94	1419951.16	8.47	**2.03**
2554	582558.65	1419792.95	3.39	5021	582558.77	1419792.86	5.41	**2.02**
2605	582454.06	1420432.49	14.04	5036	582454.15	1420432.57	16.22	**2.18**
2607	582462.49	1420334.66	13.65	5030	582462.67	1420334.67	15.71	**2.05**
2625	582577.93	1420631.61	13.51	5362	582577.88	1420631.47	15.52	**2.01**
2661	582468.56	1420212.06	8.00	5029	582468.56	1420212.18	10.05	**2.06**
2665	582675.68	1420250.55	8.23	5011	582675.67	1420250.68	10.26	**2.04**
2668	582826.61	1420275.93	8.20	5009	582826.49	1420276.06	10.33	**2.13**
2669	582832.73	1420168.30	8.16	5010	582832.73	1420168.29	10.16	**2.01**
2672	582673.65	1420140.33	8.23	5012	582673.70	1420140.38	10.24	**2.02**
2675	582515.78	1420112.80	8.16	5027	582515.76	1420112.89	10.29	**2.13**
2677	582641.91	1420072.17	7.58	5026	582641.88	1420072.26	9.63	**2.06**
2680	582633.52	1419915.04	6.09	5025	582633.38	1419915.18	8.08	**2.00**
2682	582631.15	1419817.16	3.63	5020	582631.13	1419817.21	5.92	**2.29**

TABLE 4-3
Final Grading Elevation Details
Swann Park, Baltimore, MD

2' Bottom Cap Position and Elevation				Final Grading Position and Elevation				
Point No.	**North**	**East**	**Elevation**	**Point No.**	**North**	**East**	**Elevation**	**Delta**
2696	582726.55	1419790.69	4.52	5019	582726.62	1419790.67	6.64	**2.13**
2704	582840.46	1420116.32	7.26	5013	582840.50	1420116.44	9.28	**2.03**
2706	582831.05	1420009.94	6.95	5014	582830.95	1420010.06	9.19	**2.24**
2708	582828.14	1419904.33	5.29	5017	582828.13	1419904.40	7.31	**2.02**
2881	582731.21	1420013.40	6.94	5015	582731.20	1420013.39	9.29	**2.35**
2891	582728.68	1419903.99	6.03	5016	582728.74	1419904.06	8.05	**2.02**
3029	582446.35	1420119.92	6.15	5028	582446.37	1420120.12	9.06	**2.91**
3183	582667.81	1420438.61	13.74	5006	582667.79	1420438.61	15.74	**2.00**
3187	582668.24	1420541.07	14.20	5005	582668.18	1420540.99	16.27	**2.07**
3192	582672.57	1420665.95	15.41	5004	582672.57	1420665.93	17.72	**2.30**
3205	582695.31	1420349.41	12.73	5037	582695.26	1420349.44	14.90	**2.17**
3250	582789.00	1420578.17	15.14	5003	582788.92	1420578.17	18.09	**2.94**
3266	582813.61	1420665.92	17.54	5002	582813.65	1420665.84	19.82	**2.28**
3286	582896.20	1420609.66	18.15	5001	582896.22	1420609.58	20.36	**2.21**
4178	582825.39	1419783.09	1.68	5018	582825.42	1419783.25	3.71	**2.03**
4290	582853.76	1420335.62	11.82	5008	582853.68	1420335.65	14.18	**2.36**
2519	582516.45	1420594.78	13.07	5349	582516.45	1420594.69	15.07	**2.01**
2534	582410.74	1420045.73	6.68	5356	582410.81	1420045.78	8.72	**2.04**
2550	582551.57	1420055.16	8.04	5357	582551.55	1420055.28	10.05	**2.00**
2655	582732.01	1420205.43	8.53	5353	582732.01	1420205.42	10.71	**2.18**

TABLE 4-3
Final Grading Elevation Details
Swann Park, Baltimore, MD

2' Bottom Cap Position and Elevation				Final Grading Position and Elevation				
Point No.	**North**	**East**	**Elevation**	**Point No.**	**North**	**East**	**Elevation**	**Delta**
2658	582583.78	1420177.87	8.41	5354	582583.65	1420177.85	10.52	**2.12**
2686	582690.28	1419947.37	6.77	5359	582690.31	1419947.36	8.84	**2.07**
2899	582810.87	1419805.06	4.60	5361	582810.84	1419805.11	6.61	**2.01**
3145	582447.23	1420254.16	7.70	5355	582447.22	1420254.05	9.73	**2.03**
3167	582629.24	1420323.83	13.45	5351	582629.25	1420323.87	15.57	**2.12**
3227	582740.32	1420471.27	13.01	5348	582740.24	1420471.33	15.02	**2.01**
3274	582841.52	1420478.23	15.03	5347	582841.53	1420478.25	17.10	**2.07**
4160	582853.72	1419915.16	3.42	5360	582853.69	1419915.20	5.43	**2.01**
4200	582394.45	1420307.89	11.66	5350	582394.49	1420307.83	13.72	**2.06**
4297	582748.40	1420368.55	12.18	5352	582748.35	1420368.63	14.19	**2.01**
4438	582510.61	1419895.44	4.96	5358	582510.53	1419895.51	7.01	**2.05**

