

# LONG TERM MONITORING PLAN

STUDY AREA 5

NEW JERSEY CITY UNIVERSITY  
(SITES 090 AND 184)  
AND  
FORMER MORRIS CANAL SITE (SITE 153 NORTH)  
  
JERSEY CITY, NEW JERSEY

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UPDATED MAY 2019**

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This Long Term Monitoring Plan is hereby approved by the following parties and each agrees to abide by the obligations placed upon them by this Long Term Monitoring Plan.

  
\_\_\_\_\_  
Honeywell - Global Remediation Director

5/24/19  
\_\_\_\_\_  
Date

\_\_\_\_\_  
Bayonne Municipal Utilities Authority  
(c/o City of Bayonne Department of Public Works Superintendent) \_\_\_\_\_  
Date

\_\_\_\_\_  
New Jersey City University  
Vice President for Administration and Finance \_\_\_\_\_  
Date

\_\_\_\_\_  
Alicia C. Alcorn, counsel for plaintiffs  
Hackensack Riverkeeper, Inc.,  
William Sheehan, Lawrence Baker,  
Rev. Winston Clarke \_\_\_\_\_  
Date

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\_\_\_\_\_  
Honeywell - Global Remediation Director

\_\_\_\_\_  
Date



\_\_\_\_\_  
6/4/19

\_\_\_\_\_  
Bayonne Municipal Utilities Authority  
(c/o City of Bayonne Department of Public Works Superintendent)

\_\_\_\_\_  
Date

\_\_\_\_\_  
New Jersey City University  
Vice President for Administration and Finance

\_\_\_\_\_  
Date


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Alicia C. Alcorn, counsel for plaintiffs  
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Rev. Winston Clarke

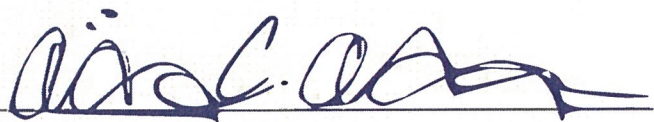
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Honeywell - Global Remediation Director  
Date

\_\_\_\_\_  
Bayonne Municipal Utilities Authority  
(c/o City of Bayonne Department of Public Works Superintendent)  
Date

  
\_\_\_\_\_  
New Jersey City University  
Vice President and Chief Operating Officer  
Date  
10/23/2019

  
\_\_\_\_\_  
Alicia C. Alcorn, counsel for plaintiffs  
Hackensack Riverkeeper, Inc.,  
William Sheehan, Lawrence Baker,  
Rev. Winston Clarke  
Date  
5/23/2019

## 1.0 INTRODUCTION

### 1.1 PURPOSE AND SCOPE

For any terms used in this document that are defined terms in the Consent Decree Regarding Remediation of the New Jersey City University (NJCU) Redevelopment Area (including Site 153 North) (the “NJCU Consent Decree”), the NJCU Consent Decree definitions will apply.<sup>1</sup>

Any reference to Honeywell, NJCU, or BMUA in this document shall include Honeywell, NJCU or BMUA, as the case may be, and its respective agents and contractors. Reference to Honeywell, BMUA, NJCU, or Plaintiffs shall include each party’s successors, assigns, heirs, corporate parents, subsidiaries and affiliates as set forth in paragraph 152 of the NJCU Consent Decree. For purposes of this Long Term Monitoring Plan, the provisions of this Long Term Monitoring Plan are not applicable to NJCU lessees or sub-lessees that are prohibited from conducting subsurface work in the Commercial AOC and intrusive activities that will disturb the Chromium Remedy.

On or about September 21, 2015, NJCU entered into a Ground Lease with CRT Holdings, LLC (“CRT”) of property known as Block 6 of the West Campus a/k/a Block 21902.01, Lot 1 as shown on the Major Subdivision Plan of Block 21902 (“Block 6”). Part of Block 6 is within the NJCU Commercial AOC on the NJCU West Campus Site and thus subject to Court oversight under the NJCU Consent Decree. On the same date, NJCU also entered into a Project Development Agreement with CRT. The Ground Lease requires, among other things, that CRT develop and construct on Block 6 a building known as Building 6 and, in connection therewith, comply with the obligations of NJCU under the provisions of the Deed Notice and Consent Decree. The Project Development Agreement also requires that CRT

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<sup>1</sup> The Consent Decree Regarding Remediation of the New Jersey City University Redevelopment Area was initially entered by the United States District Court for the District of New Jersey on January 21, 2010 (ECF No. 302 in Civil No. 05-05955) and was amended in 2017 (ECF No. 1506; *see also* Consent Order Regarding Amended Consent Decree Filed as ECF No. 1506, February 15, 2018). It is available from the Court and at the following website URL: [http://tpmlaw.com/lawyer/More-Information-Current-RCRA-Hazardous-Waste-Cases\\_cp9945.htm](http://tpmlaw.com/lawyer/More-Information-Current-RCRA-Hazardous-Waste-Cases_cp9945.htm).

comply with the Deed Notice and Consent Decree relating to any and all planned construction work, emergency work and/or disturbance on Block 6, performed by CRT or any of its employees, agents, servants and/or contractors with respect to the Chromium Remedy, and in connection with such work, relating to the regulatory notification process, restoration of engineering controls in the event of disturbance of the Chromium Remedy and coordination of such work with Honeywell and NJCU. The Project Development Agreement further requires CRT (i) to familiarize itself with the Worker Training Manual, which must be followed by its agents, servants and contractors in connection with work on the Building, portions of which are in the Commercial Area of Concern and the Residential Area of Concern; and; (ii) to complete and execute a subsurface work authorization for digging and excavation permit checklist before any intrusive subsurface work is performed in the Commercial Area of Concern; and (iii) to comply with and to use all reasonable and good faith efforts to cause its Contractors to comply with all of CRT's responsibilities in the Project Development Agreement described above.

NJCU shall provide to Honeywell any subsurface dig authorization form submitted by CRT and all plans provided to NJCU by CRT for all proposed construction work by CRT, or any of its employees and/or contractors for Building 6 involving proposed subsurface work or disturbance of the Chromium Remedy. Honeywell shall review and determine whether to approve all such subsurface dig authorization forms and plans for such work before it is undertaken. NJCU shall seek to enforce all of CRT's contractual obligations under the Ground Lease and Project Development Agreement relating to CRT's compliance with the Consent Decree, Deed Notice and Worker Training Manual with respect to any disturbance of the Chromium Remedy.

Honeywell has prepared this Long Term Monitoring Plan (LTMP) for the following sites which are part of Study Area 5 (SA-5) in Jersey City, Hudson County, New Jersey (also referred to herein as the "Sites"):

<b>Site No.</b>	<b>Site Name</b>
090	Baldwin Steel
184	M.I. Holdings
153 North	Morris Canal (portion)

The LTMP satisfies the requirements of the NJCU Consent Decree, paragraphs 96 through 105, and other referenced paragraphs (including paragraphs 73, 74[a], 77, 82, 87 and 91[a]).

Honeywell has been conducting environmental investigations and/or remediation activities at sites referred to by the New Jersey Department of Environmental Protection (NJDEP) as the Hudson County Chromium Sites, and has completed the remediation of the soils at Sites 090, 184 and 153 North, with the exception of additional remediation that may be required pursuant to paragraph 77 of the NJCU Consent Decree. This work was conducted in accordance with the Administrative Consent Order (ACO) between Honeywell (formerly Allied Signal, Inc.) and the NJDEP dated June 17, 1993, the New Jersey Technical Requirements for Site Remediation (TRSR) (N.J.A.C. 7:26E), NJDEP's Chromium Policy Directive, and the NJCU Consent Decree. The 1993 ACO was incorporated into a Consent Judgment between the NJDEP et al. and Honeywell et al. dated September 7, 2011.

According to the terms of the NJCU Consent Decree Paragraph 96:

*Honeywell shall be responsible for implementing, monitoring, maintaining, repairing, and replacing the Chromium Remedy at (i) the NJCU Commercial AOC until Honeywell's completion of further remedial activities pursuant to Paragraph 77 and its receipt of an Unrestricted Use No Further Action Determination for hexavalent chromium for the NJCU Commercial AOC; and (ii) Site 153 North until Honeywell's completion of further remedial activities pursuant to Paragraph 82 and its receipt of an Unrestricted Use No Further Action Determination for hexavalent chromium for Site 153 North. Honeywell shall satisfy this responsibility through establishment and implementation of a Long Term Monitoring Plan.*

The objectives of the LTMP are as follows:

- Monitor and maintain the integrity and effectiveness of the Chromium Remedies; and
- Monitor and document that the restrictions of the institutional controls, including the deed notices for the sites, are being satisfied.



## 1.2 STANDARD FOR REPAIR OR REPLACEMENT OF THE CHROMIUM REMEDY

The standard for repair or replacement of the Chromium Remedy is based on the Final 100% Remedial Design. The “Final 100% Remedial Design” standard to which the Chromium Remedy will be repaired or replaced as necessary under this LTMP consists of the 100% Design Report and attachments dated June 2010, as modified by the Record Drawings and list of Modifications and Field Changes included in the Remedial Action Report (“RAR”) dated September 2012 and the Record Drawings for the Hydraulic Barrier Wall (HBW) Extension dated July 2017 which are attached in **Appendix B** of this LTMP. The 100% Design Report, September 2012 RAR, and Record Drawings for the HBW Extension dated July 2017 (pursuant to Addendum 16 to the 100% Design) are available on the following website:

[www.jerseycitychromiumcleanup.com](http://www.jerseycitychromiumcleanup.com). These documents are also available at the Jersey City Public Library.

## 1.3 DOCUMENT ORGANIZATION

This document was prepared in accordance with the requirements specified in the NJCU Consent Decree, the NJDEP TRSR and applicable provisions of the United States Environmental Protection Agency (EPA) Comprehensive Five-Year Review Guidance (Office of Solid Waste & Emergency Response [OSWER] Directive 9355.7-03B-P, dated June 2001), and contains the following sections:

**Section 1: Introduction.** This section describes the purpose, scope, and organization of the document.

**Section 2: Site Background.** This section provides site background information including location, contaminants of concern and remedial action work implemented.

**Section 3: Monitoring Plan.** This section provides details of the monitoring program and contingency plan.

**Section 4: Reporting.** This section describes reporting requirements.

**Section 5: Honeywell Program Organization.** This section describes Honeywell’s program organization for the monitoring program.

**Section 6: References.** This section lists references used in preparing this document.

**Section 7: List of Acronyms/Abbreviations.** This section includes a list of commonly referenced acronyms used in this document.

## 2.0 SITE BACKGROUND

### 2.1 SITE DESCRIPTION

This section presents background information for NJCU West Campus (including Site 090 and Site 184) and Former Morris Canal (Site 153 North) including remedial measures and engineering controls for chromium. A site location map is included as **Figure 1**. A figure showing the chromium remedial measures and engineering controls is included as **Figure 2**.

#### *2.1.1 NJCU West Campus (Sites 090 and 184)*

Remedial actions for chromium within the NJCU West Campus (formerly part of Sites 090 and 184) included engineering controls in the Commercial Area of Concern (AOC) and excavation of soils in the Residential AOC (see **Figure 2**). The majority of monitoring and reporting requirements of this LTMP pertain to the Commercial AOC which contains engineering and institutional controls, located in the western portion of NJCU's West Campus abutting the northern portion of Site 153. This LTMP also addresses soil management and monitoring requirements for the Residential AOC which may be required during redevelopment activities. Background information for these sites and the Chromium Remedy follows.

##### *2.1.1.1 Baldwin Steel (Site 090)*

The former Baldwin Steel property is located at 500 Route 440, designated as Block 21902, Lots 13 and 14 (formerly Block 1286, Lots 5 and 6D) on the Jersey City tax maps. Site 090 encompasses approximately 6.8 acres, currently owned by NJCU.

The property consists of a rectangular parcel (approximately 1,000 feet long and about 300 feet wide) bordered on the north by M.I. Holdings (Site 184), on the east by property occupied by NJCU, on the south by a retail shopping center (Site 117 Former Ryerson Steel; currently occupied by Home Depot), and on the west by the Former Morris Canal (Site 153 North) and Route 440. Prior to the remedial actions, the majority of the property was covered by concrete and pavement, including the slab (estimated 650 feet long by 250 feet wide or 162,000 square feet) of a former building used for steel fabrication and distribution.

### ***2.1.1.2 M.I. Holdings (Site 184)***

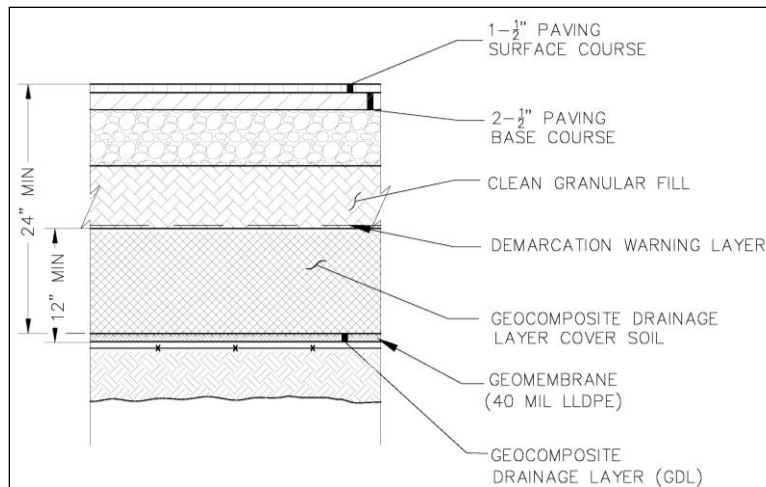
The former M.I. Holdings property is located southeast of the intersection of Carbon Place and Route 440, designated as Block 21902, Lots 2 and 3 (formerly Block 1286.5, Lots 1 and 2) on the Jersey City tax maps. The property encompasses approximately 7 acres and was formerly occupied by a chemical manufacturing facility. The property is currently owned by NJCU.

#### **Remedial Actions – NJCU Commercial AOC**

Construction of the remedial actions for chromium were completed at the NJCU site during 2010-2011 in accordance with a Remedial Action Work Plan approved by the NJDEP on July 26, 2007 and 100% Design dated June 2010. The Chromium Remedy for the NJCU Commercial AOC included installation of engineering controls consisting of a multi-layered cap with the following components above chromium-contaminated soils (from bottom to ground surface):

- Impervious geo-membrane linear low density polyethylene (LLDPE) liner;
- Geo-composite drainage layer (consisting of geotextile and clay soils);
- Orange demarcation warning layer (the warning layer consists of an orange colored geotextile material with markings in English and Spanish that state “DANGER DO NOT DIG” and “PELIGRO NO EXCAVAR” to prevent penetration of the underlying cap materials); and
- Clean soil cover (minimum 1 foot in paved areas, 2 feet in landscaped areas, and 3 feet in tree planting areas).

The Chromium Remedy in the NJCU Commercial AOC includes the above referenced cap materials (from the ground surface down to underlying chromium soils) including asphalt pavement, clean fill, drainage layer and LLDPE geo-membrane liner. The following illustration presents a simplified profile of the cap components.



**Illustration 1: NJCU Commercial Area Cap Profile**

In addition, focused soil excavation was conducted to allow for clean utility corridors (which will be located under streets as shown in Appendix B-1, i.e., future Mallory and Stegman Boulevards) for site redevelopment, allowing for new utilities to be installed above the cap.

The original shallow groundwater remedy included installation of a perimeter hydraulic barrier partially encompassing the NJCU Commercial AOC cap consisting of sealed sheet pile, groundwater monitoring wells, and a groundwater recovery and treatment system. The shallow groundwater extraction system was activated in April 2016. Extracted groundwater is conveyed for ultimate treatment at the Passaic Valley Sewerage Commission facility in Newark, New Jersey. In September 2016, Honeywell proposed, and the parties agreed, that Honeywell would construct approximately 500 additional linear feet of an underground barrier wall along the east side of the cap to fully encompass the NJCU Commercial AOC cap in order to restrict the flow of the shallow groundwater and facilitate the maintenance of an inward gradient. The hydraulic barrier wall extension was completed in 2017 and additional shallow groundwater monitoring wells were installed to provide well pairs for measuring groundwater elevations on either side of the barrier wall.

The remedial actions were documented in a Remedial Action Report dated March 2012; revised September 2012. The NJDEP issued a Conditional No Further Action Letter (Restricted Use) on May 7, 2012 (included for reference in **Appendix A**). The hydraulic barrier wall extension work was documented in a Deed Notice and Engineering Control Disturbance Report dated August 7, 2017.

The chromium remedial measures and cap cross sections are shown on **Figure 2** and **Figure 3**, respectively. Relevant regulatory correspondence is included in **Appendix A**. As-built drawings of the NJCU Chromium Remedy, including Record Drawings from the September 2012 RAR and Record Drawings for the HBW Extension dated July 2017, are provided in **Appendix B-1**. As-built drawings of the NJCU Chromium Remedy shall be updated and added to this LTMP as a reference as required by Section 2.2 of the Worker Training Manual.

As-built figures of the NJCU Commercial AOC site redevelopment that has been conducted as of October 12, 2016, are provided in **Appendix B-2**. The as-built figures for the NJCU Commercial AOC site redevelopment shall be updated and included, as necessary, as part of future LTMP updates pursuant to paragraph 99(l) of the NJCU Consent Decree. The as-built figures associated with future site redevelopment shall include all improvements and features; including but not limited to: buildings and their related structures, such as the guard house(s) and their foundation(s); utilities, such as electrical conduits to buildings, light posts and pedestrian signal lights; and other infrastructure, such as the bus shelter and its foundation.

#### **Future Redevelopment – NJCU Commercial AOC**

Currently, the majority of the NJCU Commercial AOC consists of a parking area for NJCU. Site redevelopment activities completed by NJCU through the 3<sup>rd</sup> Quarter of 2018 within or in the vicinity of the NJCU Commercial AOC include:

- Buildings 5A and 5B were constructed east of the Commercial AOC cap area.
- Phase I infrastructure/roadway work was completed in 2016 and included installation of sanitary sewer, storm sewer, and water utilities; modifications to existing sewer systems; and roadway work including intersection of University Place Boulevard (former Stegman Boulevard) and Hernandez Way (former Mallory West). Most of this work was within the Residential AOC with some work within the eastern portion of the Commercial AOC.
- Phase II infrastructure/roadway work was initiated in 2017 and, as of March 2019 is currently in progress. Work includes sanitary sewer, storm sewer, water utilities, electrical conduit; roadway improvements within University Place Boulevard, Hernandez Way, and Gothic Knights Road including

curbing, sidewalk, regrading and paving; replacement of entrance gate to Lot 7 and construction of bus garage. This work is within both the Commercial AOC and Residential AOC. A portion of the roadway construction work related to Gothic Knights Road is in the area between NJCU and adjacent Site 117.

Future site redevelopment features will continue to include paved roads and parking areas, concrete sidewalks, landscaped areas, and underground utilities (i.e., electric, sewer, water). With the exception of existing utilities within the portion of Site 153 abutting NJCU property and the trench drains, sumps, monitoring wells, and piezometers associated with the remedial actions, all utilities in the Commercial AOC shall be installed above the LLDPE geomembrane liner. Therefore, future utility work in the Commercial AOC, other than actions associated with the shallow groundwater extraction system, including necessary repairs to the trench drains and sumps and installation of monitoring wells, is not expected to involve disturbance of the geomembrane liner or potential exposure to chromium soils. This LTMP includes a contingency plan in the event of any planned or unplanned activity that disturbs or penetrates the engineering controls or otherwise compromises the integrity of the Chromium Remedy in the Commercial AOC (see Section 3.3).

#### **Remedial Actions – Residential AOC**

Remedial actions for chromium in the Residential AOC consisted of excavation of soils to 20 ppm hexavalent chromium to a depth of 20 feet in designated areas next to the Commercial AOC (Building 5 and Building 6 areas), and excavation of soils greater than 5 ppm to a depth of 4 feet below final redevelopment grade in other designated areas (see **Figure 2**).

#### **Future Development – Residential AOC**

The NJCU Consent Decree (paragraph 73) requires soils within the top 4 feet of final site redevelopment grade to meet hexavalent chromium concentration of 5 ppm or less. Therefore, during future construction or development activities in the Residential AOC, soils containing less than 5 ppm hexavalent chromium (in the top 4 feet) must be segregated from soils which may contain hexavalent chromium between 5 and 20 ppm below 4 feet (relative to final site redevelopment grade). Refer to Section 3.1.10 for monitoring requirements in the Residential AOC.

### ***2.1.2 Former Morris Canal (Site 153 North)***

Site 153 consists of a narrow strip of land (24 feet approximate width) located along the eastern side of Route 440 (between Carbon Place and Danforth Avenue) and was the location of a portion of the Former Morris Canal, which operated from the 1860s to the early 1900s. COPR was used to fill portions of the canal during its closure between 1924 and 1935. The property is designated as Block 21902, Lot 1 (formerly Block 1289.5, Lot E) on the City of Jersey City Tax Map and was owned by the Bayonne Municipal Utilities Authority (BMUA) for the purpose of constructing and maintaining a 36-inch sanitary sewer force main. Honeywell purchased the property from the BMUA in August 2007, and the City of Bayonne maintains an easement for the existing sewer line. The force main is constructed of concrete encased PCCP (pre-stressed concrete cylinder pipe), with depths to the top of the pipeline ranging from just below the surface pavement (next to NJCU and Home Depot) to approximately 4 to 6 feet below grade (south of Home Depot). The force main conveys sewage from the City of Bayonne to the Jersey City MUA for ultimate treatment at the Passaic Valley Sewerage Commission facility in Newark.

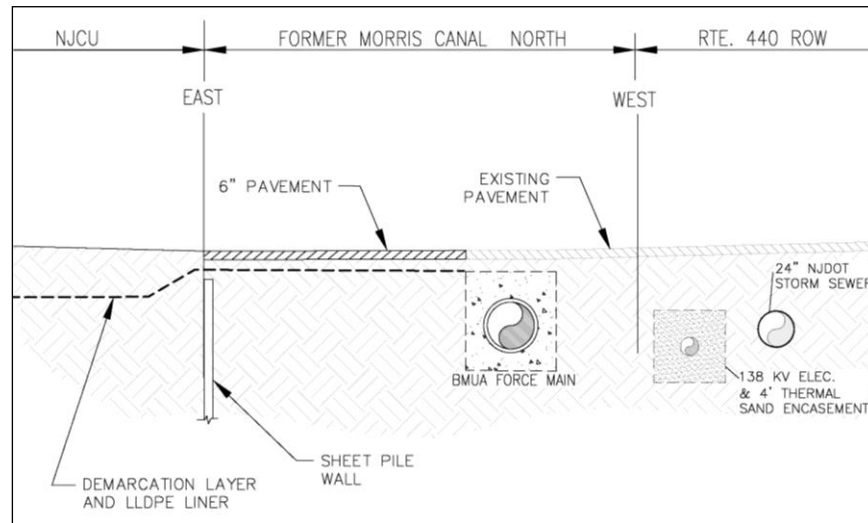
At the end of 2012, the BMUA entered into a long-term agreement with Suez Bayonne for the operation and maintenance of its sewer and water systems. At the end of 2016, the BMUA was dissolved and the City of Bayonne assumed responsibility for the sewer force main. Accordingly, any reference to the BMUA in terms of operation and maintenance of the force main sewer pipeline at Site 153 in this LTMP shall mean the City of Bayonne.

Site 153 is divided into three sections designated as Site 153 North, Site 153 South Upper Segment and Site 153 South Lower Segment. Site 153 North comprises the portion of the Morris Canal abutting the NJCU property to the west.

This document addresses the Site 153 North Segment of the Former Morris Canal in accordance with the requirements of the NJCU Consent Decree. Existing engineering controls for Site 153 North include asphalt pavement in the western portion (above and west of the force main sewer line) and a multi-layered cap system associated with the Commercial AOC in the eastern portion of Site 153 North (east of the force main). Engineering controls east of the force main include: linear low density polyethylene (LLDPE) liner and geo-composite drainage layer; orange demarcation warning layer (geotextile); two to eighteen inches of clean granular fill;



and four inches of pavement surface. The eastern perimeter of Site 153 North also has a sheet pile wall along the property boundary with NJCU. The following illustration presents a simplified profile showing the engineering controls and subsurface features for Site 153 North.



**Illustration 2: Site 153 North Cap Profile**

Remedial actions at Site 153 North were coordinated with the NJCU Chromium Remedy and documented in the September 2012 Remedial Action Report (RAR). Site 153 South (Lower and Upper segments) has been remediated pursuant to the Consent Decree Regarding Sites 79 and 153 South. A separate LTMP applies to Study Area 5 Sites 079 and 153 South (dated April 2014) in accordance with paragraphs 79 and 80 of that Consent Decree.<sup>2</sup>

### ***2.1.3 Existing Administrative and Institutional Controls***

Key existing administrative/institutional controls for the protection of the chromium remedial measures in the NJCU Commercial AOC and Site 153 North include:

- The NJCU Consent Decree
- This Long Term Monitoring Plan

<sup>2</sup> The LTMP for Sites 79 and 153 South is maintained by Honeywell at 115 Tabor Road, Morris Plains, NJ 07950. The Sites 79 and 153 South LTMP is also available from the following website: <http://www.jerseycitychromiumcleanup.com/progress/>



- Worker Training Manual – Morris Canal Site and NJCU Commercial Area (see Section 2.1.3.1)
- Standard Operating Procedure (SOP) for Coordinating Utility Work in Chromium Soil Areas – Bayonne Force Main (see Section 2.1.3.1)
- Subsurface Work Authorization Form/Digging and Excavation Permit for the NJCU Commercial Area and 153 North (see Section 2.1.3.2)
- Deed Notices for the NJCU Commercial Area and Site 153 Morris Canal (see Section 2.1.3.3)
- Remedial Action Soil Permits (see Section 2.1.3.4)
- Periodic communications via calls or meetings (see Section 2.1.3.5)
- Posting of signage with number to call before digging (see Section 2.1.3.6)
- Notice provided in NJCU construction project documents (see Section 2.1.3.7)

In addition, Honeywell is incorporating into the administrative controls use of the Terradex LandWatch system to obtain notification of any proposed soil disturbances at NJCU or Site 153 North through the New Jersey One Call system (see Section 2.1.3.8).

#### ***2.1.3.1 Worker Training Manual and SOP***

In accordance with the NJCU Consent Decree, Honeywell has prepared a Worker Training Manual (separate bound document) which addresses requirements for training and protection of workers who potentially may be exposed to chromium-impacted soils or groundwater in conjunction with utility or other subsurface work in the area of the Morris Canal (including Site 153 North and South) and the NJCU Commercial AOC, and provides steps for the coordination of work between Honeywell and the BMUA, NJCU, and any entity conducting subsurface work at the Sites. The Worker Training Manual is attached as **Appendix K** and incorporated by reference.

The Worker Training Manual is applicable to subsurface work performed on utilities or other subsurface work at the Commercial AOC. In addition to the Worker Training Manual, an accompanying SOP for Coordinating Utility Work in Chromium Soil Areas contains details for coordination of work between the BMUA and Honeywell related to the force main at Site 153. The Worker Training Manual

and SOP address identification of work, notification, response and coordination of work, and handling and disposal of chromium soils in conjunction with utility or other subsurface work that may involve disturbance of engineering controls and potential exposure to chromium soils.

As part of the Worker Training Manual implementation, Honeywell will provide initial and periodic awareness training to BMUA, NJCU, and CRT supervisory and maintenance personnel on the Worker Training Manual and to any other entity known by Honeywell intending to perform subsurface work on the sites. The training shall include health and safety requirements, chromium remedial measures, and coordination of work involving the disturbance of engineering controls. The periodic training shall be conducted when appropriate, based on site development or maintenance activities. In addition, for BMUA, NJCU, and CRT, Honeywell shall provide training at least biennially. The BMUA is responsible for providing a copy of the Worker Training Manual to their employees and contractors performing work at the sites. Honeywell is responsible for providing a copy of the Worker Training Manual (a) to any Honeywell contractor performing work at the site; (b) to any entity known to Honeywell to be intending to perform subsurface work at the Commercial AOC; and (c) upon the written request of NJCU or CRT, to any NJCU or CRT contractor performing work at the Commercial AOC.

#### ***2.1.3.2 Subsurface Work Authorization Form/Digging and Excavation Permit***

Completion of a Subsurface Work Authorization Form/Digging and Excavation Permit (“Dig Permit Form”) checklist is required prior to any subsurface work at the Sites. The Dig Permit Form is intended to facilitate coordination with Honeywell prior to conducting utility work or any other subsurface work that may potentially disturb the Chromium Remedy in the area of the Commercial AOC or subsurface soils in the NJCU Residential AOC.

Completion of the NJCU West Campus Dig Permit Form is a prerequisite for any subsurface work at the NJCU West Campus which includes the NJCU Commercial AOC and NJCU Residential AOC. The NJCU West Campus Dig Permit Form is included in **Appendix G**. The NJCU West Campus Dig Permit Form is also included as an attachment to the Worker Training Manual.

Completion of the Site 153 Dig Permit Form is a prerequisite for any subsurface work at Site 153. For work by BMUA, the BMUA and/or its contractors will initiate

completion of the form and coordinate work with Honeywell. For work by non-BMUA entities (e.g., other utilities or easement holders), Honeywell will initiate completion of the form following notification of work, and then work with the entity and/or its contractors for coordination of any work involving chromium soils or repair/restoration of engineering controls. Site 153 Dig Permit Forms are included in **Appendix H**. Site 153 Dig Permit Forms are also included as an attachment to the Worker Training Manual. Dig Permit Forms for Site 153 will also be included in the Site 79/153 South Long Term Monitoring Plan when it is updated in 2017.

### ***2.1.3.3 Deed Notices***

A Deed Notice for the NJCU Commercial AOC was recorded on May 4, 2012 with the Hudson County Register of Deeds (see **Appendix C**). A modified Deed Notice was recorded by NJCU on April 23, 2018 and is included in **Appendix C**. The modified deed notice includes added references to other documents (Amended Consent Decree, LTMP and Worker Training Manual), current block and lot information, and revised exhibit figures to reflect the hydraulic barrier wall extension completed in 2017.

A Deed Notice for the Morris Canal Site was recorded on November 30, 2010 (see **Appendix D**). A modified Deed Notice has been prepared for the Morris Canal Site to reflect the completed remedial actions, current block and lot information, and current NJDEP deed notice format. It is expected to be recorded by Honeywell in 2019. When recorded, a copy of the modified Deed Notice for the Morris Canal Site will be included in **Appendix D**.

The Deed Notices specify that the NJCU Consent Decree shall govern if there is any conflict or inconsistency between the terms of the Deed Notices and the terms of the NJCU Consent Decree, or if any action to be taken pursuant to the Deed Notices is in conflict or inconsistent with the NJCU Consent Decree.

The Deed Notices specify conditions for any alteration, improvement, and/or disturbance of the engineering controls, and provide monitoring, maintenance, notification and reporting requirements. These requirements include notification by the site owner/operator to Honeywell and the NJDEP prior to disturbance of engineering controls, and documentation that applicable worker health and safety laws and regulations are followed during the disturbance and restoration of those controls. The Deed Notices contain figures and cross-sections showing the

engineering controls and details regarding notification and reporting requirements. Notification to Plaintiffs is also required prior to any disturbance of the Chromium Remedy as indicated in Section 3 of this LTMP.

#### ***2.1.3.4 NJDEP Remedial Action Soil Permits***

A Remedial Action Soil Permit for the NJCU Commercial AOC was issued by the NJDEP on May 4, 2012 and contains requirements for monitoring, maintenance and reporting to document the protectiveness of the remedial actions and engineering controls. A modified Remedial Action Soil Permit was issued by the NJDEP on January 4, 2019 and reflects the modified Deed Notice recorded April 23, 2018 following completion of the hydraulic barrier wall extension in 2017. Honeywell has primary responsibility for permit compliance and NJCU is co-permittee as property owner. The permit includes requirements for monitoring of engineering controls (cap) in accordance with the Deed Notice, schedule for submittal of Biennial Certification Reports to the NJDEP, and requirements pertaining to financial assurance and permit transfer, modification and termination. For Site 153, a Remedial Action Soil Permit will be obtained from the NJDEP following recording of the modified Deed Notice.

#### ***2.1.3.5 Periodic Communications***

Ongoing routine communications between Honeywell and NJCU, include meetings regarding any upcoming work by NJCU, CRT, or their contractors at the NJCU West Campus which includes the Commercial AOC and Residential AOC. The schedule for routine communications between Honeywell and NJCU is indicated below:

- Pre-construction phase – monthly
- During construction – weekly
- Post-construction – quarterly

As of the date of this LTMP, NJCU is in the construction phase and CRT is in the pre-construction phase. The LTMP monitoring and contingency plan is provided in Section 3. LTMP reporting requirements are indicated in Section 4.

#### ***2.1.3.6 Signage***

Signage has been installed in the Commercial Area with a phone number to call prior to digging so that Honeywell is notified prior to any subsurface work. Example warning/notice signage and a map showing the locations of the signs as of

September 2016 are included in **Appendix I**. Signs will be maintained in the locations shown in the map included in **Appendix I** through the construction of Building 6. Once the construction of Building 6 is complete, the parties will review the locations of the warning/notice signs in the vicinity of Building 6 to determine the number and location(s) of sign(s) in that area following construction. An updated map with the locations of the warning/notice signs will be included in **Appendix I** in a future annual update to this LTMP.

#### ***2.1.3.7 Leases and Construction Project Contract Documents***

This section addresses NJCU's contracting obligations for the NJCU Commercial AOC. All leases that must comply with and contain the notice required by paragraph 6A.i of the NJCU Commercial AOC Deed Notice, which is Appendix C to this LTMP, will include in such leases the notices set forth below in sub-paragraphs (a) and (b) of this section.

All contract documents entered into for any portion of the Commercial AOC that allows for the repair, replacement, or maintenance of any portion of the Chromium Remedy in the Commercial AOC and all contract documents that allow for subsurface work that disturbs the Chromium Remedy in the Commercial AOC will include in such documents the notices set forth in sub-paragraphs (a) and (b) of this section.

- (a) In bold noticeable format, a notice of the Chromium Remedy and the requirement that all work in and/or operation of facilities within the Commercial AOC must comply with NJCU's obligations under the NJCU Consent Decree, Deed Notice, Long Term Monitoring Plan and Worker Training Manual.
- (b) Such contract documents shall also include a copy of the NJCU Consent Decree, Deed Notice, Long Term Monitoring Plan and Worker Training Manual and the requirement that all subsurface work and work that impacts the Chromium Remedy must comply with those documents.

Any pre-contract bidding documents related to subsurface work or activities that impact the Chromium Remedy in the Commercial AOC must include a notice of the Chromium Remedy and the statement that the winning contract bidder must comply with NJCU's obligations under the NJCU Consent Decree, Deed Notice, Long Term

Monitoring Plan and Worker Training Manual in connection with its performance of any awarded contract.

All commercial tenants in the NJCU Commercial AOC and all easement holders on Site 153 North shall be provided with written notice of the chromium contamination in the NJCU Commercial AOC and the remedial actions that have been undertaken or are planned. NJCU shall provide Honeywell with a list of tenants in any development on the NJCU Commercial AOC, and Honeywell shall provide annual written notice to all tenants in any development on the NJCU Commercial AOC of any long-term monitoring or maintenance activities undertaken with respect to the Chromium Remedy.

#### ***2.1.3.8 Terradex LandWatch System***

Terradex, Inc., a private company, works in conjunction with the New Jersey One Call system to obtain notification of soil disturbances at subject sites. Terradex has installed a transmitter at the Sites, which qualifies as an “underground utility” under the New Jersey Underground Utility Protection Act, which in turn triggers the requirements of the One Call process. Under this process, any person seeking to disturb soil at a site is required to notify One Call, which in turn notifies operators of registered utilities prior to the soil disturbance activity. Installation of the Terradex LandWatch system allows Honeywell and its contractors to be notified through One Call of soil disturbing activities at NJCU and Site 153 North, similar to the way in which a utility would be notified.

The Terradex LandWatch system shall be used pursuant to this Long Term Monitoring Plan. However, Honeywell’s use of this system as an institutional control at the Commercial AOC is necessarily dependent on the ongoing operations of Terradex LandWatch, as well as on Terradex’s ability to continue to work in conjunction with the New Jersey One Call system. Use of this system also assumes there are no changes in New Jersey law or regulation that would preclude Honeywell’s use of the system in this manner. Accordingly, Honeywell will review the viability of continued use of the Terradex LandWatch system during the annual reviews of the LTMP. Provided that Terradex continues to offer Terradex LandWatch service at a price that is cost-effective, that One Call continues to allow Terradex to operate in this manner, and that no changes to New Jersey law or regulation bar Honeywell from using the Terradex LandWatch system in cooperation with the One Call system, Honeywell will continue to use the Terradex

LandWatch system as a component of the institutional controls at the sites to provide for the protectiveness of the remedy. If Honeywell intends to terminate the Terradex system because it becomes unavailable, ineffective or not cost-effective, then Honeywell shall report, at least 90 days in advance of its intended action, to the non-Honeywell Parties Honeywell's decision to terminate Terradex, Honeywell's reasons for doing so, and will discuss with Plaintiffs alternative institutional controls to be considered. The 90-day period shall not apply if the Terradex LandWatch system becomes unavailable sooner than 90 days.

### 3.0 MONITORING PLAN

Pursuant to Paragraph 96 of the NJCU Consent Decree, Honeywell shall be responsible for monitoring, maintaining, repairing and replacing the Chromium Remedy. Honeywell will conduct onsite monitoring during any investigation, development, construction, or other activities in the Commercial AOC that involve disturbance of the Chromium Remedy or any subsurface work.

This section provides the details of the LTMP and Contingency Plan addressing the integrity of the chromium remedies for NJCU and Site 153 North. **Table 1** provides a timetable containing the LTMP inspection/monitoring and reporting requirements. The primary purpose of the monitoring plan is to monitor and verify the effectiveness of the Chromium Remedy in protecting human health and the environment. Monitoring requirements specified in the NJCU Consent Decree (Paragraph 99) include:

- Onsite monitoring during any development construction or other subsurface activities in the Commercial AOC to ensure that, at the conclusion of construction activities, the cap and other engineering controls are restored as set forth in the Final 100% Remedial Design;
- Quarterly inspections of the NJCU Commercial AOC and Site 153 North to ensure that neither is being put to any prohibited use or any use that would jeopardize the integrity or effectiveness of the Chromium Remedy;
- Quarterly visual inspection monitoring of the grade and slope in the Commercial AOC to identify whether erosion has occurred or is occurring in a manner that jeopardizes the protectiveness of the Commercial AOC cap;
- Quarterly visual inspection monitoring to determine the occurrence of potential settlement or subsidence in the Commercial AOC such that the integrity of the Chromium Remedy may be impaired;
- Quarterly visual inspection monitoring to determine any disturbance to the Commercial AOC Chromium Remedy other than a planned disturbance in connection with the NJCU commercial development, or BMUA sewer repair or replacement in the Commercial AOC;



- Quarterly visual inspection monitoring to ensure that burrowing animals are not materially impairing the integrity of the Chromium Remedy in the Commercial AOC;
- Quarterly visual inspection monitoring of vegetative cover, including landscaping, if any, to ensure that vegetative cover will not materially impair the integrity of the Chromium Remedy;
- Quarterly groundwater elevation monitoring to ensure that groundwater levels are maintained in accordance with the requirement to maintain an inward gradient for shallow groundwater in the Commercial AOC cap, and in accordance with the NJCU Consent Decree, the 100% Design Report (dated June 2010), and as further described in the NJCU Shallow Groundwater Monitoring and Extraction System Operation (attached as **Appendix L**);
- Periodic groundwater quality sampling in accordance with the NJCU Consent Decree, the 100% Design Report (dated June 2010), and as further described in the NJCU Shallow Groundwater Monitoring and Extraction System Operation Plan (attached as **Appendix L**);
- Annual inspection of Site 153 North to ensure that all pavement is in good condition and does not have potholes or cracks that penetrate the pavement;
- Annual inspection, and repair and/or replacement as necessary, of all warning signs on the Commercial AOC;
- Onsite monitoring during any development, construction, or other activities in the Residential AOC that involve disturbance of the below 4 feet soils; and
- Annual review of the LTMP, including updates as necessary based on changes to field conditions or regulatory requirements, or changes to the Worker Training Manual.

Details of the Contingency Plan are provided in Section 3.3, which describes the corrective actions and remedy procedure to be implemented if the inspection program identifies evidence of degradation or disturbance of the Chromium Remedy, and requirements in the event of any planned or unplanned disturbance of the chromium remedial measures.

### 3.1 NJCU COMMERCIAL AOC QUARTERLY INSPECTIONS AND MONITORING

#### *3.1.1 Timing of Inspections*

The quarterly inspections and monitoring began in March 2012. Subsequent inspections have been performed in March, June, September and December of each year since then, and will continue to be performed on that schedule in the future as set forth in paragraph 99(a) through 99(i) of the NJCU Consent Decree (see **Table 1**). The Contingency Plan, provided in Section 3.3, will be implemented if inspection indicates evidence of erosion, deterioration of the integrity of the Chromium Remedy or recent construction activities impacting the Chromium Remedy. Details regarding the inspection program are provided in the following sections.

#### *3.1.2 Chromium Remedy Visual Inspections*

Quarterly visual inspections of the Chromium Remedy installed on the Commercial AOC (including the eastern strip of Site 153 North which is part of the Commercial AOC) will be conducted to verify that there is no prohibited use or any use that would jeopardize the integrity of the Chromium Remedy. Evidence of deterioration (e.g., cracking of asphalt, spalling, potholes, vegetative coverage & erosion) or other evidence of disturbance (e.g., digging, drilling, excavation) will be recorded and evaluated. Field observations will include information on the extent of deterioration including dimensions and depth of cracks, potholes, or other disturbance of the Chromium Remedy, including whether or not such deterioration or disturbance fully penetrates the surface cover (e.g., pavement) down to the underlying ground surface. Any prohibited use or unplanned use observed will be documented and all parties to the NJCU Consent Decree and any other appropriate parties, including the party engaged in the prohibited or unplanned use, will be notified by Honeywell. Field observations regarding evidence of deterioration or disturbance of the Chromium Remedy will be addressed as indicated in the Contingency Plan (see Section 3.3).

The observations will be recorded on an inspection form and photo documentation provided. The NJDEP August 2005 Field Sampling Procedures Manual provides guidance for recordkeeping and photo documentation. An example quarterly/annual inspection form is included in **Appendix E**.

If field observations indicate that deterioration or a disturbance fully penetrates the surface cover and underlying cap components in the Commercial AOC (i.e., minimum 12 inches clean soil layer beneath pavement, orange demarcation layer, drainage layer and geomembrane liner), then soil sampling and analysis for hexavalent chromium may be performed by Honeywell to evaluate whether there has been any migration of contaminated soils and determine requirements for corrective action.

### ***3.1.3 Surface Grade Visual Inspections***

Quarterly visual inspections of the grade and slope in the Commercial AOC will be conducted to identify erosion issues that may have occurred or signs of potential erosion that would jeopardize the protectiveness of the Commercial AOC Chromium Remedy. Field observations regarding evidence of erosion shall be addressed as indicated in the Contingency Plan so as to maintain the cap integrity.

### ***3.1.4 Differential Settlement Visual Inspections***

Quarterly visual inspections of settlement in the Commercial AOC will be conducted. Potential settlement would be indicated by disturbance or subsidence of surface features (e.g., pavement). If such settlement has occurred, it will be evaluated and if necessary, rectified as required by the Contingency Plan. Corrective actions will restore the area to the original Final 100% Remedial Design specifications or to a level of protection at least equivalent to the original Chromium Remedy.

### ***3.1.5 Disturbance Visual Inspections***

Quarterly visual inspections of the Commercial AOC will be conducted to determine evidence of a disturbance, other than planned disturbance in connection with commercial development or BMUA sewer repair or replacement. Evidence of disturbance includes, but is not limited to, surface visual appearance of distinctive warning layer materials or any other cap materials. In the event of disturbance, further evaluation or investigative measures will be undertaken to evaluate whether the integrity of the cap has been compromised or the contingency system for water level maintenance has been disturbed. Based on the results of the evaluation, appropriate action will be taken in accordance with paragraph 99(d) of the NJCU Consent Decree to repair or replace the cap or the contingency system for water levels maintenance, as applicable, so as to conform to the original Final 100%

Remedial Design specifications or to a level of protection at least equivalent to the original Chromium Remedy. Corrective action requirements for asphalt pavement, groundwater levels, and vegetative cover are indicated in the Contingency Plan.

### ***3.1.6 Burrowing Animals Visual Inspection***

Quarterly visual inspections of the Commercial AOC will be conducted to determine any material disturbance caused by burrowing animals affecting the integrity of Chromium Remedy. If Honeywell finds evidence of burrowing animals, the burrowing animals will be, to the extent practical, humanely removed and the Chromium Remedy repaired or replaced to the original Final 100% Remedial Design specifications. Corrective action requirements are indicated in the Contingency Plan (Section 3.3.4).

### ***3.1.7 Vegetative Cover Visual Inspection***

Quarterly visual inspections of vegetative cover in the Commercial AOC will be conducted to determine any material disturbance that could affect the integrity of the Chromium Remedy. Field observations will include information on the extent of degradation or disturbance including dimensions and depth of erosion or missing vegetation, or evidence of damage to surface cover materials (e.g., pavement) from tree roots. In the event of material disturbance to the Chromium Remedy, appropriate restoration procedures will be followed to repair or replace the Chromium Remedy to the original Final 100% Remedial Design specifications. Corrective action requirements for vegetative cover are indicated in the Contingency Plan (Section 3.3.4).

### ***3.1.8 Warning Sign Inspections***

All warning/notice signs located in the NJCU Commercial AOC shall be inspected annually. When necessary, warning/notice signs must be repaired and/or replaced. An example warning/notice sign and a map showing the locations of the signs as of September 2016 are provided in **Appendix I**.

### ***3.1.9 Groundwater Monitoring and Sampling***

Groundwater monitoring will be performed in accordance with the NJCU Consent Decree and the 100% Design Report (dated June 2010), and as further described in the NJCU Shallow Groundwater Monitoring and Extraction System Operation Plan (attached as **Appendix L**).

The NJCU Commercial AOC groundwater recovery and treatment system was activated on or about April 20, 2016. In September 2016, Honeywell proposed, and the parties agreed, that Honeywell would construct approximately 500 additional linear feet of an underground barrier wall along the east side of the cap to fully encompass the NJCU Commercial AOC cap in order to restrict the flow of the shallow groundwater and facilitate the maintenance of an inward gradient. The hydraulic barrier wall extension was completed in 2017 and additional shallow groundwater monitoring wells were installed to provide well pairs for measuring groundwater elevations on either side of the barrier wall. The parties are monitoring the groundwater remedy, and, if it is determined that the shallow groundwater remedy is not creating an inward gradient as required by paragraphs 86 and 99(g) of the NJCU Consent Decree, the parties will determine the necessary corrective actions.

### ***3.1.10 Residential AOC Monitoring***

The Residential AOC was remediated for hexavalent chromium to allow for unrestricted use. However, the NJCU Consent Decree paragraph 73 requires soils within the top 4 feet of final site redevelopment grade to meet hexavalent chromium concentration of 5 ppm or less. Therefore, during future construction or development activities, soils containing less than 5 ppm hexavalent chromium (in the top 4 feet) must be segregated from soils which may contain hexavalent chromium between 5 and 20 ppm below 4 feet (relative to final site redevelopment grade).

Onsite monitoring will be conducted during any future development, construction, or other activities in the Residential AOC that involve potential disturbance of the Below 4 Feet Soils (with respect to final site redevelopment grade) to document that such activities are being undertaken in a manner consistent with the requirements of paragraph 73 of the NJCU Consent Decree pertaining to the management of soils.

- NJCU and Honeywell shall use reasonable efforts to maintain the soils and clean fill so that Below 4 Feet Soils are segregated and managed in such a way as to prevent such soils from being commingled with top 4 feet soils, unless the top 4 feet soils will be treated as if they are Below 4 Feet Soils for the purpose of handling, return and/or disposal.

- NJCU and Honeywell are responsible for handling and offsite disposal of any Below 4 Feet Soils that cannot be returned to a depth greater than 4 feet below final redevelopment grade.

NJCU shall notify Honeywell and Plaintiffs prior to work involving disturbance of Below 4 Feet Soils relative to final redevelopment grade to coordinate monitoring of work and soil handling and disposal (if required). Monitoring will be coordinated between Honeywell and NJCU based on the development or construction work being performed. The Dig Permit Form includes requirements to facilitate monitoring and coordination of work with Honeywell.

Honeywell and NJCU shall use all reasonable efforts to work with any entity conducting work in the Residential AOC to meet the requirements of this Section concerning the disturbance of Below 4 Feet Soils.

Within 60 days of completion of work, Honeywell will provide to Plaintiffs a report (which may be in the form of a completed dig permit), including a certificate by a New Jersey Professional Engineer, documenting whether soils were managed consistent with the requirements of the Final 100% Remedial Design and the NJCU Consent Decree.