V:\\aphrodite\proj\HoneywellInc\RaceStreet\MapFiles\Remedial_Action_Completion_Report\Figure 4-1 - Swann Park Excavation Areas.mxd

Legend

- Fence/Approximate Property Boundary
- Excavation Areas
- Field 5 Boundary

N
W E
S

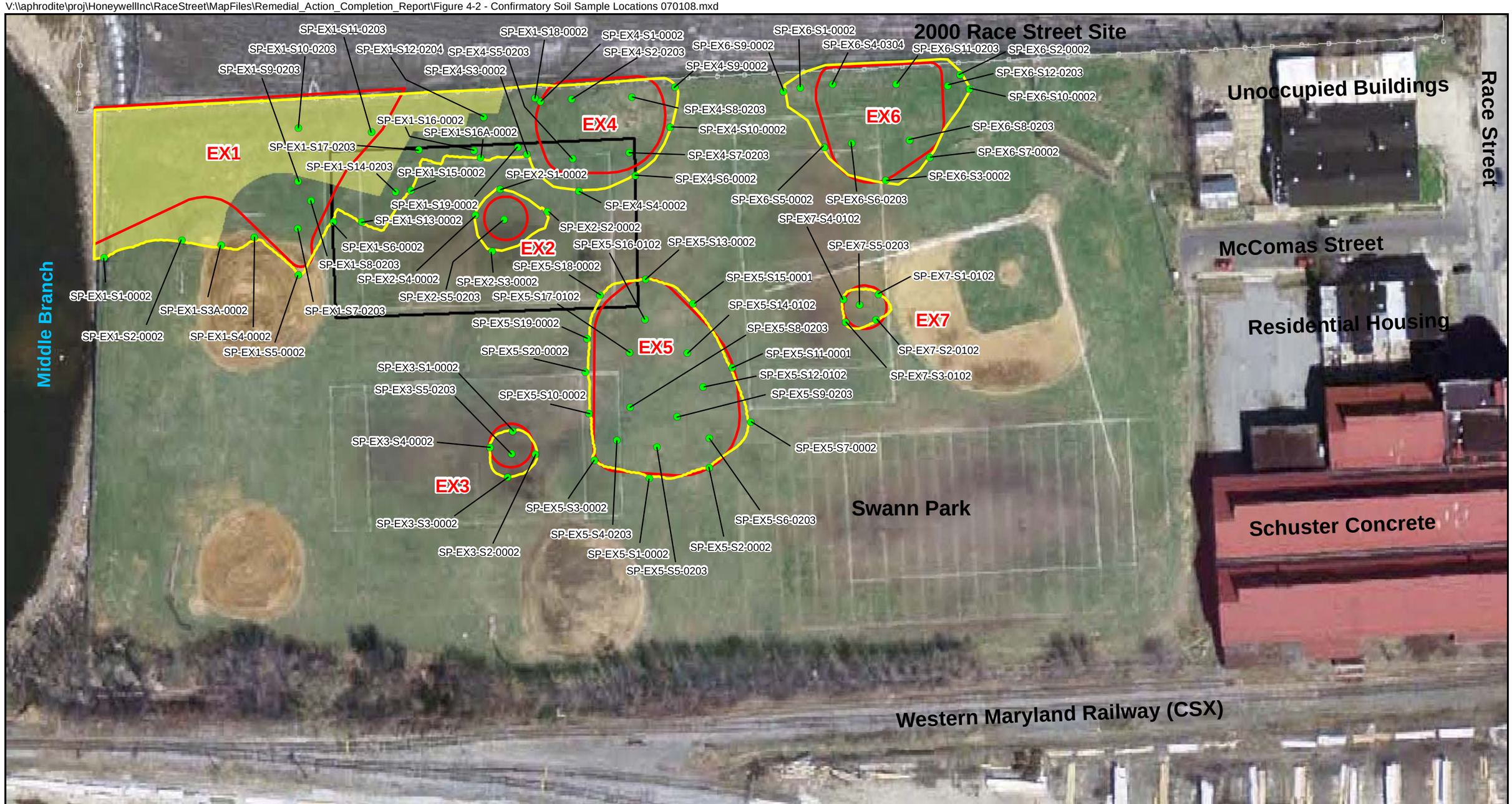
60 0 60 Feet

1 inch equals 60 feet

Figure 4-1
Swann Park Excavation Areas
Remedial Action Completion Report
Swann Park
Baltimore, Maryland