Excavation or dewatering in the Residential AOC may also affect groundwater levels in the Commercial AOC and thus affect the establishment or maintenance of an inward gradient. NJCU shall notify Honeywell and Plaintiffs of any known activities in the Residential AOC, including any activities conducted by CRT, any entity conducting subsurface work, easement holders and operators of any portion of the Residential AOC, and their respective contractors or consultants, involving excavation or water extraction more than 4 feet below grade, including the new or modified operation of building sump pumps.

## **3.2 SITE 153 NORTH ANNUAL INSPECTIONS**

### ***3.2.1 Timing of Inspections***

The annual inspections and measurements will take place in April or May of each year as set forth in paragraph 99(j) of the NJCU Consent Decree (refer to **Table 1**).

### ***3.2.2 Chromium Remedy Inspections***

An inspection to assess the protectiveness and integrity of the Chromium Remedy asphalt pavement and concrete surfaces in Site 153 North will be conducted annually. Potholes or cracks shall be repaired in accordance with the Contingency Plan (Section 3.3.1).

Evidence of deterioration (e.g., p cracking of asphalt, spalling, and potholes, and vegetative coverage & erosion) or other evidence of disturbance such as excavation will be recorded and evaluated. Field observations will include information on the extent of deterioration including dimensions and depth of cracks, potholes, or other disturbance of the capped area including whether or not such deterioration or disturbance fully penetrates the pavement down to the underlying ground surface. Any prohibited use or unplanned use will be documented and Honeywell will notify all appropriate parties in accordance with paragraph 104(c) of NJCU Consent Decree, including Plaintiffs, NJCU, CRT, BMUA, and any party creating such disturbance. The observations will be recorded on an inspection form and photo documentation provided. The NJDEP August 2005 Field Sampling Procedures Manual provides guidance for recordkeeping and photo documentation. An example quarterly/annual inspection form is included in **Appendix E**.

### ***3.2.3 Warning Sign Inspections***

No sewer and/or other utility access points (e.g., manhole covers) are located within Site 153 North. Inspections of warning signs at sewer and/or utility access points within Site 153 South are addressed as part of the LTMP for Sites 79 and 153 South dated April 2014.

## **3.3 CONTINGENCY PLAN**

In conformance with paragraph 101 of the NJCU Consent Decree, the Contingency Plan addresses requirements to provide for the continued integrity of the Chromium Remedy for Site 153 North and the NJCU Commercial AOC in the event of:

- a) any planned penetration or disturbance of the capped areas, underground barrier wall or other planned activity that could compromise the integrity of the Chromium Remedy; or



- b) any unplanned event or accident that causes a disturbance or penetration of the capped areas or underground barrier wall, or otherwise compromises the integrity of the Chromium Remedy.

This Contingency Plan also addresses maintenance and repair of asphalt cap areas due to field observations of degradation during cap inspections.

Corrective actions will be implemented to conform to the original Final 100% Remedial Design specifications or to a level of protection at least equivalent to the original Chromium Remedy.

The Contingency Plan requires an annual plan update to notify NJDEP and Non-Honeywell Parties, as specified in the NJCU Consent Decree, of (a) any event penetrating or compromising the integrity of the Commercial AOC and 153 North Chromium Remedy; (b) steps taken to identify the extent of the problem; and (c) standards for remedying the problem. Refer to Section 4.4 Contingency Plan Update/Notice to Stakeholders for details regarding notification of any event penetrating the cap or otherwise compromising the integrity of the Chromium Remedy. Annual plan updates, notification and reporting requirements are discussed in Section 4.0.

### ***3.3.1 Asphalt Degradation and Maintenance***

Potholes or cracks that do not fully penetrate the pavement will be repaired by Honeywell as part of regular maintenance at least annually, in coordination with Honeywell, NJCU, CRT Holdings, LLC, and/or BMUA as appropriate, to avoid further deterioration of the pavement, and in a manner which avoids interference with regular business operations. In most cases such repairs will be made with a sealant or pre-mixed, cold-placed asphalt, using appropriate hand tools, following manufacturers' specifications for placement and curing. An alternate method meeting standard engineering practices may be implemented by the repair contractor, subject to approval by Honeywell, NJCU and BMUA, as appropriate.

Potholes or cracks that fully penetrate the pavement must be repaired by Honeywell immediately (as soon as practicable, in coordination with Honeywell, NJCU, CRT, and/or BMUA) and in a manner which avoids interference with regular business operations. Such repairs may be carried out using sealant or pre-mixed, cold-placed asphalt, using appropriate hand tools, or, at the discretion of the repairing engineer,



using other appropriate materials and application methods, following manufacturers' specifications for placement and curing of pavement. In accordance with the NJCU Consent Decree paragraph 99(j), if 10% or greater of a localized area or 25% or greater of the entire paved area has been impacted by potholes or cracks that penetrate the pavement, Honeywell will repave such portions as necessary to maintain the pavement in good condition, using material and methods that will be specified on a case-by-case basis by the repairing engineer.

Honeywell will communicate and coordinate with NJCU, CRT, and/or BMUA regarding pavement repair or repaving work, as appropriate, and allow for representative(s) of NJCU, CRT, and/or BMUA to be present during the work if needed.

### ***3.3.2 Commercial AOC Chromium Remedy Disturbance***

#### ***3.3.2.1 Worker Training Manual***

The Worker Training Manual, which is attached as **Appendix K** (in a separate bound document), was developed to provide health and safety information to individuals working in the Commercial AOC. The Worker Training Manual is applicable to any subsurface work performed within the Commercial AOC or Site 153.

#### ***3.3.2.2 Notification***

This section describes the requirements for notice of disturbances to the Chromium Remedy, as prescribed in Paragraph 104(b) and (c) of the NJCU Consent Decree.

In accordance with Deed Notice requirements, the site owner/operator is required to provide notification to the NJDEP and Honeywell prior to any alteration, improvements, or disturbance of engineering controls, and take steps so that all applicable worker health and safety laws and regulations are followed during the work. NJDEP written approval is required prior to disturbance of engineering controls, except for certain situations, such as emergencies or in cases where the engineering controls are restored within 60 days of the initiation of disturbance. In the event of an emergency that necessitates disturbance to engineering controls, immediate notification to the NJDEP and then Honeywell is required by the person causing such disturbance (see Section 3.3.2.7 on unplanned or emergency cap disturbances for details). Refer to the Deed Notices for specific details on notification and reporting requirements in the event of alterations, improvements or

disturbance of engineering controls.

In the event of any inadvertent disturbance to the engineering controls or underlying soils, workers are advised to stop work, cover and secure the area using appropriate measures (e.g., plastic sheeting, traffic cones or barrier), and notify appropriate site management personnel (BMUA, NJCU, CRT, or other applicable party). Further work would then be coordinated with Honeywell with respect to the management of chromium-contaminated materials and repair/restoration of engineering controls as set forth in the Worker Training Manual.

For any planned disturbances of the Chromium Remedy in the NJCU Commercial AOC, the process for communication and coordination between Honeywell, NJCU and Plaintiffs follows:

- a) NJCU will notify Honeywell at least seven business days prior to any planned disturbance of the Chromium Remedy and initiate completion of the Dig Permit Form.
- b) Honeywell will provide Plaintiffs at least five business days' notice before any planned disturbance of the Chromium Remedy. (In the event that work does not begin on the scheduled date, Plaintiffs will be notified but will not be guaranteed five business days' notice of the new date.)
- c) NJCU and Honeywell will provide a schedule of activities that may disturb the engineering controls to Plaintiffs on a quarterly basis (including six-month forward look-ahead and status table on dig permit authorizations). Plaintiffs will have the opportunity to seek additional information about the report from Honeywell and NJCU.
- d) Plaintiffs may have their technical consultants observe the work performed at the NJCU Commercial AOC.

For any planned disturbances of the Chromium Remedy within Site 153 North by the BMUA, Honeywell or their contractors, the process for communication and coordination between Honeywell, BMUA, and Plaintiffs follows:

- a) BMUA will notify Honeywell prior to any planned disturbance of the Chromium Remedy and initiate completion of the Dig Permit Form.

- b) BMUA or Honeywell will provide Plaintiffs at least five business days' notice before any planned disturbance of the Chromium Remedy. (In the event that work does not begin on the scheduled date, Plaintiffs will be notified but will not be guaranteed five days' notice of the new date).
- c) BMUA and Honeywell will provide a schedule of activities that may disturb the Chromium Remedy to Plaintiffs on a quarterly basis (including six-month forward look-ahead and status table on dig permit authorizations). Plaintiffs will have the opportunity to seek additional information about the report from Honeywell and BMUA.
- d) Plaintiffs may have their technical consultants observe the work performed at Site 153 North.

Refer to the Worker Training Manual and SOP (Section 3.0) for details regarding notification and coordination of work between the BMUA and Honeywell at Site 153.

For any planned disturbance of the Chromium Remedy in the NJCU Commercial AOC and/or Site 153 North by entities other than NJCU, CRT, or BMUA, the process for notification among the entities and Plaintiffs is as follows (see the Worker Training Manual Section 3.4 for additional detail on notification and coordination for work performed by third parties):

- a) The entity notifies Honeywell regarding the work project (e.g., utility repair), or Honeywell is notified of work through the Terradex LandWatch system.
- b) For notification of work through the Terradex LandWatch system, Honeywell will initiate telephone contact with the entity and follow-up with electronic email notification within 24 hours in accordance with the requirements of the Worker Training Manual. Honeywell will copy Plaintiffs on the electronic mail communication to utilities and/or contractors for any proposed actions that Honeywell has determined may impact the Chromium Remedy.
- c) If, after evaluating the proposed work, Honeywell concludes that it will impact the Chromium Remedy, Honeywell will initiate completion of the Dig Permit form.
- d) Honeywell will provide Plaintiffs at least five business days' notice before any planned disturbance of the Chromium Remedy. (In the event that work does

not begin on the scheduled date, Plaintiffs will be notified but will not be guaranteed five days' notice of the new date).

- e) Plaintiffs will have an opportunity to have their technical representatives present to observe the work.

### ***3.3.2.3 Coordination of Work***

Prior to performing subsurface work in the Commercial AOC, any entity conducting such work, including but not limited to the BMUA, NJCU, easement holders and operators of any portion of the Commercial AOC, and their respective contractors or consultants, are required to notify Honeywell to enable coordination of work, onsite observation of work by Honeywell, establish requirements for worker protection, handling and disposal of chromium-impacted media (if applicable), and repair and restoration of the engineering controls by Honeywell. Refer to the Worker Training Manual for details regarding notification, response and coordination of work, and handling and disposal of chromium soils in conjunction with utility or other subsurface work that may involve disturbance of engineering controls and potential exposure to chromium soils.

As part of the Worker Training Manual, Honeywell has established a telephone notification and response system (referred to as the Chromium Response Hotline: **855-727-2658**) for use by any entity conducting subsurface work, including but not limited to the BMUA, NJCU, CRT, and other parties, easement holders and operators of any portion of the Commercial AOC, and their respective contractors or consultants, to notify Honeywell of any work activities planned or required on an emergency basis that may disturb engineering controls or affect the force main or other utilities within the Morris Canal or the NJCU Commercial AOC. This number is also included in Deed Notice documents (for providing notification to Honeywell prior to disturbance of engineering controls) and on signage to be posted at the NJCU Commercial AOC. Coordination of work between Honeywell and the BMUA is addressed in the Worker Training Manual and accompanying SOP document for work in the area of the force main at Site 153. Coordination of work between Honeywell and NJCU also includes use of the Dig Permit Form included for reference in **Appendix G**. As indicated on the Dig Permit Form, mechanical digging is restricted within the Commercial AOC; excavation greater than 12 inches below existing grade (or within 12 inches of cap materials, i.e., warning layer) must be performed using hand/soft dig techniques or other method approved by Honeywell which is similarly protective of the Chromium Remedy.

Similarly, mechanical digging is restricted in the area of the warning layer or force main piping within Site 153; excavation within 12 inches of the force main piping or within 12 inches of the warning layer (which is present beneath the pavement east of the force main) must be performed using hand/soft dig methods or other methods approved by BMUA and Honeywell. The Dig Permit Forms for Site 153 include additional details regarding digging in the area of the warning layer or force main piping.

For any planned subsurface work or work that disturbs the Chromium Remedy in the Commercial AOC, all contract documents and contractor bid/design documents are required to include, in bold noticeable format, a notice of the Chromium Remedy and the requirement that all work in the Commercial AOC must comply with the requirements of the NJCU Consent Decree, Deed Notice, Long Term Monitoring Plan and Worker Training Manual. NJCU contract documents which allow for construction projects involving subsurface work or work that disturbs the Chromium Remedy will include descriptive information regarding the Chromium Remedy, as well as a copy of the NJCU Consent Decree, Deed Notice, Long Term Monitoring Plan and Worker Training Manual. NJCU also will include in pre-contract bidding documents involving subsurface work or work that disturbs the Chromium Remedy, in bold format, a notice of the Chromium Remedy and that the winning contract bidder must comply with the portions of the NJCU Consent Decree, Deed Notice, Long Term Monitoring Plan and Worker Training Manual applicable to NJCU and its contractors in connection with the performance of any such subsurface work or work that disturbs the Chromium Remedy in the Commercial AOC.

Subsurface work at the Residential AOC and the Commercial AOC may only be conducted in a manner that will not interfere with or impede the shallow groundwater remedy set forth in paragraph 86 of the NJCU Consent Decree. Subsurface work at the Residential AOC and the Commercial AOC must, when applicable, comply with the Shallow Groundwater Monitoring and Extraction System Operation Plan (included in **Appendix L**).

Reference specifications and manufacturer's information for the cap/liner in the Commercial AOC are included for reference in **Appendix J**.

#### ***3.3.2.4 NJCU Future Building 7 Development***

If, pursuant to Paragraph 76 of the Consent decree, NJCU determines to undertake development of Building 7, NJCU shall inform Plaintiffs of its intent to construct Building 7 in a six-month look-ahead document, as soon as feasible after such determination is made.

Honeywell and NJCU will cooperate in coordinating the construction schedule. The coordination will address any necessary and/or required disturbance, repair, and replacement of the Chromium Remedy. In accordance with the NJCU Consent Decree paragraph 76, Honeywell will seek and obtain NJDEP or Licensed Site Remediation Professional approval, if required by law, of any further Chromium Remedy activities required in relation to the construction of Building 7 prior to the construction work start.

Honeywell and NJCU recognize that construction of Building 7, consistent with NJCU Consent Decree paragraph 76, may require relocation of clean fill, excavation and disposal of capped soils, removal and reinstallation of the cap materials at an elevation to accommodate the building foundation design, and other work that may impact components of the Chromium Remedy. In that circumstance, Honeywell will be responsible for the removal and disposal of all chromium-contaminated soils and will reinstall all components of the Chromium Remedy to integrate the cap with the Building 7. Prior to any such work, Honeywell shall present a work plan for the additional Chromium Remedy in a document that will be Subject to Review and Comment by the Non-Honeywell Parties with an Interest, and approval by NJDEP. As set forth in paragraph 54 of the NJCU Consent Decree, in the event that the Parties are not able to reach agreement, any Party may seek resolution of the dispute by motion to the United States District Court for the District of New Jersey.

Before lowering the cap below an elevation of +7 feet MSL or installing piles within the Commercial AOC, Honeywell shall conduct an analysis of the effect on the shallow groundwater remedy in order to ensure that lowering the elevation or installing piles will not affect compliance with the requirement of the NJCU Consent Decree to maintain an inward gradient within the Commercial AOC or impede the operation of the groundwater remedy.

### ***3.3.2.5 NJCU Building 6 Development***

#### **Pre-Construction Phase**

Pursuant to the Opinion dated April 7, 2016 of The Honorable Jose L. Linares in Case 2:95-cv-02097-JLL, Document 1408 filed April 7, 2016, in the United States District Court for the District of New Jersey “NJCU and Honeywell must submit the detailed construction plans to Plaintiffs for review as soon as they are completed, and the parties are encouraged to meet and confer regarding any disputes over those plans prior to returning to this Court to raise potential issues with such plans.” (Slip Op., p. 17).

#### **Reporting During Construction of Building 6**

NJCU and Honeywell shall cooperate to coordinate the construction schedule and construction of Building 6 with CRT in connection with any necessary and/or required disturbance, repair and/or replacement of the Chromium Remedy as defined in Article III of the NJCU Consent Decree, and shall provide monthly reports to Plaintiffs as to the status of work relating to such disturbance, repair or replacement during the period of such work.

Honeywell shall communicate with CRT in order to coordinate the construction of Building 6 with any necessary and/or required disturbance, repair, and replacement of the Chromium Remedy as defined in Article III of the NJCU Consent Decree. NJCU shall use all reasonable efforts to cause CRT to cooperate with Honeywell in coordinating any necessary or required disturbance, repair or replacement of the Chromium Remedy with the construction schedule and construction of Building 6.

#### **The Further Chromium Remedy – Repair and Restoration in the Vicinity of Building 6**

In connection with the construction of Building 6, to carry out its obligations under paragraph 96 of the NJCU Consent Decree to “monitor[], maintain[], repair[], and replac[e] the Chromium Remedy,” Honeywell shall undertake the following activities as necessary: (a) relocation of Clean Fill and removal of the geomembrane liner and other components of the cap within some or all of the Building 6 footprint area; (b) excavation and disposal of capped soils from the Building 6 footprint area to allow for reinstallation of the geomembrane layer and other cap components at the appropriate elevation for the construction of Building 6; (c) reinstallation of the geomembrane layer and other cap components to integrate the cap with the construction of Building 6; (d) any activities necessary to repair or restore the



shallow groundwater remedy set forth in paragraph 86 of the NJCU Consent Decree to maintain an inward gradient of groundwater within the Commercial AOC; and (e) such further work as may be necessary and/or required by NJDEP to implement the above work and so that construction of Building 6 may proceed. The activities in the prior sentence shall be known as “the Building 6 Further Chromium Remedy.” Honeywell shall seek and obtain NJDEP approval or Licensed Site Remediation Professional approval, if required by law, for the activities set forth in this paragraph. Honeywell agrees to perform such activities in connection with the construction of Building 6 in a timely manner so as not to unreasonably affect the construction, timing, and schedule of NJCU for the construction of Building 6.

Before lowering the elevation of the cap or installing foundation piles within the Commercial AOC, Honeywell shall conduct an analysis of the effect on the shallow groundwater remedy in order to ensure that lowering the elevation or installing piles will not affect compliance with the requirement of the NJCU Consent Decree to maintain an inward gradient within the Commercial AOC or impede the operation of the groundwater remedy.

Prior to commencement of any activities to disturb the Chromium Remedy, Honeywell shall present the work plan for the Building 6 Further Chromium Remedy in a document to NJCU, NJDEP, Plaintiffs, and any other entity which has an ownership or other real property interest in the property on which Building 6 will be constructed. As of the date of this LTMP, such other entities are the following: CRT Holdings, LLC.

The parties shall meet and confer regarding Honeywell’s work plan setting forth the Building 6 Further Chromium Remedy, which shall be submitted to NJDEP. The parties other than Honeywell, and NJDEP, shall have the right to submit comments on the work plan for the Building 6 Further Chromium Remedy to Honeywell and/or NJDEP. Honeywell must respond to any comments submitted to Honeywell. The parties agree to provide any such comments in a timely manner so as not to unreasonably affect the construction, timing and schedule for the construction of Building 6. No work that will disturb the Chromium Remedy for Building 6 construction shall begin until (i) the work plan for the Building 6 Further Chromium Remedy has been approved by NJDEP; and (ii) either (a) all Parties have reached agreement on the work plan for the Building 6 Further Chromium Remedy; or (b) at least 10 business days have passed from the date that any Party advises the other



Parties in writing that an impasse has been reached in the meet and confer process with respect to the work plan for the Building 6 Further Chromium Remedy. If the parties do not reach a resolution regarding the work plan for the Building 6 Further Chromium Remedy, any party to the NJCU Consent Decree may present the issue to the United States District Court for the District of New Jersey for resolution on motion.

***3.3.2.6 Other Planned Disturbance of the Commercial AOC Chromium Remedy***

In accordance with the NJCU Consent Decree paragraph 81, the existing pavement surface in Site 153 North shall constitute the engineering control in areas not covered by the Commercial AOC cap. In the event that the existing pavement is disturbed, Honeywell shall restore the pavement (as soon as reasonably possible, in cooperation with BMUA) unless such pavement is replaced by an equivalent surface material which would then constitute part of the engineering control.

If sections of the BMUA force main sewer pipeline on Site 153 North are being replaced and/or repaired, Honeywell will remove the soil necessary to meet NJDEP's chromium requirement for non-residential use in effect at the time and arrange for the disposal of the excavated material at a facility licensed for the acceptance of this waste and approved by Honeywell.

Pursuant to Paragraph 82 of the NJCU Consent Decree, Honeywell is responsible for the removal, replacement and/or disposal of chromium-contaminated soils whenever:

- Any section of the BMUA force main sewer pipeline on Site 153 North is to be replaced;
- Normal operating repairs for any section of the sewer on Site 153 North results in removal of chromium soils;
- Any portion of ingress and egress and/or roadway areas for which NJCU holds or may in the future hold an easement over Site 153 North is being installed, repaired, or replaced; or
- Normal operating repairs, improvements or any other work on the NJCU property require removal of chromium soils.

Areas of excavated materials will be restored with backfill meeting the following criteria: (i) have a hexavalent chromium concentration less than the more stringent of a formal New Jersey soil standard for unrestricted use or 1 milligram per kilogram (mg/kg) and (ii) taking appropriate steps such as the placement of geofabric so that new fill material does not become contaminated by any remaining contaminated soil. Relevant site maps will be updated as necessary subsequent to removal of contaminated materials.

For the NJCU Commercial AOC, future utilities will be installed above the cap, thus potential disturbances in this area would be primarily related to the trench drains, sumps, or monitoring wells associated with the remedial actions, or with future development consistent with the NJCU Consent Decree.

In accordance with Deed Notice requirements, the engineering controls are required to be restored to pre-disturbance conditions within 60 days after the initiation of the disturbance activities and a report filed with the NJDEP. If such disturbance is expected to last beyond 60 days, Honeywell and/or NJCU shall provide additional notification to NJDEP and obtain approval for said disturbance activity. During the period of disturbance, Honeywell will protect the public health and safety and mitigate risk of exposure to contaminants, such as restricting public access to the disturbed area by use of fencing (or other appropriate measures that cannot be bypassed by a trespasser), and measures to minimize erosion, dust generation and water run-on by the use of silt fences, temporary covers (e.g. tarps), sand bags or other appropriate engineering measures.

Upon conclusion of the work, the engineering controls and any other impacted remedial measures must be restored to conform to the original Final 100% Remedial Design specifications or to a level of protection at least equivalent to the original Chromium Remedy as set forth in Article III of the NJCU Consent Decree. A report of the disturbance and restoration activities must be submitted to the NJDEP in accordance with Deed Notice requirements within 60 days after completion of the restoration (in certain situations) or with the biennial protectiveness certification report (refer to the Deed Notices for details regarding reporting requirements). Reports will be made to Plaintiffs in accordance with Section 4 of this LTMP.

### ***3.3.2.7 Unplanned or Emergency Cap Disturbance***

In the event of an unplanned activity or emergency that involves disturbance of engineering controls and/or presents the potential for exposure to workers or the public or environment to contaminated materials, NJCU/CRT /BMUA/current owner and/or the party causing such disturbance shall provide notification to the NJDEP Hot Line (1-877-WARNDEP or 1-877-927-6337) upon discovery of such conditions. Honeywell must also be notified via the Chromium Response Hotline (**855-727-2658**) by the NJCU/BMUA/current owner and/or the party causing the disturbance upon discovery of such conditions (additional Honeywell contact is provided in Section 5).

An unplanned or emergency disturbance of the Chromium Remedy may include major weather events such as a hurricane or other major weather event such as a 100-year storm or heavy rainfall that results in flooding in the Commercial AOC area. Within 48 hours following a major weather event (or as soon as practical if conditions prevent access to the Site), an inspection will be performed by Honeywell to determine if there has been any damage to engineering controls, remedy components, or any changes in site conditions or other environmental concern requiring evaluation of impacts to receptors or corrective action. Any new discharges of hazardous substances will be reported to the NJDEP Hotline and remediated in accordance with this Contingency Plan and the NJDEP Technical Requirements for Site Remediation.

Notification to Plaintiffs will be provided by Honeywell or NJCU (for work on the NJCU property) or Honeywell or BMUA (for work at the Site 153 North property) as soon as feasible, and no later than 1 business day after notice to NJDEP, following any emergency or unplanned disturbance of the Chromium Remedy.

Response actions and coordination of work (between Honeywell and any party who disturbs the Chromium Remedy) will follow the procedures and requirements of the Worker Training Manual and SOP, as applicable. To the extent that non-Honeywell entities are performing work in the Commercial AOC, Honeywell must provide written notice to these entities in advance of the commencement of work regarding the need to use properly qualified personnel or contractor(s) to respond and take measures, and of the need to proceed only in accordance with the provisions of the Worker Training Manual to mitigate impacts to workers, the public or the environment from the contaminated materials. Honeywell will document that such written notice was provided to the entities performing the work and will

concurrently provide to Plaintiffs a copy of the communication to the entities regarding the need to comply with the Worker Training Manual.

Upon conclusion of the emergency, the engineering controls and any other impacted remedial measures must be restored by Honeywell and any required reports must be prepared and filed, as may be necessary for the particular emergency. Remedial measures must be restored to conform to the original Final 100% Remedial Design specifications or to a level of protection at least equivalent to the original Chromium Remedy as set forth in Article III of the NJCU Consent Decree.

Deed Notice requirements for emergency situations include taking measures to limit the disturbance of engineering controls and minimizing the time of such disturbance as needed to respond to the emergency; taking measures to limit the risk of exposure to contaminants; restoring the engineering control to pre-emergency conditions as soon as possible; and submittal of report to the NJDEP within 60 days after completion of the restoration of the engineering control (refer to the Deed Notice for specific requirements for emergency situations).

#### ***3.3.2.8 Post-Work Documentation***

Post-work documentation will be completed consistent with Section 4.1.1.

#### ***3.3.3 Commercial AOC Groundwater Levels and Quality***

The contingency groundwater extraction and treatment system was activated on April 20, 2016. In September 2016, Honeywell proposed, and the parties agreed, that Honeywell would construct approximately 500 additional linear feet of an underground barrier wall to fully encompass the NJCU Commercial AOC cap in order to restrict the flow of the shallow groundwater and facilitate the maintenance of an inward gradient. Groundwater elevation, extraction flow, and quality monitoring will be performed consistent with the NJCU Consent Decree, the NJCU 100% Design, and as described in greater detail in the NJCU Shallow Groundwater Monitoring and Extraction System Operation Plan (see **Appendix L**).

#### ***3.3.4 Vegetative Cover Degradation***

Vegetative cover degradation and the need for replacement of vegetation will be determined based on field observations from the quarterly monitoring program and professional judgment regarding the potential for adverse impact to the underlying Chromium Remedy. Disturbances in the vegetative cover area such as soil erosion,

settlement, or missing vegetation will be promptly (as soon as practicable in coordination with NJCU, CRT, and/or BMUA, as appropriate) corrected by either re-grading, repairing or replacement of vegetation, and if appropriate, the area restored to its original grade. Additional topsoil will be added along with planting of new grass or other vegetation to restore the vegetative cover areas.

If field conditions or weather do not permit prompt repair of vegetative cover, appropriate interim measures will be taken (e.g., geotextile mesh, silt fence or straw bales) so that the affected area is adequately protected until site conditions allow for the implementation of the appropriate corrective actions.

Burrowing animals present a potential problem for maintaining the integrity of the Chromium Remedy, even in an urban environment. Once a burrow has been located, the inhabiting animal(s) will be removed to prevent further damage. If necessary, local animal control experts would be consulted for recommended control or removal methods. After the animal has been removed, the burrow will be inspected to determine the integrity of underlying Chromium Remedy. Areas exhibiting evidence of damage will be repaired by removing sufficient area of the soil cover to repair the damage section. Following repairs, the soil will be replaced in accordance with the original condition and will be seeded.

If field observations during the monitoring program indicate that tree roots are causing damage to nearby paved areas, then the vegetation causing the damage will be promptly removed and the pavement repaired as soon as practicable in coordination with NJCU, CRT, and/or BMUA and in a manner which avoids interference with regular business operations.

## 4.0 REPORTING

This section provides requirements for reporting and periodic plan updates. **Table 1** provides a timetable of the LTMP monitoring and reporting requirements.

### 4.1 QUARTERLY AND ANNUAL REPORTING

Honeywell will maintain written logs and/or other records to document monitoring and remediation activities undertaken as part of this LTMP. Monitoring and remediation activities will be documented in writing, utilizing industry standard methods (such as bound field books). Quarterly monitoring visual inspections of the Commercial AOC and annual visual inspections of Site 153 North pavement are documented on inspection forms provided in **Appendix E**. All repairs to the Chromium Remedy will be documented in the quarterly inspection forms by including a copy of the Report of Deed Notice Disturbance as required by Section 4.1.1 (below). Copies of records will be provided by Honeywell to the Parties quarterly, as required in paragraph 102 of the NJCU Consent Decree within 30 days of the conclusion of each calendar quarter. Honeywell provides copies of inspection reports to NJDEP on a biennial basis as part of the Biennial Protectiveness Certification Reports (beginning May 4, 2014 and every 2 years thereafter for the NJCU Commercial AOC and beginning November 30, 2012 and every 2 years thereafter for Site 153<sup>3</sup>). Copies of the Biennial Protectiveness Certification Reports are provided to the Parties concurrent with submittal to NJDEP (see Section 4.2 for further information regarding biennial reports).

Quarterly groundwater monitoring results will be provided by Honeywell to all parties within 30 days of the conclusion of each calendar quarter in the format attached as **Appendix M**. Annual reporting of groundwater monitoring results is performed by Honeywell as part of the Integrated Annual Groundwater Performance Reports for Study Areas 5, 6 and 7 by Cornerstone; the most recent report was submitted July 20, 2018 (Cornerstone, 2018). The reporting requirements for groundwater also include Remedial Action Protectiveness Biennial Certification Reports for Groundwater to be submitted by Honeywell in accordance with the NJDEP Remedial Action Permit for Groundwater issued August 10, 2018.

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<sup>3</sup> The timing of future biennial protectiveness certification reports for Site 153 is expected to be revised following NJDEP issuance of a Remedial Action Permit for Soil.

The applicable requirements of this LTMP and the Integrated Groundwater Sampling and Analysis Plan for Study Areas 5, 6, and 7 will be incorporated by reference into a future Remedial Action Permit for Groundwater. The Remedial Action Groundwater Permit application will be submitted by Honeywell to the NJDEP following completion of remedial actions at SA-6, so that permit applications for the sites and groundwater zones can be coordinated consistent with the existing regional Classification Exception Areas (shallow, deep overburden, bedrock), as well as coordination of timing for submittal of future biennial protectiveness certification reports following NJDEP issuance of the permit.

#### ***4.1.1 Chromium Remedy Disturbance Reports***

Following completion of work involving the disturbance and restoration of the Chromium Remedy (e.g., engineering controls or cap materials) in the Commercial AOC, Honeywell will provide documentation of the completed work (including that, in advance of the work, the entities performing the work were provided training and with copies of the Worker Training Manual), and certification by a New Jersey Professional Engineer, that the work was completed in compliance with the NJCU Consent Decree and that remedial measures were restored in conformance with the original Final 100% Remedial Design specifications or to a level of protection at least equivalent to the original Chromium Remedy as set forth in Article III of the NJCU Consent Decree, as applicable.

Post-work documentation will be addressed either as part of the Report of Deed Notice Disturbance to the NJDEP when such a report is required, or in the completed closed out Dig Permit Form if the Report of Deed Notice Disturbance is not required or is not completed and submitted within 60 days of restoration of the Chromium Remedy. A Dig Permit Form is considered completed and closed out when all work pursuant to a Dig Permit is complete, the Chromium Remedy has been fully restored, and the section of the Dig Permit Form entitled "After Work Is Complete" has been completed. A copy of the Report of Deed Notice Disturbance will be provided to Plaintiffs concurrent with submittal to the NJDEP, and will also be provided with the next submittal of quarterly inspections pursuant to Section 4.1 (above). Copies of completed closed out Dig Permit Forms will be also provided to Plaintiffs as soon as available. If the Report of Deed Notice Disturbance is not completed and submitted to NJDEP within 60 days of restoration of the Chromium



Remedy, Honeywell will provide Plaintiffs the completed closed out Dig Permit Form as soon as it is available.

Once the Chromium Remedy has been disturbed, after 60 days have elapsed and until the time the completed closed out Dig Permit Form is submitted to Plaintiffs, upon Plaintiffs' request, which shall be limited to no more than once per month, Honeywell shall provide a status report detailing the nature and current status of the disturbance (including any temporary measures to prevent exposure to contaminated soils and/or groundwater), the work to design an appropriate repair, the anticipated schedule for the repair of the disturbance, and any repair work conducted as of the time of the status report.

Based upon the completed work to restore the Chromium Remedy, Honeywell shall make updates, if necessary, to the 100% Design As-Built drawings and the design drawings that are part of the Worker Training Manual.

#### ***4.1.2 Reporting on Follow-Up to Quarterly Visual Inspections***

In the post-work documentation following a quarterly field inspection that indicated deterioration or a disturbance of the Chromium Remedy, Honeywell will provide the results of the sampling if sampling was conducted. If no sampling was conducted, Honeywell will provide the basis for the decision to not sample.

#### ***4.1.3 Reporting on Follow-Up to Quarterly Groundwater Monitoring***

The reporting requirements for any necessary follow-up or corrective activities based on the results of shallow groundwater monitoring, construction planned or undertaken, or other modifications of the groundwater flow system, or defects identified in the design or construction of the Chromium Remedy, shall be included in the Shallow Groundwater Monitoring and Extraction System Operation Plan attached as **Appendix L** to this LTMP.

## **4.2 BIENNIAL CERTIFICATION REPORTS**

Remedial Action Protectiveness Biennial Certification Reports for Soils as part of Deed Notice requirements for the NJCU Commercial AOC and Site 153 North will be prepared by Honeywell summarizing the observations of the quarterly and annual inspections and documenting any changes or alteration to the engineering



controls. The NJDEP reporting form(s) required by the TRSR will be used for this report. The current form is included in **Appendix F**.

As required by the TRSR, the report will compare New Jersey laws, remediation standards, and other regulations applicable at the time the engineering or institutional controls were established with any relevant subsequently promulgated or modified laws, regulations or remediation standards to determine whether any changes in applicable laws, regulations, or remediation standards have occurred, and whether the institutional controls comply with the requirements of any new laws and regulations. The report will also assess whether the remedy is functioning as intended, whether the exposure assumptions and remedial action objectives used at the time of the remedy selection are still valid, and whether any other information has come to light that requires a reassessment of the protectiveness of the remedy. If necessary, any such decision points will be documented in the appropriate attachments of the NJDEP forms.

Copies of the Biennial Certification Report will be provided by Honeywell to the Plaintiffs and stakeholder parties as set forth in paragraph 91 of the NJCU Consent Decree, and all parties mandated by the TRSR including:

- Office of the City Clerk
- Hudson County Clerk
- Owner of Property indicated on the Deed Notice (NJCU)
- Current Property Owner (NJCU)/Operator (BMUA and CRT)

The Biennial Certification Reports are required to be submitted every two years following the recording date of Deed Notices or NJDEP issuance of a Remedial Action Soil Permit. Deed Notice recording dates and Biennial Report due dates are as follows:

Site	Deed Notice Recording Date	First Biennial Certification Due Date
NJCU Commercial AOC	May 4, 2012; modified Deed Notice recorded April 23, 2018	May 4, 2014 <sup>(1)</sup>
Site 153 North	November 30, 2010 <sup>(2)</sup>	November 30, 2012 <sup>(2)</sup>

- (1) Next biennial report is due May 4, 2020 and every 2 years thereafter as specified in the NJDEP Remedial Action Soil Permit dated May 4, 2012.
- (2) As of March 2019, the Modified Deed Notice for Site 153 is in progress; timing of future biennial reports will be based on NJDEP issuance of Remedial Action Soil Permit for Site 153. The Modified Deed Notice for Site 153 will be appended to this LTMP to replace the current Appendix D as part of the 2020 annual review and update of the LTMP.

Biennial certification reports for groundwater will be submitted in accordance with the schedule specified in the Remedial Action Permit for Groundwater, beginning August 17, 2020 and every 2 years thereafter.

#### **4.3 MONITORING PLAN UPDATE AND PROCEDURES FOR CHANGES**

This LTMP is prepared on the basis of information known by the parties as of the date on its cover. Because the functioning of the shallow groundwater system to create and maintain an inward gradient within the Commercial AOC is being evaluated as of the date of this LTMP, it is not addressed in the LTMP.

In accordance with paragraph 99(l) of the NJCU Consent Decree, the LTMP will be reviewed annually and updated as needed based on changes to field conditions and regulatory requirements of the Worker Training Manual and/or other relevant project documents for the NJCU Commercial AOC and Site 153 North. The process for making changes to the LTMP is described below.

In accordance with paragraph 100, any Party to the NJCU Consent Decree may propose changes to the scope of monitoring activities in the LTMP. If the parties agree to proposed changes, then the LTMP will be revised to incorporate the agreed upon changes, subject to approval by the NJDEP or a New Jersey Licensed Site Remediation Professional. If the Parties are unable to reach agreement, the Party proposing the change may submit the dispute to the Court for resolution.

#### **4.4 CONTINGENCY PLAN UPDATE/NOTICE TO STAKEHOLDERS**

In accordance with paragraph 101 of the NJCU Consent Decree, Contingency Plan requirements include annual notification by Honeywell to the relevant parties (NJDEP and Non-Honeywell Parties) of any event penetrating/compromising the cap or harming the integrity of the Chromium Remedy; the steps taken to identify the

problem; and the standards for remedying the problem. This notification will be coordinated with annual notification by Honeywell to Plaintiffs documenting compliance with the requirement to notify other stakeholders (including owners, tenants, and utilities) regarding conditions and activities affecting NJCU Commercial AOC and Site 153 North pursuant to paragraph 104 of the NJCU Consent Decree:

- Notice, updated annually, to New Jersey One Call and any other underground utility companies that exist now or are implemented in the future that identifies the location of Cr(VI) contaminated fill at or near pipelines under Site 153 North. In order to address this requirement, Honeywell has provided notice to New Jersey One Call. However, New Jersey One Call has informed Honeywell that it cannot function as a hotline service for Cr(VI) issues as it is purely a utility hotline. As a result, in order to assure proper notification of affected entities, Honeywell has been providing notification to individual utility companies identified as having utilities within Site 153. The notification indicates that if a given utility company is contemplating work in the affected area, it needs to notify Honeywell in advance of implementing such work. Honeywell will strive to remain informed about any changes in the presence of utilities in the affected sites and will continue to provide appropriate annual updates. Honeywell has also contracted with Terradex to receive notifications of any entities, including utilities, seeking to engage in subsurface activities at Site 153 North or the NJCU Commercial Area (see Section 2.1.3).
- Notice describing any excavation that either was planned by an owner/operator or Honeywell or was undertaken in an emergency and the safety measures implemented to protect individuals near Site 153 North and the NJCU Commercial AOC during such excavation. Annual summary notice of the Chromium Remedy that is made available on any Honeywell developed website to inform the public of contamination at Study Area 5, Study Area 6 North and Study Area 6 South. The website is located at the following URL: <http://www.jerseycitychromiumcleanup.com>. This notice will include a description of remedial actions undertaken and contamination remaining at the Commercial AOC. This annual update is required upon completion of the annual long-term monitoring requirements.

- NJCU shall provide Honeywell with a list of tenants in any development on the NJCU Commercial AOC, and Honeywell shall provide annual written notice to the tenants describing the long term monitoring or maintenance activities undertaken with respect to the Chromium Remedy.

Honeywell will provide a letter to the Plaintiffs documenting compliance with the above notification requirements on an annual basis. The first annual notification was provided by Honeywell on April 21, 2011. Future annual notification letters will be provided on or about April 21 each year of any event penetrating/compromising the cap or harming the integrity of the Chromium Remedy within the preceding 12 months from April 1 through March 31.

Pursuant to paragraph 88 of the NJCU Consent Decree, NJCU is required to provide annual written notice, beginning on January 15, 2011, to Honeywell and the Plaintiffs indicating whether NJCU is in compliance with the Deed Notice and whether there are any uses in the Commercial AOC that are prohibited under the Deed Notice or paragraph 87 of the NJCU Consent Decree.

## 5.0 HONEYWELL PROGRAM ORGANIZATION

This section provides Honeywell's program organization and key personnel as of the date of this document. This section will be updated at least annually as necessary.

### **Honeywell Project Manager – Maria Kaouris, Remediation Manager**

Honeywell has designated Maria Kaouris as the Remediation Manager and primary contact for this project. Her business address and telephone number follow:

Honeywell  
115 Tabor Road  
Morris Plains, NJ 07950  
Phone (973) 455-3302

### **NJDEP Primary Contact – David Doyle**

The primary contact for the NJDEP for this project will be the NJDEP Case Manager, Mr. David Doyle. His business address and telephone number are:

New Jersey Department of Environmental Protection  
Site Remediation and Waste Management Program  
Division of Remediation Management  
401 E. State Street, P.O. Box 420, Mail Code 401-05A  
Trenton, NJ 08625-0420  
(609) 292-2173

### **Environmental Consultant – Wood Environment & Infrastructure Solutions, Inc. (Wood)**

Wood is responsible for conducting cap inspections and preparing the biennial certification reports and, at the direction of Honeywell, may also provide other services, such as oversight of cap repair, if necessary.

Wood Environment & Infrastructure Solutions, Inc.  
American Metro Center  
200 American Metro Blvd, Suite 113  
Hamilton, NJ 08619  
Phone: (609) 689-2829

Primary contacts for Wood are as follows:

<b>Project Responsibility</b>	<b>Name</b>	<b>Telephone Number</b>
Program Manager – Design & Construction	Joe Clifford	609-631-2903
Program Manager – Investigation & Remediation	Ed Gaven	609-631-2905
Project Manager	Kevin McKeever	610-828-8100
Principal Engineer	Brent O'Dell	609-631-2915
Project Scientist	John Heller	609-631-2908
Designated Local Health & Safety Officer	Andrew Shust	609-631-2921
Field/Technical Support	Telly Giouzelis Dave Ambrose Mike Senna	609-631-2906 484-542-0980 732-682-3498

## 6.0 REFERENCES

- Amec Environment & Infrastructure, Inc., 2012. Remedial Action Report, Study Area 5, Baldwin Steel (Site 90), M.I. Holdings (Site 184), and Portion of Morris Canal Site (Site 153 North); March 2012; revised September 2012.
- Amec Foster Wheeler Environment & Infrastructure, Inc., 2017. Deed Notice / Engineering Control Disturbance Report for the Hydraulic Barrier Wall Extension; August 7, 2017.
- Cornerstone, 2014a. Integrated Groundwater Sampling and Analysis Plan, Study Areas 5, 6 and 7; November 5, 2013; last revised April 29, 2014.
- Cornerstone, 2018. Integrated Annual Groundwater Performance Report for 2017, Study Areas 5, 6 and 7; July 20, 2018.
- Mactec Engineering and Consulting, Inc., 2007. Final Supplemental Remedial Investigation Report/Remedial Action Selection Report/Remedial Action Work Plan; Study Area 5 New Jersey City University Redevelopment Former Baldwin Steel Site (Site 090) Former MI Holdings Site (Site 184) Former Morris Canal Site (Site 153 North) Abutting Sites 090 and 184 Jersey City, NJ. July 2007.
- Mactec Engineering and Consulting, Inc., 2010. Chromium Remedy 100% Design Report, SA-5 NJCU Redevelopment, NJDEP Sites 090, 184 and 153, Jersey City, New Jersey; May 10, 2010. Final 100% Design Report June 10, 2010.
- New Jersey Department of Environmental Protection, 2012. Technical Requirements for Site Remediation: N.J.A.C. 7:26E. May 7, 2012.
- TetraTech NUS, 1999. Draft Remedial Investigation Report for Study Area 5, Sites 079, 090, 117, 153 and 184. Jersey City, New Jersey. November 1999.