CH2MHILL

V:\\aphrodite\proj\HoneywellInc\RaceStreet\MapFiles\Remedial_Action_Completion_Report\Figure 4-2 - Confirmatory Soil Sample Locations 070108.mxd



Legend

- Soil Sample Location and ID
- Fence/Approximate Property Boundary
- Excavation Areas
- Excavation Boundary Not Confirmed
- Portion of EX1 Completed at GW table. Approximate Depth = 4 feet below grade.
- Proposed Excavation Areas
- Field 5 Boundary

N
W E
S

80 0 80 Feet

1 inch equals 80 feet

Figure 4-2
Confirmatory Soil Sample Locations through July 01, 2008
Remedial Action Completion Report
Swann Park
Baltimore, Maryland

CH2MHILL

SECTION 5

References

CH2M HILL. 2007. Comprehensive Investigation Report and Remedial Alternatives Analysis, Swann Park, Baltimore, Maryland. October.

City of Baltimore, 1905.

City of Baltimore, 1912.

MDE, 2001.

Appendix A
Honeygo Run Reclamation TCLP Characterization Data

Analytical Report for

Marcor Remediation, Inc.

Certificate of Analysis No.: 8092519

Project Manager: Dennis Raver
Project Name : Swann Park
Project Location: Baltimore, MD
Project ID : 11-04722-001

September 26, 2008

Phase Separation Science, Inc.
6630 Baltimore National Pike
Baltimore, MD 21228
Phone: (410) 747-8770
Fax: (410) 788-8723

OFFICES:
6630 BALTIMORE NATIONAL PIKE
ROUTE 40 WEST
BALTIMORE, MD 21228
410-747-8770
800-932-9047

PHASE SEPARATION SCIENCE, INC.

September 26, 2008

Dennis Raver
Marcor Remediation, Inc.
3900 Vero Road
Baltimore, MD 21227

Reference: PSS Work Order No: **8092519**
Project Name : Swann Park
Project Location: Baltimore, MD
Project ID.: 11-04722-001

Dear Dennis Raver :

The attached Analytical and QC Summary lists the analytical results from the analyses performed on the samples received under the project name referenced above and identified with the Phase Separation Science (PSS) Work Order numbered **8092519**.

All work reported herein has been performed in accordance with referenced methodologies, PSS Standard Operating Procedures and the PSS Quality Assurance Manual. PSS is limited in liability to the actual cost of the sample analysis done.

PSS reserves the right to return any unused samples, extracts or related solutions. Otherwise, the samples are scheduled for disposal, without any further notice, on October 30, 2008. This includes any samples that were received with a request to be held but lacked a specific hold period. It is your responsibility to provide a written request defining a specific disposal date if additional storage is required. Upon receipt , the request will be acknowledged by PSS, thus extending the storage period.

This report shall not be reproduced except in full, without the written approval of an authorized PSS representative. A copy of this report will be retained by PSS for at least 10 years, after which time it will be disposed without further notice, unless prior arrangements have been made.

We thank you for selecting Phase Separation Science, Inc. to serve your analytical needs. If you have any questions concerning this report, do not hesitate to contact us at 410-747-8770 or info@phaseonline.com.

Dan Prucnal
Laboratory Manager

OFFICES:
6630 BALTIMORE NATIONAL PIKE
ROUTE 40 WEST
BALTIMORE, MD 21228
410-747-8770
800-932-9047
FAX 410-788-8723

PHASE SEPARATION SCIENCE, INC.

CERTIFICATE OF ANALYSIS

No: 8092519

Marcor Remediation, Inc., Baltimore, MD

September 26, 2008

Project Name: Swann Park
Project Location: Baltimore, MD
Project ID: 11-04722-001

Sample ID: 1-N. end of pile **Date/Time Sampled: 09/25/2008 13:50** **PSS Sample ID: 8092519-001**
Matrix: SOIL **Date/Time Received: 09/25/2008 14:15**

TCLP Metals — Analytical Method: SW846 6020A — Preparation Method: SW846 3010A

	Result	Units	TCLP Limit	Flag	Dil	Prepared	Analyzed	Analyst
Arsenic	ND	mg/L	5.0		1	09/26/08	09/26/08 13:00	1034

Sample ID: 2-S. end of pile **Date/Time Sampled: 09/25/2008 13:50** **PSS Sample ID: 8092519-002**
Matrix: SOIL **Date/Time Received: 09/25/2008 14:15**

TCLP Metals — Analytical Method: SW846 6020A — Preparation Method: SW846 3010A

	Result	Units	TCLP Limit	Flag	Dil	Prepared	Analyzed	Analyst
Arsenic	ND	mg/L	5.0		1	09/26/08	09/26/08 13:25	1034

SAMPLE CHAIN OF CUSTODY/AGREEMENT FORM

PHASE SEPARATION SCIENCE, INC.