## 7.0 LIST OF ACRONYMS AND ABBREVIATIONS

ACO	Administrative Consent Order
AOC	Area of Concern
BMUA	Bayonne Municipal Utilities Authority
Cr(VI)	Hexavalent Chromium
CRT	CRT Holdings, LLC
EPA	United States Environmental Protection Agency
HBW	Hydraulic Barrier Wall
LLDPE	Linear Low Density Polyethylene
LTMP	Long Term Monitoring Plan
mg/kg	milligrams per kilogram
N.J.A.C.	New Jersey Administrative Code
NJCU	New Jersey City University
NJDEP	New Jersey Department of Environmental Protection
OSWER	Office of Solid Waste & Emergency Response
RAR	Remedial Action Report
SA	Study Area
SOP	Standard Operating Procedure
TRSR	Technical Requirements for Site Remediation



## TABLE

**Table 1**  
**LTMP Inspection/Monitoring and Reporting Timetable**  
**Study Area 5 NJCU Commercial AOC and 153 North**

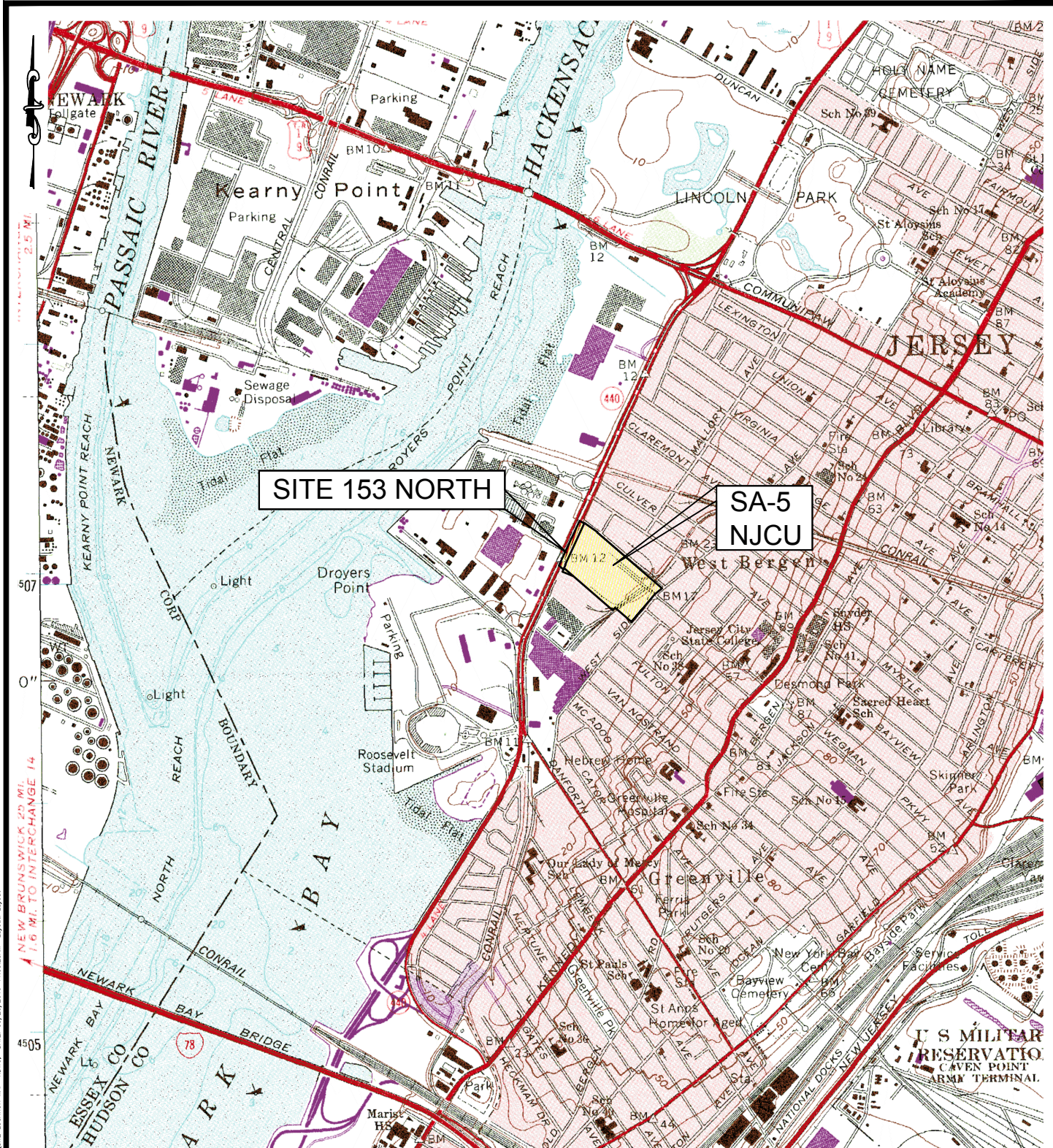
<b>MONITORING PLAN TASK</b>	<b>FREQUENCY</b>	<b>SCHEDULE</b>	<b>REFERENCE / COMMENTS</b>
<b>INSPECTIONS / MONITORING</b>			
Visual inspection of Commercial AOC, including grade and slope; settlement/subsidence; vegetative cover; animal burrowing; disturbances due to development or BMUA sewer repairs	Quarterly	Beginning March 2012; quarterly thereafter	Consent Decree Par. 99(a) through (f) (Deed Notice recorded 5/4/2012)
NJCU Commercial AOC signage	Annual	Annual	LTMP Section 3.1.8
Construction and development of NJCU Commercial AOC and Residential AOC below 4 feet soil	During Construction	To be determined prior to construction	Consent Decree Par. 99(h & i)
NJCU Commercial AOC Shallow Groundwater: GW Level Measurements at Monitoring Wells and Piezometers	Quarterly	Beginning March 2012; quarterly thereafter	Consent Decree Par. 99(g) Timing to be coordinated with quarterly annual cap inspections. Current and future monitoring as specified in Shallow Groundwater Monitoring Plan (Appendix L of the LTMP) <sup>1</sup>
NJCU Commercial AOC Shallow Groundwater: Sampling of Monitoring Wells	Quarterly	Quarterly Beginning March 2012	NJCU 100% Design; Shallow Groundwater Monitoring Plan. Current and future monitoring as specified in Shallow Groundwater Monitoring Plan (Appendix L of LTMP) <sup>1</sup>
Site 153 North Pavement Cap	Annual	Beginning April 2012; Annual thereafter	Consent Decree Par. 99(j)
Commercial AOC – visual inspection following major weather event (such as 100-year storm or heavy rainfall resulting in flooding)	As applicable	Within 48 hours of major weather event, as practicable	LTMP Section 3.3.2.7; inspection to evaluate any damage to engineering controls or environmental concerns requiring corrective action
<b>REPORTING</b>			
Deed notice compliance <u>by NJCU</u>	Annual	First submittal by 1/15/2011; annually thereafter	Consent Decree Par. 88 Honeywell will remind NJCU 30 days prior to due date for submitting report
Biennial Certification Report for Soils- NJCU Commercial AOC	Biennial	First submittal by 5/4/2014; every 2 years thereafter	Consent Decree Par. 91(b)
Biennial Certification Report for Soils - Site 153 North	Biennial	First submittal by 11/30/2012; every 2 years thereafter	Consent Decree Par. 91(a)(iii) The timing of future biennial reports may change following NJDEP issuance of Remedial Action Soil Permit
Biennial Certification Report for Groundwater – NJCU Commercial AOC	Biennial	First submittal by 8/17/2020; every 2 years thereafter	NJDEP Remedial Action Groundwater Permit
Inspection/Monitoring Logs Records - Commercial AOC	Quarterly	Quarterly, by end of month following calendar quarter	Consent Decree Par.102 Maintain logs/submit quarterly and with biennial report
Inspection/Monitoring Logs or Records - Site 153 North Pavement Cap	Annual	Annual; concurrent with Commercial AOC quarterly logs	Consent Decree Par.102 Maintain logs/submit annually and with biennial report
Post-Disturbance Reports for work involving disturbance and restoration of the chromium remedy	As applicable	As applicable, per LTMP and Deed Notice	Deed Notice and LTMP Section 4; Reporting includes Deed Notice Disturbance Reports or completed Dig Permit (if Deed Notice Disturbance Report is not required or submitted within 60 days of restoration)
Report on Residential AOC Soil Management for work involving below 4 feet soils	As applicable	60 days following completion of work	Consent Decree Par. 73 and LTMP Section 3.1.10

<b>MONITORING PLAN TASK</b>	<b>FREQUENCY</b>	<b>SCHEDULE</b>	<b>REFERENCE / COMMENTS</b>
LTMP/Contingency Plan Annual Review and Notification to Riverkeeper and NJDEP	Annual	First submittal April 21, 2011; annually thereafter	Consent Decree Par.101 (part of annual notification to stakeholders/utilities under Paragraph 104)
Annual review, updated if necessary based on changes to field conditions or regulatory requirements, of the Worker Training Manual	Annual	Annual by March 31	Consent Decree Par.99(l)
Work Plan for Additional Chromium Remedy prior to Building 7 development	As applicable	Prior to work involving removal of chromium soils and restoration of cap materials	Consent Decree Par.76 and LTMP Section 3.3.2.4; Honeywell submit work plan to the NJDEP and non-Honeywell Parties with an Interest
Work Plan for Further Chromium Remedy in the area of Building 6	As applicable	Prior to work involving disturbance of chromium remedy	LTMP Section 3.3.2.5; Honeywell submit work plan to the NJDEP, NJCU, Plaintiffs, and any other entity with ownership or real property interest
<b>PUBLIC NOTICE</b>			
New Jersey One Call notification on the location and type of contamination at or near pipeline (153 North)	Annual	Beginning April 21, 2011; annually thereafter	Consent Decree Par.104(a)
Annual Notice to Stakeholders/Utilities regarding planned or emergency disturbance of the chromium remedy at 153 North or the Commercial AOC	Annual	same as above	Consent Decree Par.104(b)(c)
Annual update website to inform the public about chromium remedies	Annual	same as above	Consent Decree Par.104(d)
NJCU provide to Honeywell a list of tenants in any development on the NJCU Commercial AOC. Honeywell to provide annual notice to tenants of any long term monitoring and maintenance activities with respect to the chromium remedy	Annual	Annual as applicable, for tenants in the NJCU Commercial AOC	Consent Decree Par.104(e)
<b>OTHER NOTIFICATIONS</b>			
Owner/Operator of Commercial AOC: notify NJDEP in the event of disturbance of engineering controls	As applicable	In the event of disturbance of engineering controls	Deed Notice; Notify NJDEP at 877-WARNDEP within 24 hours (for planned disturbance) or immediately (for emergency disturbance)
NJCU notify Honeywell prior to planned disturbance of chromium remedy	As applicable	At least 7 business days prior to disturbance	LTMP Section 3.3.2.2
Honeywell notify Plaintiffs prior to planned disturbance of chromium remedy	As applicable	At least 5 business days prior to disturbance	Same as above
NJCU and Honeywell provide schedule of activities that may disturb engineering controls to Plaintiffs	Quarterly	By the end of each calendar quarter	Same as above; schedule includes 6-month look ahead and dig permit status table
BMUA notify Honeywell prior to any planned disturbance of chromium remedy	As applicable	Prior to disturbance of chromium remedy	Same as above
BMUA or Honeywell notify Plaintiffs prior to planned disturbance of chromium remedy	As applicable	At least 5 business days prior to disturbance	Same as above
BMUA and Honeywell provide schedule of activities that may disturb chromium remedy at Site 153 North to Plaintiffs	Quarterly	By the end of each calendar quarter	Same as above; schedule includes 6-month look ahead and dig permit status table

<sup>1</sup> Shallow groundwater level monitoring and groundwater quality monitoring requirements are addressed in Table 1 of Appendix L, incorporated herein by reference.

## FIGURES





SOURCE: JERSEY CITY, NJ USGS QUADRANGLE MAP, 1983



WOOD PROJECT No. 7772180033 DRAWING: SITE LOCATION MAP-1	
PREPARED/DATE: DL 05/13/11	CHECKED/DATE: US 05/17/11

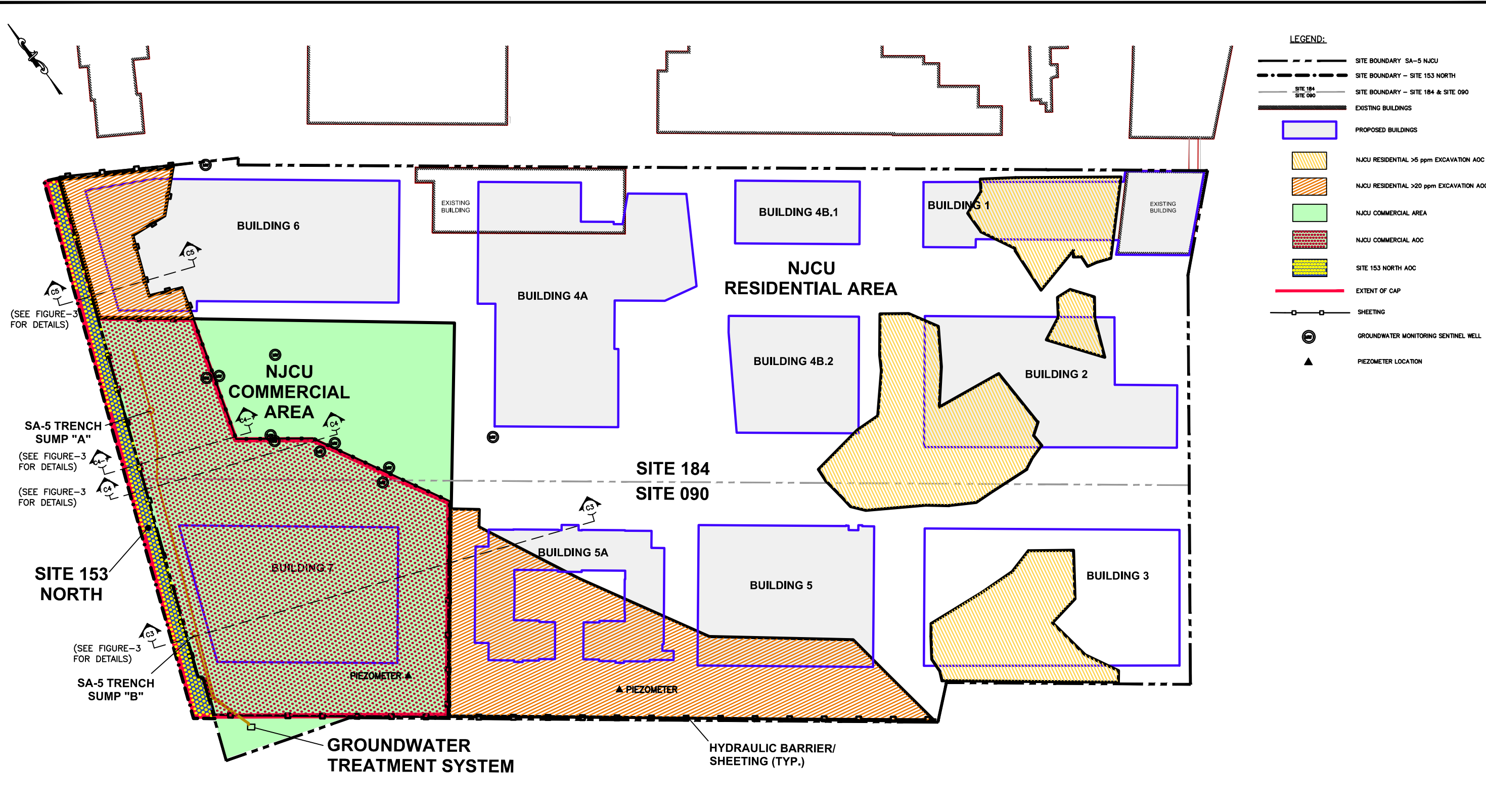
**wood.**  
 ENVIRONMENT & INFRASTRUCTURE SOLUTIONS  
 200 AMERICAN METRO BLVD, SUITE 113  
 HAMILTON, NEW JERSEY 08619

**FIGURE 1**  
 SITE LOCATION MAP  
 LONG TERM MONITORING PLAN  
 SA-5 NJCU AND SITE 153 NORTH  
 JERSEY CITY, NEW JERSEY

FILE: P:\GDD\WOOD\NEW JERSEY CITY\SA 5 SITE 90 & 184 INJUCU\TIMP\SITE LOCATION MAP-1.DWG, DATE: 03/20/2018 11:05:25AM Layout: Layout



N:\GIS\Projects\2019\20190301\20190301.dwg Wed, 20 Mar 2019 11:04am charles.wingfield Layout: FIGURE-2  
 P:\GDD\HONEYWELL\JERSEY CITY\SA 5\SITE 90 & 184\NJCUN\NJCUN LTMP\NJCUN LTMP-0001.dwg Wed, 20 Mar 2019 11:04am charles.wingfield Layout: FIGURE-2  
 UNLESS OTHERWISE NOTED, ALL DIMENSIONS, SPACING, AND OTHER INFORMATION ARE THE PROPERTY OF THE CLIENT. THE CLIENT ACCEPTS FULL RESPONSIBILITY FOR THE ACCURACY OF THE INFORMATION PROVIDED. THE CONSULTANT'S LIABILITY IS LIMITED TO THE SCOPE OF THE CONTRACT AND THE CONSULTANT'S NEGLIGENCE. THE CONSULTANT SHALL NOT BE RESPONSIBLE FOR ANY DAMAGE TO PERSONS OR PROPERTY, INCLUDING CONSEQUENTIAL AND INCIDENTAL DAMAGES, ARISING FROM OR OUT OF THE USE OF THE INFORMATION PROVIDED HEREIN. THE CONSULTANT'S LIABILITY IS LIMITED TO THE SCOPE OF THE CONTRACT AND THE CONSULTANT'S NEGLIGENCE. THE CONSULTANT SHALL NOT BE RESPONSIBLE FOR ANY DAMAGE TO PERSONS OR PROPERTY, INCLUDING CONSEQUENTIAL AND INCIDENTAL DAMAGES, ARISING FROM OR OUT OF THE USE OF THE INFORMATION PROVIDED HEREIN.



- LEGEND:**
- SITE BOUNDARY - SA-5 NJCU
  - - - - SITE BOUNDARY - SITE 153 NORTH
  - SITE BOUNDARY - SITE 184 & SITE 090
  - EXISTING BUILDINGS
  - PROPOSED BUILDINGS
  - ▨ NJCU RESIDENTIAL >5 ppm EXCAVATION AOC
  - ▨ NJCU RESIDENTIAL >20 ppm EXCAVATION AOC
  - ▨ NJCU COMMERCIAL AREA
  - ▨ NJCU COMMERCIAL AOC
  - ▨ SITE 153 NORTH AOC
  - EXTENT OF CAP
  - SHEETING
  - ⊙ GROUNDWATER MONITORING SENTINEL WELL
  - ▲ PIEZOMETER LOCATION

(SEE FIGURE-3 FOR DETAILS)

SA-5 TRENCH SUMP "A"

(SEE FIGURE-3 FOR DETAILS)

(SEE FIGURE-3 FOR DETAILS)

SITE 153 NORTH

(SEE FIGURE-3 FOR DETAILS)

SA-5 TRENCH SUMP "B"

**NOTE:**

NJCUN RESIDENTIAL AREA OF CONCERN (AOC) EXTENT NOTED IN THE FIGURE IS SUBJECT TO CHANGE, PENDING FURTHER SAMPLE RESULTS.



SOURCE: HISTORIC SOIL DATA - DRAFT RIR STUDY AREA 5 (TETRA TECH NUS, NOV. 1999), RIR ADDENDUM (TETRA TECH NUS, OCT. 2004).  
 BASEMAP: PHASE I CONCEPT PLAN, LANGAN 2 MARCH 2007.  
 UTILITIES NOT SHOWN.

REV.	DATE	STATUS	PRPD BY	CHKD BY

WOOD PROJECT No. 7772180033  
 DRAWING: NJCU LTMP-0001

PREPARED/DATE:  
DL 05/17/11

CHECKED/DATE:  
US 06/14/11

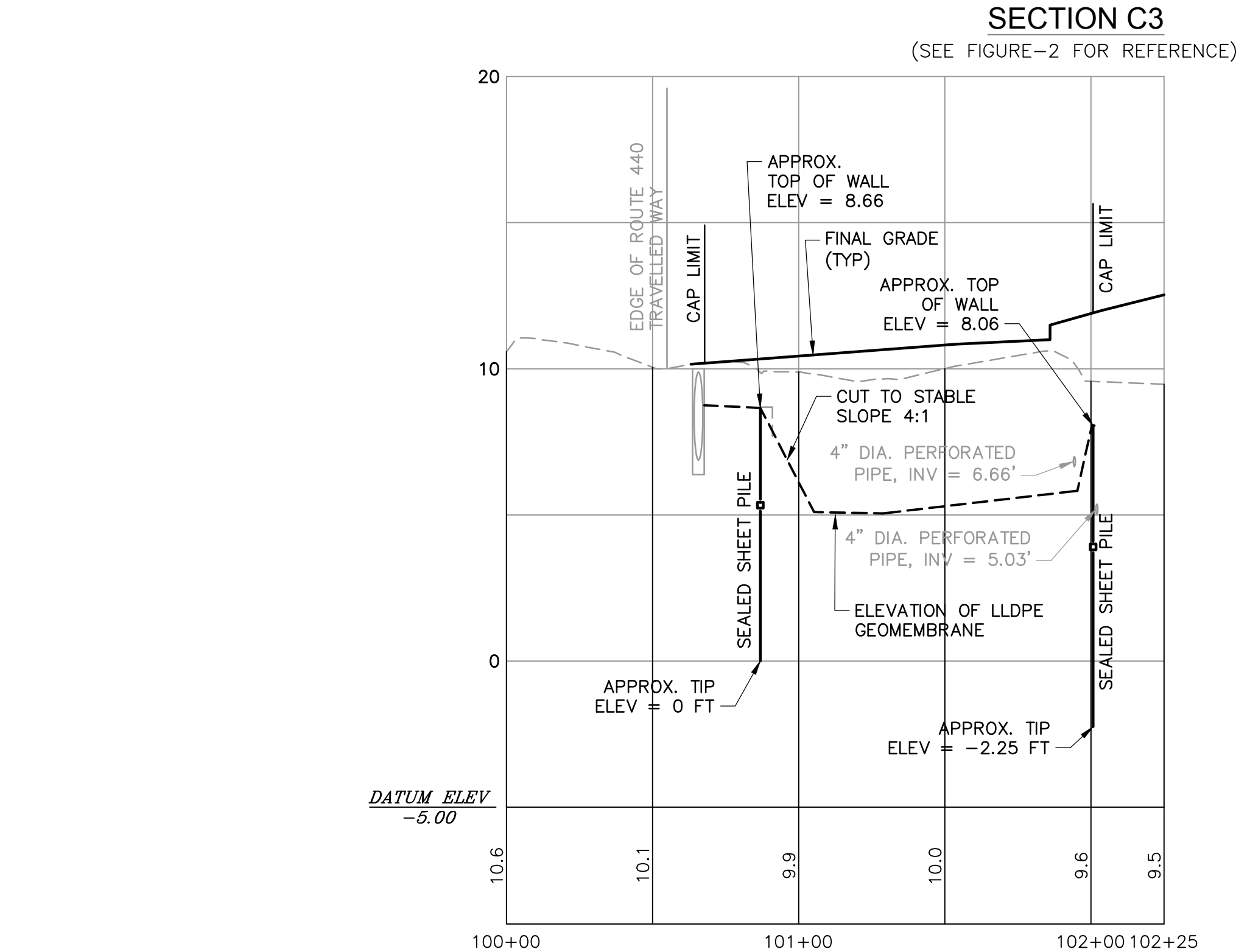
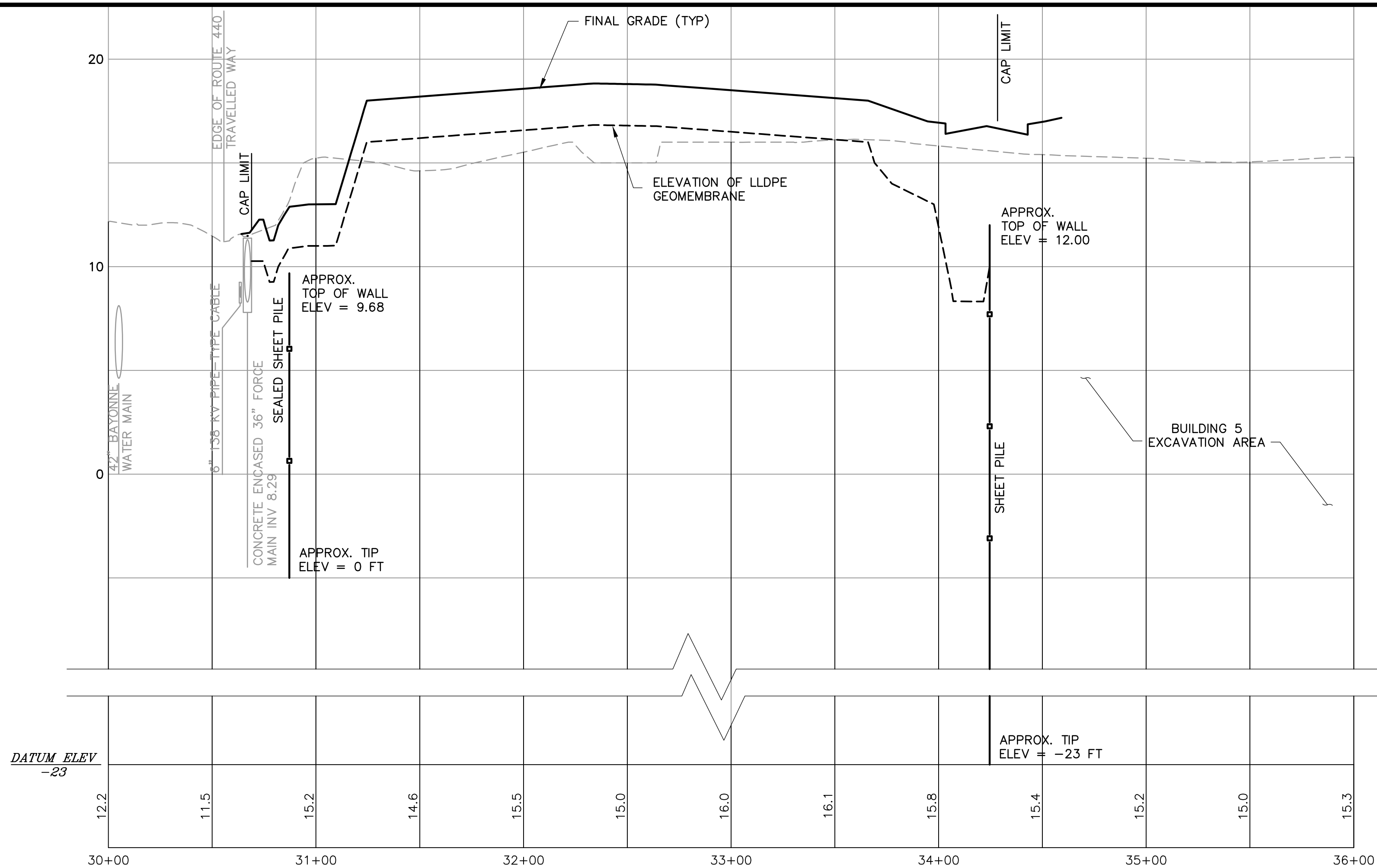
**wood.**

ENVIRONMENT & INFRASTRUCTURE SOLUTIONS  
 200 AMERICAN METRO BLVD, SUITE 113  
 HAMILTON, NEW JERSEY 08619

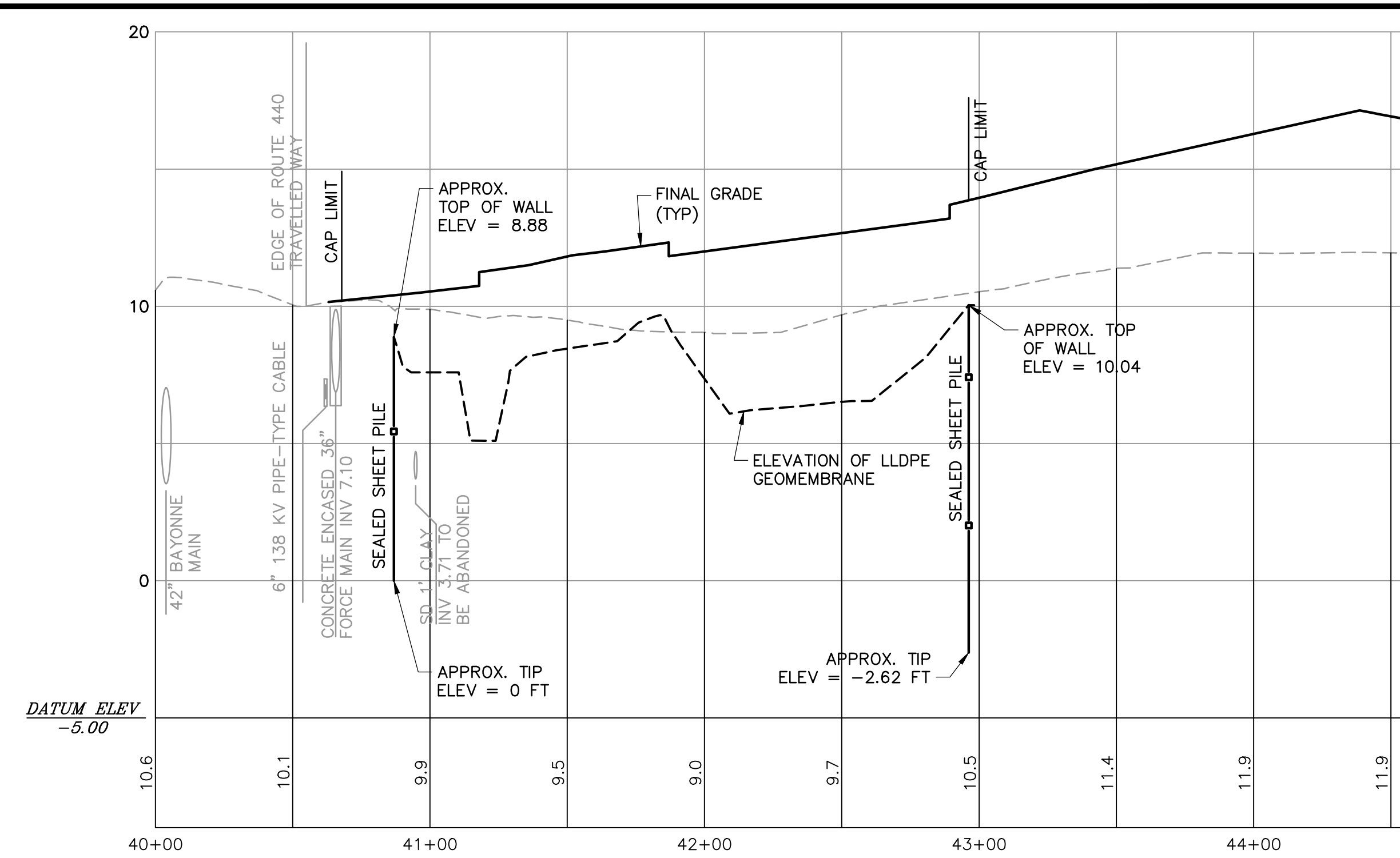
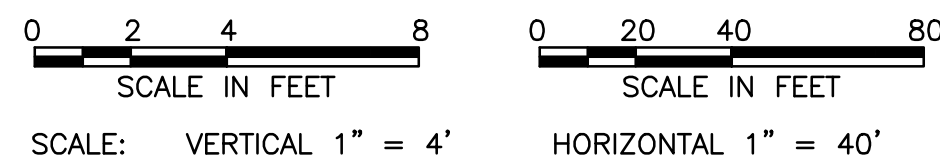
**FIGURE 2**  
 REMEDIAL ACTIONS FOR CHROMIUM  
 LONG TERM MONITORING PLAN  
 SA-5 NJCU SITE 90/184 AND SITE 153 NORTH  
 JERSEY CITY, NEW JERSEY

UNLESS OTHERWISE AGREED IN A WRITTEN CONTRACT BETWEEN AMEC FOSTER WHEELER AND ITS CLIENT, (i) THIS DOCUMENT CONTAINS INFORMATION, DATA AND DESIGN THAT IS CONFIDENTIAL AND NOT TO BE DISCLOSED TO ANY OTHER PARTY WITHOUT THE WRITTEN CONSENT OF AMEC FOSTER WHEELER AND (ii) THE CLIENT SHALL BE RESPONSIBLE FOR THE ACCURACY AND COMPLETENESS OF THE INFORMATION, DATA AND DESIGN PROVIDED TO AMEC FOSTER WHEELER AND FOR OBTAINING NECESSARY PERMITS AND APPROVALS FROM THE APPROPRIATE AGENCIES.

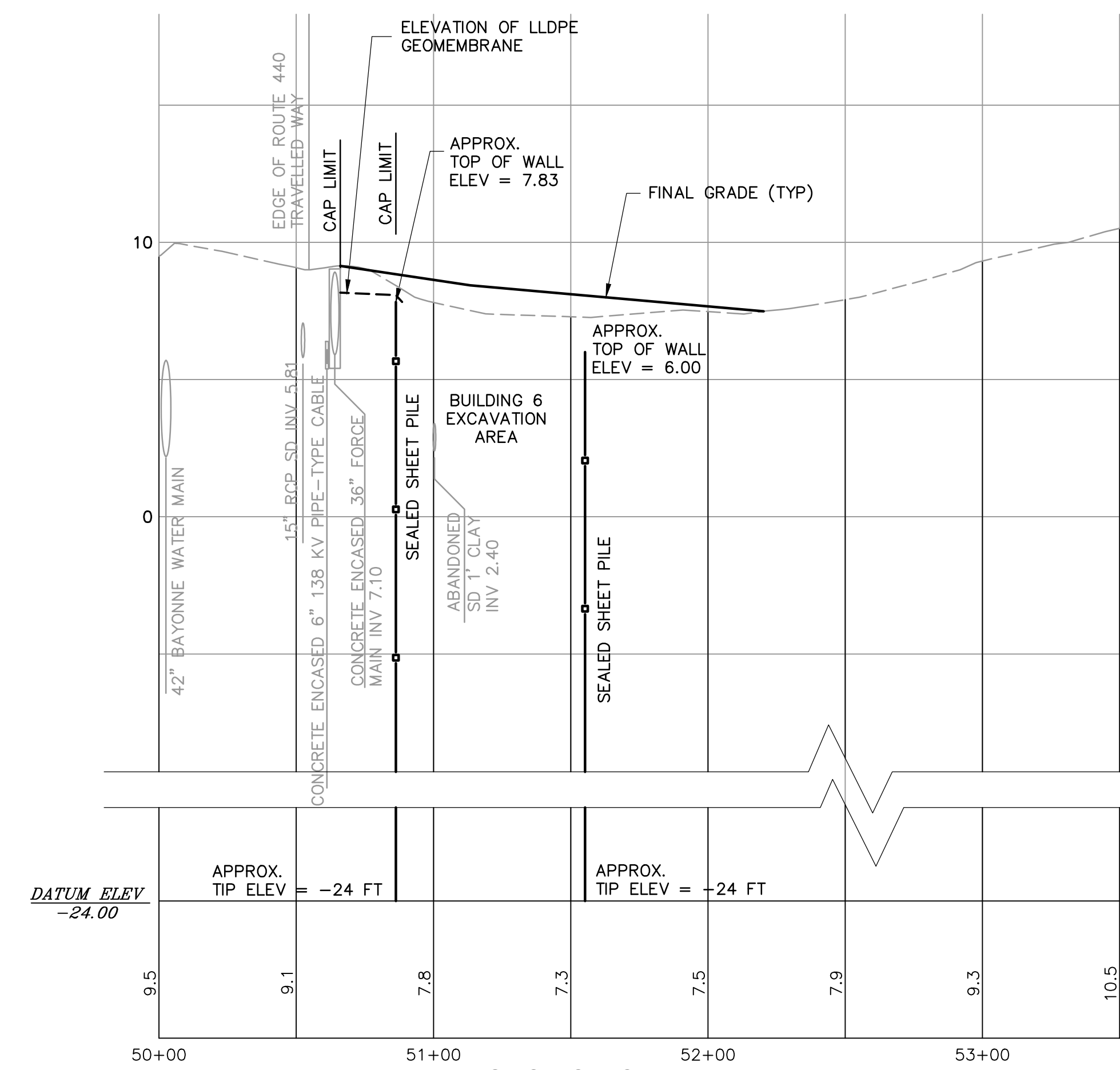
F:\CADD\HONEYWELL\JERSEY CITY\SA 90 & 184 NJCU\NJCUI LTM\CAP CROSS SECTIONS.dwg Wed, 20 Mar 2019 - 11:06am charles.wingfield Layout: Layout



SECTION C4-1  
(SEE FIGURE-2 FOR REFERENCE)



SECTION C4  
(SEE FIGURE-2 FOR REFERENCE)



SECTION C5  
(SEE FIGURE-2 FOR REFERENCE)

REV.	DATE	STATUS	BY	CHKD BY
4	03/20/18	REFLECTS: ADDENDUM #16 SHEETPILE AND LINER INSTALLATION	SPM	NS
3	04/11/11	REFLECTS: ADDENDUM #15 SUB-GRADE MODIFICATIONS	RJR	SCS

WOOD PROJECT No. 7772180033  
DRAWING: CAP CROSS SECTIONS

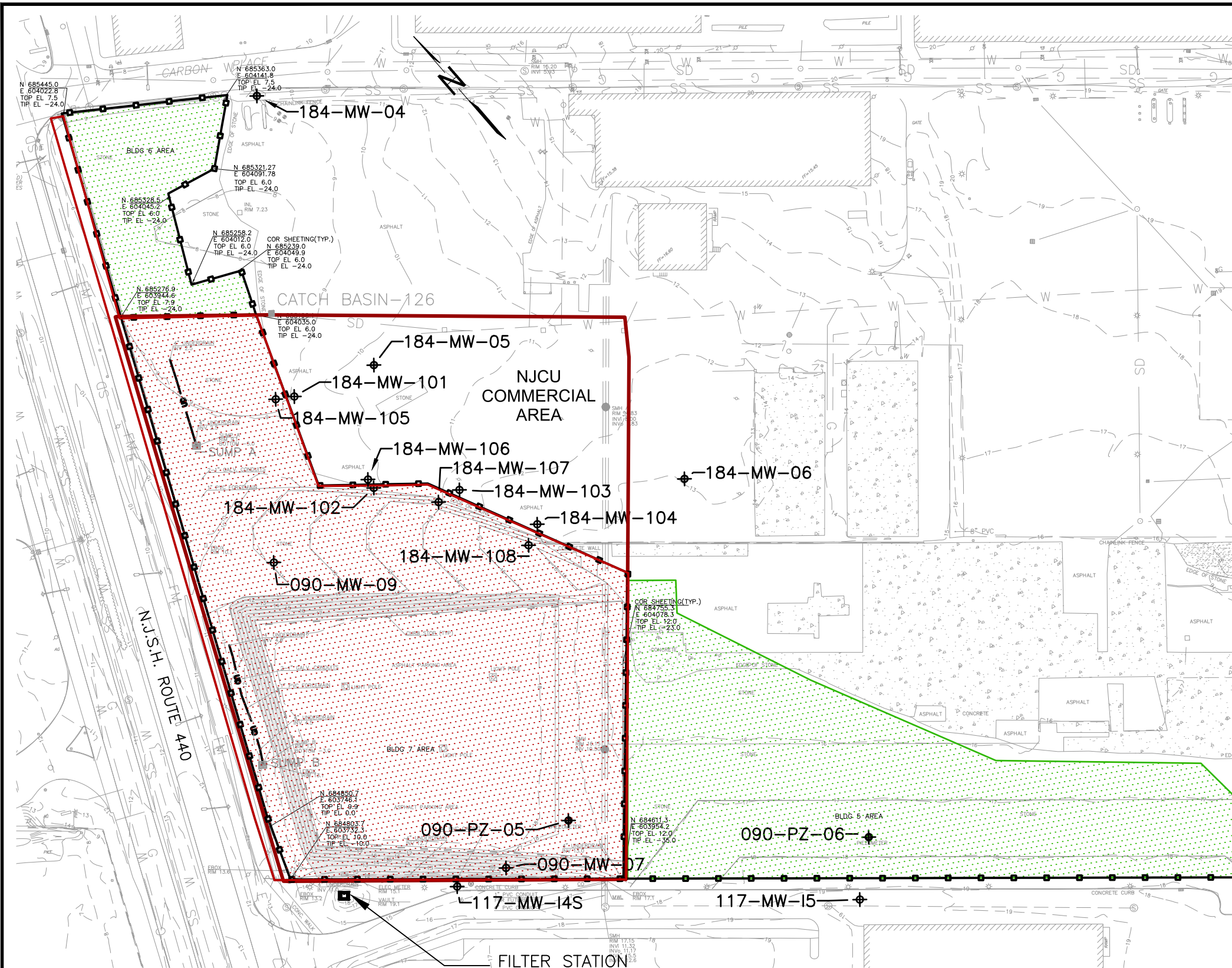
PREPARED/DATE: SPM 03/20/18  
CHECKED/DATE: NS 03/20/18

**wood.**  
ENVIRONMENT & INFRASTRUCTURE SOLUTIONS  
200 AMERICAN METRO BLVD, SUITE 113  
HAMILTON, NEW JERSEY 08619

**FIGURE 3**  
CAP CROSS SECTIONS  
LONG TERM MONITORING PLAN  
SA-5 NJCU SITE 90/184 AND SITE 153 NORTH  
JERSEY CITY, NEW JERSEY

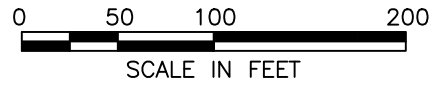


UNLESS OTHERWISE SPECIFIED, ALL MONITORING POINTS, SUMP, PILE, AND OTHER INFORMATION, DATA AND DESIGN THAT IS SHOWN ON THIS DRAWING IS THE PROPERTY OF WOOD GROUP, INC. AND IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF WOOD GROUP, INC. THE USER OF THIS DRAWING SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND FOR OBTAINING ALL NECESSARY INFORMATION FROM THE LOCAL GOVERNMENT AND FOR OBTAINING ALL NECESSARY INFORMATION FROM THE LOCAL GOVERNMENT AND FOR OBTAINING ALL NECESSARY INFORMATION FROM THE LOCAL GOVERNMENT. THE USER OF THIS DRAWING SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND FOR OBTAINING ALL NECESSARY INFORMATION FROM THE LOCAL GOVERNMENT AND FOR OBTAINING ALL NECESSARY INFORMATION FROM THE LOCAL GOVERNMENT.



**LEGEND**

- MONITORING WELL
- PIEZOMETER WELL
- SUMP
- SHEET PILE WALL
- COMMERCIAL AREA BOUNDARY
- CAP AREA
- EXCAVATION AREA (CLEAN FILL)



SOURCE MAP REFERENCE:  
 "AS-BUILT SURVEY FINAL EXISTING CONDITIONS" BLOCK 1286.5, LOT 1 & BLOCK 1286,  
 LOT 5 JERSEY CITY, NEW JERSEY HONEYWELL SITE ID 37288, 37811 & 37460 KENNON  
 SURVEYING SERVICES INC. WARREN, NEW JERSEY SHEET 1 OF 2, PROJECT NUMBER 2201,

REV.	DATE	STATUS	DRFT BY	CHKD BY

WOOD PROJECT No. 7772180033  
 DRAWING: 7772180033-6100-LTMN-ALTO

PREPARED/DATE:  
STR 09/24/16

CHECKED/DATE:  
JH 09/25/16

**wood.**

ENVIRONMENT & INFRASTRUCTURE SOLUTIONS  
 200 AMERICAN METRO BLVD, SUITE 113  
 HAMILTON, NEW JERSEY 08619

**FIGURE 4**  
 GROUNDWATER MONITORING LOCATIONS  
 STUDY AREA 5 NEW JERSEY CITY UNIVERSITY  
 JERSEY CITY, NEW JERSEY



## **APPENDICES**

**APPENDIX A**

**RELEVANT REGULATORY CORRESPONDENCE**

**NJDEP No Further Action Letter**

**NJDEP Remedial Action Soil Permit for NJCU Commercial Area**



## State of New Jersey

CHRIS CHRISTIE  
Governor

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BOB MARTIN  
Commissioner

KIM GUADAGNO  
Lt. Governor

Site Remediation Program  
P.O. Box 028  
Trenton, NJ 08625-0028  
Phone #: 609-292-1250  
Fax #: 609-777-1914

May 7, 2012

Honeywell International Inc.  
Attn: Mr. John Morris, Remediation Director  
101 Columbia Road  
Morristown, NJ 07962-1057

Re: **Area of Concern – Conditional No Further Action Letter**

Remedial Action Type: **Soils Only - Restricted Use for the CCPW Area of Concern  
Only as Defined Below**

Hudson County Chromate - Honeywell

Study Area 5, New Jersey City University – Former Baldwin Steel (Hudson County  
Chromate Site 090) and Former MI Holdings (Hudson County Chromate Site 184)

Route 440 and West Side Avenue, Jersey City, Hudson County

Program Interest #: Site 090 PI# 031779 and Site 184 PI# 000015

Activity Number: RPC 920001 (Site 090) RPC930001 (Site 184)

Document Title: Honeywell\_SA5\_090\_184\_AOC\_NFA\_050712

Blocks 1286, 1286.5, Lots 5&6D, 1&2

Dear Mr. Morris:

Pursuant to N.J.S.A. 58:10B-13.1 and N.J.A.C. 7:26C, the New Jersey Department of Environmental Protection (Department) issues this Conditional No Further Action Letter for the remediation of the Chromate Chemical Production Waste (CCPW) area of concern (AOC) specifically referenced above, so long as Honeywell International Inc. (Honeywell) did not withhold any information from the Department. This action is based upon information in the Department's case file and Honeywell's final certified report dated March 2012. In issuing this AOC - No Further Action (AOC-NFA) letter, the Department has relied upon the certified representations and information provided to the Department. To remain in compliance with the terms of this AOC-NFA letter, Honeywell, as well as each subsequent owner, lessee and operator must comply with the conditions noted below.

By issuance of this AOC-NFA letter, the Department acknowledges the completion of a Remedial Action pursuant to the Technical Requirements for Site Remediation (N.J.A.C. 7:26E), and the Consent Judgment dated September 7, 2011, for the CCPW AOC and no

other areas. CCPW is defined in the Consent Judgment as “the residual solid material produced by the processing of raw chromite bearing ore at a facility in Hudson County formerly owned or operated by one of the Companies or their predecessors. CCPW shall include COPR (chromite ore processing residue), and/or hexavalent chromium associated with COPR, and/or other metals associated with COPR and/or other material containing COPR.”

By operation of law, a Covenant Not to Sue pursuant to N.J.S.A. 58:10B-13.1 applies to this remediation. The Covenant Not to Sue is subject to any conditions and limitations contained herein. The Covenant Not to Sue remains effective only as long as the real property referenced above continues to meet the conditions of this AOC-NFA letter and applicable permits.

### **NO FURTHER ACTION CONDITIONS**

Pursuant to N.J.S.A. 58:10B-12o, Honeywell and any other person who was liable for the cleanup and removal costs, and remains liable pursuant to the Spill Act, shall inform the Department in writing within 14 calendar days whenever its name or address changes. Any notices submitted pursuant to this paragraph shall reference the above case numbers and shall be sent to: Bureau of Case Assignment and Initial Notice - Case Assignment Section, 401-05H, P.O. Box 420, Trenton, N.J. 08625-0420.

Honeywell, as well as each subsequent owner, lessee and operator (collectively Successors) shall comply with each of the following:

Honeywell has obtained all applicable permit(s) and authorization(s) to ensure that this remedial action remains protective of public health, safety and the environment into the future provided that Honeywell, as well as each subsequent owner, remains in full compliance with the terms and conditions of those permit(s) and authorization(s). The designation permit number for the Remedial Action Soil Permit is RAP120001 (effective May 4, 2012).

### **NOTICES**

#### Building Interiors Not Addressed

Please be advised that the remediation that is covered by this AOC-NFA letter does not address the remediation of hazardous substances that may exist in building interiors or equipment; including, but not limited to, radon, asbestos and lead. As a result, any risks to human health presented by any building interior or equipment remains. A complete building interior evaluation should be completed by the owner before any change in use or re-occupancy is considered.

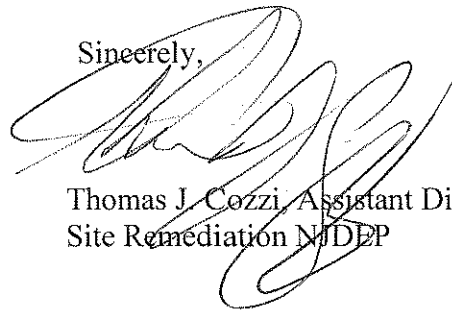
Soils-Only NFA when Ground Water Contamination remains from that Area(s) of Concern or Site

This AOC-NFA letter only applies to soils at the referenced site. By issuing this AOC-NFA letter, the Department has relied on the completion of remedial activities for soils and groundwater as per the NJDEP approved Remedial Action Work Plan (July 26, 2007). As per the referenced document, the implemented groundwater remedy includes a vertical hydraulic barrier, groundwater collection system with two extraction sumps, and a treatment system vault with connection to the local Publically-Owned Treatment Works. Three sentinel wells installed outside of the capped area will be monitored for groundwater levels and quality in accordance with provisions detailed in the Final Long Term Monitoring Plan. Results of the groundwater monitoring form the basis for need of any operation of the treatment system.

Please be advised that if changes in future ground water data no longer support the completed soils remedy, additional soil remediation may be necessary. Please note that there is an affirmative obligation to remediate the remaining contamination, within specific regulatory and mandatory timeframes, pursuant to the Spill Compensation and Control Act, N.J.S.A. 58:10-23.11 et seq. and the Site Remediation Reform Act, N.J.S.A. 58:10C-1 et seq.

Thank you for your attention to these matters. If you have any questions regarding this matter, please contact me at (609) 984-2905.

Sincerely,



Thomas J. Cozzi, Assistant Director  
Site Remediation NJDEP

- c: Honorable Jerramiah T. Healy, Mayor of Jersey City
- William Matsikoudis, Jersey City Corporation Counsel
- Joseph Castagna, Jersey City Division of Health
- Robert Ferraiuolo, Hudson Regional Health Commission
- David S. Doyle, Case Manager, NJDEP
- Teruo Sugihara, Section Chief, NJDEP- BEERA
- David Van Eck, NJDEP -BGWPA
- NJDEP-BOMM – Rob Hoch (as applicable for sites with Deed Notices)
- NJDEP- BISPS – Nick Sodano (CEA, Deed Notice and Historic Fill applicable)



## State of New Jersey

PHILIP D. MURPHY  
*Governor*

DEPARTMENT OF ENVIRONMENTAL PROTECTION

CATHERINE R. MCCABE  
*Commissioner*

SHEILA Y. OLIVER  
*Lt. Governor*

Site Remediation and Waste Management Program  
*Remediation Review Element*  
*Bureau of Remedial Action Permitting*  
401 E. State Street  
P.O. Box 420  
Mail Code 401-05S  
Trenton, NJ 08625-0420  
Phone: (609) 984-2990

January 4, 2019

Aaron Aska  
Vice President  
NJ CITY UNIVERSITY  
2039 Kennedy Blvd; Hepburn Hall  
Jersey City, NJ 07305

John Morris  
Global Remediation Director  
HONEYWELL INTERNATIONAL INC  
115 Tabor Road  
Morris Plains, NJ 07950

Re: Soil Remedial Action Permit Modification  
Site: Study Area 5 New Jersey City University  
A/K/A: Former Baldwin Steel (Site 90)  
and Former M.I. Holding (Site 184)  
Address: Route 440 and West Side Avenue  
City: Jersey City  
County: Hudson  
SRP Program Interest (PI) #: 031779  
Soil Remedial Action Permit #: RAP180002

Dear Mr. Aska and Mr. Morris:

Enclosed is a Soil Remedial Action Permit Modification issued pursuant to the Site Remediation Reform Act, 58:10C-1 et seq. and the Administrative Requirements for the Remediation of Contaminated Sites at N.J.A.C. 7:26C-1 et seq. This permit modification becomes effective on January 8, 2019. Please note the referenced permit and program interest numbers and refer to them when corresponding with the Department.

The enclosed permit modification replaces Soil Remedial Action Permit RAP120001 which requires the permittee to conduct monitoring, maintenance

and evaluation for compliance and effectiveness of the remedial action and its associated institutional control. This modification is required due to a change in the engineering control. The modification establishes requirements necessary for demonstrating that the remedial action and control continue to be protective of public health, safety and the environment.

#### Requirement to Retain License Site Remediation Professional (LSRP)

The Technical Requirements for Site Remediation (Technical Requirements) at N.J.A.C. 7:26E-1.8 define remediation to include a remedial action. The Technical Requirements further define remedial action such that "... A remedial action continues as long as an engineering control or an institutional control is needed to protect the public health and safety and the environment, and until all unrestricted use remediation standards are met." Therefore, a person who is implementing a remedial action that includes an engineering or institutional control is conducting remediation, and that person is required to hire a LSRP pursuant to the Administrative Requirements for the Remediation of Contaminated Sites (ARRCS; see N.J.A.C. 7:26C-2.3(a) and (b)).