www.phaseonline.com
email: info@phaseonline.com

(1)
CLIENT: MARCOR OFFICE LOC.
PROJECT MGR: Dennis Ravel PHONE NO.: (443) 324 1037
EMAIL: RAVERD@MARCOR.COM FAX NO.: ( )
PROJECT NAME: SWANN PARK PROJECT NO.: 11-04722-001
SITE LOCATION: BALTIMORE, MD P.O. NO.:
SAMPLERS: DCM

PSS Work Order #: 80925189 AB 9/26/08 PAGE 1 OF 1

Matrix Codes:
SW=Surface Wtr DW=Drinking Wrt GW=Ground Wtr WW=Waste Wtr O=Oil S=Soil WL=Waste Liquid WS=Waste Solid W= Wipe

(2)

LAB NO.	SAMPLE IDENTIFICATION	DATE	TIME	MATRIX (See Codes)	No. CONTAINERS	SAMPLE TYPE C = COMP G = GRAB	Preservatives Used	Analysis/ Method Required (3) TCLP-AS	REMARKS
1	1-N. end of pile	9/25	1:50	S	1	C			
2	2 S. end of pile	9/25	1:50	S	1	C			

(5)

Relinquished By: (1)	Date	Time	Received By:
DCM	9/25	1:50	[illegible]
Relinquished By: (2)	Date	Time	Received By:
DCM	9/25	2:15	[illegible]
Relinquished By: (3)	Date	Time	Received By:
Relinquished By: (4)	Date	Time	Received By:

(4)
Requested Turnaround Time
☐ 5-Day ☐ 3-Day ☐ 2-Day
☐ Next Day ☒ Emergency ☐ Other

Data Deliverables Required:

# of Coolers: 0
Custody Seal: ABS
Ice Present: ABS Temp: 27°C
Shipping Carrier: CLIENT

Special Instructions:
Please call 443-324-1037 by COB 9/26/08

6630 Baltimore National Pike • Route 40 West • Baltimore, Maryland 21228 • (410) 747-8770 • (800) 932-9047 • Fax (410) 788-8723

The client (Client Name), by signing, or having client's agent sign, this "Sample Chain of Custody/Agreement Form", agrees to pay for the above requested services per the latest version of the Service Brochure or PSS-provided quotation including any and all attorney's or other reasonable fees if collection becomes necessary.

Phase Separation Science, Inc

Sample Receipt Checklist

Wo Number	8092519	**Received By**	Rachel Davis
Client Name	Marcor Remediation, Inc	**Date Received**	09/25/2008 02:15:00 PM
Project Name	Swann Park	**Delivered By**	Client
Project Number	11-04722-001	**Tracking No**	Not Applicable
		Logged In By	Rachel Davis

Shipping Container(s)

No. of Coolers	0	Ice	Absent
Custody Seals	Absent	Temp (deg C)	27
Seal Condition	None	Temp Blank Present	No

Documentation

COC agrees with sample labels? X Yes or ____ No

Chain of Custody (COC) X Yes or ____ No

Sample Container

Appropiate for Specified Analysis?	Yes X	No___	Custody Seal(s)	Yes___	No X
Intact?	X	____	Custody Seal(s) Intact?	____	X
Labeled and Labels Legible	X	____	Seal(s) Signed / Dated	____	X
Total No. of Samples Received	2		Total No. of Containers Received	2	

Preservation

		Yes	No	N/A
Metals	(pH<2)	____	____	X
Cyanides	(pH>12)	____	____	X
Sulfide	(pH>9)	____	____	X
TOC, COD, Phenols	(pH<2)	____	____	X
TOX, TKN, NH3, Total Phos	(pH<2)	____	____	X
VOC, BTEX (VOA Vials Rcvd Preserved)	(pH<2)	____	____	X
Do VOA vials have zero headspace?		____	____	X

Comments: (Any "No" response must be detailed in the comments section below.)

For any improper preservation conditions, list sample ID, preservative added (reagent ID number) below as well as documentation of any client notification as well as client instructions Samples for pH, chlorine and dissolved oxygen should be analyzed as soon as possible, preferably in the field at the time of sampling.

Samples Inspected/Checklist Completed By: R. Davis Date: 9/25/8

PM Review and Approval: [illegible] Date: 9/25/08

Appendix B
Confirmation Soil Sampling Results

Arsenic Results by Field XRF, MDE XRF, and Laboratory Analysis
Swann Park Redevelopment
Baltimore, Maryland