At all times, an LSRP is required to be retained for a case that has a Deed Notice, Classification Exception Area, Soil Remedial Action Permit, and/or Ground Water Remedial Action Permit until the remedial action(s) is no longer needed to protect the public health and safety and the environment, and until all unrestricted use remediation standards are met. The LSRP must be retained to operate, maintain, and monitor the institutional and/or engineering controls at the site, to ensure that the remedial action(s) remains protective of public health and safety and the environment, and to ensure compliance with the requirements of the Deed Notice, Classification Exception Area, Soil Remedial Action Permit, and/or the Ground Water Remedial Action Permit. This includes but is not limited to site inspections, ground water sampling, biennial submission of a Soil and/or Ground Water Remedial Action Protectiveness/Biennial Certification Form and Report, responding to any activities involving the institutional and/or engineering controls at the site, and responding to any public inquiries regarding the current status of the site. It is the responsibility of the LSRP certifying the Remedial Action Permit application to inform the Responsible Entity of the requirement regarding LSRP retention for a case that has a Soil and/or Ground Water Remedial Action Permit.

An LSRP may be retained or dismissed for a case that has an approved Soil and/or Ground Water Remedial Action Permit through the New Jersey Department of Environmental Protection online portal ([www.nj.gov/dep/online/](http://www.nj.gov/dep/online/)) by choosing the "LSRP Retention" or "LSRP Release" submission type selection option within the "LSRP Notification of Retention or Dismissal" service, and choosing the "Remedial Action Permit" activity in the case selection page. Please note that the Bureau of Remedial Action Permitting records the LSRP Retention for pending Remedial Action Permit Applications so there is no need to perform this function online. Also note that the LSRP Comprehensive Report

([datamine2.state.nj.us/DEP\\_OPRA/OpraMain/categories?category=SRRA](http://datamine2.state.nj.us/DEP_OPRA/OpraMain/categories?category=SRRA)) now includes information pertaining to approved Soil and Ground Water Remedial Action Permits to which the LSRP is assigned.

### Annual Fees

Please be aware that there are annual fees associated with this permit in accordance with N.J.A.C. 7:26C-4.6. These annual permit fees will be handled by invoicing the fee billing contact we have on record:

Maria Kaouris  
Remediation Manager  
Honeywell International, Inc.  
115 Tabor Road  
Morris Plains, NJ 07950  
Phone: (973) 455-3302  
Email: maria.kaouris@honeywell.com

Any changes to this contact should be brought to the Department's attention. Changes to fee billing contacts are updates and are not considered modifications to the permit.

The Department looks forward to future continued cooperation in working together to provide a healthy environment for the citizens of New Jersey and to protect its resources. Going forward, questions or comments regarding this permit should be addressed to Robert Steinhagen with the Bureau of Remedial Action Permitting at [Robert.Steinhagen@dep.nj.gov](mailto:Robert.Steinhagen@dep.nj.gov) or 609-633-1472.

Sincerely,



William S. Hose, Assistant Director  
Remediation Review Element

Enclosure

c: Municipal Clerk, Jersey City  
[rbyrne@jcnj.org](mailto:rbyrne@jcnj.org)

Jersey City Division of Health  
[smithv@jcnj.org](mailto:smithv@jcnj.org)

Hudson County Register  
[lsenerchia@hcnj.us](mailto:lsenerchia@hcnj.us)



Hudson Regional Health Commission  
[cnawrocki@hudsonregionalhealth.org](mailto:cnawrocki@hudsonregionalhealth.org)

John Heller  
[john.heller@woodplc.com](mailto:john.heller@woodplc.com)



Bureau of Remedial Action Permitting  
401 East State Street  
P.O. Box 420  
Mail Code 401-05S  
Trenton, NJ 08625-0420  
Phone: (609) 984-2990

## SOIL REMEDIAL ACTION PERMIT MODIFICATION Deed Notice with Engineering Control

The New Jersey Department of Environmental Protection hereby grants you a Remedial Action Permit Modification pursuant to N.J.S.A. 58:10C-1 et seq. and N.J.A.C. 7:26C-1 et seq. for the facility/activity named in this document. This permit modification is the regulatory mechanism used by the Department to help ensure your remedial action will be protective of human health and the environment.

This permit modification replaces Soil Remedial Action Perm RAP120001 which establishes the monitoring, maintenance, and evaluation requirements for determining the effectiveness of the deed notice's engineering control. This modification is required due to a change in the engineering controls.

**Site:** Study Area 5 New Jersey City University  
**A/K/A:** Former Baldwin Steel Site (site 90) and Former M.I. Holdings (Site 184)

<b><u>Facility Address:</u></b> Route 440 and West Side Avenues Jersey City, NJ 07304 Hudson County Block: 21902 Lot: 13.01, 14.01, 14.02, 14.03, 2.01 Block: 21902.01 Lot: 1 Block: 21902.03 Lot: 1	<b><u>SRP PI #:</u></b> 031779 <b><u>Permit #:</u></b> RAP180002 <b><u>Effective Date:</u></b> 05/04/2012 <b><u>Modification Date:</u></b> 01/08/2019
<b><u>Person Responsible for Conducting the Remediation - Co-Permittee:</u></b>  John Morris Global Remediation Director HONEYWELL INTERNATIONAL INC 115 Tabor Road Morris Plains, NJ 07950 Phone: (973) 455-4003 Email: john.morris@honeywell.com	
<b><u>Property Owner - Co-Permittee:</u></b>  Aaron Aska Vice President NJ CITY UNIVERSITY 2039 Kennedy Blvd; Hepburn Hall Jersey City, NJ 07305 Phone: (201) 200-3035 Email: AAska@njcu.edu	

## I. Authority

The Department is issuing this permit in accordance with N.J.S.A. 58:10C-1 et seq. and N.J.A.C. 7:26C-1et seq.

## II. Permit Requirements

### A. MONITORING REQUIREMENTS

1. The permittee shall retain a LSRP for the Soil Remedial Action Permit until the remedial action is no longer needed to protect the public health and safety and the environment, and until all unrestricted use remediation standards are met. The LSRP must be retained to operate, maintain, and monitor the institutional and/or engineering controls at the site, to ensure that the remedial action remains protective of public health and safety and the environment, and to ensure compliance with the requirements of the Soil Remedial Action Permit. This includes but is not limited to site inspections, biennial submission of a Soil Remedial Action Protectiveness/Biennial Certification Form and Report, responding to any activities involving the institutional and/or engineering controls at the site, and responding to any public inquiries regarding the current status of the site. [N.J.A.C. 7:26C- 2.3(a and b)]
2. The permittee shall conduct monitoring and maintenance pursuant to Exhibit C of the attached Deed Notice. [N.J.A.C. 7:26C- 7.8(a)2]
3. The permittee shall conduct periodic inspections of each engineering control to determine its integrity, operability, and effectiveness. [N.J.A.C. 7:26C- 7.8(b)2]
4. The permittee shall conduct periodic inspections of any excavations or disturbances that have resulted in unacceptable exposure to the soil contamination. The permittee shall maintain a detailed maintenance and evaluation log. [N.J.A.C. 7:26C- 7.8(b)]

### B. REMEDIAL ACTION PROTECTIVENESS/BIENNIAL CERTIFICATION FORM

#### 1. Reporting Requirements

- a. The permittee shall prepare and submit to the Department a Remedial Action Protectiveness/Biennial Certification Form every two years following the anniversary of the date of the effective date of this permit. The certification shall be submitted on the required form provided by the Department. Submit a Remedial Action Protectiveness/Biennial Certification Form biennially from the effective date of this permit. [N.J.A.C. 7:26C- 7.7(a)1]

#### 2. Evaluation Requirements

- a. The permittee shall hire a Licensed Site Remediation Professional to prepare and certify that the remedial action continues to be protective of the public health and safety and the environment. [N.J.A.C. 7:26C- 1.5(a)2]
- b. The permittee shall conduct the remediation in accordance with all applicable statutes, rules, and guidance. [N.J.A.C. 7:26C- 1.2(a)]

c. The permittee shall provide the results of the periodic inspections required under the monitoring requirements of this permit. [N.J.A.C. 7:26C- 7.8(c)]

d. The Remedial Action Protectiveness/Biennial Certification Form shall include an evaluation of any actual or pending zoning or land use changes to determine if these changes are consistent with the use restrictions contained in the attached deed notice/declaration of environmental restriction. If the evaluation finds that the engineering/institutional controls are no longer protective of the public health and safety and the environment, the permittee shall implement appropriate remedial action to ensure that the engineering/institutional controls are protective of the public health and safety and the environment. [N.J.A.C. 7:26C- 7.8(b)1]

e. The Remedial Action Protectiveness/Biennial Certification Form shall include a comparison of the laws, Remediation Standards, and other regulations applicable at the time the engineering or institutional control was established with any relevant subsequently promulgated or modified laws or regulations to determine whether the engineering or institutional control remains protective. The results shall be provided in table format, comparing of applicable laws, regulations, and standards. [N.J.A.C. 7:26C- 7.8(b)3]

## C. FINANCIAL ASSURANCE REQUIREMENTS

### 1. Reporting Requirements - Letter of Credit

a. The permittee shall have the issuer of the Letter of Credit notify the Department, and the person providing the Letter of Credit by certified mail that, if the issuer of the Letter of Credit decides not to extend the letter of credit beyond the expiration date. Submit a written notification of lapse of Letter of Credit prior to 120 days before the letter of credit expiration date. [N.J.A.C. 7:26C- 5.7(a)4]

b. The permittee shall prepare an estimate of the future costs to operate, maintain, and inspect all engineering controls subject to this permit, and submit it to the Department. Submit engineering controls maintenance cost estimate with the Protectiveness/Biennial Certification biennially from the effective date of this permit. [N.J.A.C. 7:26C- 7.10(a)1]

### 2. Financial Assurance - Maintenance

a. The permittee shall maintain financial assurance in an amount equal to or greater than the most recent estimated full cost to operate, maintain, and inspect all engineering controls that are part of any remedial action over the life of the permit. [N.J.A.C. 7:26C- 7.7(a)3]

## D. FEES

1. For each year hereafter on the anniversary of the effective date of this permit, the Department shall invoice the permittees the amount of the annual Remedial Action Permit Fee. [N.J.A.C. 7:26C- 4.6]

## E. PERMIT TRANSFERS

1. The permittee shall, at least 60 days prior to the sale or transfer of the property, or transfer of the operation of the property, or termination of a lease, submit a Remedial Action Permit Transfer/Change of Ownership Application and pay the permit transfer fee to the Department. [N.J.A.C. 7:26C- 7.11(b)]

## F. PERMIT MODIFICATIONS

### 1. Soil Permit Modifications

- a. The permittee shall apply to have the Department modify a Remedial Action Permit within 30 days after a statement that the permittee has completed a protectiveness evaluation required in its permit and has determined that the remedial action is not adequately protective of the public health and safety and of the environment, and stating the reasons for coming to this conclusion. [N.J.A.C. 7:26C- 7.12(b)1]
- b. The permittee shall apply to have the Department modify a Remedial Action Permit within 30 days after any person proposes to change the engineering controls applicable to the site, as described in the deed notice filed for the property. [N.J.A.C. 7:26C- 7.12(b)3]
- c. The permittee shall apply to have the Department modify a Remedial Action Permit within 30 days after the person responsible for conducting the remediation modifies the remedial action. [N.J.A.C. 7:26C- 7.12(b)4]
- d. The permittee shall apply to have the Department modify a Remedial Action Permit within 30 days after the permittee changes its address. [N.J.A.C. 7:26C- 7.12(b)6]

## G. PERMIT TERMINATIONS

1. A request for a permit termination can be filed by submitting a Remedial Action Permit Application to terminate the permit to the Department when the remedial action meets all applicable remediation standards without the need for the Remedial Action Permit and the remedial action is protective of the public health and safety and of the environment without the presence of the Remedial Action Permit. [N.J.A.C. 7:26C- 7.13]

## H. FORM SUBMITTAL

1. Any forms, applications or documents required by this chapter that can be submitted in an electronic format shall be submitted electronically 90 days after the date that the Department informs the public in the New Jersey Register that the relevant electronic application is functional. [N.J.A.C. 7:26C- 1.6(c)]
2. All submissions required pursuant to this permit shall be made on forms approved and available from the Department. These forms and instructions for completing these forms can be found at <http://www.nj.gov/dep/srp/srra/forms>. [N.J.A.C. 7:26C- 1.6]

## I. RESTRICTED LAND USES

1. Contaminated sites remediated to non-residential soil remediation standards that require the maintenance of engineering and/or institutional controls cannot be converted to a child care facility, public, private or charter school without the Department's prior approval, unless a presumptive remedy is implemented pursuant to the Presumptive Remedies for Soil Contamination at Schools, Child Care Centers, and Residences. [N.J.A.C. 7:26E- 5.3]

### III. Permit Schedule

<b>Permit Effective Date: 05/04/2012</b>	
<b>Submission Requirement</b>	<b>Due Date</b>
Submit a Remedial Action Protectiveness/Biennial Certification Form	05/04/2020
Submit a Remedial Action Protectiveness/Biennial Certification Form	05/04/2022
Submit a Remedial Action Protectiveness/Biennial Certification Form	05/04/2024
Submit a Remedial Action Protectiveness/Biennial Certification Form	05/04/2026
Submit a Remedial Action Protectiveness/Biennial Certification Form	05/04/2028
Submit a Remedial Action Protectiveness/Biennial Certification Form	05/04/2030
Submit a Remedial Action Protectiveness/Biennial Certification Form	05/04/2032
Submit a Remedial Action Protectiveness/Biennial Certification Form	05/04/2034
Submit a Remedial Action Protectiveness/Biennial Certification Form	05/04/2036
Submit a Remedial Action Protectiveness/Biennial Certification Form	05/04/2038
Submit a Remedial Action Protectiveness/Biennial Certification Form	05/04/2040
Submit a Remedial Action Protectiveness/Biennial Certification Form	05/04/2042
Submit a Remedial Action Protectiveness/Biennial Certification Form	05/04/2044
Submit a Remedial Action Protectiveness/Biennial Certification Form	05/04/2046
Submit a Remedial Action Protectiveness/Biennial Certification Form	05/04/2048

**Note:** Remedial Action Protectiveness/Biennial Certification Forms are required to be submitted according to the schedule, and shall continue to be submitted until the Permit is terminated or modified.

Your Soil Remedial Action Permit under Administrative Requirements for the Remediation of Contaminated Sites, N.J.A.C. 7:26C-1 et seq. has been approved by the New Jersey Department of Environmental Protection.

Sincerely,



William S. Hose, Assistant Director  
Remediation Review Element

### IV. Attachments:

A. Deed Notice

Deed Notice ID: DER1518493

Filed Deed Notice in the Hudson County Register's Office

Book Number the Deed Notice is filed in: 9300

Page Numbers: 662-701

Date Filed: 04/23/2018

Block: 21902.01 Lot: 1

Block: 21902.03 Lot: 1

Block: 21902 Lots: 2.01, 13.01, 14.01, 14.02, 14.03

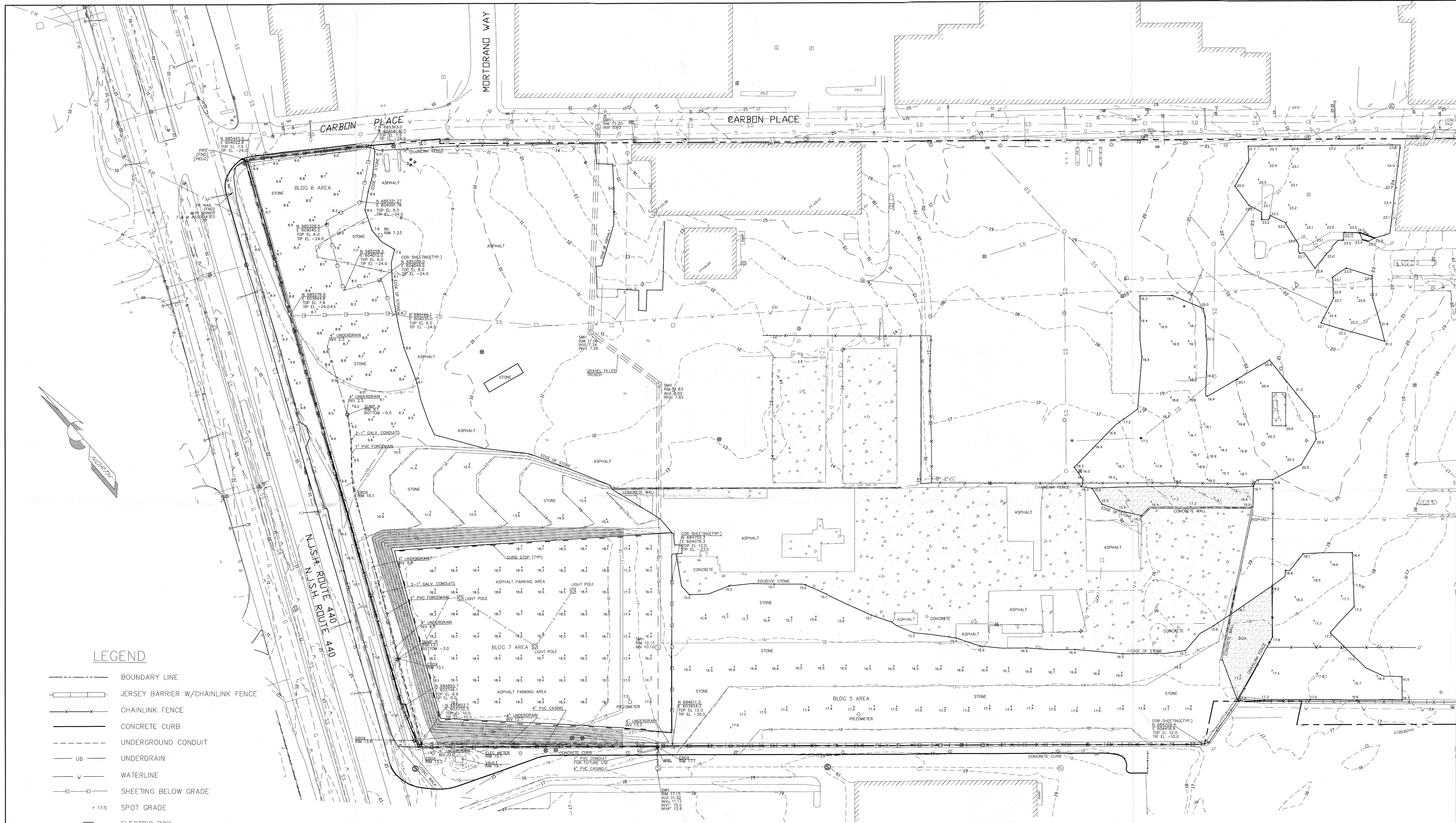
**APPENDIX B**

**AS-BUILT DRAWINGS OF NJCU CHROMIUM REMEDIATION  
AND COMMERCIAL AOC REDEVELOPMENT**

**APPENDIX B-1**

**NJCU CHROMIUM REMEDY  
AS-BUILT FIGURES**





**LEGEND**

- BOUNDARY LINE
- JERSEY BARRIER W/CHAINLINK FENCE
- x-x- CHAINLINK FENCE
- CONCRETE CURB
- UNDERGROUND CONDUIT
- UNDERDRAIN
- WATERLINE
- SHEETING BELOW GRADE
- x 17.5 SPOT GRADE
- ELECTRIC BOX
- ⊙ SANITARY SEWER MANHOLE
- ⊙ MONITOR WELL
- INLET
- ▨ TOPSOIL/SEEDED AREA
- ▨ CONCRETE AREA
- CURB STOP

**NOTES**

1. THIS MAP WAS PREPARED TO SHOW THE AS-BUILT CONDITIONS OF THE SITE POST CONSTRUCTION. THIS MAP WAS CREATED FROM FIELD MEASUREMENTS PERFORMED BY THIS FIRM THROUGH 12-22-11.
2. HORIZONTAL DATUM NAD 83, VERTICAL DATUM NGVD 29.
3. BOUNDARY LINE, AND BACKGROUND INFORMATION SHOWN HEREON OUTSIDE OF THE SURVEY LIMITS FROM PLANS ENTITLED "EXISTING CONDITIONS" PREPARED BY MACTEC LAST REVISED 05-06-10.
4. CONTOURS SHOWN HEREON IN A DASHED LINE TYPE REPRESENT THE ASBUILT AND EXISTING CONDITIONS. AND THE CONTOURS SHOWN IN A SOLID LINE TYPE REPRESENT THE PROPOSED FINAL GRADE AS SHOWN ON MACTEC DESIGN PLANS ENTITLED "POST CHROMIUM REMEDIATION GRADING AND DRAINAGE PLAN, ADDENDUM 3".

**KENNY L. KENNON, P.L.S.**  
 PROFESSIONAL LAND SURVEYOR LICENSE NO. 37195

*Kenny Kennon*  
 DATE: 1-13-12

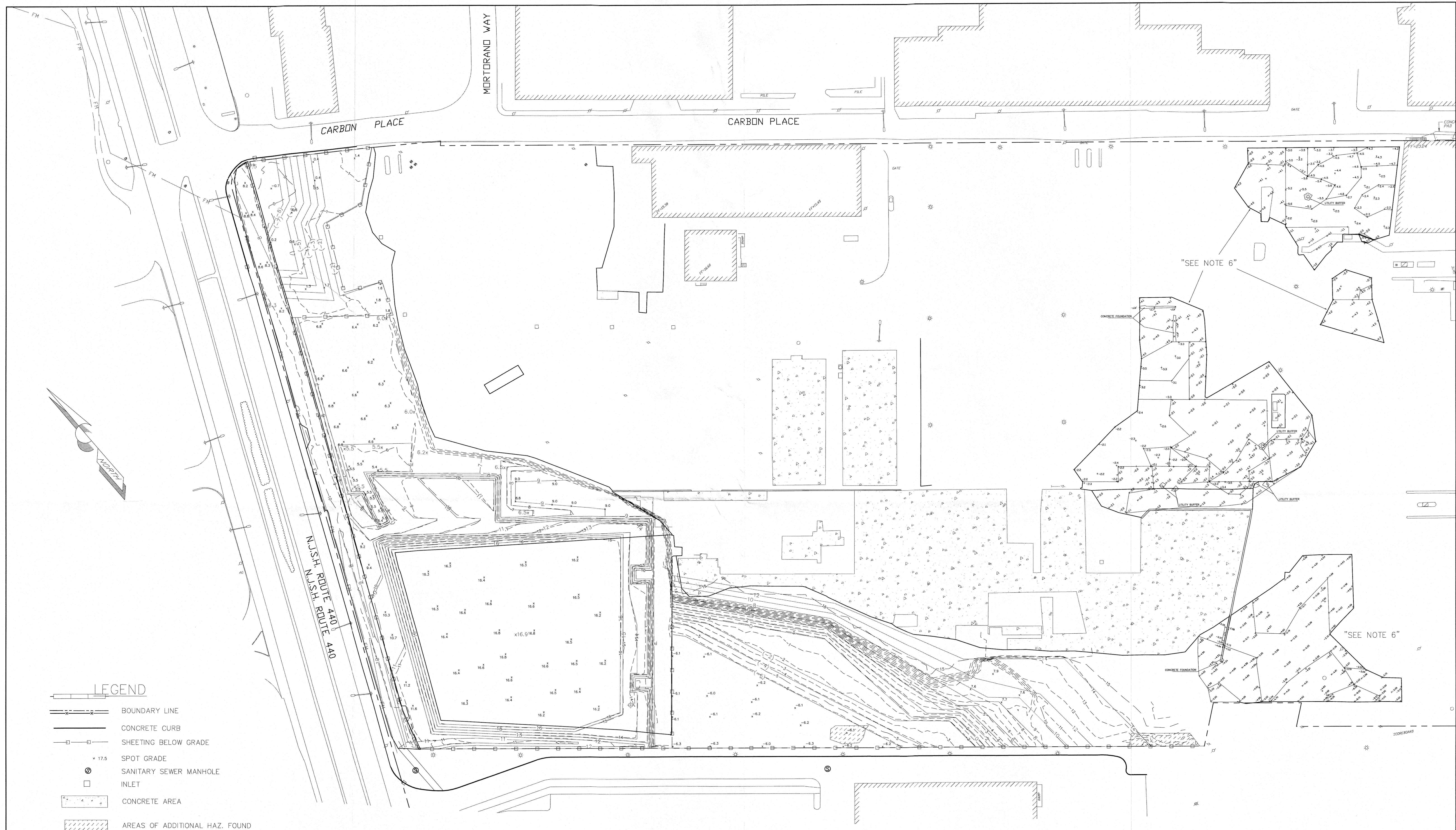
**AS-BUILT SURVEY**  
**"FINAL EXISTING CONDITIONS"**  
 BLOCK 1286.5, LOT 1 & BLOCK 1286, LOT 5  
 JERSEY CITY, NEW JERSEY  
 HONEYWELL SITE ID 37288, 37811 & 37460

**KSS** KENNON SURVEYING SERVICES INC.  
 5 POWDER HORN DRIVE, SUITE 4  
 P.O. BOX 4477  
 WARREN, NEW JERSEY 07059

PHONE 732-564-1818 CERTIFICATE OF AUTHORIZATION NO. 27944900 FAX 732-564-9999

DATE 01-13-12	SCALE 1" = 50'	PROJ. NO. 2201	SHEET 1 OF 2
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- LEGEND**
- BOUNDARY LINE
  - CONCRETE CURB
  - SHEETING BELOW GRADE
  - SPOT GRADE
  - SANITARY SEWER MANHOLE
  - INLET
  - CONCRETE AREA
  - AREAS OF ADDITIONAL HAZ. FOUND

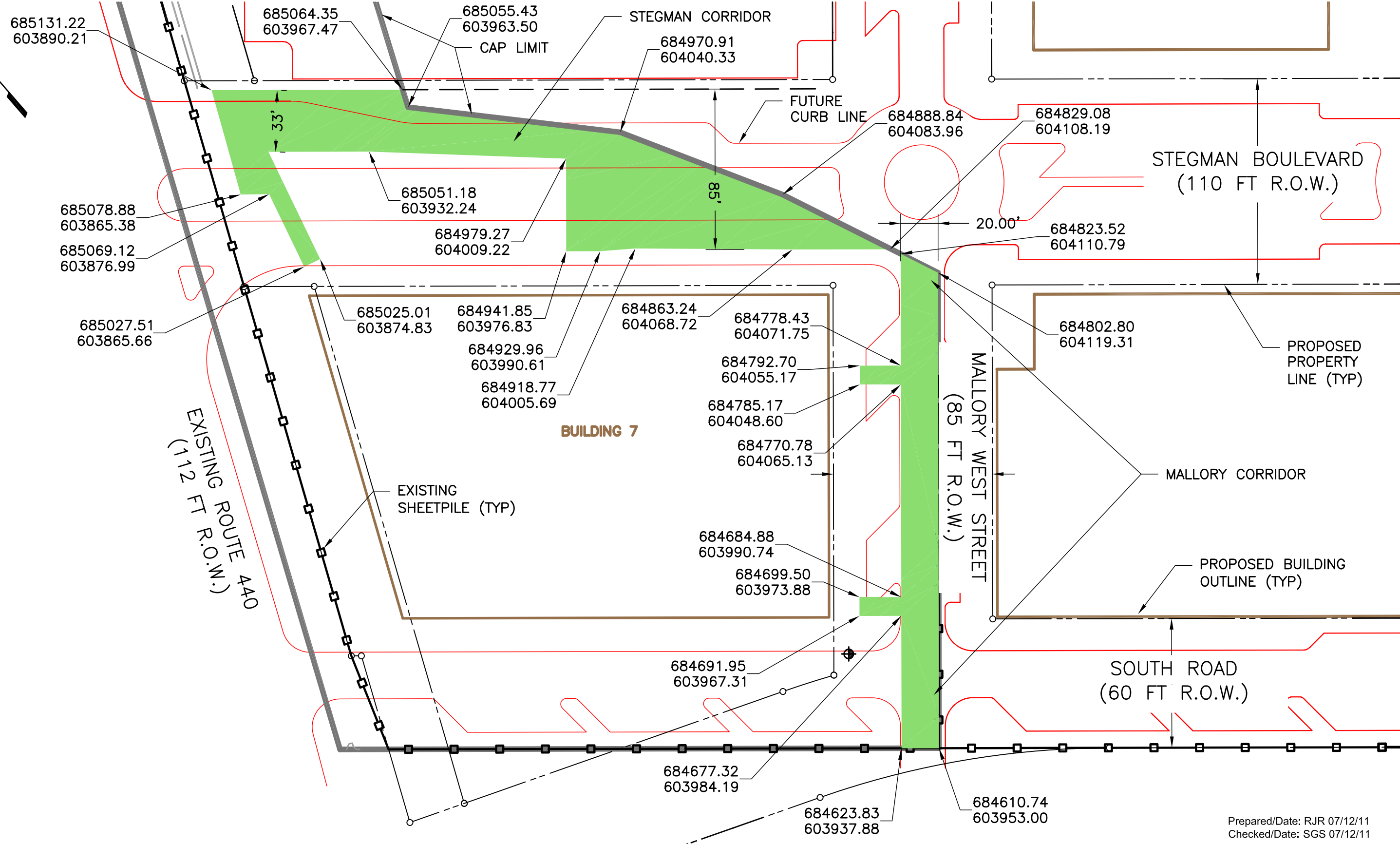
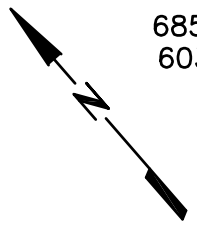
- NOTES**
1. THIS MAP WAS PREPARED TO SHOW THE AS-BUILT CONDITIONS OF THE BOTTOM OF EXCAVATION.
  2. HORIZONTAL DATUM NAD 83, VERTICAL DATUM NGVD 29.
  3. BOUNDARY LINE, AND BACKGROUND INFORMATION SHOWN HEREON OUTSIDE OF THE SURVEY LIMITS FROM PLANS ENTITLED "EXISTING CONDITIONS" PREPARED BY MACTEC LAST REVISED 05-06-10.
  4. CONTOURS SHOWN HEREON IN A DASHED LINE TYPE REPRESENT THE ASBUILT SUBGRADE. AND THE CONTOURS SHOWN IN A SOLID LINE TYPE REPRESENT THE PROPOSED SUBGRADE AS SHOWN ON MACTEC DESIGN PLANS ENTITLED "SOIL EXCAVATION PLAN", DATED 05-06-10, (FOR BUILDING 5 & 6) AND "MACTEC-CSP02 ADDNM15 SG-NO PILE -DRAFT FOR PLAINTIFF REVIEW", DATED 04-14-11, (BUILDING 7).
  5. EXCAVATION DEPTHS FOR BUILDING 6 AREA WERE LIMITED BY THE EXISTING "MEADOW MAT SYSTEM".
  6. SPOT GRADES SHOWN IN THE JERSEY CITY UNIVERSITY PARKING LOT REPRESENT THE DEPTH OF EXCAVATION.

**KENNY L. KENNON, P.L.S.**  
 PROFESSIONAL LAND SURVEYOR LICENSE NO. 37195  
*Kenny L. Kennon* DATE: 1-13-12

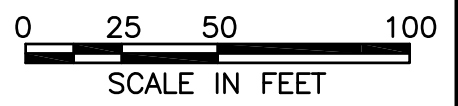
**AS-BUILT SURVEY  
 "SUB-GRADE"**  
 BLOCK 1286.5, LOT 1 & BLOCK 1286, LOT 5  
 JERSEY CITY, NEW JERSEY  
 HONEYWELL SITE ID 37288, 37811 & 37460  
**KSS KENNON SURVEYING SERVICES INC.**  
 5 POWDER HORN DRIVE, SUITE 4  
 P.O. BOX 4477  
 WARREN, NEW JERSEY 07059  
 PHONE 732-564-1818 CERTIFICATE OF AUTHORIZATION NO. 27944900 FAX 732-564-9999  
 DATE 01-13-12 SCALE 1" = 50' PLOT NO. 2201 SHEET 2 OF 2



M:\Projects\HONEYWELL\_SA-5\_Design\Figure - Legal Utility Corridor\_Current.dwg Tue, 12 Jul 2011 - 4:30pm rjriquier



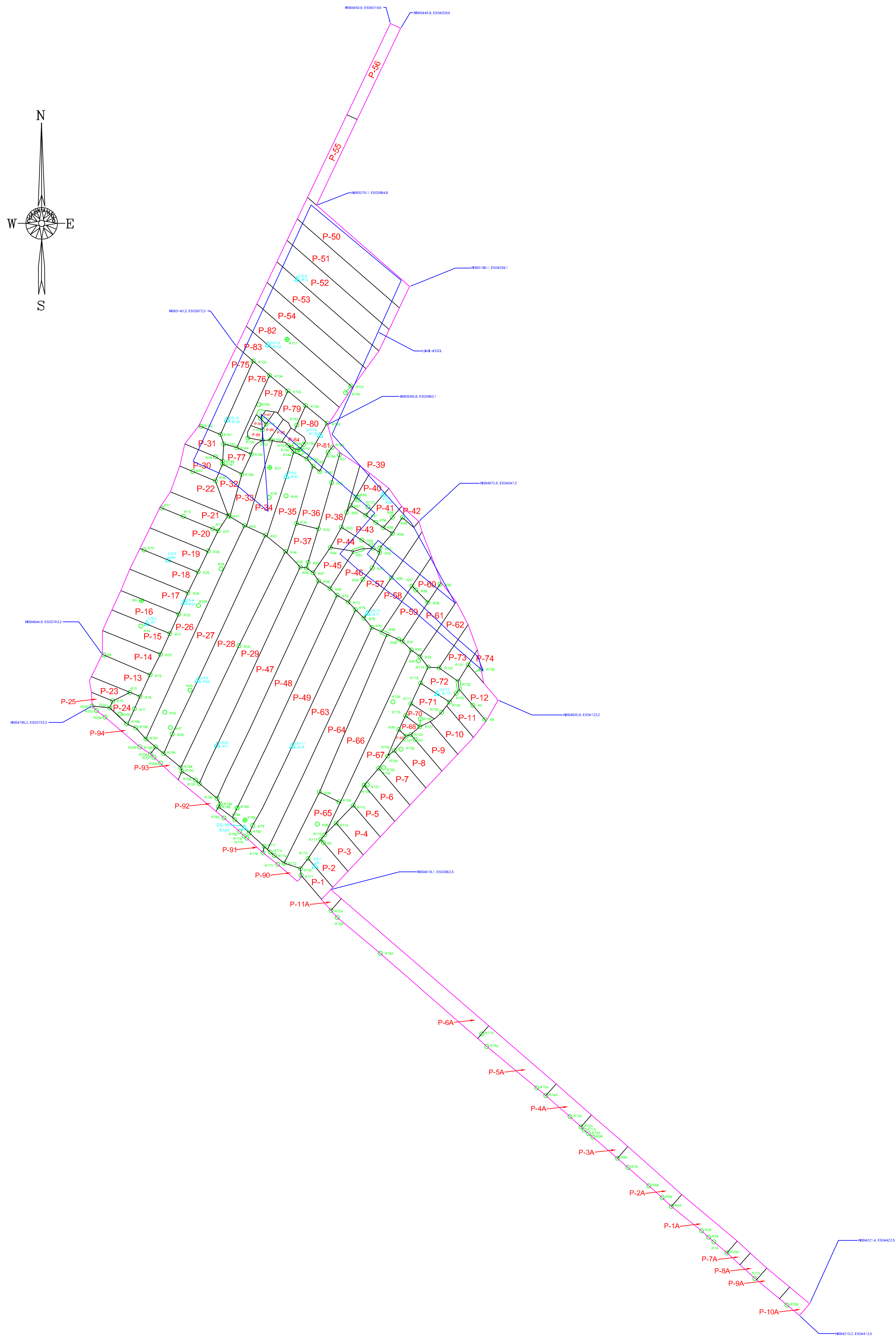
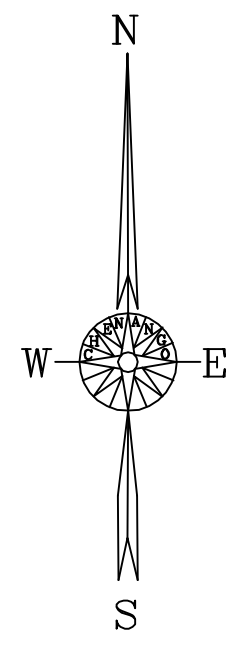
Prepared/Date: RJR 07/12/11  
Checked/Date: SGS 07/12/11



HONEYWELL SA-5  
JERSEY CITY, NEW JERSEY



CURRENT STEGMAN AND MALLERY  
UTILITY CORRIDORS WITHIN CAP AREA  
PROJECT 3480-06-0208

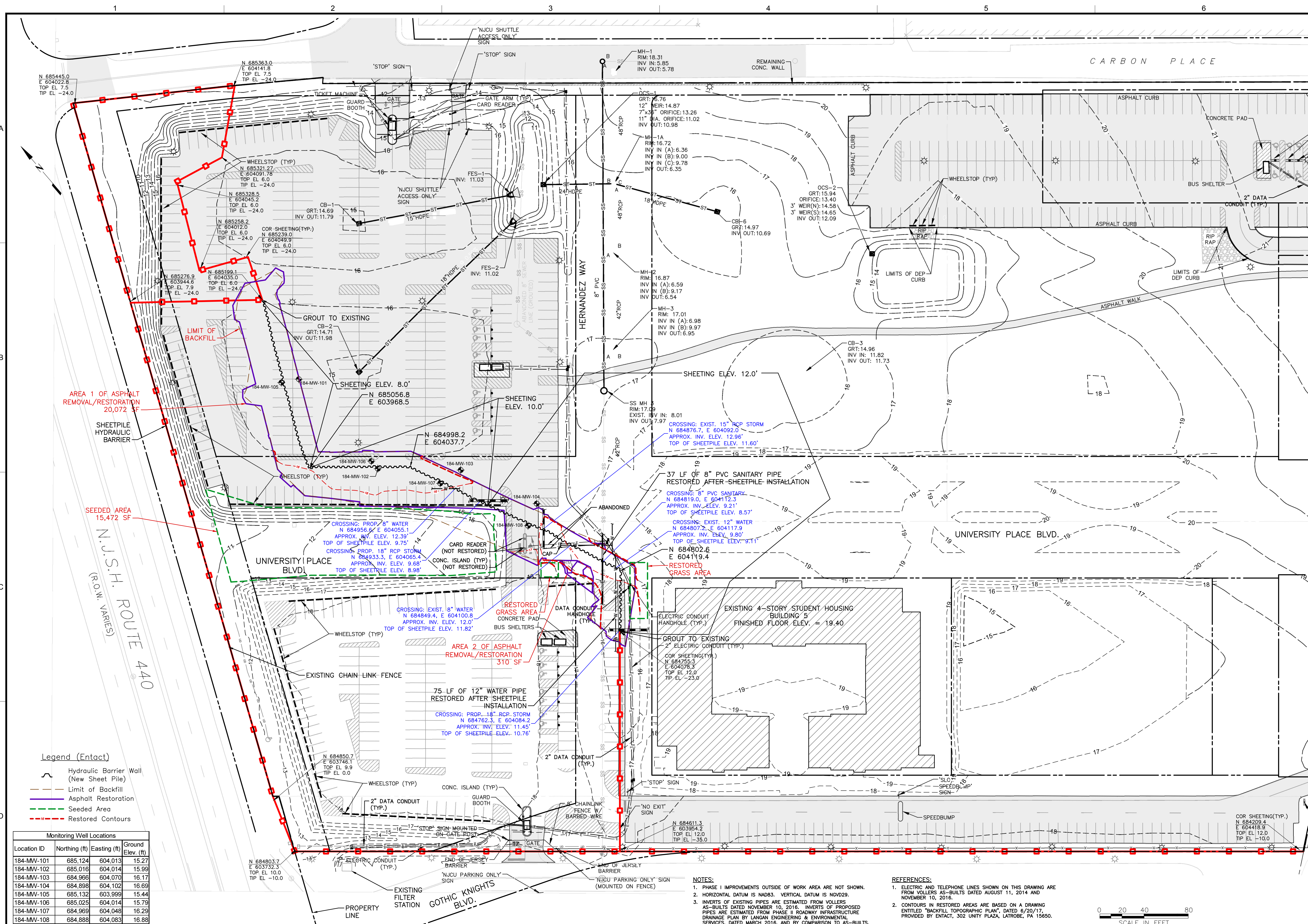


**LEGEND**

- P-## PANEL IDENTIFICATION NUMBER
- APPROXIMATE LOCATION OF LINER LIMIT
- APPROXIMATE GCL LIMIT
- REPAIR LOCATION
- △ DESTRUCT LOCATION

PROJECT NO.: 10039 SCALE: 1"=60' DRAWN BY: PRM SHEET: 1 OF 1	<b>GEOMEMBRANE RECORD DRAWING</b> HONEYWELL JERSEY CITY JERSEY CITY, NEW JERSEY	Johnson City, NY 13790 29 Arbutus Road  Phone 607.729.8500 Fax 607.729.2415
		DATE STATUS





**Legend (Entact)**

- Hydraulic Barrier Wall (New Sheet Pile)
- Limit of Backfill
- Asphalt Restoration
- Seeded Area
- Restored Contours

**Monitoring Well Locations**

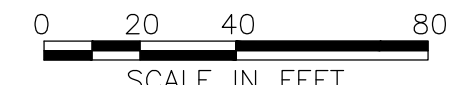
Location ID	Northing (ft)	Easting (ft)	Ground Elev. (ft)
184-MW-101	685,124	604,013	15.27
184-MW-102	685,016	604,014	15.99
184-MW-103	684,966	604,070	16.17
184-MW-104	684,898	604,102	16.69
184-MW-105	685,132	603,999	15.44
184-MW-106	685,025	604,014	15.79
184-MW-107	684,969	604,048	16.29
184-MW-108	684,888	604,083	16.88

**NOTES:**

- PHASE I IMPROVEMENTS OUTSIDE OF WORK AREA ARE NOT SHOWN.
- HORIZONTAL DATUM IS NAD83. VERTICAL DATUM IS NGVD29.
- INVERTS OF EXISTING PIPES ARE ESTIMATED FROM VOLLERS AS-BUILTS DATED NOVEMBER 10, 2016. INVERTS OF PROPOSED PIPES ARE ESTIMATED FROM PHASE II ROADWAY INFRASTRUCTURE DRAINAGE PLAN BY LANGAN ENGINEERING & ENVIRONMENTAL SERVICES, DATED MARCH 2016, AND BY COMPARISON TO AS-BUILTS.

**REFERENCES:**

- ELECTRIC AND TELEPHONE LINES SHOWN ON THIS DRAWING ARE FROM VOLLERS AS-BUILTS DATED AUGUST 11, 2014 AND NOVEMBER 10, 2016.
- CONTOURS IN RESTORED AREAS ARE BASED ON A DRAWING ENTITLED "BACKFILL TOPOGRAPHIC PLAN," DATED 6/20/17, PROVIDED BY ENTACT, 302 UNITY PLAZA, LATROBE, PA 15650.



**Amec Foster Wheeler**  
 ENVIRONMENT & INFRASTRUCTURE, Inc.  
 200 AMERICAN METRO BLVD, SUITE 113  
 HAMILTON, NEW JERSEY 08619  
 TELEPHONE: (908) 689-2829  
 FAX: (908) 689-2828  
 NJ Certificate of Authorization  
 Number 24GA28010900

REV	DATE	ISSUE/REVISION DESCRIPTION	DRFT	CHKD	BY
0	10/5/16	ISSUED FOR BIDDING PURPOSES	SPM	NS	NS
A	11/2/16	ISSUED FOR SSSC PERMIT APPLICATION	SPM	NS	NS
B	4/7/17	DCB 1 - UPDATED AS-BUILT PER NOV. 10, 2016 FILE	SPM	NS	NS
C	4/14/17	UPDATED MONITORING WELLS AND NOTES	SPM	NS	NS
D	7/18/17	RECORD DRAWING	SPM	NS	NS

**PROJECT:** SA-5 NJCU SITE 90/184  
 JERSEY CITY, NEW JERSEY  
**ADDENDUM 16 TO THE 100% DESIGN**  
**PROPOSED SHEETPILE INSTALLATION**

**TITLE:** GENERAL  
**RESTORATION PLAN**

**CLIENT:** HONEYWELL  
 115 TABOR ROAD (4D-8)  
 MORRIS PLAINS, NJ 07950

**SEAL:** BRENT C. O'DELL  
 NJ PROFESSIONAL ENGINEER  
 LICENSE NUMBER 24GED38077

DESIGNED BY:	NS	DRAWN BY:	SPM
CHECKED BY:	BOD	DATE:	7/18/2017
SCALE:	AS SHOWN	REVISION:	D
VERIFY SCALE			
THIS BAR MEASURES ONE INCH ON THE ORIGINAL DRAWING.			
0 1"			
PROJECT NUMBER:	3480150481		
DRAWING NUMBER:	C-101		
SHEET NUMBER:	1 OF 2		

PROPRIETARY INFORMATION: THIS DRAWING IS THE PROPERTY OF AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE, INC. AND IS NOT TO BE LOANED OR REPRODUCED IN ANY WAY WITHOUT THE PERMISSION OF AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE, INC.







**APPENDIX B-2**

**NJCU COMMERCIAL AOC REDEVELOPMENT  
AS-BUILT FIGURES**







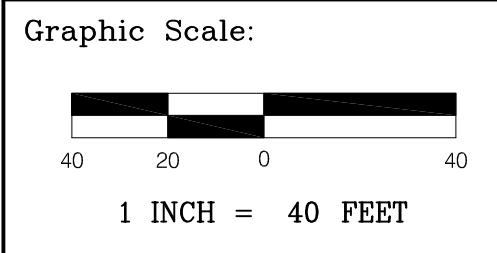
**Notes:**

- AS-BUILT INFORMATION AS SHOWN IS FOR WORK INSTALLED BY VOLLERS ONLY. ALL OTHER LINENWORK IS FOR REFERENCE ONLY AND HAS NOT BEEN VERIFIED.
- ALL INLETS EXCEPT FOR CB-6 ARE INSTALLED WITH A 2 FT PUMP PER JCMUA REQUIREMENTS.

**Revisions**

No.	Description	Date
2	COMMENTS BY LANGAN	11/10/2016
1	COMMENTS BY LANGAN	10/27/2016

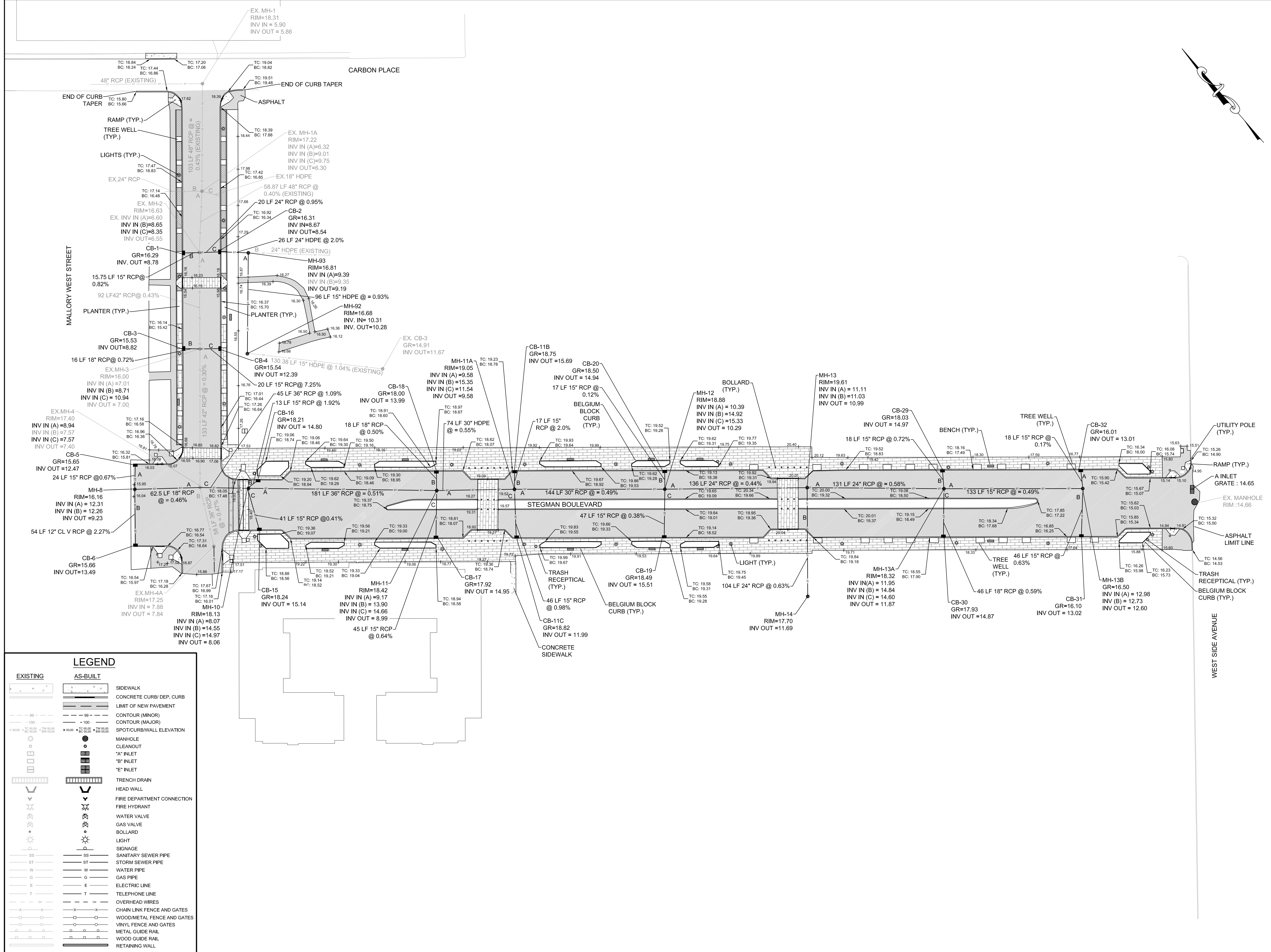
Date: 10/12/2016  
 Job Number: 2922  
 Drawn By: DNV  
 Revised By: DNV  
 Checked By: SB



**Project Title:**  
 NEW JERSEY CITY UNIVERSITY  
 WEST CAMPUS REDEVELOPMENT  
 CITY OF JERSEY CITY,  
 HUDSON COUNTY, NEW JERSEY

**Drawing Title:**  
 GRADING AND DRAINAGE ASBUILT

Rev. No. **2** Sheet: **1/3**



**LEGEND**

EXISTING	AS-BUILT	DESCRIPTION
[Symbol]	[Symbol]	SIDEWALK
[Symbol]	[Symbol]	CONCRETE CURB/ DEP. CURB
[Symbol]	[Symbol]	LIMIT OF NEW PAVEMENT
[Symbol]	[Symbol]	CONTOUR (MINOR)
[Symbol]	[Symbol]	CONTOUR (MAJOR)
[Symbol]	[Symbol]	SPOT CURB/WALL ELEVATION
[Symbol]	[Symbol]	MANHOLE CLEANOUT
[Symbol]	[Symbol]	"A" INLET
[Symbol]	[Symbol]	"B" INLET
[Symbol]	[Symbol]	"E" INLET
[Symbol]	[Symbol]	TRENCH DRAIN
[Symbol]	[Symbol]	HEAD WALL
[Symbol]	[Symbol]	FIRE DEPARTMENT CONNECTION
[Symbol]	[Symbol]	FIRE HYDRANT
[Symbol]	[Symbol]	WATER VALVE
[Symbol]	[Symbol]	GAS VALVE
[Symbol]	[Symbol]	BOLLARD
[Symbol]	[Symbol]	LIGHT
[Symbol]	[Symbol]	SIGNAGE
[Symbol]	[Symbol]	SANITARY SEWER PIPE
[Symbol]	[Symbol]	STORM SEWER PIPE
[Symbol]	[Symbol]	WATER PIPE
[Symbol]	[Symbol]	GAS PIPE
[Symbol]	[Symbol]	ELECTRIC LINE
[Symbol]	[Symbol]	TELEPHONE LINE
[Symbol]	[Symbol]	OVERHEAD WIRES
[Symbol]	[Symbol]	CHAIN LINK FENCE AND GATES
[Symbol]	[Symbol]	WOOD/METAL FENCE AND GATES
[Symbol]	[Symbol]	VINYL FENCE AND GATES
[Symbol]	[Symbol]	METAL GUIDE RAIL
[Symbol]	[Symbol]	WOOD GUIDE RAIL
[Symbol]	[Symbol]	RETAINING WALL

10/2016 N.J.C.I. Plans 1. Roadwork/Engineering/2016 GPS SURVEY/2016/2016 ASBUILT 2016/10/12/2016 FINAL ASBUILT 2016/11/10/2016





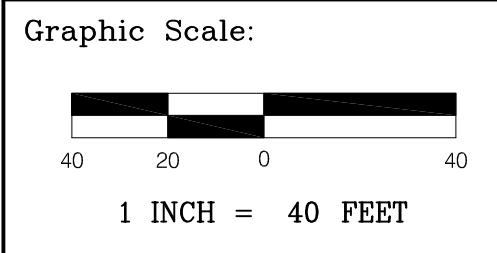


**Notes:**  
 1. AS-BUILT INFORMATION AS SHOWN IS FOR WORK INSTALLED BY VOLLERS ONLY. ALL OTHER LINENWORK IS FOR REFERENCE ONLY AND HAS NOT BEEN VERIFIED.

**Revisions**

No.	Description	Date
1	COMMENTS BY LANGAN	10/27/2016

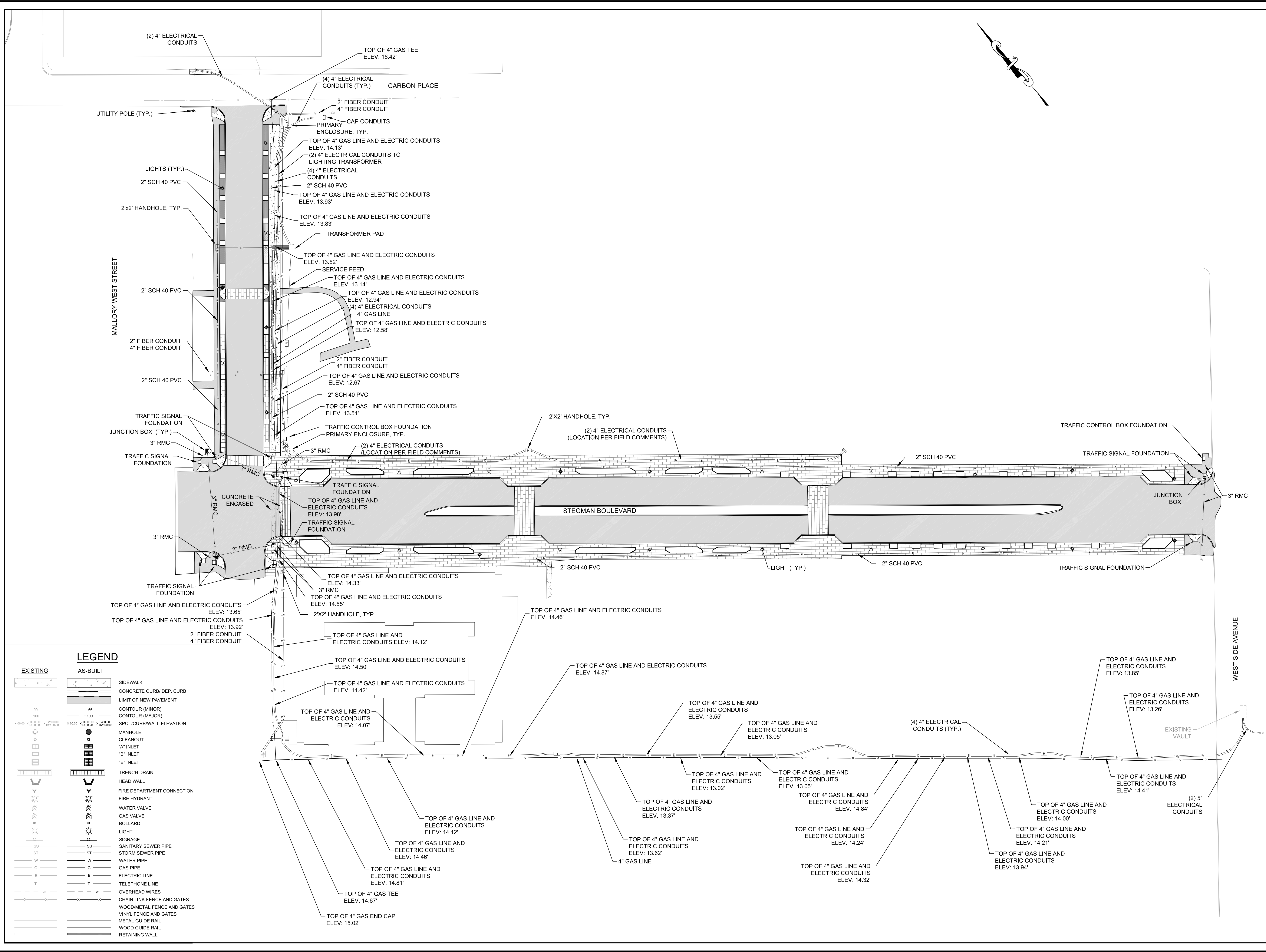
Date: 10/12/2016  
 Job Number: 2922  
 Drawn By: DNV  
 Revised By: DNV  
 Checked By: SB



**Project Title:**  
 NEW JERSEY CITY UNIVERSITY  
 WEST CAMPUS REDEVELOPMENT  
 CITY OF JERSEY CITY,  
 HUDSON COUNTY, NEW JERSEY

**Drawing Title:**  
 UTILITY ASBUILT  
 (ELECTRIC)

Rev. No. 1 Sheet: 3/3



**LEGEND**

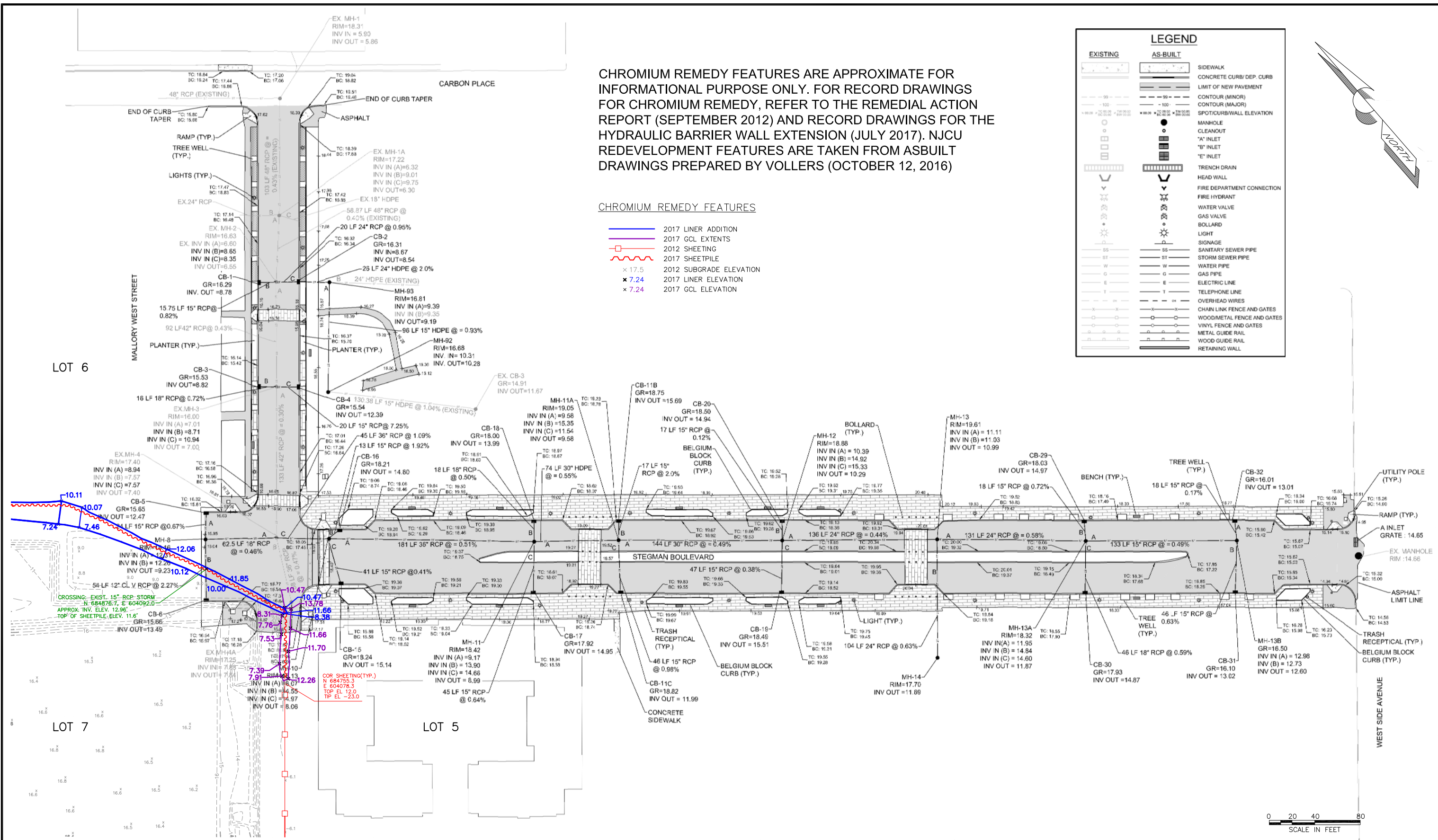
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[Symbol]	[Symbol]	CONCRETE CURB/ DEP. CURB
[Symbol]	[Symbol]	LIMIT OF NEW PAVEMENT
[Symbol]	[Symbol]	CONTOUR (MINOR)
[Symbol]	[Symbol]	CONTOUR (MAJOR)
[Symbol]	[Symbol]	SPOT/CURB/WALL ELEVATION
[Symbol]	[Symbol]	MANHOLE
[Symbol]	[Symbol]	CLEANOUT
[Symbol]	[Symbol]	"A" INLET
[Symbol]	[Symbol]	"B" INLET
[Symbol]	[Symbol]	"E" INLET
[Symbol]	[Symbol]	TRENCH DRAIN
[Symbol]	[Symbol]	HEAD WALL
[Symbol]	[Symbol]	FIRE DEPARTMENT CONNECTION
[Symbol]	[Symbol]	FIRE HYDRANT
[Symbol]	[Symbol]	WATER VALVE
[Symbol]	[Symbol]	GAS VALVE
[Symbol]	[Symbol]	BOLLARD
[Symbol]	[Symbol]	LIGHT
[Symbol]	[Symbol]	SIGNAGE
[Symbol]	[Symbol]	SANITARY SEWER PIPE
[Symbol]	[Symbol]	STORM SEWER PIPE
[Symbol]	[Symbol]	WATER PIPE
[Symbol]	[Symbol]	GAS PIPE
[Symbol]	[Symbol]	ELECTRIC LINE
[Symbol]	[Symbol]	TELEPHONE LINE
[Symbol]	[Symbol]	OVERHEAD WIRES
[Symbol]	[Symbol]	CHAIN LINK FENCE AND GATES
[Symbol]	[Symbol]	WOOD/METAL FENCE AND GATES
[Symbol]	[Symbol]	VINYL FENCE AND GATES
[Symbol]	[Symbol]	METAL GUIDE RAIL
[Symbol]	[Symbol]	WOOD GUIDE RAIL
[Symbol]	[Symbol]	RETAINING WALL

10/2016 N.J.C.I.T. Plans - 1. Roadwork/Signage/2016 AS-BUILT FINAL ASBUILT 2016/10/12 10:02:02 FINAL ASBUILT 2016/10/12 10:02:02

**NJCU COMMERCIAL AOC REDEVELOPMENT  
AS-BUILT FIGURES  
WITH CHROMIUM REMEDY OVERLAY**



UNLESS SPECIFICALLY REFERRED TO IN WRITTEN CONTRACT DOCUMENTS, THE DESIGNER'S LIABILITY IS LIMITED TO THE DESIGN SERVICES PROVIDED. THE DESIGNER SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OF ANY INFORMATION PROVIDED BY ANY OTHER PARTY OR FOR THE CONSEQUENCES OF ANY RELIANCE ON ANY INFORMATION PROVIDED BY ANY OTHER PARTY. THE DESIGNER'S LIABILITY IS LIMITED TO THE DESIGN SERVICES PROVIDED. THE DESIGNER SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OF ANY INFORMATION PROVIDED BY ANY OTHER PARTY OR FOR THE CONSEQUENCES OF ANY RELIANCE ON ANY INFORMATION PROVIDED BY ANY OTHER PARTY.



CHROMIUM REMEDY FEATURES ARE APPROXIMATE FOR INFORMATIONAL PURPOSE ONLY. FOR RECORD DRAWINGS FOR CHROMIUM REMEDY, REFER TO THE REMEDIAL ACTION REPORT (SEPTEMBER 2012) AND RECORD DRAWINGS FOR THE HYDRAULIC BARRIER WALL EXTENSION (JULY 2017). NJCU REDEVELOPMENT FEATURES ARE TAKEN FROM ASBUILT DRAWINGS PREPARED BY VOLLERS (OCTOBER 12, 2016)

- CHROMIUM REMEDY FEATURES**
- 2017 LINER ADDITION
  - 2017 GCL EXTENTS
  - 2012 SHEETING
  - 2017 SHEETPILE
  - x 17.5 2012 SUBGRADE ELEVATION
  - x 7.24 2017 LINER ELEVATION
  - x 7.24 2017 GCL ELEVATION

**LEGEND**

EXISTING	AS-BUILT	DESCRIPTION
[Symbol]	[Symbol]	SIDEWALK
[Symbol]	[Symbol]	CONCRETE CURB/DEP. CURB
[Symbol]	[Symbol]	LIMIT OF NEW PAVEMENT
[Symbol]	[Symbol]	CONTOUR (MINOR)
[Symbol]	[Symbol]	CONTOUR (MAJOR)
[Symbol]	[Symbol]	SPOT/CURB/WALL ELEVATION
[Symbol]	[Symbol]	MANHOLE
[Symbol]	[Symbol]	CLEANOUT
[Symbol]	[Symbol]	"A" INLET
[Symbol]	[Symbol]	"B" INLET
[Symbol]	[Symbol]	"E" INLET
[Symbol]	[Symbol]	TRENCH DRAIN
[Symbol]	[Symbol]	HEAD WALL
[Symbol]	[Symbol]	FIRE DEPARTMENT CONNECTION
[Symbol]	[Symbol]	FIRE HYDRANT
[Symbol]	[Symbol]	WATER VALVE
[Symbol]	[Symbol]	GAS VALVE
[Symbol]	[Symbol]	BOLLARD
[Symbol]	[Symbol]	LIGHT
[Symbol]	[Symbol]	SIGNAGE
[Symbol]	[Symbol]	SANITARY SEWER PIPE
[Symbol]	[Symbol]	STORM SEWER PIPE
[Symbol]	[Symbol]	WATER PIPE
[Symbol]	[Symbol]	GAS PIPE
[Symbol]	[Symbol]	ELECTRIC LINE
[Symbol]	[Symbol]	TELEPHONE LINE
[Symbol]	[Symbol]	OVERHEAD WIRES
[Symbol]	[Symbol]	CHAIN LINK FENCE AND GATES
[Symbol]	[Symbol]	WOOD/METAL FENCE AND GATES
[Symbol]	[Symbol]	VINYL FENCE AND GATES
[Symbol]	[Symbol]	METAL GUIDE RAIL
[Symbol]	[Symbol]	WOOD GUIDE RAIL
[Symbol]	[Symbol]	RETAINING WALL

LOT 6

LOT 7

LOT 5

REV.	DATE	STATUS	PRPD BY	CHKD BY

WOOD PROJECT No. 3480150439  
 DRAWING: FIGURE B3A

PREPARED/DATE: NS 09/25/18  
 CHECKED/DATE: BOD 09/25/18

**wood.**  
 ENVIRONMENT & INFRASTRUCTURE SOLUTIONS  
 200 AMERICAN METRO BLVD, SUITE 113  
 HAMILTON, NEW JERSEY 08619

**FIGURE B2A**  
 CHROMIUM REMEDY FEATURES RELATIVE  
 TO NJCU REDEVELOPMENT  
 (GRADING AND DRAINAGE)

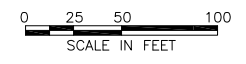
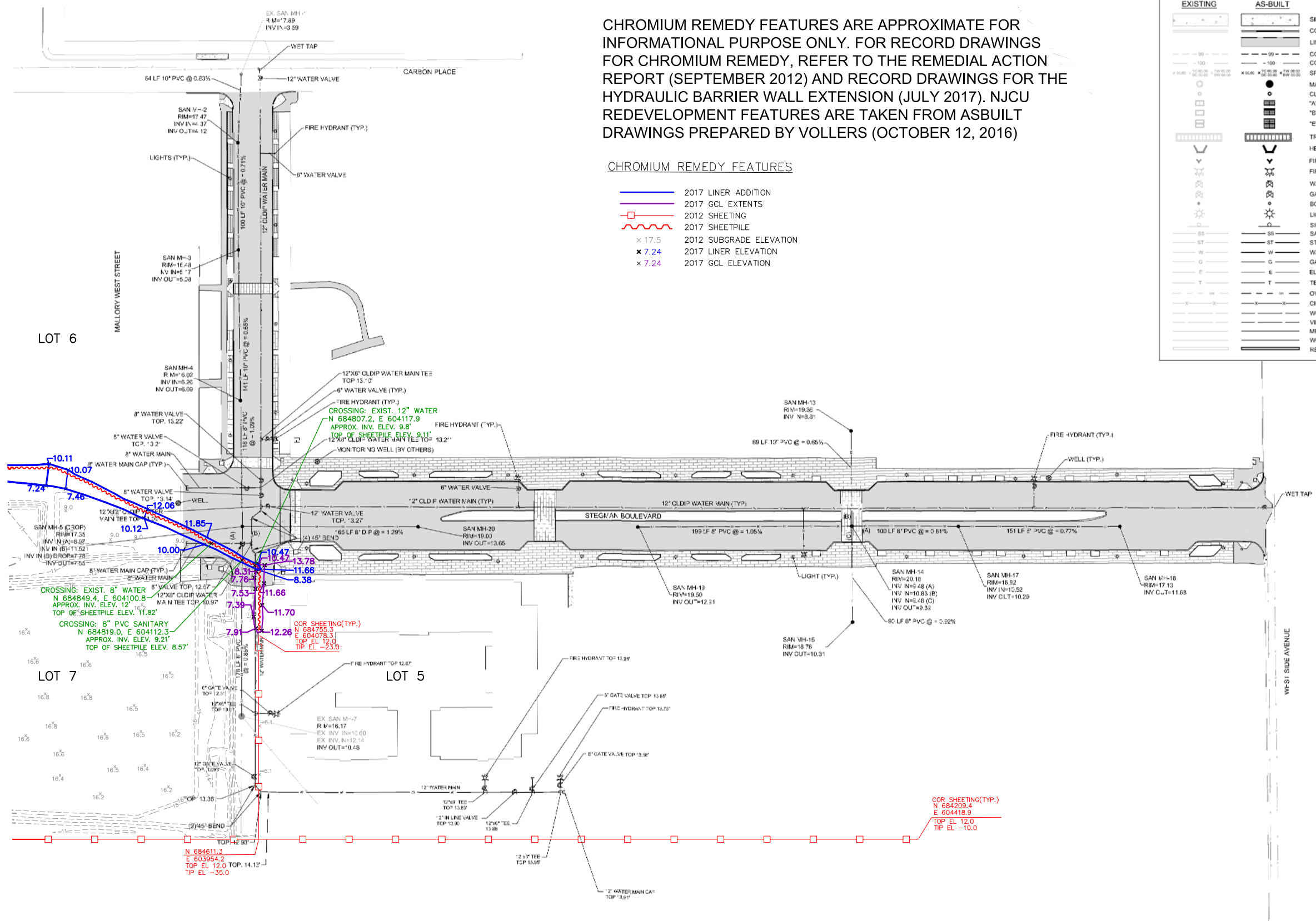
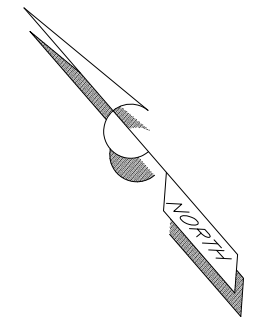
UNLESS OTHERWISE AGREED IN A WRITTEN CONTRACT BETWEEN WOOD AND ITS CLIENT: (1) THIS DOCUMENT CONTAINS INFORMATION, DATA AND DESIGN THAT IS CONFIDENTIAL AND PROPRIETARY TO WOOD AND IS NOT TO BE DISCLOSED, REPRODUCED, COPIED, OR USED FOR ANY OTHER PURPOSE WITHOUT THE WRITTEN CONSENT OF WOOD. (2) WOOD AND ITS CLIENT SHALL BE RESPONSIBLE FOR THE ACCURACY AND COMPLETENESS OF THE INFORMATION, DATA AND DESIGN PROVIDED HEREIN. (3) WOOD AND ITS CLIENT SHALL NOT BE RESPONSIBLE FOR ANY ERRORS, OMISSIONS, OR INADEQUACIES IN THE INFORMATION, DATA AND DESIGN PROVIDED HEREIN. (4) WOOD AND ITS CLIENT SHALL NOT BE RESPONSIBLE FOR ANY CONSEQUENCES ARISING FROM THE USE OF THIS DOCUMENT BY ANY THIRD PARTY AS A PART OF ANY PROJECT. (5) WOOD AND ITS CLIENT SHALL NOT BE RESPONSIBLE FOR ANY CONSEQUENCES ARISING FROM THE USE OF THIS DOCUMENT BY ANY THIRD PARTY AS A PART OF ANY PROJECT.

CHROMIUM REMEDY FEATURES ARE APPROXIMATE FOR INFORMATIONAL PURPOSE ONLY. FOR RECORD DRAWINGS FOR CHROMIUM REMEDY, REFER TO THE REMEDIAL ACTION REPORT (SEPTEMBER 2012) AND RECORD DRAWINGS FOR THE HYDRAULIC BARRIER WALL EXTENSION (JULY 2017). NJCU REDEVELOPMENT FEATURES ARE TAKEN FROM ASBUILT DRAWINGS PREPARED BY VOLLERS (OCTOBER 12, 2016)

- CHROMIUM REMEDY FEATURES**
- 2017 LINER ADDITION
  - 2017 GCL EXTENTS
  - 2012 SHEETING
  - 2017 SHEETPILE
  - x 17.5 2012 SUBGRADE ELEVATION
  - x 7.24 2017 LINER ELEVATION
  - x 7.24 2017 GCL ELEVATION

**LEGEND**

EXISTING	AS-BUILT	
		SIDEWALK
		CONCRETE CURB/ DEP. CURB
		LIMIT OF NEW PAVEMENT
		CONTOUR (MINOR)
		CONTOUR (MAJOR)
		SPOT/CURB/WALL ELEVATION
		MANHOLE
		CLEANOUT
		"A" INLET
		"B" INLET
		"E" INLET
		TRENCH DRAIN
		HEAD WALL
		FIRE DEPARTMENT CONNECTION
		FIRE HYDRANT
		WATER VALVE
		GAS VALVE
		BOLLARD
		LIGHT
		SIGNAGE
		SANITARY SEWER PIPE
		STORM SEWER PIPE
		WATER PIPE
		GAS PIPE
		ELECTRIC LINE
		TELEPHONE LINE
		OVERHEAD WIRES
		CHAIN LINK FENCE AND GATES
		WOOD/METAL FENCE AND GATES
		VINYL FENCE AND GATES
		METAL GUIDE RAIL
		WOOD GUIDE RAIL
		RETAINING WALL



REV.	DATE	STATUS	PRPD BY	CHKD BY

WOOD PROJECT No. 3480150439  
 DRAWING: FIGURE B3B

PREPARED/DATE: NS 09/25/18  
 CHECKED/DATE: BOD 09/25/18

**wood.**  
 ENVIRONMENT & INFRASTRUCTURE SOLUTIONS  
 200 AMERICAN METRO BLVD, SUITE 113  
 HAMILTON, NEW JERSEY 08619

**FIGURE B2B**  
 CHROMIUM REMEDY FEATURES RELATIVE  
 TO NJCU REDEVELOPMENT  
 (WATER AND SANITARY)



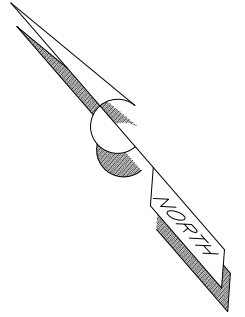
UNLESS OTHERWISE AGREED IN A WRITTEN CONTRACT BETWEEN WOOD AND ITS CLIENT, (1) THIS DOCUMENT CONTAINS INFORMATION, DATA AND DESIGN THAT IS CONFIDENTIAL AND PROPRIETARY TO WOOD AND (2) IT IS TO BE USED ONLY FOR THE PROJECT AND SITE SPECIFICALLY IDENTIFIED HEREIN. ANY OTHER USE OR RELIANCE ON THIS DOCUMENT BY ANY THIRD PARTY IS AT THAT PARTY'S SOLE RISK AND RESPONSIBILITY.

P:\CADD\HONEYWELL\VERSEY CITY\SA 5\SITE 90 & 184\NJCU\Langan File Reviews\Sheetpile Design - 2016 September - Lowereed\Cr Remedy Overlay - Vollers L3.dwg Fri, 28 Sep 2018 - 10:23am namm\l3.dwg

CHROMIUM REMEDY FEATURES ARE APPROXIMATE FOR INFORMATIONAL PURPOSE ONLY. FOR RECORD DRAWINGS FOR CHROMIUM REMEDY, REFER TO THE REMEDIAL ACTION REPORT (SEPTEMBER 2012) AND RECORD DRAWINGS FOR THE HYDRAULIC BARRIER WALL EXTENSION (JULY 2017). NJCU REDEVELOPMENT FEATURES ARE TAKEN FROM ASBUILT DRAWINGS PREPARED BY VOLLERS (OCTOBER 12, 2016)

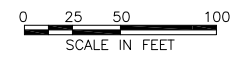
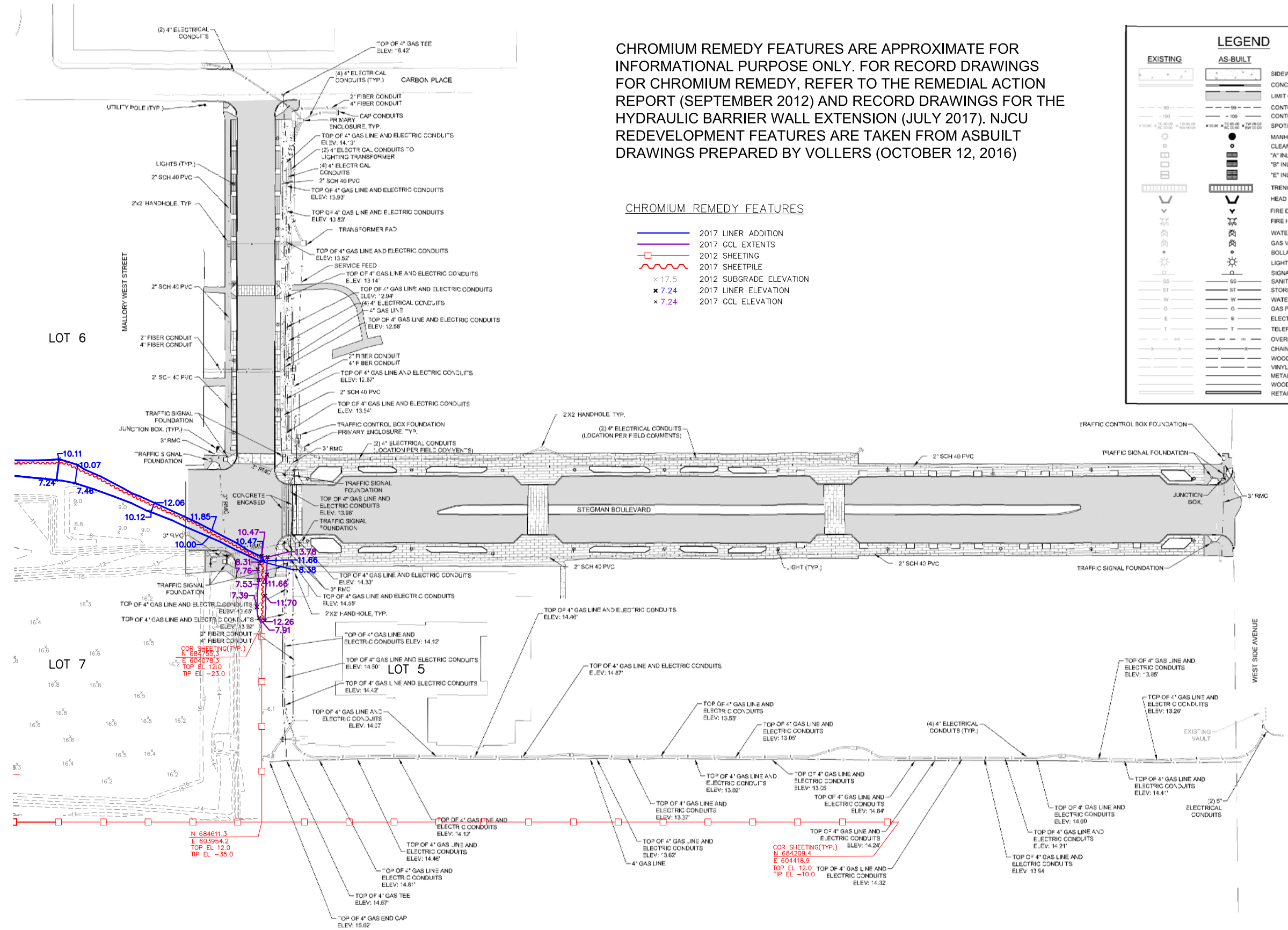
### LEGEND

EXISTING	AS-BUILT	
[Symbol]	[Symbol]	SIDEWALK
[Symbol]	[Symbol]	CONCRETE CURB/ DEP. CURB
[Symbol]	[Symbol]	LIMIT OF NEW PAVEMENT
[Symbol]	[Symbol]	CONTOUR (MINOR)
[Symbol]	[Symbol]	CONTOUR (MAJOR)
[Symbol]	[Symbol]	SPOT/CURB/WALL ELEVATION
[Symbol]	[Symbol]	MANHOLE
[Symbol]	[Symbol]	CLEANOUT
[Symbol]	[Symbol]	"A" INLET
[Symbol]	[Symbol]	"B" INLET
[Symbol]	[Symbol]	"E" INLET
[Symbol]	[Symbol]	TRENCH DRAIN
[Symbol]	[Symbol]	HEAD WALL
[Symbol]	[Symbol]	FIRE DEPARTMENT CONNECTION
[Symbol]	[Symbol]	FIRE HYDRANT
[Symbol]	[Symbol]	WATER VALVE
[Symbol]	[Symbol]	GAS VALVE
[Symbol]	[Symbol]	BOLLARD
[Symbol]	[Symbol]	LIGHT
[Symbol]	[Symbol]	SIGNAGE
[Symbol]	[Symbol]	SANITARY SEWER PIPE
[Symbol]	[Symbol]	STORM SEWER PIPE
[Symbol]	[Symbol]	WATER PIPE
[Symbol]	[Symbol]	GAS PIPE
[Symbol]	[Symbol]	ELECTRIC LINE
[Symbol]	[Symbol]	TELEPHONE LINE
[Symbol]	[Symbol]	OVERHEAD WIRES
[Symbol]	[Symbol]	CHAIN LINK FENCE AND GATES
[Symbol]	[Symbol]	WOOD/METAL FENCE AND GATES
[Symbol]	[Symbol]	VINYL FENCE AND GATES
[Symbol]	[Symbol]	METAL GUIDE RAIL
[Symbol]	[Symbol]	WOOD GUIDE RAIL
[Symbol]	[Symbol]	RETAINING WALL



#### CHROMIUM REMEDY FEATURES

- 2017 LINER ADDITION
- 2017 GCL EXTENTS
- 2012 SHEETING
- 2017 SHEETPILE
- x 17.5 2012 SUBGRADE ELEVATION
- x 7.24 2017 LINER ELEVATION
- x 7.24 2017 GCL ELEVATION



REV.	DATE	STATUS	PRPD BY	CHKD BY

WOOD, PROJECT No. 3480150439  
DRAWING: FIGURE B3C

PREPARED/DATE:  
NS 09/25/18

CHECKED/DATE:  
BOD 09/25/18

**wood.**

ENVIRONMENT & INFRASTRUCTURE SOLUTIONS  
200 AMERICAN METRO BLVD, SUITE 113  
HAMILTON, NEW JERSEY 08619

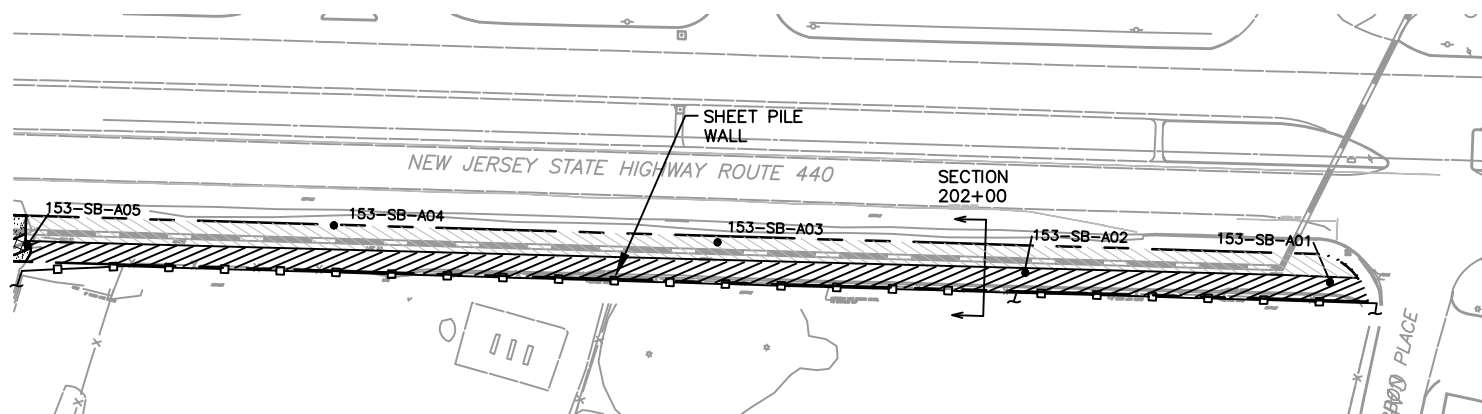
**FIGURE B2C**  
CHROMIUM REMEDY FEATURES RELATIVE  
TO NJCU REDEVELOPMENT  
(ELECTRIC)



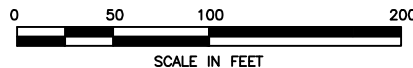
**APPENDIX B-3**

**SITE 153 NORTH CHROMIUM REMEDY  
AS-BUILT FIGURES**

P:\CADD\HONEYWELL\JERSEY CITY\SA 5\FIELD MANUAL\CURRENT DRAWINGS\3480130379-6100-B200-0000.dwg    Fri, 13 Dec 2013 - 11:20am    scott.rudkin

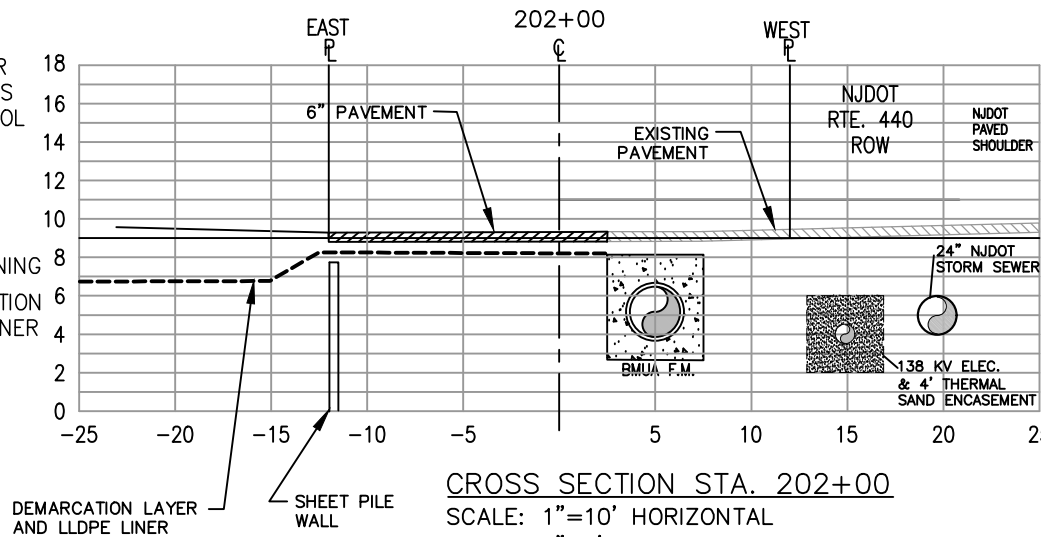


PLAN VIEW



**LEGEND**

- 153-SB-AXX      SAMPLE LOCATION
- CROSS SECTION DIRECTION & LOCATION
- 6" OF ASPHALT PAVEMENT, ORANGE DEMARCATION LAYER AND LLDPE LINER AS ENGINEERING CONTROL
- EXISTING PAVEMENT
- BMUA FORCEMAIN
- PROPERTY LINE
- CENTERLINE STATIONING
- ORANGE DEMARCATION LAYER & LLDPE LINER
- SHEET PILE WALL



CROSS SECTION STA. 202+00

SCALE: 1"=10' HORIZONTAL  
1"=1' VERTICAL

**NOTES:**

1. DEPTH OF THE SHEET PILE WALL, LLDPE LINER, DEMARCATION LAYER AND BMUA FORCEMAIN VARY.
2. THE LLDPE LINER AND DEMARCATION LAYER TERMINATES AT THE CONCRETE ENCASMENT OF THE BMUA FORCEMAIN.
3. THE WIDTH OF THE CONCRETE ENCASMENT AROUND THE BMUA FORCEMAIN VARIES.
4. LIMIT OF LLDPE LINER AND LOCATION OF SHEET PILE WALL ARE BASED ON AS-BUILT DRAWINGS PROVIDED BY KENNON SURVEYING SERVICES, INC. FURTHER DETAILS ON CAP CONSTRUCTION ARE PROVIDED IN THE REMEDIAL ACTION REPORT FOR THE SA-5 NJCU REMEDIATION PROJECT AND EXHIBIT C-2 (A)(1) OF DEED NOTICE.

REV.	DATE	STATUS	DRFT BY	CHKD BY

AMEC PROJ No.: 3480130370  
 DRAWING: 3480130379-6100-B200-0000  
 PREPARED/DATE: STR 02/27/12    CHECKED/DATE: CMR 04/02/12





ENVIRONMENT & INFRASTRUCTURE  
 200 AMERICAN METRO BLVD, SUITE 113  
 HAMILTON, NEW JERSEY 08619

SITE 153 NORTH SEGMENT  
 CHROMIUM REMEDY  
 ENGINEERING CONTROLS  
 SA 5 - SITE 153 FORMER MORRIS CANAL  
 JERSEY CITY, NEW JERSEY  
 BLOCK 21-02: LOT 1

**APPENDIX C**

**DEED NOTICE  
NJCUCOMMERCIAL AOC**

<b>Hudson County Recording Data Page</b> <b>Honorable Diane Coleman</b> <b>Hudson County Register</b>	 <i>Official Use Only - Bc</i> 20180423010043680 1/40 04/23/2018 01:10:20 PM DEED Bk: 9300 Pg: 662 Diane Coleman Hudson County, Register of Deeds Receipt No. 1351216
 <i>Official Use Only - Record &amp; Return</i> Robert A. Wayne, Esq. LeClairRyan 1037 Raymond Boulevard, Sixteenth Floor Newark, New Jersey 07102	<i>Official Use Only - Realty Transfer Fee</i>
<b>Date of Document:</b> March 29, 2018	<b>Type of Document:</b> DEED NOTICE
<b>First Party Name:</b> New Jersey City University 2039 Kennedy Blvd., Jersey City, NJ 07305	<b>Second Party Name:</b> N/A
<b>Additional Parties:</b> N/A	

<b>THE FOLLOWING SECTION IS REQUIRED FOR DEEDS ONLY</b>	
<b>Block:</b> 21902.01 <b>Portions of Block 21902</b>	<b>Lot:</b> 1; Block 21902.01, Lot 1, and Lots 2.01, 13.01, 14.01, 14.02, 14.03
<b>Municipality:</b> Jersey City	
<b>Consideration:</b> None	
<b>Mailing Address of Grantee:</b> N/A	

<b>THE FOLLOWING SECTION IS FOR ORIGINAL MORTGAGE BOOKING &amp; PAGING INFORMATION FOR ASSIGNMENTS, RELEASES, SATISFACTIONS, DISCHARGES &amp; OTHER ORIGINAL MORTGAGE AGREEMENTS ONLY</b>	
<b>Original Book:</b>	<b>Original Page:</b>

**HUDSON COUNTY RECORDING DATA PAGE**  
 Please do not detach this page from the original document as it contains important recording information and is part of the permanent record.

0-410 Pgs #4133 -

**DEED NOTICE**

IN ACCORDANCE WITH N.J.S.A. 58:10B-13, THIS DOCUMENT IS TO BE RECORDED IN THE SAME MANNER AS ARE DEEDS AND OTHER INTERESTS IN REAL PROPERTY.

Prepared by: Robert A. Wayne, Esq.

\_\_\_\_\_

Recorded by:

\_\_\_\_\_  
[Signature, Officer of County Recording Office]

\_\_\_\_\_  
[Print name below signature]

**DEED NOTICE CONCERNING CONTROLS  
INSTALLED TO CONTAIN CHROMIUM  
CONTAMINATION UNDERLYING THE NJCU  
COMMERCIAL AOC**

This Deed Notice is made as of the 29<sup>th</sup> day of March, 2018, by *New Jersey City University, whose post office address is 2039 Kennedy Boulevard, Jersey City, New Jersey 07305*, together with his/her/its/their successors and assigns (collectively "Owner").

1. THE PROPERTY. *New Jersey City University is the owner in fee simple of certain real property designated as Block 21902.03, Lot 1 and portions of Block 21902, Lots 2.01, 13.01, 14.01, 14.02, 14.03; and Block 21902.01, Lot 1 (formerly Block 21902, Lots 14, 13, 2 and 3) on the tax map of the City of Jersey City, Hudson County, New Jersey; the New Jersey Department of Environmental Protection (NJDEP) Program Interest Numbers (PI#s) for the contaminated site which includes this property are Hudson County Chromate Site No. 090 – PI#031779 and Hudson County Chromate Site No 184 – PI#000015, and the property is more particularly described in Exhibit A, which is attached hereto and made a part hereof (the "Property"). Part of the Property is known as the NJCU Commercial Area of Concern (AOC) pursuant to the Amended Consent Decree Regarding Remediation of the New Jersey City University Redevelopment Area ("the Consent Decree") entered by the United States District Court for the District of New Jersey on September 21, 2017, in *Riverkeeper v. Honeywell International Inc.* (ECF No. 1506 in Civ. No. 95-2097). The Consent Decree includes requirements regarding the transfer and use and of the NJCU Commercial AOC. To the*

extent that there is any conflict or inconsistency between the terms of this Deed Notice and the terms of the Consent Decree; the Consent Decree shall govern. To the extent that any action to be taken pursuant to this Deed Notice is in conflict with or inconsistent with the Consent Decree, the Consent Decree shall govern.

## 2. REMEDIATION

- i. The NJDEP Bureau of Case Management (BCM) was the program that was responsible for the oversight of the remediation of the Property. The matter was Case No. Hudson County Chromate Site No 090 (PI#031779) and Hudson County Chromate Site No. 184 (PI#000015).
- ii. N.J.A.C. 7:26C-7 requires the Owner, among other persons, to obtain a Soil Remedial Action Permit for the soil remedial action at the Property. The NJDEP issued a Remedial Action Soil Permit dated May 4, 2012 (Remedial Action Permit # RAP 120001). The permit contains the monitoring, maintenance and biennial certification requirements that apply to the Property.

3. SOIL AND GROUNDWATER CONTAMINATION. Honeywell International Inc. (Honeywell), a corporation in the State of New Jersey whose post office address is 115 Tabor Road, Morris Plains, New Jersey, 07950, has completed construction of remedial actions within the NJCU Commercial AOC to address chromium-related soil and shallow groundwater contamination. A Remedial Action Work Plan was approved by the New Jersey Department of Environmental Protection on July 26, 2007 for the NJCU Commercial AOC. Remedial actions were further provided under the Consent Decree. Under both the Remedial Action Work Plan and the Consent Decree, soil and shallow groundwater contamination remains in the NJCU Commercial AOC which contains contaminants in concentrations that do not allow for the unrestricted use of the NJCU Commercial AOC. This soil and groundwater contamination is described, including the type, concentration and specific location of such contaminants, in Exhibit B, which is attached hereto and made a part hereof. As a result, there is a statutory requirement for this Deed Notice and engineering controls in accordance with N.J.S.A. 58:10B-13. Under the terms of the Consent Decree and this Deed Notice, Honeywell is responsible for monitoring and maintaining the soil and shallow groundwater remediation for the NJCU Commercial AOC in perpetuity or until such time as the NJCU Commercial AOC is further remediated to the level that would permit unrestricted use of the NJCU Commercial AOC.

4. CONSIDERATION. In accordance with the New Jersey Department of Environmental Protection's approval of the remedial action work plan for the remediation of the site which included the NJCU Commercial AOC, and in consideration of the terms and conditions of that approval, and other good and valuable considerations, Owner has agreed to subject the NJCU Commercial AOC to certain statutory and regulatory requirements which impose restrictions upon the use of the NJCU Commercial AOC, to restrict certain uses of the NJCU Commercial AOC, and to provide notice to subsequent owners, lessees and operators of the restrictions and the monitoring, maintenance, and biennial certification requirements outlined in this Deed Notice and required by law, as set forth herein.