Excavation ID	Field Sample ID	Sample Date	Arsenic Concentration by Field XRF (mg/kg)	Arsenic Concentration by MDE XRF (mg/kg)	Arsenic Concentration by Laboratory Analysis[1] (mg/kg)	Comment
EX7	SP-EX7-S1-0102	5/30/2008	158.2	--	118	Results confirm excavation limit. EX7 approved for closure.
	SP-EX7-S2-0102	5/30/2008	7.9	8.4	9.17	
	SP-EX7-S3-0102	5/30/2008	13.3	--	13.4	
	SP-EX7-S4-0102	5/30/2008	87.9	17.6	67.5	
	SP-EX7-S5-0203	5/30/2008	**6**	8.8	6.04	
EX3	SP-EX3-S1-0002	5/30/2008	13.2	--	10.5	Results confirm excavation limit. EX3 approved for closure.
	SP-EX3-S2-0002	5/30/2008	40.1	12.6	5.38	
	SP-EX3-S3-0002	5/30/2008	**14.7**	--	4.56	
	SP-EX3-S4-0002	5/30/2008	21.2	45.4	12.3	
	SP-EX3-S5-0203	5/30/2008	**5.8**	**5**	3.99	
EX2	SP-EX2-S1-0002	6/2/2008	41.5	--	102	Results confirm excavation limit. EX2 approved for closure.
	SP-EX2-S2-0002	6/2/2008	111.6	114.5	158	
	SP-EX2-S3-0002	6/2/2008	176.3	--	123	
	SP-EX2-S4-0002	6/2/2008	151.6	191	106	
	SP-EX2-S5-0203	6/2/2008	**11.6**	44.9	20.7	
EX5	SP-EX5-S1-0002	6/4/2008	**11**	--	13.9	Results confirm excavation limit. EX5 approved for closure.
	SP-EX5-S2-0002	6/4/2008	23	--	20.6	
	SP-EX5-S3-0002	6/4/2008	96	--	94.5	
	SP-EX5-S4-0203	6/5/2008	**20**	--	11.3	
	SP-EX5-S5-0203	6/5/2008	**7**	6.2	5.38	
	SP-EX5-S6-0203	6/5/2008	**8**	2.7	1.67	
	SP-EX5-S7-0002	6/5/2008	29	53.6	36	
	SP-EX5-S8-0203	6/17/2008	**8**	**10**	5.68	
	SP-EX5-S9-0203	6/17/2008	**7**	13.3	7.01	
	SP-EX5-S10-0002	6/17/2008	35	76.6	55.6	
	SP-EX5-S11-0001	6/17/2008	23	--	28.3	
	SP-EX5-S12-0102	6/17/2008	8	--	11.2	
	SP-EX5-S13-0002	6/18/2008	166	--	222	
	SP-EX5-S14-0102	6/17/2008	**5**	--	2.8	
	SP-EX5-S15-0001	6/17/2008	79	--	132	
	SP-EX5-S16-0102	6/17/2008	17	--	9.56	
	SP-EX5-S16-0102-D	6/17/2008	17	--	7.71	
	SP-EX5-S17-0102	6/17/2008	**6**	--	3.6	
	SP-EX5-S18-0002	6/18/2008	11	--	10.1	
	SP-EX5-S19-0002	6/18/2008	55	--	59.4	
	SP-EX5-S20-0002	6/18/2008	143	--	71.5	
EX1	SP-EX1-S1-0002	6/9/2008	295	155.8	306	Results confirm excavation limit. EX1 approved for closure.
	SP-EX1-S2-0002	6/12/2008	195	--	280	
	SP-EX1-S3-0002	6/9/2008	301		483	
	SP-S3A-0002	6/12/2008	58	82.4	63.9	
	SP-EX1-S4-0002	6/12/2008	272	--	300	
	SP-EX1-S5-0002	6/12/2008	230	258.3	250	
	SP-EX1-S6-0002	6/12/2008	135	--	175	
	SP-EX1-S7-0203	6/12/2008	48	--	60.8	
	SP-EX1-S8-0203	6/12/2008	**6**	--	5.03	
	SP-EX1-S9-0203	6/13/2008	14	--	9.8	
	SP-EX1-S10-0203	6/13/2008	2829	--	--	

Arsenic Results by Field XRF, MDE XRF, and Laboratory Analysis
Swann Park Redevelopment
Baltimore, Maryland

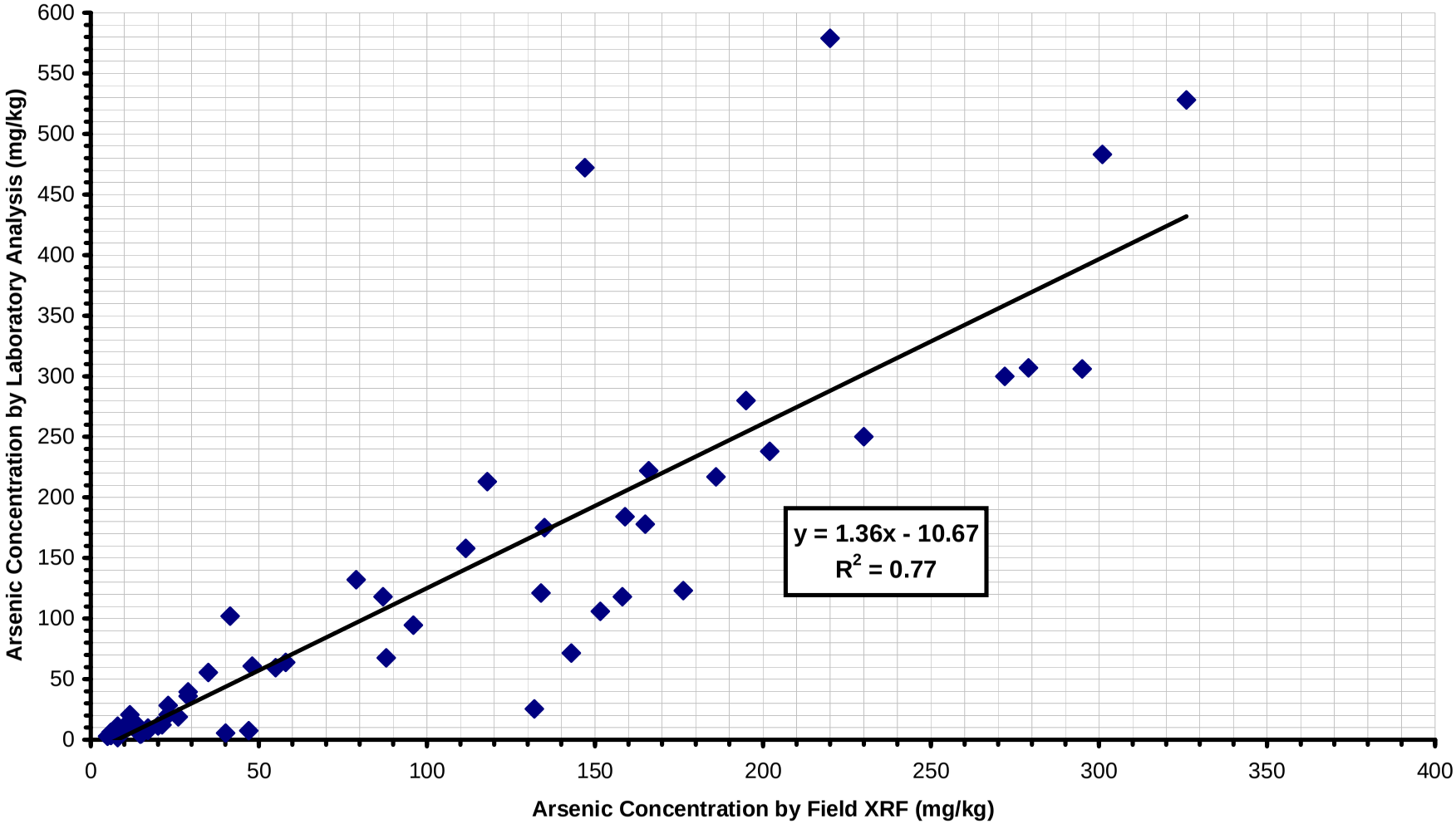
EX1	SP-EX1-S11-0203	6/13/2008	326	--	528	Results confirm excavation limit. EX1 approved for closure.
	SP-EX1-S12-0204	6/20/2008	118	--	213	
	SP-EX1-S13-0002	6/20/2008	165	--	178	
	SP-EX1-S14-0203	6/19/2008	15	--	4.8	
	SP-EX1-S15-0002	6/19/2008	202	--	238	
	SP-EX1-S16-0002	6/25/2008	147	--	472	
	SP-EX1-S16A-0002	6/27/2008	159	--	184	
	SP-EX1-S17-0203	6/20/2008	26	--	18.9	
	SP-EX1-S18-0002	6/25/2008	220	--	579	
EX4	SP-EX4-S1-0002	6/20/2008	134	--	121	Results confirm excavation limit. EX4 approved for closure.
	SP-EX4-S2-0203	6/20/2008	29	33.7	39.4	
	SP-EX4-S3-0002	6/23/2008	279	--	307	
	SP-EX4-S4-0002	6/23/2008	186		217	
	SP-EX4-S5-0203	6/23/2008	**47**	53.3	7.38	
	SP-EX4-S6-0002	6/23/2008	87	--	118	
	SP-EX4-S7-0203	6/23/2008	**132**	--	25.5	
	SP-EX4-S8-0203	6/23/2008	157	--	181	
	SP-EX4-S9-0002	6/23/2008	313	136.2	115	
	SP-EX4-S10-0002	6/23/2008	9	--	13	
EX6	SP-EX6-S1-0002	6/24/2008	308	--	490	Additional excavation completed - see SP-EX6-S9-0002
	SP-EX6-S2-0002	6/24/2008	374	--	457	Additional excavation completed - see SP-EX6-S10-0002
	SP-EX6-S3-0002	6/24/2008	228	267.8	144	Results confirm excavation limit.
	SP-EX6-S4-0304	6/25/2008	**7**	10.5	4.87	Results confirm excavation limit.
	SP-EX6-S4-0304-D	6/25/2008	**7**	--	5.14	Results confirm excavation limit.
	SP-EX6-S5-0002	6/30/2008	316	--	319	Results confirm excavation limit.
	SP-EX6-S6-0203	6/30/2008	**6**	--	1.55	Results confirm excavation limit.
	SP-EX6-S7-0002	7/1/2008	139	--	108	Results confirm excavation limit.
	SP-EX6-S8-0203	7/1/2008	**6**	ND	1.57	Results confirm excavation limit.
	SP-EX6-S9-0002	7/1/2008	145	--	236	Results confirm excavation limit.
	SP-EX6-S10-0002	7/1/2008	153	--	204	Results confirm excavation limit.
	SP-EX6-S11-0203	7/1/2008	**7**	--	6.17	Results confirm excavation limit.
	SP-EX6-S12-0203	7/1/2008	6	15.7	15.8	Results confirm excavation limit.