5A. RESTRICTED AREAS. Due to the presence of these contaminants, the Owner has agreed, as part of the remedial action for the site, to restrict the use of the NJCU Commercial AOC (also known as the "Restricted Area"); a narrative description of these restrictions, along with the associated monitoring and maintenance activities and the biennial certification requirements are provided in Exhibit C, which is attached hereto and made a part hereof. The Owner has also agreed to maintain a list of these restrictions on site at NJCU Facilities and Construction Management, 2039 Kennedy Boulevard, Jersey City, NJ 07305, for inspection by governmental enforcement officials.

5B. RESTRICTED LAND USES. The following land use restrictions apply to the Restricted Areas:

- i. The Brownfield and Contaminated Site Remediation Act, N.J.S.A. 58:10B-12.g(10), prohibits the conversion of a contaminated site, remediated to non-residential soil remediation standards that require the maintenance of engineering or institutional controls, to a child care facility, or public, private, or charter school without the Department's prior written approval, unless a presumptive remedy is implemented;
- ii. The Brownfield and Contaminated Site Remediation Act, N.J.S.A. 58:10B-12.g(12), prohibits the conversion of a landfill, with gas venting systems and or leachate collection systems, to a single family residence or a child care facility without the Department's prior written approval; and
- iii. The Consent Decree, paragraph 87, prohibits residential, day care, and educational uses, other than administrative, unless further remedial activities are undertaken pursuant to paragraph 77 of the Consent Decree and an Unrestricted Use No Further Action Determination is issued for the Restricted Area by NJDEP.

5C. ENGINEERING CONTROLS. Due to the presence and concentration of these contaminants, the Owner has also agreed, as part of the remedial action for the Property, to the placement of certain engineering controls on the NJCU Commercial AOC. A narrative description of these engineering controls, along with the associated monitoring and maintenance activities and the biennial certification requirements are provided in Exhibit C. Honeywell shall be responsible for monitoring and maintenance of engineering controls and biennial certification requirements.

5D. LONG TERM MONITORING PLAN. Honeywell has prepared a Long Term Monitoring Plan which sets forth requirements for monitoring of the chromium remedial measures including engineering controls within the NJCU Commercial AOC and shallow groundwater, and requirements for notification and reporting pursuant to the Consent Decree, Deed Notice and Soil Remedial Action Permit. A copy of the Long-Term Monitoring Plan is maintained by Honeywell at 115 Tabor Road, Morris Plains, NJ 07950 and by NCJU at 2039 Kennedy Boulevard, Jersey City, NJ 07305.



5E. WORKER TRAINING MANUAL. Honeywell has prepared a Worker Training Manual that shall be used during any ground intrusive work on the Restricted Area. The Worker Training Manual shall be used by the owner, lessees, operators, tenants, and any other entity conducting ground intrusive work within the Restricted Area, in order to protect workers who may be exposed to chromium-impacted soils or groundwater in conjunction with utility or other ground intrusive work on the Restricted Area. The Worker Training Manual identifies health and safety requirements for the protection of personnel and contractors who may perform ground intrusive activities (e.g., digging, drilling, excavation) and provides a basis for worker awareness to inform workers of potential hazards associated with chromium-impacted media. Honeywell and/or the Owner shall make the Worker Training Manual available to lessees, operators, contractors, utility workers, and any other entity that it is known intends to conduct invasive work within the Restricted Area in order to prevent unauthorized disturbance of engineering controls and potential exposure to contaminants. A copy of the Worker Training Manual is available from Honeywell and NJCU.

6A. CHANGE IN OWNERSHIP AND REZONING.

- i. The Owner and the subsequent owners, and lessees shall cause all leases, grants, and other written transfers of an interest in the NJCU Commercial AOC to contain a provision expressly requiring all holders thereof to take the NJCU Commercial AOC subject to the restrictions contained herein and to comply with all, and not to violate any of the conditions of this Deed Notice. Nothing contained in this Paragraph shall be construed as limiting any obligation of any person to provide any notice required by any law, regulation, or order of any governmental authority.
- ii. The Owner, the subsequent owners, and lessees, as applicable, shall provide written notice to the Department of Environmental Protection on a form provided by the Department and available at [www.nj.gov/srp/forms](http://www.nj.gov/srp/forms) within thirty (30) calendar days after the effective date of any conveyance, grant, gift, or other transfer, in whole or in part, of the owner's or lessee's interest in the Restricted Area. Any such conveyance, grant or gift must be consistent with the terms of the Consent Decree.
- iii. The Owner and the subsequent owners shall provide written notice to the Department, on a form available from the Department at [www.nj.gov/srp/forms](http://www.nj.gov/srp/forms), within thirty (30) calendar days after the Owner receives notice of rezoning of the Restricted Area to residential, Owner's petition for rezoning of the NJCU Commercial AOC to residential or filing of any document initiating a rezoning of the NJCU Commercial AOC to residential.

6B. SUCCESSORS AND ASSIGNS. This Deed Notice shall also be binding upon Owner and upon Owner's successors and assigns, and subsequent owners, lessees, and operators, while each is an owner, lessee, or operator of the NJCU Commercial AOC.

## 7A. ALTERATIONS, IMPROVEMENTS, AND DISTURBANCES.

i. The Owner and all subsequent owners and lessees shall notify any person of whom it has knowledge, including, without limitation, tenants, employees of tenants, and contractors, intending to conduct invasive work or excavate within the Restricted Areas, of the nature and location of known contamination in the Restricted Areas, and, of the precautions necessary to protect the engineering controls and minimize potential human exposure to contaminants.

ii. Except as provided in the Consent Decree and in Paragraph 7B, no person shall make, or allow to be made, any alteration, improvement, or disturbance in, to, or about the NJCU Commercial AOC which disturbs any engineering control at the NJCU Commercial AOC without first obtaining a Soil Remedial Action Permit modification pursuant to N.J.A.C. 7:26C-7. Nothing herein shall constitute a waiver of the obligation of any person to comply with all applicable laws and regulations including, without limitation, the applicable rules of the Occupational Safety and Health Administration.

iii. Notwithstanding subparagraph 7A.ii., above, a Soil Remedial Action Permit modification is not required for any alteration, improvement, or disturbance provided that:

(A) Such action is conducted in conformance with the Consent Decree and this Deed Notice;

(B) The Department of Environmental Protection is notified of the activity by calling the DEP Hotline, at 1-877-WARN-DEP or 1-877-927-6337, within twenty-four (24) hours after the beginning of each alteration, improvement, or disturbance;

(C) Honeywell is notified of the activity by calling 855-727-2658 at least 7-business days before the beginning of each alteration, improvement, or disturbance;

(D) Honeywell and/or the owner, lessee or operator restores any disturbance of an engineering control to pre-disturbance conditions, within sixty (60) calendar days after the initiation of the alteration, improvement or disturbance;

(E) All applicable worker health and safety laws and regulations, and the Worker Training Manual are followed during the alteration, improvement, or disturbance, and during the restoration;

(F) Appropriate measures are taken so that human exposure, and exposure of the environment, to contamination in excess of the applicable remediation criteria and standards does not occur; and

(G) The next biennial certification includes a description of the nature of the alteration, improvement, or disturbance, the dates and duration of the alteration,

improvement, or disturbance, the name of key individuals and their affiliations conducting the alteration, improvement, or disturbance, a description of the notice the Owner gave to those persons prior to the disturbance, the amounts of soil generated for disposal, if any, the final disposition and any precautions taken to prevent exposure.

7B. EMERGENCIES. In the event of an emergency which presents, or may present, an unacceptable risk to the public health and safety, or to the environment, or immediate environmental concern (see N.J.S.A. 58:10C-2), any person may temporarily breach any engineering control provided that:

- i. The NJDEP is immediately notified of the emergency, by calling the DEP Hotline at 1-877-WARNDEP or 1-877-927-6337;
- ii. Immediately after notifying NJDEP, Honeywell is notified by calling 855-727-2658;
- iii. If applicable, hire a Licensed Site Remediation Professional (unless the Restricted Area is associated with an unregulated heating oil tank) to respond to the emergency;
- iv. The actual disturbance and the time needed for the disturbance are limited to the minimum reasonably necessary to adequately respond to the emergency;
- v. All measures necessary to limit actual or potential, and present or future risk of exposure to humans or the environment to the contamination are implemented;
- vi. NJDEP is notified when the emergency or immediate environmental concern has ended by calling the DEP Hotline at 1-877-WARNDEP or 1-877-927-6337;
- vii. Honeywell and/or owner is notified when the emergency or immediate environmental concern has ended by calling 855-727-2658;
- viii. Honeywell restores the engineering control to the pre-emergency conditions, as required by the Consent Decree and the Long Term Monitoring Plan, as soon as possible; and
- ix. A written report is submitted to the NJDEP within sixty (60) calendar days after completion of the restoration of the engineering control including: (a) the nature and likely cause of the emergency, (b) the potential discharges of or exposures to contaminants, if any, that may have occurred, (c) the measures that have been taken to mitigate the effects of the emergency on human health and the environment, (d) the measures completed or implemented to restore the engineering control, and (e) the changes to the engineering control or site operation and maintenance plan to prevent recurrence of such conditions in the future.

**8A. MONITORING AND MAINTENANCE OF DEED NOTICE, AND PROTECTIVENESS CERTIFICATION.** The persons in any way responsible, pursuant to the Spill Compensation and Control Act, N.J.S.A. 58:10-23.11a et seq., for the hazardous substances that remain at the NJCU Commercial AOC, the persons responsible for conducting the remediation, Honeywell, the Owner, and the subsequent owners, lessees, and operators, shall monitor and maintain this Deed Notice. The subsequent owners, lessees and operators have this obligation only during their ownership, tenancy, or operation. Honeywell shall certify to the Department on a biennial basis that the remedial action that includes this Deed Notice remains protective of the public health and safety and of the environment. The specific obligations to monitor and maintain the Deed Notice shall include all of the following:

- i. Monitoring and maintaining this Deed Notice according to the requirements in Exhibit C, so that the remedial action that includes the Deed Notice continues to be protective of the public health and safety and of the environment;
- ii. Conducting any additional remedial investigations and implementing any additional remedial actions, that are necessary to correct, mitigate, or abate each problem related to the protectiveness of the remedial action for the NJCU Commercial AOC prior to the date that the Certification is due to the Department pursuant to iii, below, so that the remedial action that includes this Deed Notice remains protective of the public health and safety and of the environment; and
- iii. Certifying to the Department of Environmental Protection as to the continued protectiveness of the remedial action that includes this Deed Notice, on a form provided by the Department consistent with N.J.A.C. 7:26C-1.5, and according to the schedule identified in the Soil Remedial Action Permit.

**8B. MONITORING AND MAINTENANCE OF ENGINEERING CONTROLS, AND PROTECTIVENESS CERTIFICATION.** The persons in any way responsible pursuant to the Spill Compensation and Control Act, N.J.S.A. 58:10-23.11a et seq., for the hazardous substances that remain at the NJCU Commercial AOC, the person responsible for conducting the remediation, Honeywell, and the Owner and subsequent owners, lessees, and operators, shall maintain all engineering controls at the NJCU Commercial AOC. The subsequent owners, lessees and operators have this obligation only during their ownership, tenancy, or operation. Honeywell shall certify to the Department on a biennial basis that the remedial action of which each engineering control is a part remains protective of the public health and safety and of the environment. The specific obligations to monitor and maintain the engineering controls shall include the following:

- i. Monitoring and maintaining each engineering control according to the requirements in Exhibit C, so that the remedial action that includes the engineering control continues to be protective of the public health and safety and of the environment;

ii. Conducting any additional remedial investigations and implement any additional remedial actions, that are necessary to correct, mitigate, or abate each problem related to the protectiveness of the remedial action for the NJCU Commercial AOC prior to the date that the certification is due to the Department pursuant to iii, below, so that the remedial action that includes the engineering control remains protective of the public health and safety and of the environment; and

iii. Certify to the Department of Environmental Protection as to the continued protectiveness of the remedial action that includes the engineering control, on a form provided by the Department consistent with N.J.A.C. 7:26C-1.5, and according to the schedule identified in the Soil Remedial Action Permit.

9. ACCESS. The Owner and the subsequent owners, lessees and operators agree to allow the Department and its agents and representatives access to the NJCU Commercial AOC to inspect and evaluate the continued protectiveness of the remedial action that includes this Deed Notice and to conduct additional remediation to provide for the protection of the public health and safety and of the environment if persons responsible for monitoring and maintaining the protectiveness of the remedial action fail to conduct such remediation pursuant to this Deed Notice as required by law. The Owner and the subsequent owners and lessees shall also cause all leases, subleases, grants, and other written transfers of an interest in the NJCU Commercial AOC to contain a provision expressly requiring that all holders thereof provide such access to the Department.

#### 10. ENFORCEMENT OF VIOLATIONS.

i. This Deed Notice itself is not intended to create any interest in real estate in favor of the Department of Environmental Protection, nor to create a lien against the Property, but merely is intended to provide notice of certain conditions and restrictions on the NJCU Commercial AOC and to reflect the regulatory and statutory obligations imposed as a conditional remedial action for the NJCU Commercial AOC.

ii. The restrictions provided herein may be enforceable by the Department against any person who violates this Deed Notice. To enforce violations of this Deed Notice, the Department may initiate one or more enforcement actions pursuant to N.J.S.A. 58:10-23.11 and N.J.S.A 58:10C, and require additional remediation and assess damages pursuant to N.J.S.A. 58:10-23.11 and N.J.S.A 58:10C.

11. SEVERABILITY. If any court of competent jurisdiction determines that any provision of this Deed Notice requires modification, such provision shall be deemed to have been modified automatically to conform to such requirements. If a court of competent jurisdiction determines that any provision of this Deed Notice is invalid or unenforceable and the provision is of such a nature that it cannot be modified, the provision shall be deemed deleted from this instrument as if the provision had never been included herein. In either case, the remaining provisions of this Deed Notice shall remain in full force and effect.

## 12. MODIFICATION AND TERMINATION OF DEED NOTICE.

i. Any person may request in writing, at any time, that the Department modify this Deed Notice where performance of subsequent remedial actions, a change of conditions at the NJCU Commercial AOC, or the adoption of revised remediation standards suggest that modification of the Deed Notice would be appropriate.

ii. Any person may request in writing, at any time, that the Department terminate this Deed Notice because the conditions which triggered the need for this Deed Notice are no longer applicable.

iii. Any person seeking a modification or termination of this Deed Notice must also have such modification or termination approved by the United States District Court for the District of New Jersey pursuant to the Consent Decree until such time as the Consent Decree terminates with regard to the NJCU Commercial AOC pursuant to paragraph 147 of the Consent Decree.

iv. If the United States District Court for the District of New Jersey and the Department have concluded that this Deed Notice shall be modified or terminated, such modification or termination will only be effective upon the filing of a Termination of Deed Notice, available at N.J.A.C. 7:26C Appendix C, with the office of the Register of Deeds of Hudson County, New Jersey, expressly modifying or terminating this Deed Notice. Within thirty (30) calendar days after the filing of a Termination of Deed Notice, the owner of the Property shall apply to the Department for modification or termination of the Soil Remedial Action Permit pursuant to N.J.A.C. 7:26C-7.

v. This Deed Notice may be modified only if it has first been terminated pursuant to subparagraph 12iv above, and upon filing of a modified Deed Notice, executed by the Owner of the Property, in the office of the Register of Deeds of Hudson County, New Jersey.

13A. EXHIBIT A. Exhibit A includes the following maps of the Property and the vicinity:

i. Exhibit A-1: Vicinity Map - A map that identifies by name, the roads and other important geographical features in the vicinity of the NJCU Commercial AOC;

ii. Exhibit A-2: Metes and Bounds Description of NJCU Commercial AOC - A metes and bounds description of the NJCU Commercial AOC, including reference to tax lot and block numbers for the NJCU Commercial AOC and a Tax Map;

iii. Exhibit A-3: NJCU Commercial AOC Map - A scaled map of the NJCU Commercial AOC, scaled at one inch to 200 feet or less, which includes diagrams of major surface topographical features such as buildings, roads, and parking lots.

13B. EXHIBIT B. Exhibit B includes the following descriptions of the Restricted Areas:

i. Exhibit B-1: Restricted Area Map - A map of the NJCU Commercial AOC that includes, as applicable:

(A) As-built diagrams of each engineering control, including caps, fences, hydraulic barrier walls, ground water monitoring wells, and the ground water pumping system including the trenches and sumps;

(B) As-built diagrams of any buildings, roads, parking lots, utility corridors, and other structures that function as engineering controls; and

(C) Designation of all soil sample locations within the restricted areas that exceed any NJDEP soil standard or criteria that are keyed into one of the tables described in the following paragraph, and shallow groundwater monitoring locations.

ii. Exhibit B-2: Restricted Area Data Table - A table for NJCU Commercial AOC that includes:

(A) Sample location designation from Restricted Area map (Exhibit B-1);

(B) Sample elevation based upon mean sea level;

(C) Name and chemical abstract service registry number of each contaminant with a concentration that exceeds the unrestricted use standard;

(D) The restricted and unrestricted use standards for each contaminant in the table; and

(E) The remaining concentration of each contaminant at each sample location at each elevation.

13C. EXHIBIT C. Exhibit C includes narrative descriptions of the institutional controls and engineering controls as follows:

i. Exhibit C-1: Deed Notice as Institutional Controls: Exhibit C-1 includes a narrative description of the restriction and obligations of this Deed Notice that are in addition to those described above, as follows:

(A) General Description of the Deed Notice:

(1) Description and estimated size of the NJCU Commercial AOC as described above;

(2) Description of the restrictions on the NJCU Commercial AOC by operation of this Deed Notice; and

(3) The objective of the restrictions.

(B) Description of the monitoring necessary to determine whether:

(1) Any disturbances of the soil in the Restricted Areas did or did not result in the unacceptable exposure to the soil contamination;

- (2) There have been any land use changes subsequent to the filing of this Deed Notice or the most recent biennial certification, whichever is more recent;
- (3) The current land use on the NJCU Commercial AOC is consistent with the restrictions in this Deed Notice;
- (4) Any newly promulgated or modified requirements of applicable regulations or laws apply to the NJCU Commercial AOC; and
- (5) Any new standards, regulations, or laws apply to the NJCU Commercial AOC that might necessitate additional sampling in order to evaluate the protectiveness of the remedial action which includes this Deed Notice, and conduct the necessary sampling.

(C) Description of the following items that will be included in the biennial certification:

- (1) A monitoring report that describes the specific activities pursuant to (A) and (B) above, conducted in support of the biennial certification of the protectiveness of the remedial action that includes this Deed Notice;
- (2) Land use at the NJCU Commercial AOC is consistent with the restrictions in this Deed Notice; and
- (3) The remedial action that includes this Deed Notice and the Consent Decree continues to be protective of the public health and safety and of the environment.

ii. Exhibit C-2 Engineering Controls: Clean Fill and Soil Capping System; Underground Containment Walls; Shallow Groundwater Collection and Treatment System.

Exhibit C-2 (series A-C) includes a narrative description of the engineering controls as follows:

- (A) General description of the engineering controls:
  - (1) Description of the engineering controls;
  - (2) The objective of the engineering controls; and
  - (3) How the engineering controls are intended to function.
- (B) Description of the operation and maintenance necessary to ensure that:
  - (1) Periodic inspections of each engineering control are performed in order to determine its integrity, operability, and effectiveness;
  - (2) Each engineering control continues as designed and intended to protect the public health and safety and the environment;
  - (3) Each alteration, excavation or disturbance of any engineering control is timely and appropriately addressed to maintain the integrity of the engineering controls;
  - (4) The engineering controls are being inspected and maintained and their integrity remains so that the remedial action continues to be protective of the public health and safety and of the environment;



(5) A record of the self-inspection dates, name of the inspector, results of the inspection and condition(s) of the engineering controls. Sampling, for example, may be necessary if it is not possible to visually evaluate the integrity/performance of the engineering controls; and

(6) Any new standards, regulations, or laws that apply to the NJCU Commercial AOC and necessitate additional sampling in order to evaluate the protectiveness of the remedial action (including this Deed Notice), are followed and that any necessary sampling is conducted.

(C) Description of the following items that will be included in the biennial certification:

(1) A monitoring report that describes the specific activities, pursuant to (A) and (B), above, conducted in support of the biennial certification of the protectiveness of the remedial action that includes this Deed Notice and the Consent Decree;

(2) The engineering controls continue to operate as designed; and

(3) The remedial action that includes the engineering controls continues to be protective of the public health and safety and of the environment.

**EXHIBIT A**

**A-1 Vicinity Map**

**A-2A Metes and Bounds Description of NJCU Commercial AOC**

**A-2B Tax Map**

**A-3 NJCU Commercial AOC Map**

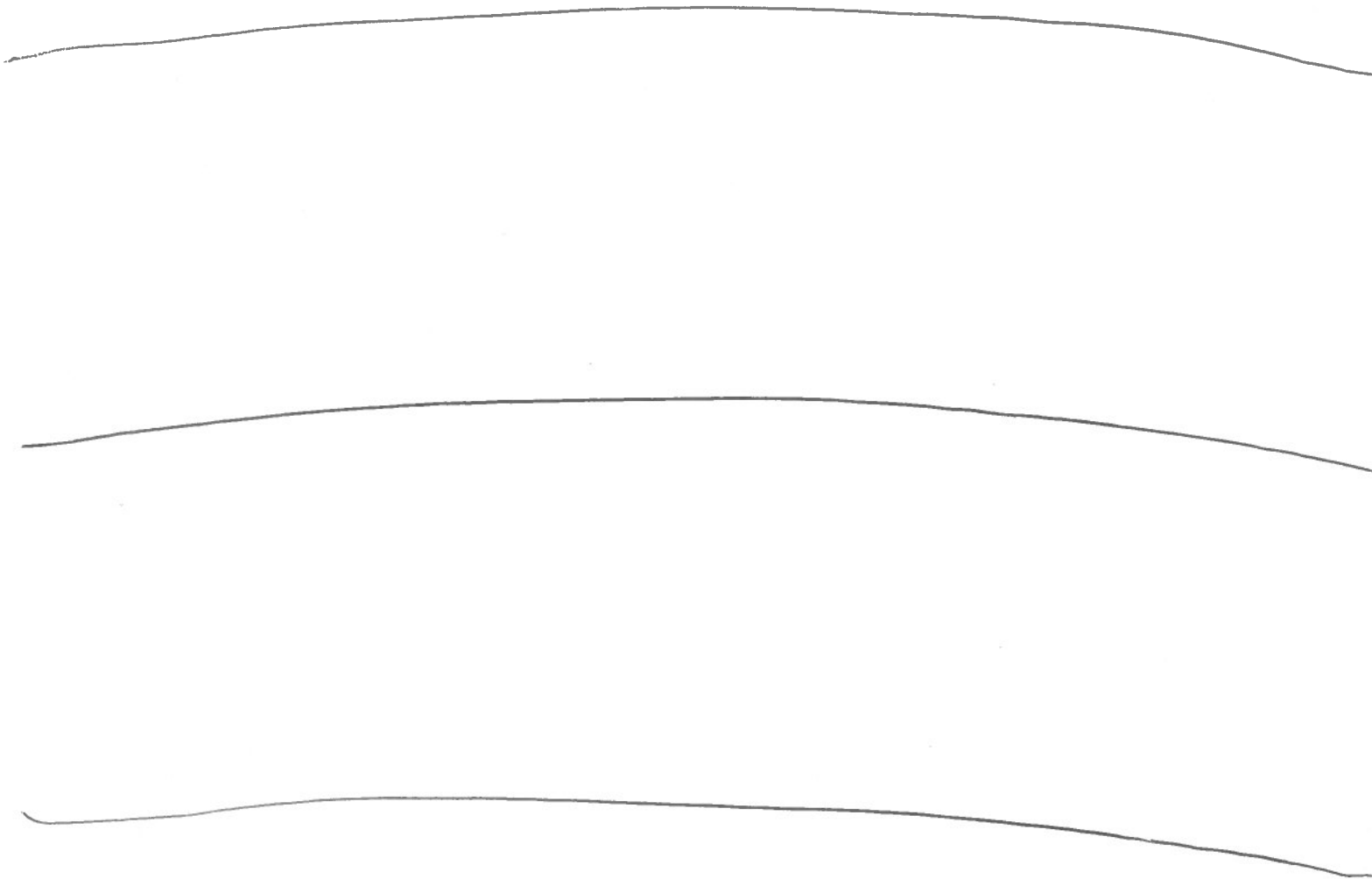
*Block 21902.03, Lot 1*

*Portions of Block 21902, Lots 2.01, 13.01, 14.01, 14.02, 14.03; Block 21902.01, Lot 1  
(formerly Block 21902, Lots 14, 13 and 2)*

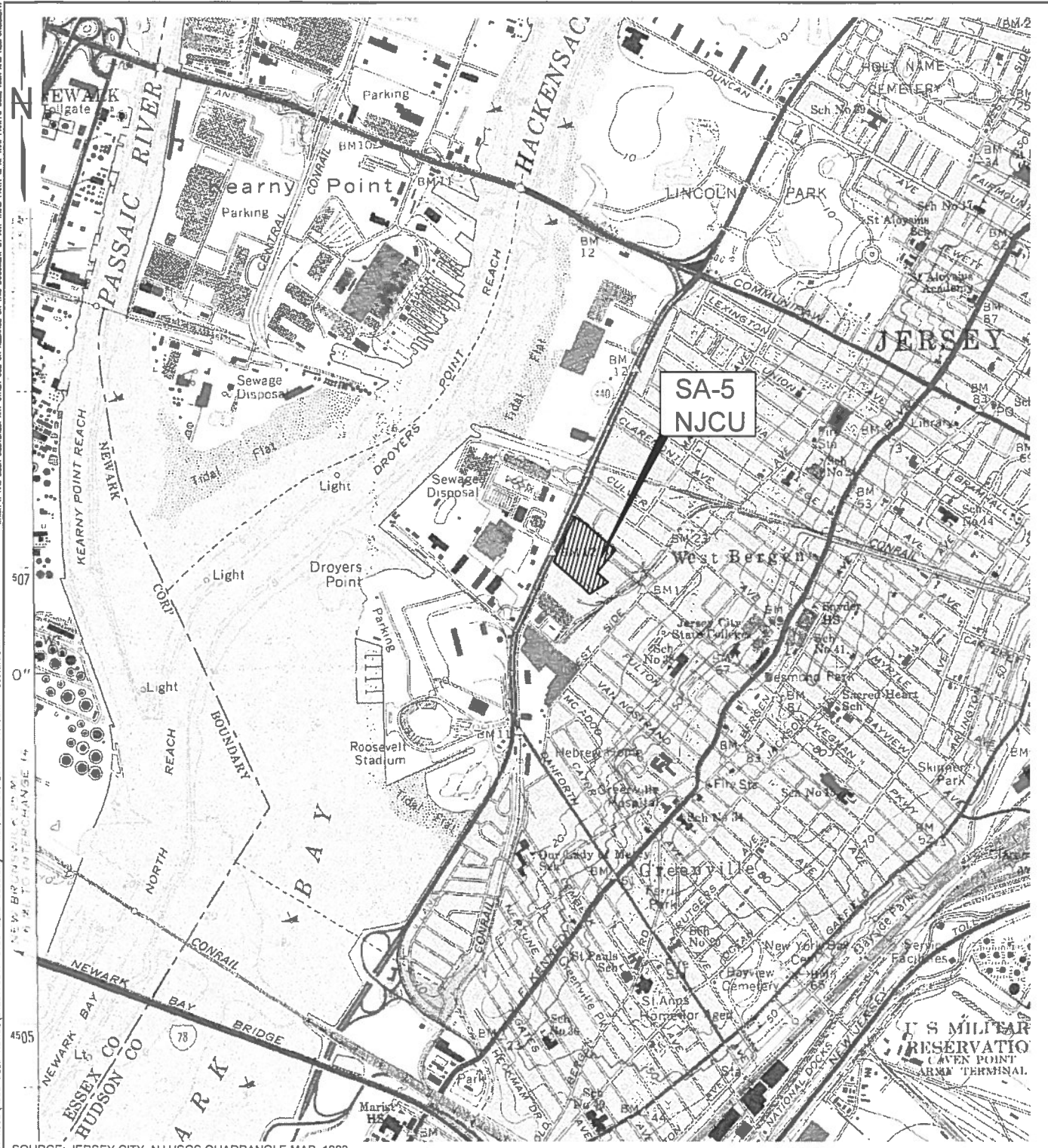
*City of Jersey City, New Jersey*

Exhibit Figure A-1 Vicinity Map consists of a road map for the vicinity of the NJCU Commercial AOC. Exhibit Figure A-2A consists of the metes and bounds description of the NJCU Commercial AOC. Exhibit Figure A-2B consists of a tax map for the Property. Exhibit Figure A-3 NJCU Commercial AOC Map consists of a figure indicating major surface features and engineering controls for the NJCU Commercial AOC.

**Exhibit Figure A-1  
Site Vicinity Map**



P:\CAD\HONEYWELL\JERSEY CITY\SA 5\SITE 90 & 184\NACU\NACU DEED NOTICE\3480170547-6100-SLMO-0000.dwg Mon, 30 Oct 2017 - 11:13am scott.rubin  
 NEW JERSEY DEPARTMENT OF TREASURY AND BUREAU OF REVENUE HAS REVIEWED THIS MAP AND HAS FOUND IT TO BE CORRECT AND ACCURATE. THE USER OF THIS MAP ASSUMES ALL LIABILITY FOR THE USE OF THIS MAP AND HAS AGREED TO HOLD THE STATE OF NEW JERSEY HARMLESS FROM ANY AND ALL CLAIMS, DAMAGES, LOSSES AND EXPENSES, INCLUDING REASONABLE ATTORNEY'S FEES, THAT MAY BE INCURRED BY ANY PARTY AS A RESULT OF THE USER'S USE OF THIS MAP. THE USER OF THIS MAP ASSUMES ALL LIABILITY FOR THE USE OF THIS MAP AND HAS AGREED TO HOLD THE STATE OF NEW JERSEY HARMLESS FROM ANY AND ALL CLAIMS, DAMAGES, LOSSES AND EXPENSES, INCLUDING REASONABLE ATTORNEY'S FEES, THAT MAY BE INCURRED BY ANY PARTY AS A RESULT OF THE USER'S USE OF THIS MAP.



SOURCE: JERSEY CITY, NJ USGS QUADRANGLE MAP, 1983



Amec Foster Wheeler PROJECT No. 3480170547 DRAWING: 3480170547-6100-SLMO-0000	
PREPARED/DATE: STR 10/24/17	CHECKED/DATE: JH 10/26/17

amec foster wheeler   
 ENVIRONMENT & INFRASTRUCTURE, Inc.  
 200 AMERICAN METRO BLVD, SUITE 113  
 HAMILTON, NEW JERSEY 08619

**EXHIBIT A-1**  
 VICINITY MAP  
 DEED NOTICE  
 SA-5 NJCU COMMERCIAL AOC  
 JERSEY CITY, NEW JERSEY

**Exhibit A-2**  
**Metes and Bounds Description of NJCU Commercial AOC**  
**Block 21902.03, Lot 1**  
**Portions of Block 21902, Lots 2.01, 13.01, 14.01, 14.02, 14.03; Block 21902.01, Lot 1**  
**(formerly Block 21902, Lots 14, 13 and 2)**  
**City of Jersey City, New Jersey**

*The NJCU Commercial AOC is identified as Block 21902.03, Lot 1 and portions of Block 21902, Lots 2.01, 13.01, 14.01, 14.02, & 14.03; and Block 21902.01, Lot 1; the property being presently owned by New Jersey City University. A copy of the current tax map showing the Property is included as Exhibit Figure A-2B.*

Metes and Bounds Description of NJCU Commercial AOC:

All that certain lot, tract or parcel of land situate, lying and being in the City of Jersey City, in the County of Hudson and the State of New Jersey, and being a portion of Lots 2.01, 13.01, 14.01, 14.02 and 14.03 in Block 21902, a portion of Lot 1 in Block 21902.01, and all of Lot 1 in Block 21902.03, as shown on a map entitled "New Jersey City University West Campus, Block No. 21902, Lot Nos. 2-5, 7-10 & 12-14, City Of Jersey City, Hudson County, New Jersey, Major Subdivision Plan Of Block 21902", prepared by Langan Engineering & Environmental Services, Inc., dated July 27, 2016, filed in the Hudson County Clerk's office on December 27, 2016 as filed map No. 2716, and being more particularly bounded and described as follows, to wit:

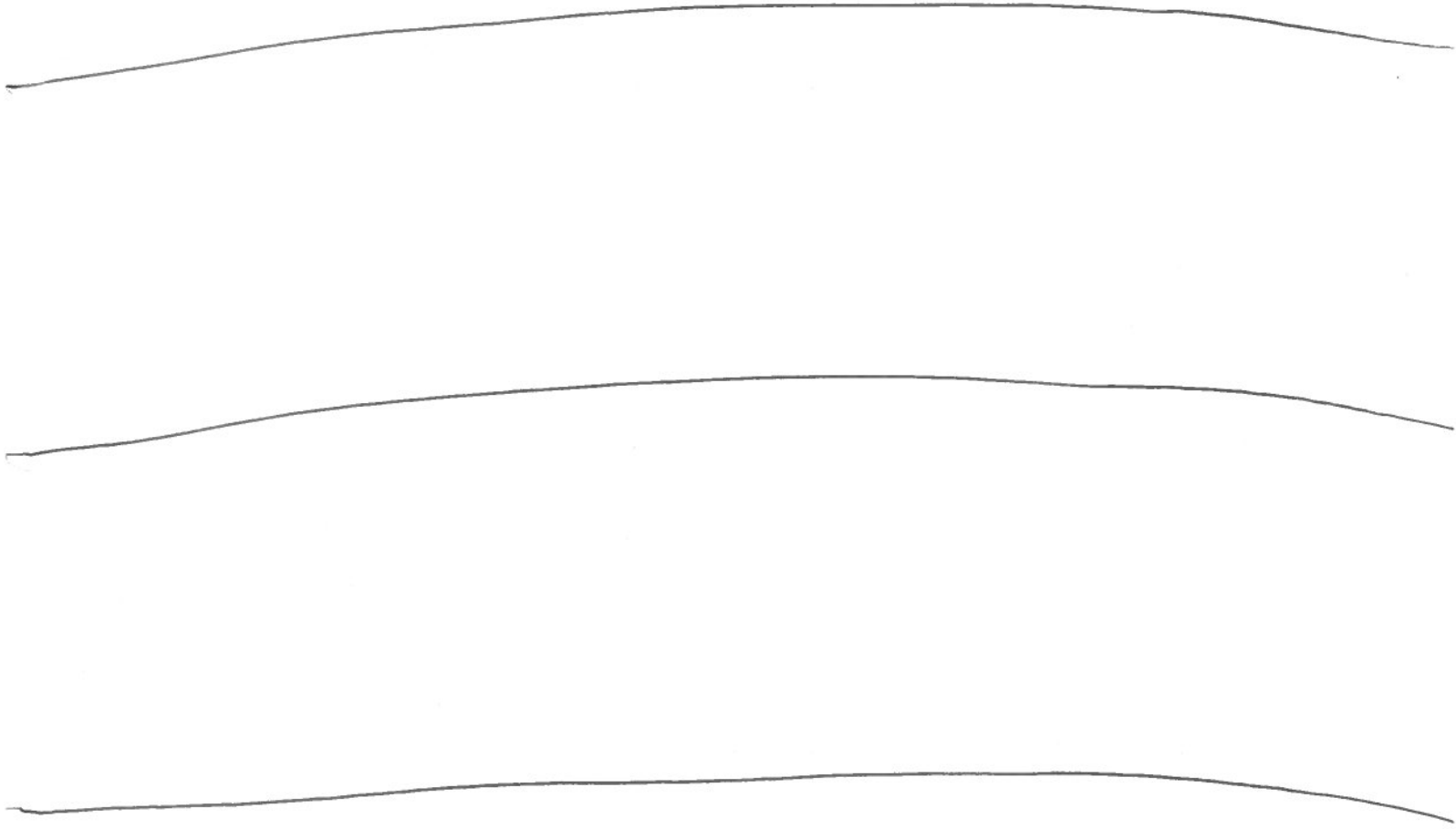
**BEGINNING** at the intersection of the Easterly line of Block 21902 Lot 1, with the division line between Block 26101 Lot 1 and Block 21902 Lot 2.01, and running; thence –

Along the easterly line of Block 21902 Lot 1, the following three (3) courses:

1. **N 24° 45' 41" E, 52.05 feet**, thence –
2. **N 49° 07' 19" W, 5.39 feet**, thence –
3. **N 24° 48' 01" E, 466.43 feet**, to the intersection of the same with the outside northerly edge of a sheet piling wall, as shown on a map entitled "As-Built Survey "Sub-Grade" Block 1286.5, Lot 1 & Block 1286, Lot 5, Jersey City, New Jersey, Honeywell Site ID 37288, 37811 & 37460", prepared by KSS Kennon Surveying Services Inc., dated January 13, 2012, thence –
4. **S 49° 17' 03" E, 442.68 feet**, running through the aforementioned Block 21902 Lot 2.01 and beyond, through Block 21902.01 Lot 1 and beyond, through Block 21902 Lot 14.03, along the said outside northerly edge and beyond, to the projected intersection of same with the northward projection of the easterly outside edge of another sheet pile wall as shown on the aforesaid As-Built Survey, thence –
5. **S 40° 45' 18" W, 499.44 feet**, running through said Lot 14.03 and beyond, through Block 21902 Lots 14.01, 14.02 and 13.01, along said projection of the easterly outside sheet pile wall edge and beyond, along the outside easterly edge of said sheet pile wall, to the division line between Block 26101 Lot 1, and Block 21902 Lot 13.01, thence –
6. **N 49° 07' 19" W, 294.74 feet** along the aforesaid division line and beyond, along the division line between said Block 26101 Lot 1, and Block 21902.03 Lot 1 and beyond, along the division line between said Block 26101 Lot 1, and Block 21902 Lot 2.01, to the Point and Place of **BEGINNING**.

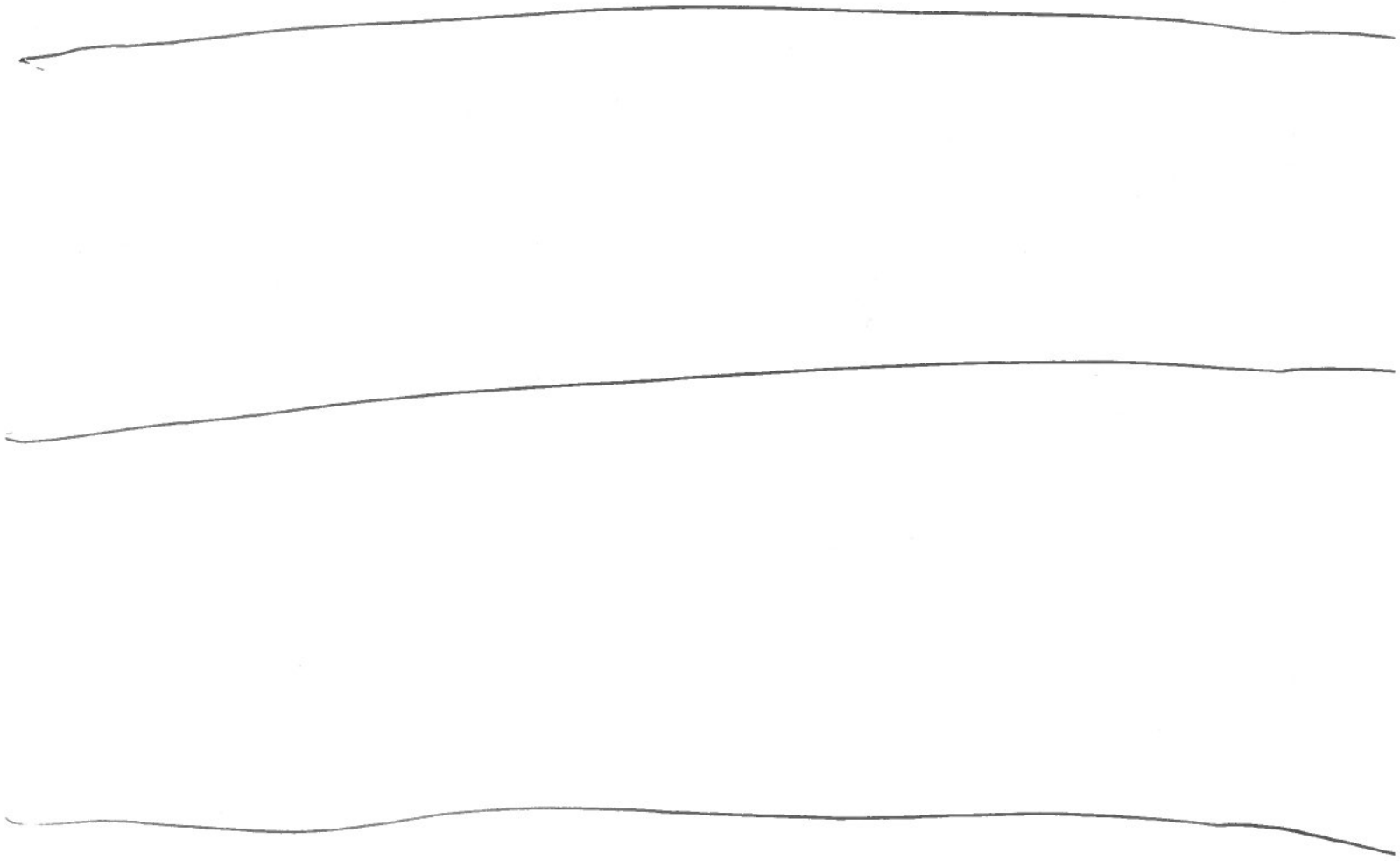
**CONTAINING: 185,047 square feet** of land more or less/or **4.248 acres** of land more or less.

**Exhibit Figure A-2B  
Tax Map**





**Exhibit Figure A-3  
NJCU Commercial AOC Property Map**







## **EXHIBIT B**

### **Exhibit B-1A&B: Restricted Area Maps**

### **Exhibit B-2: Restricted Area Data Table**

*Block 21902.03, Lot 1*

*Portions of Block 21902, Lots 2.01, 13.01, 14.01, 14.02, 14.03; Block 21902.01, Lot 1  
(formerly Block 21902, Lots 14, 13 and 2)*

*City of Jersey City, New Jersey*

Exhibit B-1 Restricted Area Maps: Figure B-1A(1) (Engineering Controls), Figure B-1A(2) (Engineering Controls Cap Cross Sections) and Figure B-1B (Soil and Shallow Groundwater Monitoring Locations).

Exhibit B-2 Restricted Area Data Table: indicates soil sample locations with concentrations remaining above the NJDEP Soil Cleanup Criteria.

#### ***Restricted Area Map Notes:***

*Figures B-1A(1) and (2) indicate the engineering controls for soils (cap). For soils with hexavalent chromium concentrations above 20 mg/kg, the engineering controls include a capping system consisting of impervious geo-membrane liner; geo-composite drainage layer; and clean soil cover with minimum 12 inches thickness in areas where buildings or pavement are proposed; and 36-inches thickness in areas where the planting of trees and bushes is proposed and a minimum 24-inches thickness in areas where other vegetation is proposed.*

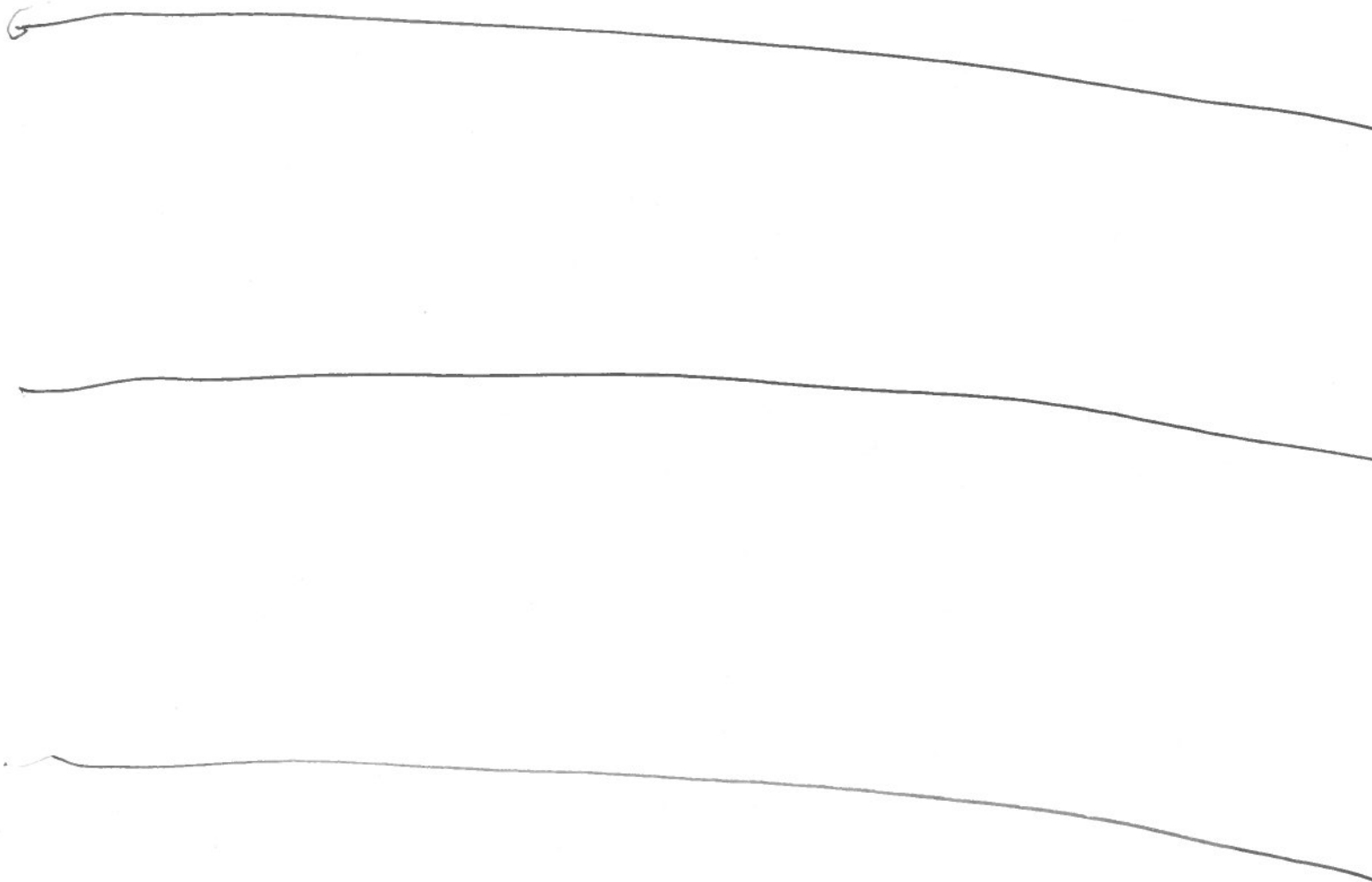
*Figures B-1A(1) and (2) also indicate engineering controls for shallow groundwater. The shallow groundwater engineering controls include underground barrier walls and a system of wells, pumps and piping for the collection and treatment of shallow groundwater from the NJCU Commercial AOC.*

*Monitoring requirements for the engineering controls are set forth in the Long Term Monitoring Plan. Additional shallow groundwater monitoring requirements will be set forth in the Shallow Groundwater Document that will be incorporated into the Long Term Monitoring Plan.*







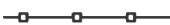
*Figure B-1B indicates soil sample locations with concentrations above the NJDEP Soil Cleanup Criteria. This soil contaminant of concern is hexavalent chromium above the NJDEP soil cleanup criteria of 20 mg/kg.*

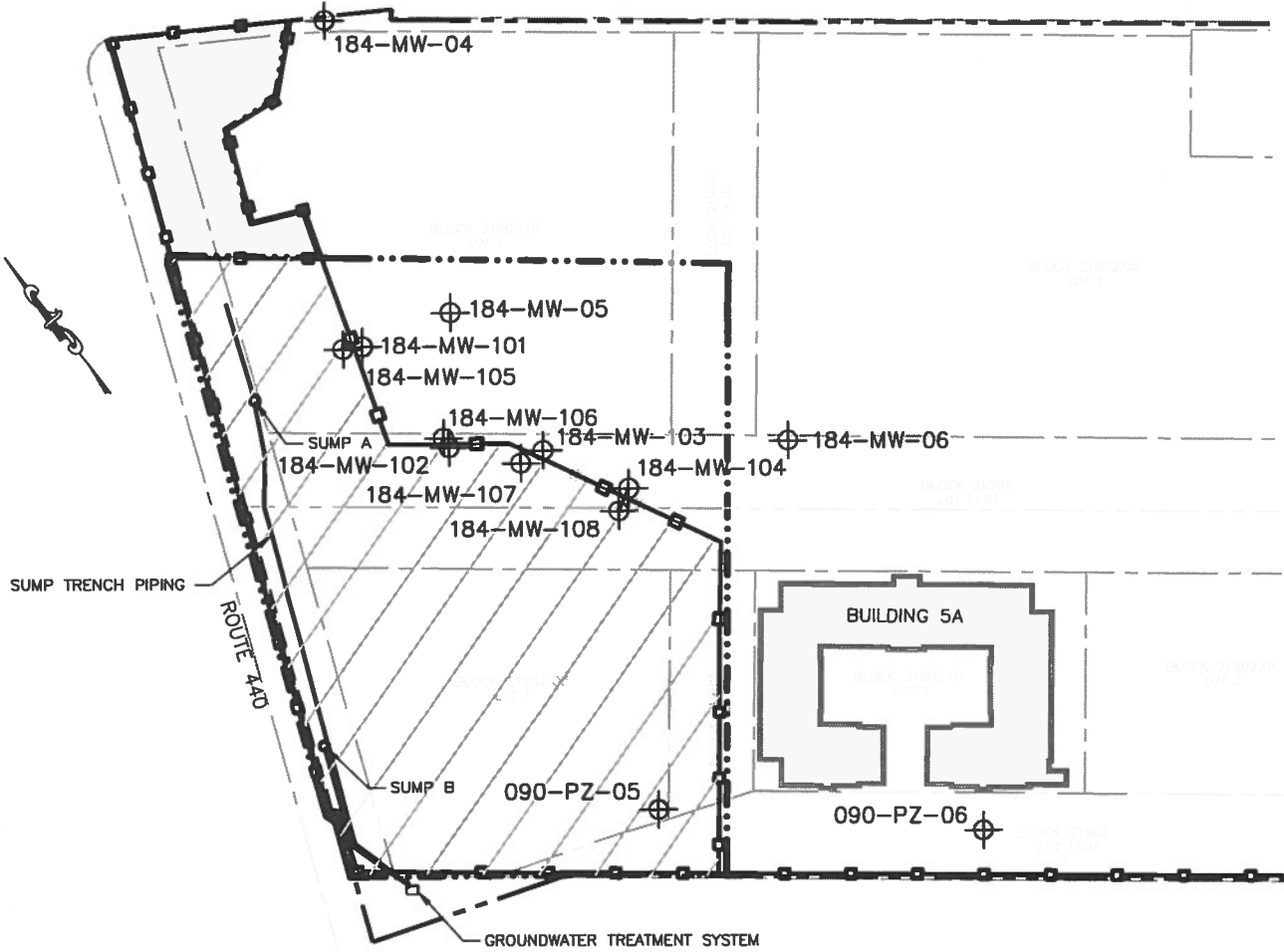
*Figure B-1B also indicates shallow groundwater monitoring locations. The groundwater contaminant of concern is total chromium above the NJDEP groundwater quality standard of 70µg/L.*

**Exhibit Figure B-1A**  
**Exhibit B-1A(1): Soil and Shallow Groundwater Engineering Controls Plan**  
**Exhibit B-1A(2): Soil and Shallow Groundwater Engineering Controls Cap Cross**  
**Sections**

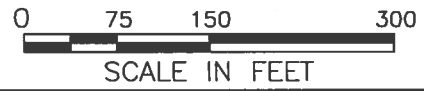


UNLESS OTHERWISE NOTED IN A WRITTEN CONTRACT BETWEEN AMEC FOSTER WHEELER AND ITS CLIENT, THIS DOCUMENT CONTAINS PROPRIETARY, DATA AND DESIGN THAT IS CONFIDENTIAL AND NOT BE LOANED, REPRODUCED, COPIED, REPRODUCED, OR DISCLOSED TO ANY OTHER PARTY WITHOUT THE WRITTEN CONSENT OF AMEC FOSTER WHEELER. THE INFORMATION CONTAINED HEREIN IS THE PROPERTY OF AMEC FOSTER WHEELER AND IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF AMEC FOSTER WHEELER.