Notes:
BOLD values <LOD
1 = Laboratory QC has been reviewed by CH2M HILL

Field XRF and Laboratory Results Correlation

Swann Park Redevelopment

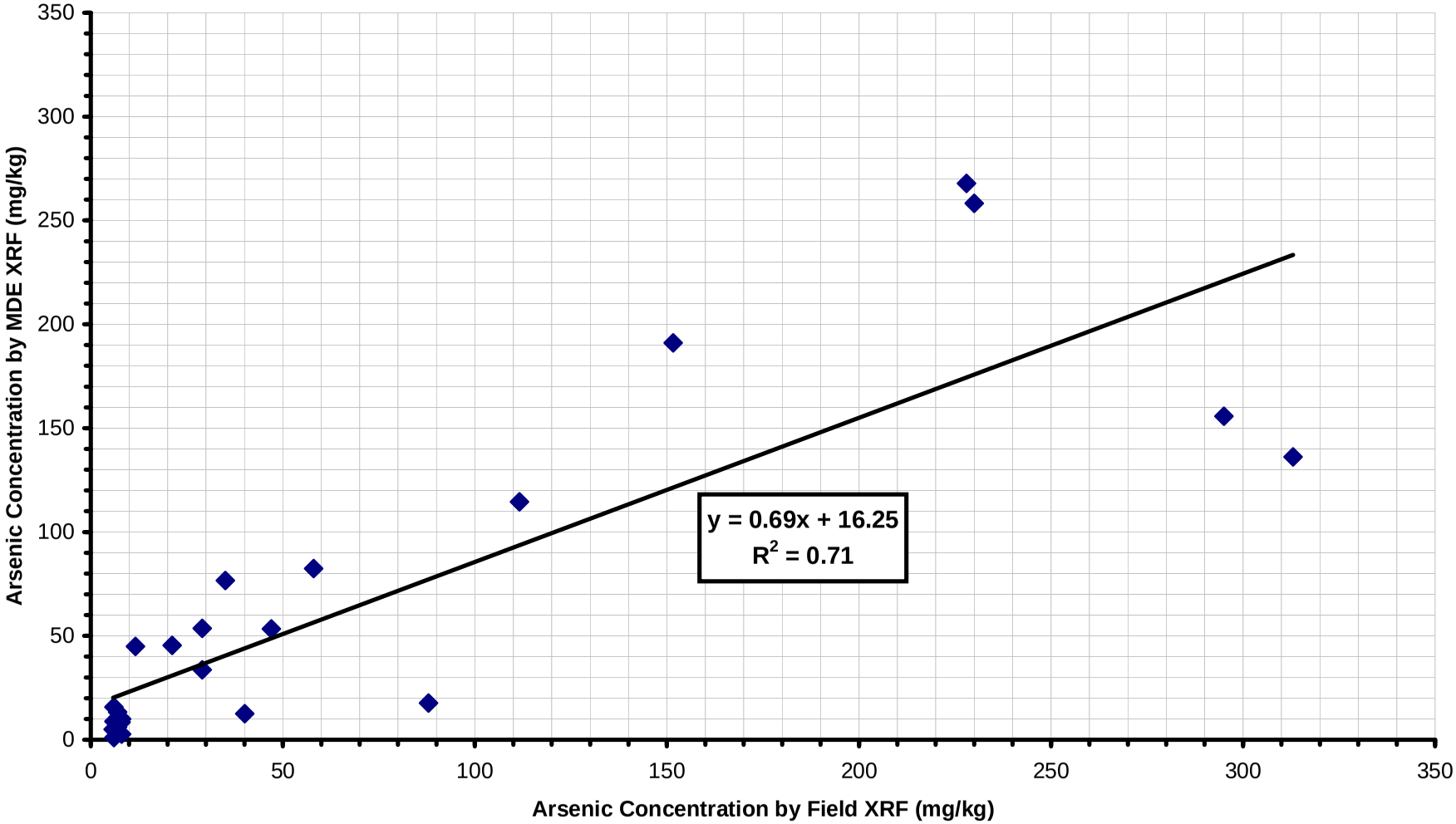
Baltimore, Maryland



Field XRF and MDE XRF Correlation

Swann Park Redevelopment

Baltimore, Maryland



Appendix C
As-Built Survey Drawings

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

GENERAL NOTES

1. THIS FINAL AS BUILT IS THE COMBINATION OF AS–BUILT FIELD DATA ON DATES: 8/27/08, 9/05/08, 9/11/08, 9/17/08, 10/01/08, 10/02/08 AND 10/06/08. DUE TO SITE CONDITIONS, WE WERE UNABLE TO AS–BUILT THE ENTIRE SITE AT ONE TIME.

2. THE BALL FIELDS, PATHWAY AND CUL–DE–SAC ARE PROPOSED AND SHOWN FOR GRAPHIC PURPOSES ONLY.

SURVEYOR'S CERTIFICATION

I HEREBY CERTIFY, TO THE BEST OF MY PROFESSIONAL KNOWLEDGE, INFORMATION AND BELIEF, THAT THIS SURVEY IS BASED UPON AVAILABLE LAND RECORDS, AS REFERENCED HEREON, AND WAS PREPARED IN ACCORDANCE WITH THE MARYLAND MINIMUM STANDARDS OF PRACTICE FOR TOPOGRAPHIC SURVEYS (COMAR 09.13.06.04).

A. Botterill 11/25/08

ARTHUR M. BOTTERILL
PROFESSIONAL LAND SURVEYOR
MD REGISTRATION No. 10886

STATE OF MARYLAND
ARTHUR M. BOTTERILL
NO 10886
PROFESSIONAL LAND SURVEYOR

LEGEND

5000
+10.00
SET 1000

POINT LOCATION THAT MATCH FINAL AS–BUILT

DATE	DESCRIPTION
11/25/08	CH2M HILL COMMENTS
10/16/08	CH2M HILL COMMENTS

PHR+A

Patton Harris Rust & Associates, pc
Engineers. Surveyors. Planners. Landscape Architects.
8818 Centre Park Drive, Columbia, MD 21045
T 410.997.8900 **F** 410.997.9282

BOTTOM OF CAP GRADE AS-BUILT

SWANN PARK
BALTIMORE CITY, MARYLAND

DRAWN: D.D.K.
CHECKED:
DATE: 10–13–08
SCALE:1"=30'
SHEET 1 OF 1
FILE NO:15112–2–0

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

LEGEND

WM	EX. WATER METER
E	EX. ELECTRIC MANHOLE
	EX. WATER VALVE
D	EX. STORM DRAIN MANHOLE
	EX. FIRE HYDRANT
S	EX. SANITARY MANHOLE
5000 '10.00 SET 1000	AS-BUILT POINT LOCATION AT 2' BOTTOM POINT
TS	TOP SWALE
BS	BOTTOM SWALE
D	DIRT
ED	EDGE DIRT
ELPB	PEDESTAL

SURVEYOR'S CERTIFICATION

I HEREBY CERTIFY, TO THE BEST OF MY PROFESSIONAL KNOWLEDGE, INFORMATION AND BELIEF, THAT THIS SURVEY IS BASED UPON AVAILABLE LAND RECORDS, AS REFERENCED HEREON, AND WAS PREPARED IN ACCORDANCE WITH THE MARYLAND MINIMUM STANDARDS OF PRACTICE FOR TOPOGRAPHIC SURVEYS (COMAR 09.13.06.04).

A. Botterill 11/25/08

ARTHUR M. BOTTERILL
PROFESSIONAL LAND SURVEYOR
MD REGISTRATION No. 10886

STATE OF MARYLAND
ARTHUR M. BOTTERILL
No 10886
PROFESSIONAL LAND SURVEYOR

GENERAL NOTES

1. THE PATHWAY, FENCES AND CUL-DE-SAC ARE PROPOSED AND SHOWN FOR GRAPHIC PURPOSES ONLY.

2. AS-BUILT SURVEY PERFORMED BY PATTON HARRIS RUST AND ASSOCIATES ON OR ABOUT OCTOBER 22, 2008 AND NOVEMBER 24, 2008.

DATE	DESCRIPTION
11/25/08	CH2M HILL COMMENTS

PHRA

Patton Harris Rust & Associates, pc
Engineers. Surveyors. Planners. Landscape Architects.
8818 Centre Park Drive, Columbia, MD 21045
T 410.997.8900 **F** 410.997.9282

FINAL GRADING AS-BUILT

SWANN PARK
BALTIMORE CITY, MARYLAND

DRAWN: D.D.K.
CHECKED:
DATE: 10-22-08
SCALE:1"=30'
SHEET 1 OF 1
FILE NO:15112-2-0