- LEGEND:**
-  EXISTING MONITORING WELL
  -  PIEZOMETER
  -  CAP AREA
  -  SITE BOUNDARY SA-5 NJCU
  -  SITE BOUNDARY - SITE 184 & SITE 090
  -  EXTENT OF COMMERCIAL AOC
  -  SHEET PILE WALL



SOURCE: HISTORIC SOIL DATA - DRAFT RIR STUDY AREA 5 (TETRA TECH NUS, NOV. 1999), RIR ADDENDUM (TETRA TECH NUS, OCT. 2004).  
 BASEMAP: PHASE I CONCEPT PLAN, LANGAN 2 MARCH 2007.  
 UTILITIES NOT SHOWN.



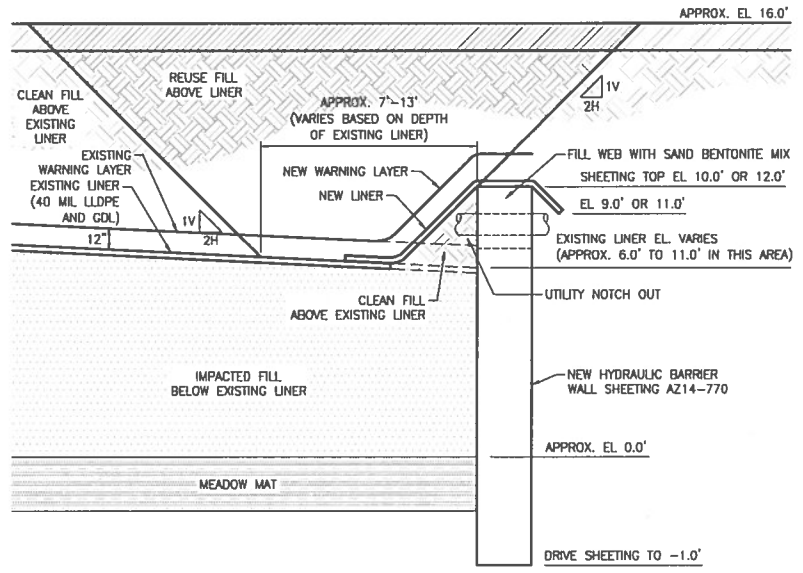
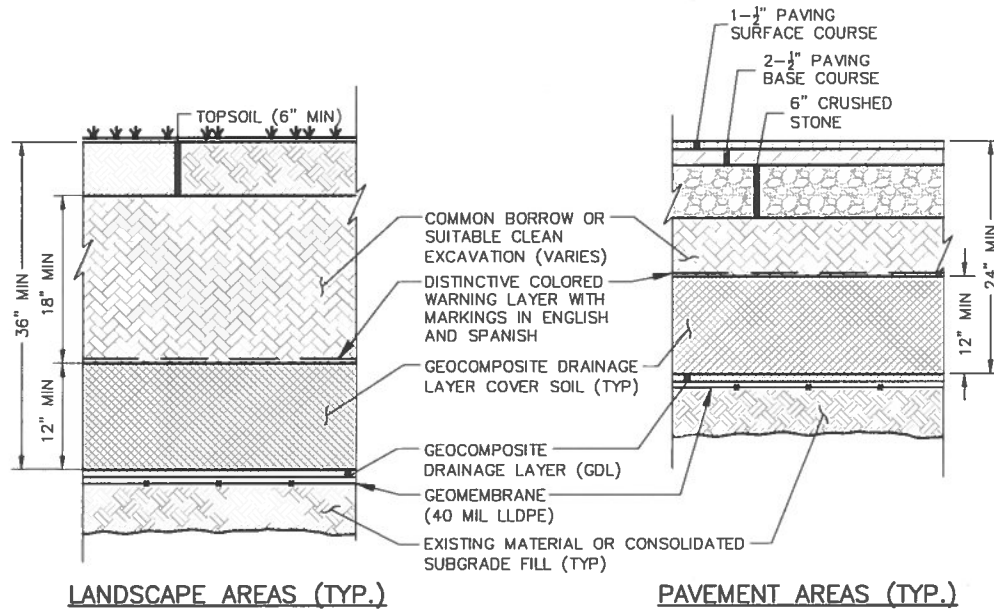
REV.	DATE	STATUS	DRAWN BY	CHECKED BY

Amec Foster Wheeler PROJECT No. 3480170547  
 DRAWING: 3480170547-6100-ECPO-0001  
 PREPARED/DATE: STR 10/24/17  
 CHECKED/DATE: JH 10/26/17

amec foster wheeler   
 ENVIRONMENT & INFRASTRUCTURE, Inc.  
 200 AMERICAN METRO BLVD SUITE 113  
 HAMILTON, NEW JERSEY 08619

**EXHIBIT B-1A(1)**  
 ENGINEERING CONTROLS PLAN  
 DEED NOTICE  
 SA-5 NJCU SITE COMMERCIAL AOC  
 JERSEY CITY, NEW JERSEY

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**NOTE:**

- FOR FURTHER DETAILS REGARDING ENGINEERING CONTROLS, REFER TO THE 100% CHROMIUM REMEDY DESIGN (JUNE 2010); RECORD INFORMATION IN THE REMEDIAL ACTION REPORT (SEPTEMBER 2012); AND RECORD DRAWING FOR THE HYDRAULIC BARRIER WALL EXTENSION (DATED JULY 28, 2017).

REV.	DATE	STATUS	DRY BY	CRD BY

Amec Foster Wheeler PROJECT No. J480150481  
 DRAWING: EXHIBIT B-1A(2)

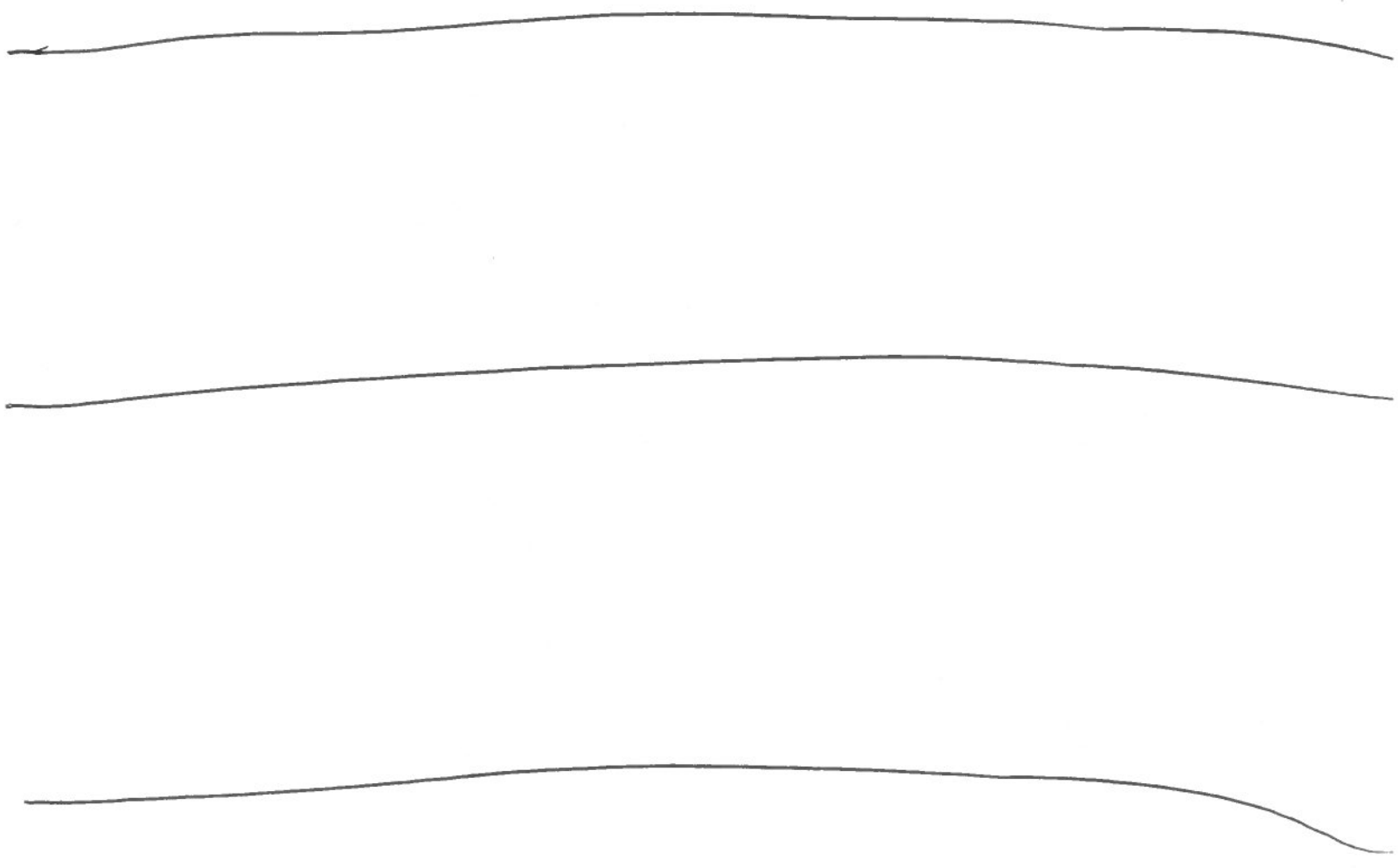
PREPARED/DATE: SPM 7/13/17  
 CHECKED/DATE: JH 7/13/17

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 HAMILTON, NEW JERSEY 08610

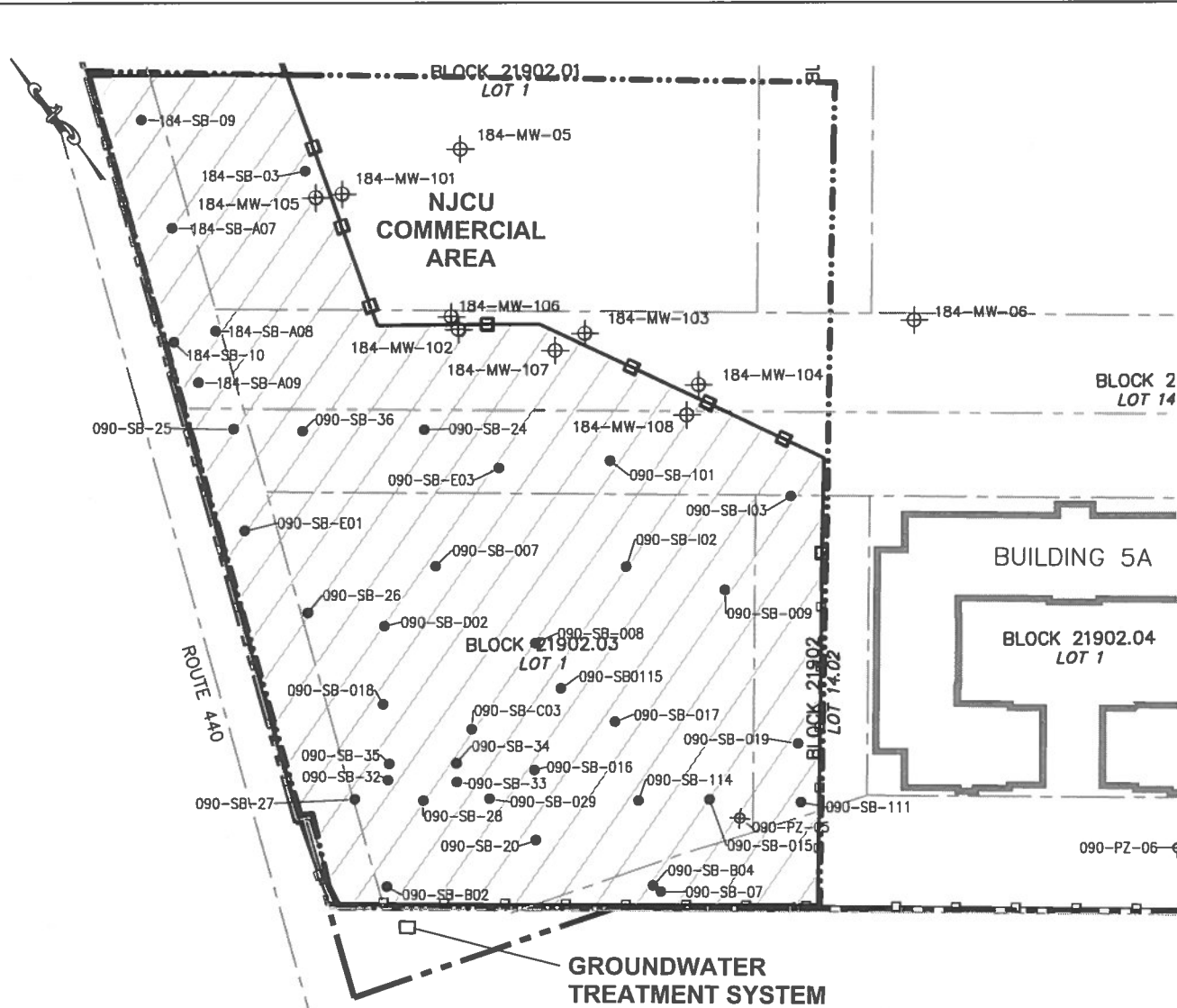
**EXHIBIT B-1A(2)**  
 ENGINEERING CONTROL CROSS-SECTIONS  
 DEED NOTICE  
 SA-5 NJCU SITE COMMERCIAL AOC  
 JERSEY CITY, NEW JERSEY



**Exhibit Figure B-1B**  
**Soil Sample Locations Above NJDEP Standards or Criteria**  
**and Shallow Groundwater Monitoring Locations**



1. THE NJCU COMMERCIAL AOC IS LOCATED ON A PORTION OF BLOCK 21902, LOTS 2, 14 AND 13; FORMERLY BLOCK 1286.5 LOT 1 AND BLOCK 1286, LOTS 5 AND 6D RESPECTIVELY.  
 2. MONITORING WELL 184-MW-04 NOT SHOWN. REFER TO EXHIBIT FIGURE B-1A(1) FOR ALL MONITORING WELL LOCATIONS.



- LEGEND:**
- SOIL SAMPLE LOCATION
  - ⊕ EXISTING MONITORING WELL
  - ⊕ PIEZOMETER
  - ▨ CAP AREA
  - SITE BOUNDARY SA-5 NJCU
  - SITE BOUNDARY - SITE 184 & SITE 090
  - ⋯ EXTENT OF COMMERCIAL AOC
  - SHEET PILE WALL

- NOTES:**
1. THE NJCU COMMERCIAL AOC IS LOCATED ON A PORTION OF BLOCK 21902, LOTS 2, 14 AND 13; FORMERLY BLOCK 1286.5 LOT 1 AND BLOCK 1286, LOTS 5 AND 6D RESPECTIVELY.
  2. MONITORING WELL 184-MW-04 NOT SHOWN. REFER TO EXHIBIT FIGURE B-1A(1) FOR ALL MONITORING WELL LOCATIONS.


SOURCE: HISTORIC SOIL DATA - DRAFT RIR STUDY AREA 5 (TETRA TECH NUS, NOV. 1999), RIR ADDENDUM (TETRA TECH NUS, OCT. 2004).  
 BASEMAP: PHASE I CONCEPT PLAN, LANGAN 2 MARCH 2007.  
 UTILITIES NOT SHOWN.



REV.	DATE	STATUS	DRN BY	CHK BY

Amec Foster Wheeler PROJECT No. 3480170547  
 DRAWING: 3480170547-6100-SSLM-0000

PREPARED/DATE: STR 10/25/17  
 CHECKED/DATE: JH 10/26/17

amec foster wheeler   
 ENVIRONMENT & INFRASTRUCTURE, Inc.  
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**EXHIBIT B-1B**  
 SOIL SAMPLE LOCATIONS AND SHALLOW  
 GROUNDWATER MONITORING LOCATIONS  
 DEED NOTICE  
 SA-5 NJCU COMMERCIAL AOC  
 JERSEY CITY, NEW JERSEY

**Exhibit B-2:  
Table B-2 Soil Sample Results Above NJDEP Standards or Criteria**

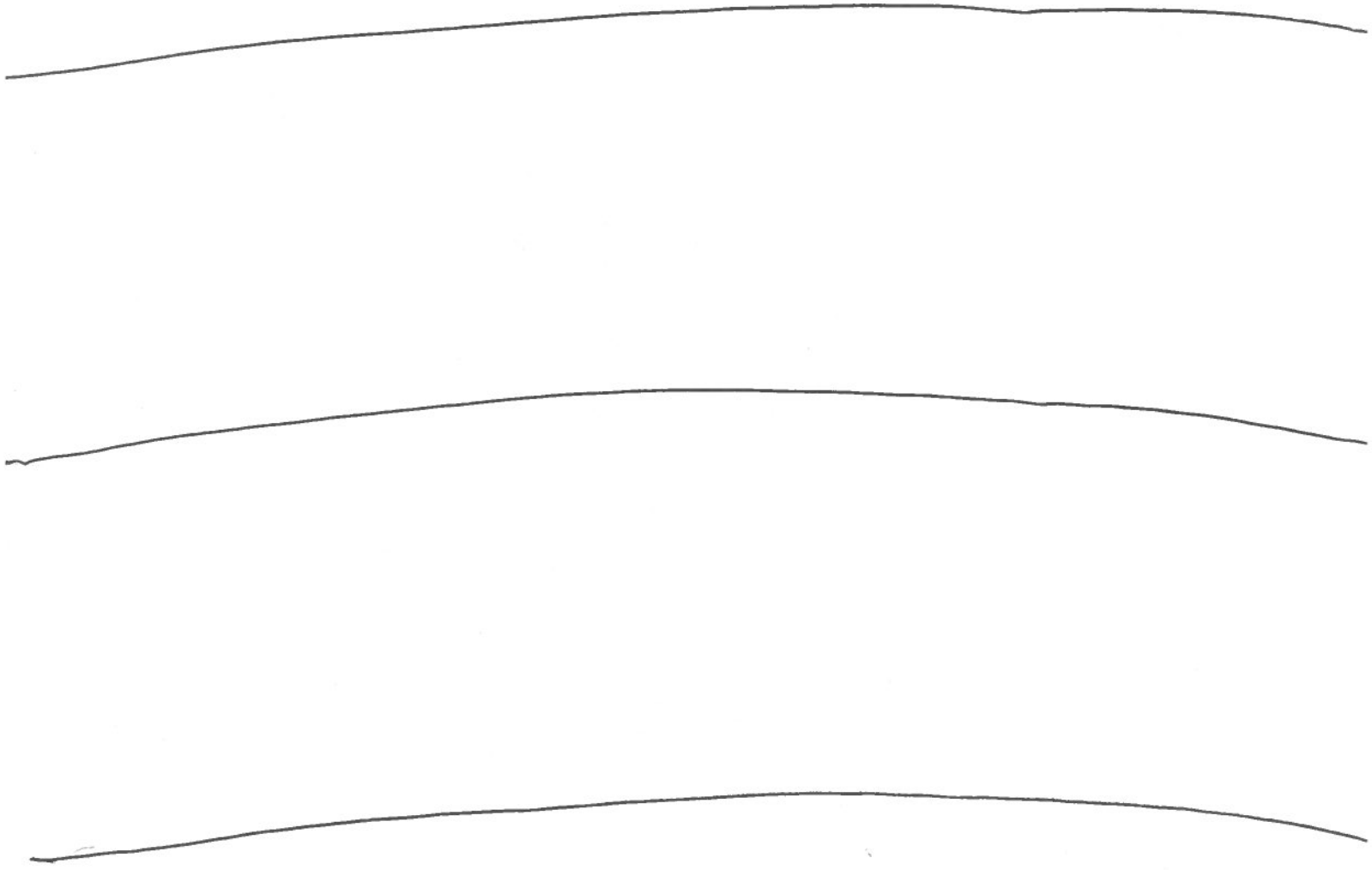
The table area is completely redacted with three thick, hand-drawn black wavy lines that span the width of the page.

EXHIBIT B-2  
RESTRICTED AREA DATA TABLE  
STUDY AREA 5 - NJCU PROPERTY COMMERCIAL AOC  
JERSEY CITY, NEW JERSEY

Location ID	Field Sample ID <sup>(1)</sup>	Sample Elevation (feet above mean sea level)	Parameter Name	Date Sampled	Chemical Abstract Service Registry Number	Concentration (mg/kg)	NJDEP Unrestricted Use Standard (mg/kg) <sup>(2)</sup>
090-SB-07	090-SB-07-0507	8.7	HEXAVALENT CHROMIUM	03/10/03	18540-29-9	83.7	20
090-SB-07	090-SB-07-0709	6.7	HEXAVALENT CHROMIUM	03/10/03	18540-29-9	117	20
090-SB-07	090-SB-07-0911	4.7	HEXAVALENT CHROMIUM	03/10/03	18540-29-9	130	20
090-SB-07	090-SB-07-1113	2.7	HEXAVALENT CHROMIUM	03/10/03	18540-29-9	198	20
090-SB-07	090-SB-07-1315	0.7	HEXAVALENT CHROMIUM	03/10/03	18540-29-9	249	20
090-SB-07	090-SB-07-1517	-1.3	HEXAVALENT CHROMIUM	03/10/03	18540-29-9	159	20
090-SB-07	090-SB-07-1719	-3.3	HEXAVALENT CHROMIUM	03/10/03	18540-29-9	37.7	20
090-SB-07	090-SB-07-1921	-5.3	HEXAVALENT CHROMIUM	03/10/03	18540-29-9	29.4	20
090-SB-07	090-SB-07-2123	-7.3	HEXAVALENT CHROMIUM	03/10/03	18540-29-9	110	20
090-SB-07	090-SB-07-2325	-9.3	HEXAVALENT CHROMIUM	03/10/03	18540-29-9	37.7	20
090-SB-07	090-SB-07-2527	-11.3	HEXAVALENT CHROMIUM	03/10/03	18540-29-9	40	20
090-SB-07	090-SB-07-2729	-13.3	HEXAVALENT CHROMIUM	03/17/03	18540-29-9	64.8	20
090-SB-07	090-SB-07-3133	-17.3	HEXAVALENT CHROMIUM	03/17/03	18540-29-9	37.8	20
090-SB-07	090-SB-07-3537	-21.3	HEXAVALENT CHROMIUM	03/17/03	18540-29-9	35.4	20
090-SB-07	090-SB-07-3941	-25.3	HEXAVALENT CHROMIUM	03/17/03	18540-29-9	98.9	20
090-SB-07	090-SB-07-4749	-33.3	HEXAVALENT CHROMIUM	03/17/03	18540-29-9	1030	20
090-SB-07	090-SB-07-5557	-41.3	HEXAVALENT CHROMIUM	03/18/03	18540-29-9	1640	20
090-SB-07	090-SB-07-5557-D	-41.3	HEXAVALENT CHROMIUM	03/18/03	18540-29-9	1770	20
090-SB-07	090-SB-07-6163	-47.3	HEXAVALENT CHROMIUM	03/18/03	18540-29-9	288	20
090-SB-20	090-SB-20-0406	7.9	HEXAVALENT CHROMIUM	07/29/03	18540-29-9	87.4	20
090-SB-20	090-SB-20-0608	5.9	HEXAVALENT CHROMIUM	07/29/03	18540-29-9	6190	20
090-SB-20	090-SB-20-0810	3.9	HEXAVALENT CHROMIUM	07/29/03	18540-29-9	6140	20
090-SB-20	090-SB-20-1012	1.9	HEXAVALENT CHROMIUM	07/29/03	18540-29-9	869	20
090-SB-20	090-SB-20-1214	-0.1	HEXAVALENT CHROMIUM	07/29/03	18540-29-9	138	20
090-SB-20	090-SB-20-1416	-2.1	HEXAVALENT CHROMIUM	07/29/03	18540-29-9	123	20
090-SB-24	090-SB-24-0002	14.1	HEXAVALENT CHROMIUM	07/28/03	18540-29-9	73.8	20
090-SB-24	090-SB-24-0204	12.1	HEXAVALENT CHROMIUM	07/28/03	18540-29-9	27.9	20
090-SB-24	090-SB-24-1416	0.1	HEXAVALENT CHROMIUM	07/28/03	18540-29-9	21.4	20
090-SB-25	090-SB-25-0204	10.9	HEXAVALENT CHROMIUM	10/09/03	18540-29-9	29.1	20
090-SB-25	090-SB-25-0608	6.9	HEXAVALENT CHROMIUM	10/09/03	18540-29-9	6020	20
090-SB-25	090-SB-25-0608-D	6.9	HEXAVALENT CHROMIUM	10/09/03	18540-29-9	3180	20
090-SB-25	090-SB-25-0810	4.9	HEXAVALENT CHROMIUM	10/09/03	18540-29-9	8900	20
090-SB-25	090-SB-25-1012	2.9	HEXAVALENT CHROMIUM	10/09/03	18540-29-9	1850	20
090-SB-26	090-SB-26-0810	3.8	HEXAVALENT CHROMIUM	10/08/03	18540-29-9	41.9	20
090-SB-26	090-SB-26-1012	1.8	HEXAVALENT CHROMIUM	10/08/03	18540-29-9	2000	20
090-SB-26	090-SB-26-1416	-2.2	HEXAVALENT CHROMIUM	10/08/03	18540-29-9	24.6	20
090-SB-27	090-SB-27-0204	11.5	HEXAVALENT CHROMIUM	10/08/03	18540-29-9	291	20
090-SB-27	090-SB-27-0406	9.5	HEXAVALENT CHROMIUM	10/08/03	18540-29-9	204	20
090-SB-27	090-SB-27-0608	7.5	HEXAVALENT CHROMIUM	10/08/03	18540-29-9	7480	20
090-SB-27	090-SB-27-0810	5.5	HEXAVALENT CHROMIUM	10/08/03	18540-29-9	7890	20
090-SB-27	090-SB-27-1012	3.5	HEXAVALENT CHROMIUM	10/08/03	18540-29-9	4970	20
090-SB-27	090-SB-27-1214	1.5	HEXAVALENT CHROMIUM	10/08/03	18540-29-9	3550	20
090-SB-27	090-SB-27-1214-D	1.5	HEXAVALENT CHROMIUM	10/08/03	18540-29-9	4120	20
090-SB-27	090-SB-27-1618	-2.5	HEXAVALENT CHROMIUM	10/08/03	18540-29-9	220	20
090-SB-27	090-SB-27-1820	-4.5	HEXAVALENT CHROMIUM	10/08/03	18540-29-9	80.8	20
090-SB-28	090-SB-28-0002	14	HEXAVALENT CHROMIUM	10/08/03	18540-29-9	151	20
090-SB-28	090-SB-28-0406	10	HEXAVALENT CHROMIUM	10/08/03	18540-29-9	40.6	20
090-SB-28	090-SB-28-0608	8	HEXAVALENT CHROMIUM	10/08/03	18540-29-9	28.8	20
090-SB-28	090-SB-28-0810	6	HEXAVALENT CHROMIUM	10/08/03	18540-29-9	1340	20
090-SB-28	090-SB-28-1012	4	HEXAVALENT CHROMIUM	10/08/03	18540-29-9	6060	20
090-SB-28	090-SB-28-1416	0	HEXAVALENT CHROMIUM	10/08/03	18540-29-9	212	20
090-SB-28	090-SB-28-1618	-2	HEXAVALENT CHROMIUM	10/08/03	18540-29-9	36.7	20
090-SB-28	090-SB-28-1820	-4	HEXAVALENT CHROMIUM	10/08/03	18540-29-9	61	20
090-SB-28	090-SB-28-1820-D	-4	HEXAVALENT CHROMIUM	10/08/03	18540-29-9	63.7	20
090-SB-29	090-SB-29-0002	13.8	HEXAVALENT CHROMIUM	10/08/03	18540-29-9	265	20

EXHIBIT B-2  
RESTRICTED AREA DATA TABLE  
STUDY AREA 5 - NJCU PROPERTY COMMERCIAL AOC  
JERSEY CITY, NEW JERSEY

Location ID	Field Sample ID <sup>(1)</sup>	Sample Elevation (feet above mean sea level)	Parameter Name	Date Sampled	Chemical Abstract Service Registry Number	Concentration (mg/kg)	NJDEP Unrestricted Use Standard (mg/kg) <sup>(2)</sup>
090-SB-29	090-SB-29-0204	11.8	HEXAVALENT CHROMIUM	10/08/03	18540-29-9	24.5	20
090-SB-29	090-SB-29-0406	9.8	HEXAVALENT CHROMIUM	10/08/03	18540-29-9	30.6	20
090-SB-29	090-SB-29-0810	5.8	HEXAVALENT CHROMIUM	10/08/03	18540-29-9	873	20
090-SB-29	090-SB-29-1012	3.8	HEXAVALENT CHROMIUM	10/08/03	18540-29-9	435	20
090-SB-29	090-SB-29-1214	1.8	HEXAVALENT CHROMIUM	10/08/03	18540-29-9	22.2	20
090-SB-29	090-SB-29-1416	-0.2	HEXAVALENT CHROMIUM	10/08/03	18540-29-9	44.1	20
090-SB-29	090-SB-29-1820	-4.2	HEXAVALENT CHROMIUM	10/08/03	18540-29-9	35	20
090-SB-32	090-SB-32-0002	13.9	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	115	20
090-SB-32	090-SB-32-0204	11.9	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	159	20
090-SB-32	090-SB-32-0406	9.9	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	162	20
090-SB-32	090-SB-32-0608	7.9	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	88.7	20
090-SB-32	090-SB-32-0810	5.9	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	68.2	20
090-SB-32	090-SB-32-1012	3.9	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	2370	20
090-SB-32	090-SB-32-1214	1.9	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	560	20
090-SB-32	090-SB-32-1618	-2.1	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	34.9	20
090-SB-32	090-SB-32-1820	-4.1	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	79.9	20
090-SB-33	090-SB-33-0002	13.8	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	115	20
090-SB-33	090-SB-33-0204	11.8	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	20.3	20
090-SB-33	090-SB-33-0204-D	11.8	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	20.2	20
090-SB-33	090-SB-33-0608	7.8	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	24.6	20
090-SB-33	090-SB-33-1012	3.8	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	4190	20
090-SB-33	090-SB-33-1214	1.8	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	1220	20
090-SB-33	090-SB-33-1820	-4.2	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	40.7	20
090-SB-34	090-SB-34-0002	13.6	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	131	20
090-SB-34	090-SB-34-0608	7.6	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	23.1	20
090-SB-34	090-SB-34-0810	5.6	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	1490	20
090-SB-34	090-SB-34-1012	3.6	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	26.5	20
090-SB-34	090-SB-34-1214	1.6	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	326	20
090-SB-34	090-SB-34-1416	-0.4	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	123	20
090-SB-34	090-SB-34-1618	-2.4	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	93.9	20
090-SB-35	090-SB-35-0002	13.8	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	379	20
090-SB-35	090-SB-35-0204	11.8	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	71.9	20
090-SB-35	090-SB-35-0608	7.8	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	36.1	20
090-SB-35	090-SB-35-0810	5.8	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	34.1	20
090-SB-35	090-SB-35-1012	3.8	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	1590	20
090-SB-35	090-SB-35-1416	-0.2	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	34.1	20
090-SB-35	090-SB-35-1618	-2.2	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	75.8	20
090-SB-35	090-SB-35-1820	-4.2	HEXAVALENT CHROMIUM	10/13/03	18540-29-9	70.9	20
090-SB-36	090-SB-36-0204	11.6	HEXAVALENT CHROMIUM	10/21/03	18540-29-9	88.2	20
090-SB-36	090-SB-36-0810	5.6	HEXAVALENT CHROMIUM	10/21/03	18540-29-9	777	20
090-SB-36	090-SB-36-1012	3.6	HEXAVALENT CHROMIUM	10/21/03	18540-29-9	1490	20
090-SB-B02	090-SB-B02-0002	15.4	HEXAVALENT CHROMIUM	05/13/97	18540-29-9	644	20
090-SB-B02	090-SB-B02-0204	13.4	HEXAVALENT CHROMIUM	05/13/97	18540-29-9	834	20
090-SB-B02	090-SB-B02-0406	11.4	HEXAVALENT CHROMIUM	05/13/97	18540-29-9	6300	20
090-SB-B02	090-SB-B02-0406-D	11.4	HEXAVALENT CHROMIUM	05/13/97	18540-29-9	6360	20
090-SB-B02	090-SB-B02-0810	7.4	HEXAVALENT CHROMIUM	05/13/97	18540-29-9	146	20
090-SB-B02	090-SB-B02-1012	5.4	HEXAVALENT CHROMIUM	05/13/97	18540-29-9	1050	20
090-SB-B02	090-SB-B02-1416	1.4	HEXAVALENT CHROMIUM	05/13/97	18540-29-9	195	20
090-SB-B02	090-SB-B02-1618	-0.6	HEXAVALENT CHROMIUM	05/13/97	18540-29-9	159	20
090-SB-B02	090-SB-B02-1820	-2.6	HEXAVALENT CHROMIUM	05/13/97	18540-29-9	53.1	20
090-SB-B04	090-SB-B04-0002	15.2	HEXAVALENT CHROMIUM	05/13/97	18540-29-9	429	20
090-SB-B04	090-SB-B04-0204	13.2	HEXAVALENT CHROMIUM	05/13/97	18540-29-9	7390	20
090-SB-B04	090-SB-B04-0406	11.2	HEXAVALENT CHROMIUM	05/13/97	18540-29-9	298	20
090-SB-B04	090-SB-B04-0608	9.2	HEXAVALENT CHROMIUM	05/13/97	18540-29-9	68.1	20
090-SB-B04	090-SB-B04-0810	7.2	HEXAVALENT CHROMIUM	05/13/97	18540-29-9	119	20



EXHIBIT B-2  
RESTRICTED AREA DATA TABLE  
STUDY AREA 5 - NJCU PROPERTY COMMERCIAL AOC  
JERSEY CITY, NEW JERSEY

Location ID	Field Sample ID <sup>(1)</sup>	Sample Elevation (feet above mean sea level)	Parameter Name	Date Sampled	Chemical Abstract Service Registry Number	Concentration (mg/kg)	NJDEP Unrestricted Use Standard (mg/kg) <sup>(2)</sup>
090-SB-B04	090-SB-B04-1012	5.2	HEXAVALENT CHROMIUM	05/13/97	18540-29-9	150	20
090-SB-C03	090-SB-C03-0002	13.6	HEXAVALENT CHROMIUM	05/12/97	18540-29-9	34.7	20
090-SB-C03	090-SB-C03-0810	5.6	HEXAVALENT CHROMIUM	05/12/97	18540-29-9	50.3	20
090-SB-C03	090-SB-C03-1012	3.6	HEXAVALENT CHROMIUM	05/12/97	18540-29-9	3870	20
090-SB-C03	090-SB-C03-1416	-0.4	HEXAVALENT CHROMIUM	05/12/97	18540-29-9	71.4	20
090-SB-D02	090-SB-D02-0002	13.8	HEXAVALENT CHROMIUM	05/12/97	18540-29-9	43.1	20
090-SB-D02	090-SB-D02-1214	1.8	HEXAVALENT CHROMIUM	05/12/97	18540-29-9	83.1	20
090-SB-E01	090-SB-E01-0002	11.8	HEXAVALENT CHROMIUM	05/12/97	18540-29-9	226	20
090-SB-E01	090-SB-E01-0406	7.8	HEXAVALENT CHROMIUM	05/12/97	18540-29-9	6250	20
090-SB-E01	090-SB-E01-0810	3.8	HEXAVALENT CHROMIUM	05/12/97	18540-29-9	8210	20
090-SB-E01	090-SB-E01-1012	1.8	HEXAVALENT CHROMIUM	05/12/97	18540-29-9	5020	20
090-SB-E01	090-SB-E01-1214	-0.2	HEXAVALENT CHROMIUM	05/12/97	18540-29-9	694	20
090-SB-E03	090-SB-E03-0002	7.4	HEXAVALENT CHROMIUM	05/12/97	18540-29-9	108	20
090-SB-E03	090-SB-E03-0204	5.4	HEXAVALENT CHROMIUM	05/12/97	18540-29-9	27	20
090-SB-E03	090-SB-E03-0810	-0.6	HEXAVALENT CHROMIUM	05/12/97	18540-29-9	116	20
090-SB-I01	090-SB-I1-0810	-0.4	HEXAVALENT CHROMIUM	01/31/03	18540-29-9	25.1	20
090-SB-I01	090-SB-I1-1618	-8.4	HEXAVALENT CHROMIUM	02/25/03	18540-29-9	50.3	20
090-SB-I02	090-SB-I02-0002	14	HEXAVALENT CHROMIUM	10/07/03	18540-29-9	51.5	20
090-SB-I02	090-SB-I02-0406	10	HEXAVALENT CHROMIUM	10/07/03	18540-29-9	21.4	20
090-SB-I02	090-SB-I02-0810	6	HEXAVALENT CHROMIUM	10/07/03	18540-29-9	11500	20
090-SB-I02	090-SB-I02-1012	4	HEXAVALENT CHROMIUM	10/07/03	18540-29-9	9780	20
090-SB-I02	090-SB-I02-1214	2	HEXAVALENT CHROMIUM	10/07/03	18540-29-9	35.9	20
090-SB-I02	090-SB-I02-1416	0	HEXAVALENT CHROMIUM	10/07/03	18540-29-9	113	20
090-SB-I02	090-SB-I02-1820	-4	HEXAVALENT CHROMIUM	10/07/03	18540-29-9	111	20
090-SB-I03	090-SB-I3-0204	11.8	HEXAVALENT CHROMIUM	02/27/03	18540-29-9	27.4	20
090-SB-I11	090-SB-I11-0204	12.2	HEXAVALENT CHROMIUM	10/07/03	18540-29-9	20.3	20
090-SB-I11	090-SB-I11-1416	0.2	HEXAVALENT CHROMIUM	10/07/03	18540-29-9	152	20
090-SB-I11	090-SB-I11-1618	-1.8	HEXAVALENT CHROMIUM	10/07/03	18540-29-9	99.3	20
090-SB-I11	090-SB-I11-1820	-3.8	HEXAVALENT CHROMIUM	10/07/03	18540-29-9	108	20
090-SB-I14	090-SB-I14-0002	14.2	HEXAVALENT CHROMIUM	10/20/03	18540-29-9	43.5	20
090-SB-I14	090-SB-I14-0204	12.2	HEXAVALENT CHROMIUM	10/20/03	18540-29-9	57.4	20
090-SB-I14	090-SB-I14-0406	10.2	HEXAVALENT CHROMIUM	10/20/03	18540-29-9	105	20
090-SB-I14	090-SB-I14-0608	8.2	HEXAVALENT CHROMIUM	10/20/03	18540-29-9	28400	20
090-SB-I14	090-SB-I14-0810	6.2	HEXAVALENT CHROMIUM	10/20/03	18540-29-9	20100	20
090-SB-I14	090-SB-I14-1012	4.2	HEXAVALENT CHROMIUM	10/20/03	18540-29-9	201	20
090-SB-I14	090-SB-I14-1214	2.2	HEXAVALENT CHROMIUM	10/20/03	18540-29-9	127	20
090-SB-I14	090-SB-I14-1416	0.2	HEXAVALENT CHROMIUM	10/20/03	18540-29-9	64.7	20
090-SB-I14	090-SB-I14-1618	-1.8	HEXAVALENT CHROMIUM	10/20/03	18540-29-9	206	20
090-SB-I14	090-SB-I14-1820	-3.8	HEXAVALENT CHROMIUM	10/20/03	18540-29-9	214	20
090-SB-I15	090-SB-I15-0002	13.8	HEXAVALENT CHROMIUM	10/20/03	18540-29-9	48.3	20
090-SB-I15	090-SB-I15-0608	7.8	HEXAVALENT CHROMIUM	10/20/03	18540-29-9	20.3	20
090-SB-I15	090-SB-I15-0810	5.8	HEXAVALENT CHROMIUM	10/20/03	18540-29-9	9710	20
090-SB-I15	090-SB-I15-1012	3.8	HEXAVALENT CHROMIUM	10/20/03	18540-29-9	1370	20
090-SB-007	090-SB-007-1012	1.8	HEXAVALENT CHROMIUM	06/12/98	18540-29-9	4300	20
090-SB-007	090-SB-007-1012-D	1.8	HEXAVALENT CHROMIUM	06/12/98	18540-29-9	4250	20
090-SB-008	090-SB-008-0810	6	HEXAVALENT CHROMIUM	06/12/98	18540-29-9	7450	20
090-SB-008	090-SB-008-0810-D	6	HEXAVALENT CHROMIUM	06/12/98	18540-29-9	6990	20
090-SB-009	090-SB-009-0810	6	HEXAVALENT CHROMIUM	06/12/98	18540-29-9	37.9	20
090-SB-015	090-SB-015-0002	11.9	HEXAVALENT CHROMIUM	06/12/98	18540-29-9	82.1	20
090-SB-015	090-SB-015-0608	5.9	HEXAVALENT CHROMIUM	06/12/98	18540-29-9	3630	20
090-SB-015	090-SB-015-0810	3.9	HEXAVALENT CHROMIUM	06/12/98	18540-29-9	1870	20
090-SB-016	090-SB-016-0002	11.9	HEXAVALENT CHROMIUM	06/12/98	18540-29-9	27.9	20
090-SB-016	090-SB-016-0608	5.9	HEXAVALENT CHROMIUM	06/12/98	18540-29-9	85.8	20
090-SB-016	090-SB-016-0810	3.9	HEXAVALENT CHROMIUM	06/12/98	18540-29-9	16600	20
090-SB-016	090-SB-016-1012	1.9	HEXAVALENT CHROMIUM	06/12/98	18540-29-9	29900	20

EXHIBIT B-2  
 RESTRICTED AREA DATA TABLE  
 STUDY AREA 5 - NJCU PROPERTY COMMERCIAL AOC  
 JERSEY CITY, NEW JERSEY

Location ID	Field Sample ID <sup>(1)</sup>	Sample Elevation (feet above mean sea level)	Parameter Name	Date Sampled	Chemical Abstract Service Registry Number	Concentration (mg/kg)	NJDEP Unrestricted Use Standard (mg/kg) <sup>(2)</sup>
090-SB-017	090-SB-017-0204	12.2	HEXAVALENT CHROMIUM	06/12/98	18540-29-9	28.1	20
090-SB-017	090-SB-017-0608	8.2	HEXAVALENT CHROMIUM	06/12/98	18540-29-9	6040	20
090-SB-017	090-SB-017-0810	6.2	HEXAVALENT CHROMIUM	06/12/98	18540-29-9	11800	20
090-SB-017	090-SB-017-1012	4.2	HEXAVALENT CHROMIUM	06/12/98	18540-29-9	13000	20
090-SB-018	090-SB-018-0810	3.8	HEXAVALENT CHROMIUM	06/12/98	18540-29-9	27.9	20
090-SB-018	090-SB-018-1012	1.8	HEXAVALENT CHROMIUM	06/12/98	18540-29-9	1270	20
090-SB-018	090-SB-018-1214	-0.2	HEXAVALENT CHROMIUM	06/12/98	18540-29-9	6540	20
090-SB-019	090-SB-019-1618	-2.2	HEXAVALENT CHROMIUM	06/12/98	18540-29-9	1550	20
184-SB-03	184-SB-03-0608	1.4	HEXAVALENT CHROMIUM	07/29/03	18540-29-9	36.1	20
184-SB-03	184-SB-03-0810	-0.6	HEXAVALENT CHROMIUM	07/29/03	18540-29-9	23.2	20
184-SB-03	184-SB-03-1214	-4.6	HEXAVALENT CHROMIUM	07/29/03	18540-29-9	59.8	20
184-SB-03	184-SB-03-1416	-6.6	HEXAVALENT CHROMIUM	07/29/03	18540-29-9	30.2	20
184-SB-09	184-SB-09-0204	4.8	HEXAVALENT CHROMIUM	10/06/03	18540-29-9	142	20
184-SB-09	184-SB-09-0406	2.8	HEXAVALENT CHROMIUM	10/06/03	18540-29-9	159	20
184-SB-10	184-SB-10-0204	5.6	HEXAVALENT CHROMIUM	10/06/03	18540-29-9	2100	20
184-SB-10	184-SB-10-0406	3.6	HEXAVALENT CHROMIUM	10/06/03	18540-29-9	740	20
184-SB-10	184-SB-10-0608	1.6	HEXAVALENT CHROMIUM	10/06/03	18540-29-9	22	20
184-SB-10	184-SB-10-1012	-2.4	HEXAVALENT CHROMIUM	10/06/03	18540-29-9	35.9	20
184-SB-A07	184-SB-A07-0002	6.8	HEXAVALENT CHROMIUM	06/10/98	18540-29-9	44.2	20
184-SB-A08	184-SB-A08-0002	6.8	HEXAVALENT CHROMIUM	06/10/98	18540-29-9	71.8	20
184-SB-A08	184-SB-A08-0204	4.8	HEXAVALENT CHROMIUM	06/10/98	18540-29-9	47.5	20
184-SB-A09	184-SB-A09-0002	6	HEXAVALENT CHROMIUM	06/12/98	18540-29-9	368	20
184-SB-A09	184-SB-A09-0204	4	HEXAVALENT CHROMIUM	06/12/98	18540-29-9	455	20
184-SB-A09	184-SB-A09-0406	2	HEXAVALENT CHROMIUM	06/12/98	18540-29-9	482	20

Notes:

- (1) - The last four digits of each Field Sample ID represent the sample depth in feet below ground surface. For example, 0002 indicates a sample collected between 0 and 2 feet below ground surface
  - (2) - The Unrestricted Use Standard refers to the current NJDEP Soil Cleanup Criteria for hexavalent chromium of 20 mg/kg  
mg/kg - milligrams per Kilogram
- D - Duplicate Sample

**EXHIBIT C**

**Exhibit C-1: Deed Notice as Institutional Controls**

**Exhibit C-2: Engineering Controls**

*Block 21902.03, Lot 1*

*Portions of Block 21902, Lots 2.01, 13.01, 14.01, 14.02, 14.03; Block 21902.01, Lot 1*

*(formerly Block 21902, Lots 14, 13 and 2)*

*City of Jersey City, New Jersey*

**Exhibit C-1: Deed Notice as Institutional Controls**  
**Block 21902.03, Lot 1**  
**Portions of Block 21902, Lots 2.01, 13.01, 14.01, 14.02, 14.03; Block 21902.01, Lot 1**  
**(formerly Block 21902, Lots 14, 13 and 2)**  
**City of Jersey City, New Jersey**

i. Exhibit C-1: Deed Notice as Institutional Controls: Exhibit C-1 includes a narrative description of the restriction and obligations of this Deed Notice that are in addition to those described above, as follows:

(A) General Description of this Deed Notice:

(1) Description and estimated size of the Restricted Areas as described above;

*The NJCU Commercial AOC constitutes a portion of the Property known as Block 21902.03, Lot 1; Block 21902, Lots 2.01, 13.01, 14.01, 14.02, & 14.03; and Block 21902.01, Lot 1; and constitutes the Restricted Area. The NJCU Commercial AOC or Restricted Area is identified on Exhibit Figure B-1A(1); estimated at approximately 4.2 acres.*

(2) Description of the restrictions on the NJCU Commercial AOC by operation of this Deed Notice; and

*By operation of this Deed Notice, the NJCU Commercial AOC shall not be used for residential, day care, or educational uses, except administrative educational uses. Intrusive activities (i.e., excavation or digging) that breach the engineering controls (as described in Exhibit C-2) will only occur on the NJCU Commercial AOC with the appropriate measures. See Deed Notice for additional information; subsections 7A Alterations, Improvements, Disturbances, and 7B, Emergencies.*

(3) The objective of the restrictions;

*The restrictions will prohibit contact with soils above the NJDEP Soil Cleanup Criteria and with shallow groundwater above the NJDEP groundwater quality standard for total chromium.*

(B) Description of the monitoring necessary to determine whether:

(1) Any disturbances of the soil in the NJCU Commercial AOC did or did not result in the unacceptable exposure to the soil or groundwater contamination;

*Quarterly visual inspections by Honeywell of the NJCU Commercial AOC. Inspections and other monitoring of the NJCU Commercial AOC as set forth in the Long-Term Monitoring Plan developed pursuant to the Consent Decree.*

(2) There have been any land use changes subsequent to the filing of this Deed Notice or the most recent biennial certification, whichever is more recent;

*Same as (B)(1).*

(3) The current land use on the NJCU Commercial AOC is consistent with the restrictions in this Deed Notice;

*Same as (B)(1).*

(4) Any newly promulgated or modified requirements of applicable regulations or laws apply to the NJCU Commercial AOC; and

*Review by Honeywell and Owner of newly promulgated or modified requirements of applicable regulations or laws that potentially may apply to the NJCU Commercial AOC.*

(5) Any new standards, regulations, or laws apply to the NJCU Commercial AOC that might necessitate additional sampling in order to evaluate the protectiveness of the remedial action which includes this Deed Notice, and conduct the necessary sampling.

*Same as (B)(4).*

(C) Description of the following items that will be included in the biennial certification:

(1) A monitoring report that describes the specific activities pursuant to (A) and (B) above, conducted in support of the biennial certification of the protectiveness of the remedial action that includes this Deed Notice;

(2) Land use at the NJCU Commercial AOC is consistent with the restrictions in this Deed Notice; and

(3) The remedial action that includes this Deed Notice continues to be protective of the public health and safety and of the environment.

*The monitoring report will be included in the biennial certification. Components of the monitoring report will include the following:*

- *A report of all conditions set forth in sections (A) and (B) above to assure that they have been adhered to, including evaluation of any available documents as a result of changes in land use or incidents.*
- *Determination whether or not the land use at the NJCU Commercial AOC has remained consistent with the restrictions in the Deed Notice.*
- *Determination whether or not the Deed Notice continues to be protective of the public health and safety and the environment.*



**Exhibit C-2: Engineering Controls**  
**Block 21902.03, Lot 1**  
**Portions of Block 21902, Lots 2.01, 13.01, 14.01, 14.02, 14.03; Block 21902.01, Lot 1**  
**(formerly Block 21902, Lots 14, 13 and 2)**  
**City of Jersey City, New Jersey**

i. Exhibit C-2: Narrative description of the Engineering Controls: Soil Capping System, Underground Containment Walls, and Shallow Groundwater Collection and Treatment System as follows:

(A) General Description of the engineering controls:

(1) Description of the engineering controls;

*The Engineering Controls consist of the following:*

*For soils with hexavalent chromium concentrations above 20 mg/kg, the engineering controls include a capping system consisting of: impervious geomembrane liner; geo-composite drainage layer; and clean soil cover with minimum 12 inch thickness in areas where buildings or pavement are proposed; and 36-inch thickness in areas where the planting of trees and bushes is proposed and a minimum 24-inch thickness in areas where other vegetation is proposed. Engineering controls will also include clean fill to be placed in excavated areas. For shallow groundwater the engineering controls also include underground barrier walls and a system of wells, pumps and piping for the collection and treatment of shallow groundwater, from the NJCU Commercial AOC.*

(2) The objective of the engineering controls; and

*The objective of the controls is to contain and prevent direct contact with soils that exceed the NJDEP Soil Cleanup Criteria and to contain shallow groundwater above the NJDEP groundwater quality standard for total chromium.*

(3) How the engineering controls are intended to function.

*The soil engineering controls are intended to function as a barrier to underlying and adjacent soils that exceed the NJDEP Soil Cleanup Criteria. The groundwater engineering controls are intended to restrict the flow of shallow groundwater so as to prevent the outward movement of chromium contamination and to collect and treat contaminated groundwater. Monitoring requirements for the engineering controls are set forth in the Long Term Monitoring Plan. Additional shallow groundwater monitoring requirements will be set forth in the Shallow Groundwater Document that will be incorporated into the Long Term Monitoring Plan.*

(B) Description of the operation and maintenance necessary to ensure that:

(1) Periodic inspections of each engineering control are performed in order to determine their integrity, operability, and effectiveness;

***Performed quarterly by visual inspection of the NJCU Commercial AOC. Honeywell will perform quarterly monitoring by visual inspection of the NJCU Commercial AOC pursuant to the Consent Decree. Other monitoring activities shall be performed as set forth in the Long-Term Monitoring Plan developed pursuant to the Consent Decree.***

(2) Each engineering control continues to function as designed and intended in order to protect the public health and safety and the environment;

***Same as (B)(1) above.***

(3) Each alteration, excavation or disturbance of any engineering control is timely and appropriately addressed to maintain the integrity of the engineering controls;

***Same as (B)(1) above. Also, see Deed Notice and Consent Decree for additional information: Deed Notice subsections 7A Alterations, Improvements, Disturbances, and 7B Emergencies.***

(4) The engineering controls are being inspected and maintained and their integrity remains so that the remedial action continues to be protective of the public health and safety and of the environment;

***Same as (B)(1) above.***

(5) A record of the self-inspection dates, name of the inspector, results of the inspection and condition(s) of the engineering controls. Sampling, for example, may be necessary if it is not possible to visually evaluate the integrity/performance of the engineering controls; and

***Records of the inspections are to be maintained as listed in (5). Should the visual inspection or activities carried out in conformance with the Long-Term Monitoring Plan developed pursuant to the Consent Decree indicate that other activities are necessary, those activities will be listed and executed.***

(6) Any new standards, regulations, or laws apply to the NJCU Commercial AOC that might necessitate additional sampling in order to evaluate the protectiveness of the remedial action which includes this Deed Notice, and conduct the necessary sampling.

***A review of any new standards, regulations, or laws will be conducted by Honeywell and NJCU. Should the review indicate that other activities are necessary, those activities will be listed and executed.***

(C) Description of the following items that will be included in the biennial certification:

(1) A monitoring report that describes the specific activities, pursuant to (A) and (B), above, conducted in support of the biennial certification of the protectiveness of the remedial action that includes this Deed Notice;

(2) The engineering controls continues to operate as designed; and

(3) The remedial action that includes the engineering control continues to be protective of the public health and safety and of the environment.

*The monitoring report will be included in the biennial certification. Components of the monitoring report will include the following:*

- *A report of all conditions set forth in sections (A) and (B) above to assure that they have been adhered to, including an evaluation to determine whether or not the engineering controls are continuing to meet the original objective and intended function.*
- *A report to determine whether or not the engineering controls continue to operate as designed.*
- *A report to determine whether or not the engineering controls continue to be protective of the public health and safety and of the environment.*

14. SIGNATURES. IN WITNESS WHEREOF, Owner has executed this Deed Notice as of the date first written above.

Owner is a State of New Jersey entity:  
New Jersey City University  
An institution of public higher education of the State of New Jersey

ATTEST:

Dr. Aaron Aska

For: New Jersey City Univ.

Chief Operating Officer  
[Print name and title]

  
[Signature]

STATE OF NEW JERSEY  
COUNTY OF HUDSON

SS.:

I certify that on March 29, 2018, Aaron Aska personally came before me, and this person acknowledged under oath, to my satisfaction, that:

- (a) this person is the Chief Operating Officer of New Jersey City University, the university named in this document;
- (b) this person is the attesting witness to the signing of this document by the proper corporate officer who is the Chief Operating Officer of the university;
- (c) this document was signed and delivered by the university as its voluntary act and was duly authorized;
- (d) this person knows the proper seal of the university which was affixed to this document; and
- (e) this person signed this proof to attest to the truth of these facts.

*[Handwritten signature]*

[Signature]

Alfred E. Ramey, Jr., University Counsel  
[Print name and title of attesting witness]



Signed and sworn before me on March 29<sup>th</sup>, 2018

Michael Sims, Notary Public

*[Handwritten signature]*  
[Print name and title]

**MICHAEL SIMS**  
Notary Public - State of New Jersey  
My Commission Expires Oct 19, 2021

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NUMBER OF PAGES : 40  
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MICHAEL SIMS  
Notary Public - State of New Jersey  
My Commission Expires Oct 18, 2021

**APPENDIX D**

**DEED NOTICE**

**SITE 153 FORMER MORRIS CANAL**

Record and Return to:  
Annette Wall, Senior Paralegal  
Gibbons P.C.  
One Gateway Center  
Newark, NJ 07102

**DEED NOTICE**

IN ACCORDANCE WITH N.J.S.A. 58:10B-13, THIS DOCUMENT IS TO BE RECORDED IN THE SAME MANNER AS ARE DEEDS AND OTHER INTERESTS IN REAL PROPERTY.

Prepared by: *John J. Morris*  
[Signature] \_\_\_\_\_  
John J. Morris  
[425/445 Route 440 Property LLC]  
[Print name below signature]



20101130010092950 1/172  
11/30/2010 02:36:26 PM DEED  
Bk: 8765 Pg: 187  
Willie L. Flood  
Hudson County, Register of Deeds  
Receipt No. 474756

Recorded by:

\_\_\_\_\_  
[Signature, Officer of County Recording Office]  
\_\_\_\_\_  
[Print name below signature]

**DEED NOTICE CONCERNING CONTROLS  
INSTALLED TO CONTAIN CHROMIUM  
CONTAMINATION UNDERLYING  
PROPERTY AND RESTRICTIONS  
CONCERNING THE USE OF PROPERTY**

This Deed Notice is made as of the 11<sup>th</sup> day of ~~November~~ 2010, by Honeywell International Inc. ("Honeywell") and its subsidiary 425/445 Route 440 Property LLC, whose post office address is 101 Columbia Road, Morristown, New Jersey 07962. Owner shall mean 425/445 Route 440 Property LLC, together with its successors and assigns, including all successors in interest in the Property which is the subject of this Deed Notice as described fully below.

1. THE PROPERTY. 425/445 Route 440 Property LLC is the current owner in fee simple of certain real property designated as that portion of Block 1289.5, Lot E on the tax map of the City of Jersey City, Hudson County, New Jersey (Property); the New Jersey Department of Environmental Protection (NJDEP) Program Interest Number for the contaminated site which includes this Property is Hudson County Chromate Site No. 153 Program Interest (PI) #G000008767. The Property is known in parts as Site 153 South and Site 153 North pursuant to the Consent Decree Regarding Site 79 and 153 South and the Consent Decree Regarding Remediation of the New Jersey City University Redevelopment Area ("Consent Decrees"), which are attached hereto and entered as

\$ 1753.00 - 142 Pages

orders of the Court in the following consolidated actions *JCMUA v. Honeywell International Inc.*, D.N.J., Civ. No. 05-05955; *JCIA v. Honeywell International Inc.*, D.N.J., Civ. No. 05-5993; and *Hackensack Riverkeeper, Inc. v. Honeywell International Inc.*, D.N.J., Civ. No. 06-22. The portion of the Property subject to this Deed Notice is described by metes and bounds in Exhibit A-1 and further defined as Site 153 South and Site 153 North in the Consent Decrees. The Consent Decrees restrict transfer, use and development of the Site 153 South and North portions of the Property without further remediation, pursuant to the terms of the Consent Decrees. To the extent that there is any conflict or inconsistency between the terms of this Deed Notice and the terms of the Consent Decrees, the Consent Decrees shall govern. To the extent that any action to be taken pursuant to this Deed Notice is in conflict with or inconsistent with the Consent Decrees, the Consent Decrees shall govern.

2. DEPARTMENT'S ASSIGNED BUREAU. The Bureau of State Case Management (BCM) was the New Jersey Department of Environmental Protection program that was responsible for the oversight of the remediation of the Property. The matter was Case No. Hudson County Chromate Site No. 153 Program Interest (PI) # G000008767.

3. SOIL CONTAMINATION. Honeywell, a corporation in the State of New Jersey whose post office address is 101 Columbia Road, Morristown, New Jersey 07962, is remediating the Property to address chromium-related soil contamination. The Remedial Action Work Plan for the NJCU Remediation Area, including that portion of the Property designated as Site 153 North abutting NJCU property was approved by NJDEP on July 26, 2007. Interim Remedial Action Work Plans for Site 153 South Lower and Upper Segments have been submitted to NJDEP on October 15, 2009 and May 21, 2010, respectively. Remedial actions were further approved pursuant to the Consent Decrees. Under the Consent Decrees and the Remedial Action Work Plan, soil contamination remains in the Property which contains contaminants in concentrations that do not allow for the unrestricted use of the Property. The soil contamination is described, including the type, concentration and specific location of such contaminants, in Exhibit B, which is attached hereto and made a part hereof. As a result of the contamination, there is a statutory requirement for this Deed Notice and engineering controls in accordance with N.J.S.A. 58:10B-13. The remedial actions and engineering controls are further described in Exhibit C. Under the terms of the Consent Decrees and this Deed Notice, Honeywell is responsible for monitoring and maintaining the soil remediation for the Site 153 North and South portions of the Property until such time as the Property is remediated to the level that would permit the removal of this Deed Notice pursuant to the Consent Decrees.

4. CONSIDERATION. In accordance with the NJDEP's approval of the Remedial Action Work Plan for the remediation of Hudson County Chromate Site No. 153 and in consideration of the terms and conditions of that approval, and in accordance with the Consent Decrees, and other good and valuable considerations, Owner has agreed to subject the Property to certain statutory and regulatory requirements which impose restrictions upon the use of the Property, to restrict certain uses of the Property, and to provide notice to easement holders, lessees and operators of the restrictions until the

Property is further remediated and no longer must be encumbered by this Deed Notice pursuant to the terms of the Consent Decree.

5A. RESTRICTED AREAS. Due to the presence of these contaminants throughout the Property, Owner has agreed, as part of the remedial action for the Property, to restrict the use of the Property (also referred to as the "Restricted Areas"); a narrative description of these restrictions, along with the associated monitoring and maintenance activities and the biennial certification requirements are provided in Exhibit C, which is attached hereto and made a part hereof. Owner has also agreed to maintain a list of these restrictions on site for inspection by governmental enforcement officials.

5B. ENGINEERING CONTROLS. Due to the presence and concentration of these contaminants, Owner has also agreed, as part of the remedial action for the Property, to the placement of certain engineering controls on the Property. A narrative description of these engineering controls, along with the associated monitoring and maintenance activities and the biennial certification requirements are provided in Exhibit C. Honeywell shall be responsible for monitoring and maintenance of engineering controls and biennial certification requirements as specified in Paragraphs 7A&B.

5C. ADDITIONAL PROVISIONS PURSUANT TO CONSENT DECREE. The clean fill, caps and asphalt cover (also referred to as the Restricted Area) constitute engineering controls that must be maintained in accordance with the New Jersey Technical Requirements for Site Remediation, N.J.A.C. § 7:26E. Future uses of the Property are limited to open space, utility corridor, transportation, roadway, crossing, or access to adjacent properties.

6A. ALTERATIONS, IMPROVEMENTS, AND DISTURBANCES.

i. Except as provided in the Consent Decrees and Paragraph 6B, below, no person shall make, or allow to be made, any alteration, improvement, or disturbance in, to, or about the Property which disturbs any engineering control at the Property except as (a) permitted in the Consent Decrees and (b) without first obtaining the express written consent of NJDEP. Nothing herein shall constitute a waiver of the obligation of any person to comply with all applicable laws and regulations including, without limitation, the applicable rules of the Occupational Safety and Health Administration. To request the consent of the NJDEP, contact:

Department of Environmental Protection  
Division of Remediation Management and Response  
Bureau of Operation, Maintenance and Monitoring  
Deed Notice Inspection Program  
P.O. Box 413  
401 E. State Street  
Trenton, NJ 08625-0413



ii. Notwithstanding subparagraph 6A.i., above, NJDEP's express written consent is not required for any alteration, improvement, or disturbance provided that the owner, lessee or operator:

- (A) Takes such action in conformance with the Consent Decrees; and
- (B) Notifies NJDEP of the activity by calling the NJDEP Hotline, at 1-877-WARN-DEP or 1-877-927-6337, within twenty-four (24) hours after the beginning of each alteration, improvement, or disturbance;
- (C) Notifies Honeywell of the activity by calling 973-455-3302;
- (D) Restores or causes Honeywell to restore any disturbance of an engineering control to pre-disturbance conditions within sixty (60) calendar days after the initiation of the alteration, improvement or disturbance;
- (E) Ensures that all applicable worker health and safety laws and regulations are followed during the alteration, improvement, or disturbance, and during the restoration;
- (F) Ensures that exposure to contamination in excess of the applicable remediation standards does not occur;
- (G) Submits, or causes Honeywell to submit a written report, describing the alteration, improvement, or disturbance, to NJDEP within sixty (60) calendar days after the end of each alteration, improvement, or disturbance. The report shall include in the report the nature of the alteration, improvement, or disturbance, the dates and duration of the alteration, improvement, or disturbance, the name of key individuals and their affiliations conducting the alteration, improvement, or disturbance, a description of the notice the Owner gave to those persons prior to the disturbance, the amounts of soil generated for disposal, if any, the final disposition and any precautions taken to prevent exposure. Such a report shall be submitted to:

New Jersey Department of Environmental Protection  
Division of Remediation Management and Response  
Bureau of Operation, Maintenance and Monitoring  
Deed Notice Inspection Program  
P.O. Box 413  
401 E. State Street  
Trenton, NJ 08625-0413

6B. EMERGENCIES. In the event of an emergency which presents, or may present, an unacceptable risk to the public health and safety, or to the environment, any person may temporarily breach any engineering control provided that that person complies with each of the following:

- i. Immediately notifies NJDEP of the emergency, by calling the NJDEP Hotline at 1-877-WARNDEP or 1-877-927-6337;
- ii. Immediately notifies Honeywell of the emergency by calling 973-455-3302;
- iii. Limits both the actual disturbance and the time needed for the disturbance to the minimum reasonably necessary to adequately respond to the emergency;
- iv. Implements all measures necessary to limit actual or potential, present or future risk of exposure to humans or the environment to the contamination;
- v. Notifies NJDEP when the emergency has ended by calling the NJDEP Hotline at 1-877-WARNDEP or 1-877-927-6337;
- vi. Notifies Honeywell when the emergency has ended by calling 973-455-3302; and
- vii. Restores or causes Honeywell to restore the engineering control to the pre-emergency conditions as soon as possible, and provides a written report to NJDEP of such emergency and restoration efforts within sixty (60) calendar days after completion of the restoration of the engineering control. The report must include all information pertinent to the emergency, potential discharges of contaminants, and restoration measures that were implemented, which, at a minimum, should specify: (a) the nature and likely cause of the emergency, (b) the potential discharges of or exposures to contaminants, if any, that may have occurred, (c) the measures that have been taken to mitigate the effects of the emergency on human health and the environment, (d) the measures completed or implemented to restore the engineering control, and (e) the changes to the engineering control or site operation and maintenance plan to prevent recurrence of such conditions in the future. The report shall be submitted to:

Department of Environmental Protection  
Division of Remediation Management and Response  
Bureau of Operation, Maintenance and Monitoring  
Deed Notice Inspection Program  
P.O. Box 413  
401 E. State Street  
Trenton, NJ 08625-0413

7A. MONITORING AND MAINTENANCE OF DEED NOTICE, AND PROTECTIVENESS CERTIFICATION. Honeywell and the Owner shall monitor and maintain this Deed Notice, and certify to NJDEP on a biennial basis that the remedial

action that includes this Deed Notice remains protective of the public health and safety and of the environment. The specific obligations to monitor and maintain the deed notice shall include all of the following:

- i. Monitoring and maintaining this Deed Notice according to the requirements in Exhibit C, to ensure that the remedial action that includes the Deed Notice continues to be protective of the public health and safety and of the environment;
- ii. Conducting any additional remedial investigations and implement any additional remedial actions, that are necessary to correct, mitigate, or abate each problem related to the protectiveness of the remedial action for the Property prior to the date that the certification is due to NJDEP pursuant to iii, below, in order to ensure that the remedial action that includes this Deed Notice remains protective of the public health and safety and of the environment.
- iii. Certify to NJDEP as to the continued protectiveness of the remedial action that includes this Deed Notice, on a form provided by NJDEP and consistent with N.J.A.C. 7:26C-7.4(b)1, every two years on the anniversary of the date stamped on the Deed Notice that indicates when the Deed Notice was recorded.

**7B. MONITORING AND MAINTENANCE OF ENGINEERING CONTROLS, AND PROTECTIVENESS CERTIFICATION.** Honeywell and the Owner shall maintain all engineering controls at the Property and certify to the Department on a biennial basis that the remedial action of which each engineering control is a part remains protective of the public health and safety and of the environment. The specific obligations to monitor and maintain the engineering controls shall include the following:

- i. Monitoring and maintaining each engineering control according to the requirements in Exhibit C, to ensure that the remedial action that includes the engineering control continues to be protective of the public health and safety and of the environment;
- ii. Conducting any additional remedial investigations and implement any additional remedial actions, that are necessary to correct, mitigate, or abate each problem related to the protectiveness of the remedial action for the Property prior to the date that the certification is due to the Department pursuant to iii, below, in order to ensure that the remedial action that includes the engineering control remains protective of the public health and safety and of the environment.
- iii. Certify to NJDEP as to the continued protectiveness of the remedial action that includes the engineering control, on a form provided by NJDEP and consistent with N.J.A.C. § 7:26C-1.2 (a)1, every two years on the anniversary of the date stamped on the Deed Notice that indicates when the Deed Notice was recorded.

**8. ACCESS.** Owner agrees to allow NJDEP, its agents and representatives access to the Property to inspect and evaluate the continued protectiveness of the remedial action that

includes this Deed Notice and to conduct additional remediation to ensure the protection of the public health and safety and of the environment if persons responsible for monitoring the protectiveness of the remedial action, as described in Paragraph 7, above, fail to conduct such remediation pursuant to this Deed Notice as required by law. Owner shall also cause all leases, subleases, grants, and other written transfers of an interest in the Restricted Areas to contain a provision expressly requiring that all holders thereof provide such access to the Department.

#### 9. NOTICES.

i. Owner shall cause all leases, grants, and easements for the Property to contain a provision expressly requiring all holders thereof to take the Property subject to the restrictions contained herein and to comply with all, and not to violate any of the conditions of this Deed Notice. Nothing contained in this Paragraph shall be construed as limiting any obligation of any person to provide any notice required by any law, regulation, or order of any governmental authority.

ii. Owner shall notify any person intending to conduct invasive work or excavate within the Property on its behalf of the nature and location of contamination and, of the precautions necessary to minimize potential human exposure to contaminants.

iii. Owner shall provide written notice to NJDEP at least thirty (30) calendar days before the effective date of any conveyance, grant, gift, or other transfer, in whole or in part, of the owner's interest in the Property. Any such conveyance, grant or gift must be consistent with the terms of the Consent Decrees.

iv. Owner shall provide written notice to NJDEP within thirty (30) calendar days following the Owner's receiving notice of any petition for a rezoning of the Property. The Owner shall submit the written notice to:

Department of Environmental Protection  
Division of Remediation Management and Response  
Bureau of Operation, Maintenance and Monitoring  
Deed Notice Inspection Program  
P.O. Box 413  
401 E. State Street  
Trenton, NJ 08625-0413.

#### 10. ENFORCEMENT OF VIOLATIONS.

i. This Deed Notice itself is not intended to create any interest in real estate in favor of the NJDEP, nor to create a lien against the Property, but merely is intended to provide notice of certain conditions and restrictions on the Property and to reflect the regulatory and statutory obligations imposed as a conditional remedial action for the Property.

ii. The restrictions provided herein may be enforceable by NJDEP against any person who violates this Deed Notice. To enforce violations of this Deed Notice, NJDEP may

initiate one or more enforcement actions pursuant to N.J.S.A. § 58:10-23.11u and require additional remediation and assess damages pursuant to N.J.S.A. § 58:10-23.11g.

11. SEVERABILITY. If any court of competent jurisdiction determines that any provision of this Deed Notice requires modification, such provision shall be deemed to have been modified automatically to conform to such requirements. If a court of competent jurisdiction determines that any provision of this Deed Notice is invalid or unenforceable and the provision is of such a nature that it cannot be modified, the provision shall be deemed deleted from this instrument as if the provision had never been included herein. In either case, the remaining provisions of this Deed Notice shall remain in full force and effect.

12. SUCCESSORS AND ASSIGNS. This Deed Notice shall be binding upon Honeywell. This Deed Notice shall also be binding upon Owner and upon Owner's successors and assigns, and subsequent easement holders, lessees and operators while each has an interest in the Property.

13. MODIFICATION AND TERMINATION.

i. Any person may request in writing, at any time, that NJDEP modify this Deed Notice where performance of subsequent remedial actions, a change of conditions at the Property, or the adoption of revised remediation standards suggest that modification of the Deed Notice would be appropriate.

ii. Any person may request in writing, at any time, that NJDEP terminate this Deed Notice because the conditions which triggered the need for this Deed Notice are no longer applicable.

iii. Any person seeking a modification of this Deed Notice must also have such modification approved by the United States District Court for the District of New Jersey pursuant to the Consent Decrees.

iv. This Deed Notice may be revised or terminated only upon filing of an instrument, executed by NJDEP, in the office of the Hudson County Register, New Jersey, expressly modifying or terminating this Deed Notice.

14A. EXHIBIT A. Exhibit A includes the following maps of the Property and vicinity:

i. Exhibit A-1: Vicinity Map - A map that identifies by name the roads, and other important geographical features in the vicinity of the Property;

ii. Exhibit A-2: Metes and Bounds Description - A metes and bounds description of the Property, including reference to tax lot and block numbers for the Property and a Tax Map;

iii. Exhibit A-3: Property Map - A scaled map of the Property, scaled at one inch to 200 feet or less, and if more than one map is submitted, the maps shall be presented as overlays, keyed to a base map; the map(s) shall include diagrams of major surface topographical features such as buildings, roads, and parking lots.

14B. EXHIBIT B. Exhibit B includes the following descriptions of the Restricted Areas:

i. Exhibit B-1 (Figures B-1A through B-1D): Restricted Area Maps - Maps for the Area that include, as applicable:

(A) As-built diagrams of each engineering control, including caps, fences, slurry walls, ground water monitoring wells, and ground water pumping system;

(B) As-built diagrams of any buildings, roads, parking lots and other structures that function as engineering controls; and

(C) Designation of all soil and/or sediment sample locations within the restricted areas that exceed any soil or sediment standard that are keyed into one of the tables described in the following paragraph.

ii. Exhibit B-2: Restricted Area Data Table - Table for the Restricted Area that includes:

(A) Sample location designation from Restricted Area maps (Exhibit B-1);

(B) Sample elevation based upon mean sea level;

(C) Name and chemical abstract service registry number of each contaminant with a concentration that exceeds the unrestricted use standard;

(D) The restricted and unrestricted use standards for each contaminant in the table with instructions that direct the reader to the Consent Decree for further information; and

(E) The remaining concentration of each contaminant at each sample location at each elevation (or if historic fill, include data from the Department's default concentrations at N.J.A.C. § 7:26E-4.6, Table 4-2).

14C. EXHIBIT C. Exhibit C includes narrative descriptions of the institutional controls and engineering controls as follows:

i. Exhibit C-1: Deed Notice as Institutional Control; Exhibit C-1 includes a narrative description of the restrictions and obligations of this Deed Notice that



are in addition to those described above, as follows:

(A) General Description of the Institutional Controls:

- (1) Description and estimated size of the Restricted Areas as described above;
- (2) Description of the restrictions on the Property by operation of this Deed Notice and the other Institutional Controls; and
- (3) The objective of the restrictions;

(B) Description of the monitoring necessary to determine whether:

- (1) Any disturbances of the soil in the Restricted Areas did not result in the unacceptable exposure to the soil contamination;
- (2) There have been any land use changes subsequent to the filing of this Deed Notice and the other Institutional Controls or the most recent biennial certification, whichever is more recent;
- (3) The current land use on the Property is consistent with the restrictions in this Deed Notice and the other Institutional Controls;
- (4) Any newly promulgated or modified requirements of applicable regulations or laws apply to the Property; and
- (5) Any new standards, regulations, or laws apply to the Property that might necessitate additional sampling in order to evaluate the protectiveness of the remedial action which includes this Deed Notice and the other Institutional Controls, and conduct the necessary sampling; and

(C) Description of the following items that will be included in the biennial certification:

- (1) A monitoring report that describes the specific activities, pursuant to (A) and (B), above, conducted in support of the biennial certification of the protectiveness of the remedial action that includes this Deed Notice and the other Institutional Controls;
- (2) Land use at the Property is consistent with the restrictions in this Deed Notice and the other Institutional Controls; and
- (3) The remedial action that includes this Deed Notice and the other Institutional Controls continues to be protective of the public health and safety and of the environment.

ii. Exhibit C-2: Engineering Controls: Clean Fill, Vegetative Cover, Pavement and Access Point Warnings:

Exhibit C-2 includes a narrative description of the engineering controls as follows:

(A) General Description of the engineering control:

- (1) Description of the engineering control;
- (2) The objective of the engineering control; and

(3) How the engineering control is intended to function.

(B) Description of the operation and maintenance necessary to ensure that:

- (1) Periodic inspections of each engineering control are performed in order to determine its integrity, operability, and effectiveness;
- (2) Each engineering control continues as designed and intended to protect the public health and safety and the environment;
- (3) Each alteration, excavation or disturbance of any engineering control is timely and appropriately addressed to maintain the integrity of the engineering control;
- (4) The engineering control is being inspected and maintained and its integrity remains so that the remedial action continues to be protective of the public health and safety and of the environment;
- (5) A record of the self-inspection dates, name of the inspector, results of the inspection and condition(s) of the engineering control. Sampling, for example, may be necessary if it is not possible to visually evaluate the integrity/performance of the engineering control; and
- (6) Any new standards, regulations, or laws apply to the Property that might necessitate additional sampling in order to evaluate the protectiveness of the remedial action which includes this Deed Notice, and conduct the necessary sampling; and

(C) Description of the following items that will be included in the biennial certification:

- (1) A monitoring report that describes the specific activities, pursuant to (A) and (B), above, conducted in support of the biennial certification of the protectiveness of the remedial action that includes this Deed Notice;
- (2) The engineering control continues to operate as designed; and
- (3) The remedial action that includes the engineering control continues to be protective of the public health and safety and of the environment.

14D. EXHIBIT D. Consent Decrees as Institutional Controls: Exhibit D-1 includes a copy of the Consent Decree Regarding Sites 79 and 153 South. Exhibit D-2 includes a copy of the Consent Decree Regarding Remediation of the New Jersey City University Redevelopment Area.

15. SIGNATURES.

IN WITNESS WHEREOF, Owner has executed this Deed Notice as of the date first written above.

ATTEST:  
Maria Kaouris  
Maria Kaouris  
[Print name and title] Remediation  
Manager

425/445 Route 440 Property-LLC  
By John J. Morris  
John J. Morris  
[Signature] Remediation Director

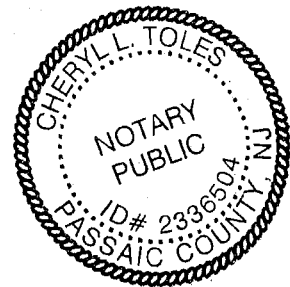
STATE OF NEW JERSEY SS.:  
COUNTY OF ~~[where document is executed]~~ MORRIS

I certify that on Nov. 11, 2010, ~~[Name of person executing document on behalf of Owner]~~ Maria Kaouris personally came before me, and this person acknowledged under oath, to my satisfaction, that:

- (a) this person is the ~~[secretary/assistant secretary]~~ Remediation Manager of Route 425/445 Route 440 LLC, the corporation named in this document;
- (b) this person is the attesting witness to the signing of this document by the proper corporate officer who is the ~~[president/vice president]~~ John J. Morris Remediation Director of the corporation;
- (c) this document was signed and delivered by the corporation as its voluntary act and was duly authorized;
- (d) this person knows the proper seal of the corporation ~~which was affixed to this document~~; and
- (e) this person signed this proof to attest to the truth of these facts.

Maria Kaouris  
[Signature]  
Maria Kaouris - Remediation manager  
[Print name and title of attesting witness]

Signed and sworn before me on Nov. 11, 2010  
Cheryl L. Toles, Notary Public  
Cheryl L. Toles  
[Print name and title]  
My Commission Expires: October 27, 2015



**EXHIBIT A**

**A-1 Vicinity Map  
A-2 Metes and Bounds Description  
A-3 Property Map**

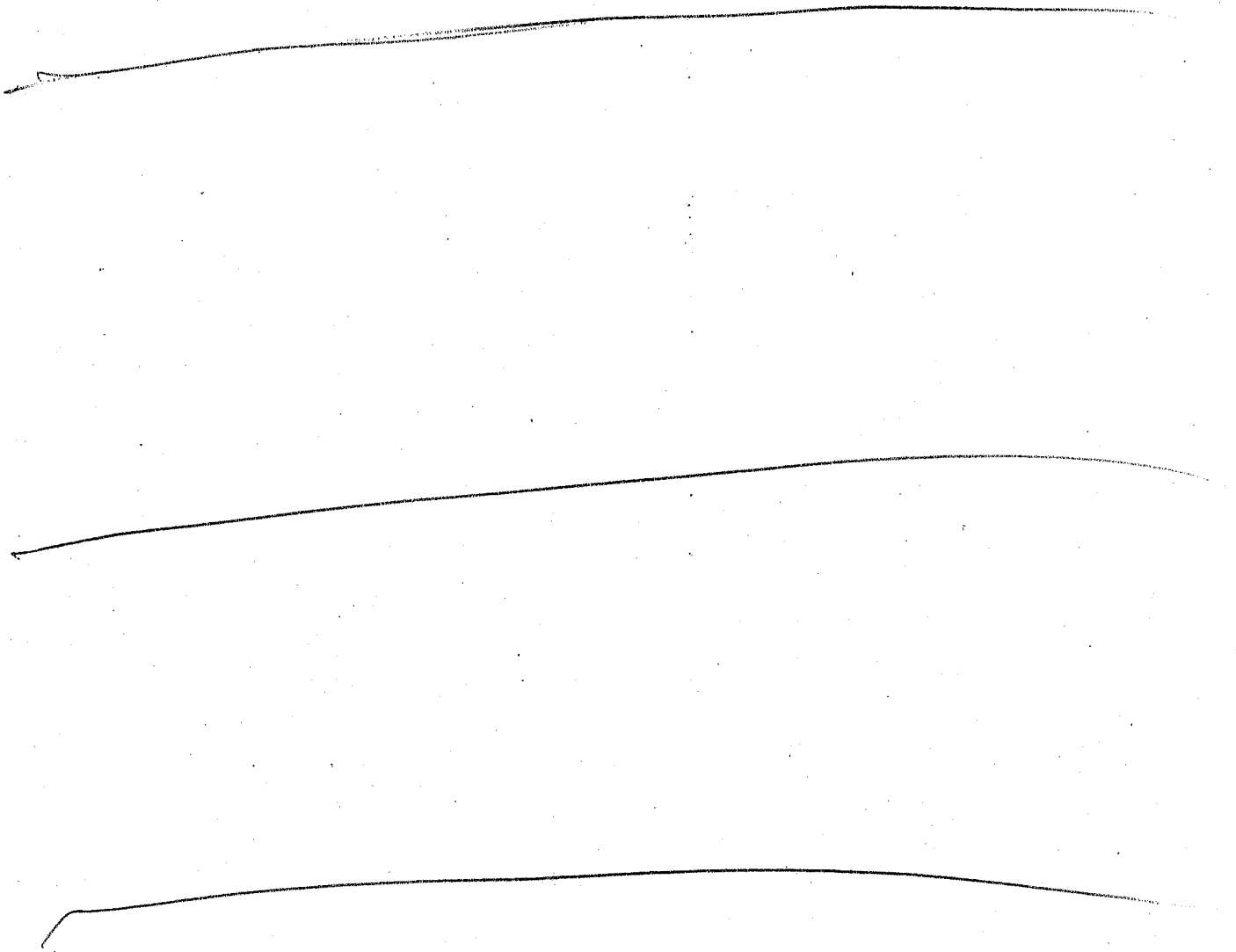
NJDEP Site No. 153 Former Morris Canal  
Block 1289.5, Lot E  
City of Jersey City, Hudson County, New Jersey

Exhibit A-1 consists of a road map for the vicinity of the Property.

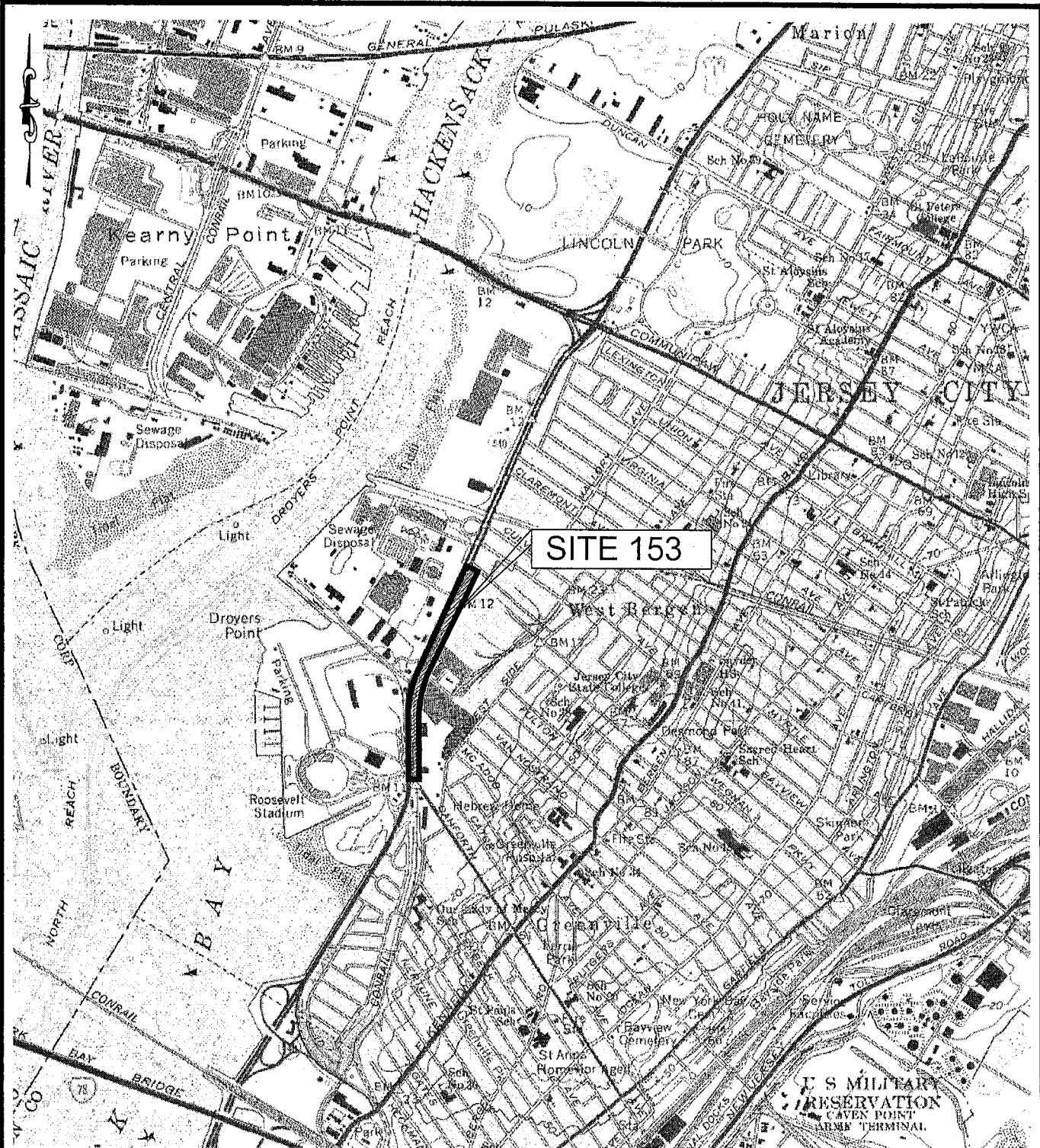
Exhibit A-2 consists of a metes and bounds description for the Property

Exhibit A-3 (A-3A through A-3D) consists of a figures indicating major surface features and existing features for the Property.

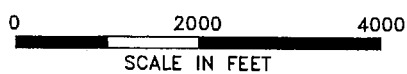
**Exhibit Figure A-1  
Site Vicinity Map**



FILE: P:\LOAD\INSTRUMENTS\JERSEY CITY\SA 5\SITE 153\DEED RESTRICTIONS\CURRENT DRAWINGS\EXHIBIT A-1.DWG, DATE: 10/16/2010 04:06:53PM Layout: Layout



SOURCE: JERSEY CITY, NJ USGS QUADRANGLE MAP, 1983



MACTEC PROJ No.: 3480050145 DRAWING: EXHIBIT A-1	
PREPARED/DATE: STR 5/5/2010	CHECKED/DATE: KS 5/5/2010

**MACTEC**  
MACTEC Engineering and Consulting  
200 American Metro Boulevard, Suite 113  
Hamilton, NJ 08619

EXHIBIT A-1  
VICINITY MAP  
DEED NOTICE  
BLOCK 1289.5, LOT E  
SA 5 - SITE 153 FORMER MORRIS CANAL  
JERSEY CITY, NEW JERSEY



**Exhibit A-2**  
**Metes and Bounds Description of Property**

Block 1289.5, Lot E  
City of Jersey City, New Jersey

Metes and Bounds Description

Real property in the City of Jersey City, County of Hudson, State of New Jersey, described as follows: All that certain Lot, piece or parcel of land, with the buildings and improvements thereon erected, situate, lying and being in the City of Jersey City, County of Hudson, State of New Jersey:

All those two certain pieces or parcels of land, being a part or portion of Grantor's property known as Branch No.1 identified as Line Code 0597 in Grantor's corporate records, also known as Lot E, Block 1289.5 on City of Jersey City Tax maps, situate in the City of Jersey City, County of Hudson and State of New Jersey, separately bounded and described in accordance with a Plat of Survey prepared by Albert N. Faraldi, Professional Land Surveyor No. 29346, of Albert N. Faraldi Group, P.C., 854 Eight Street, Secaucus, New Jersey, dated August 10, 1988; as follows:

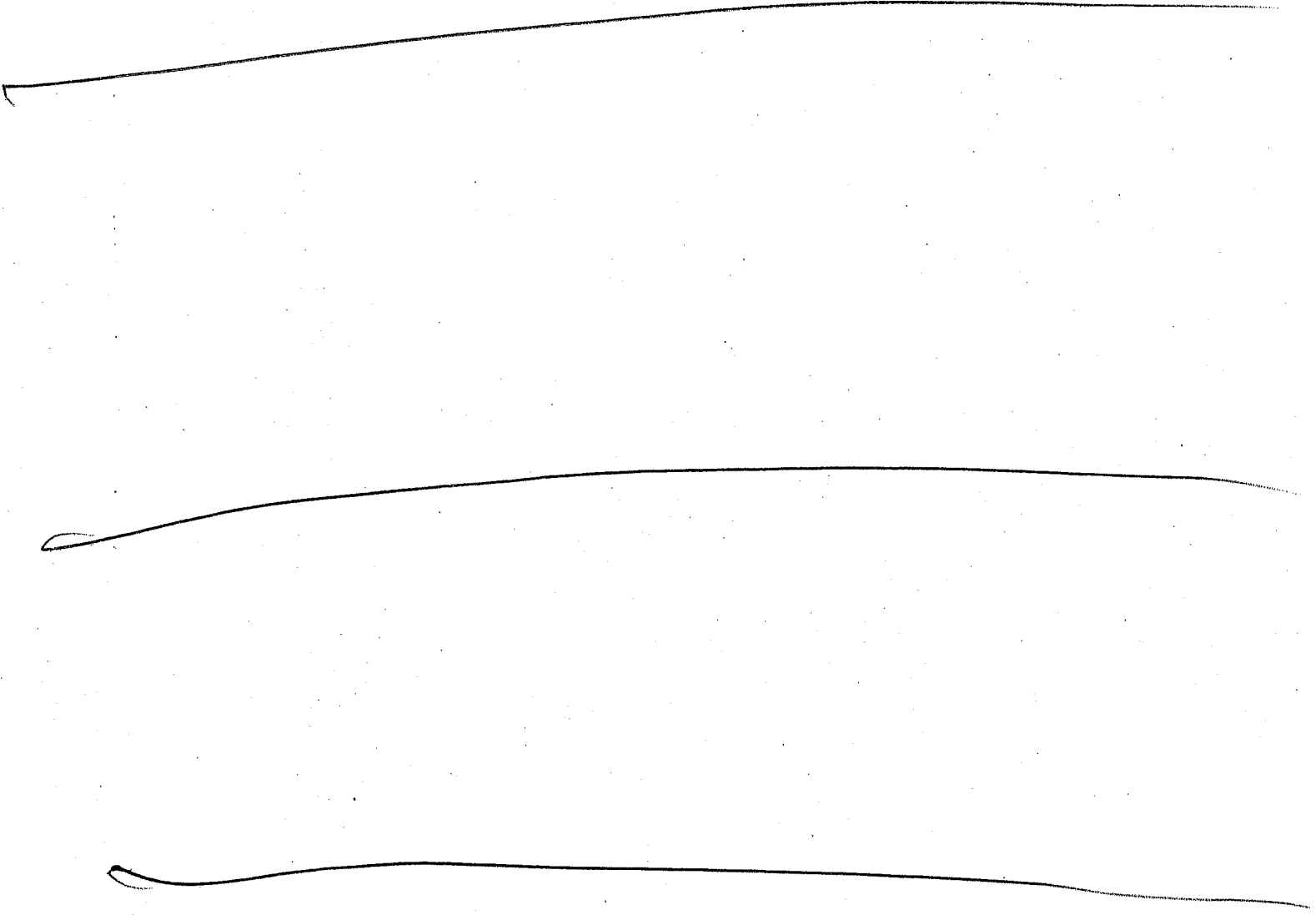
Tract I

Beginning at a point in the easterly line of New Jersey State Highway Route 440 distant 4.12 feet southerly from the State Highway Route 440 with the southerly line of Carbon Place (40 feet wide); and running thence (1) southerly along said New Jersey State Highway Route 440 on a curve to the left with a radius of 27.00 feet and an arc distant of 39.41 feet; thence (2) South 25°09' 35" West, 1,763.23 feet to a point of curvature; thence (3) still southerly and along said New Jersey State Highway Route 440 on a curve to the left with a radius of 1,237.57 feet and an arc distance of 580.19 feet to a point of tangency; thence (4) still southerly along said New Jersey State Highway Route 440 South 1° 42' 05" East, 816.38 feet to the northerly line of Danforth Avenue (70 feet wide); thence (5) South 32° 23' 37" East, 47.02 feet; thence (6) North 1° 42' 05" West, 855.39 feet to a point of curvature; thence (7) on a curve to the right with a radius of 1,213.57 feet and an arc distance of 568.94 feet to a point of tangency; thence (8) North 25° 09' 35" East, 1,790.06 feet, to the point of place of Beginning. Containing 78,016 square feet, or 1.791 acres, more or less.

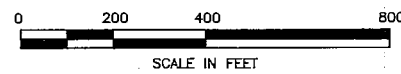
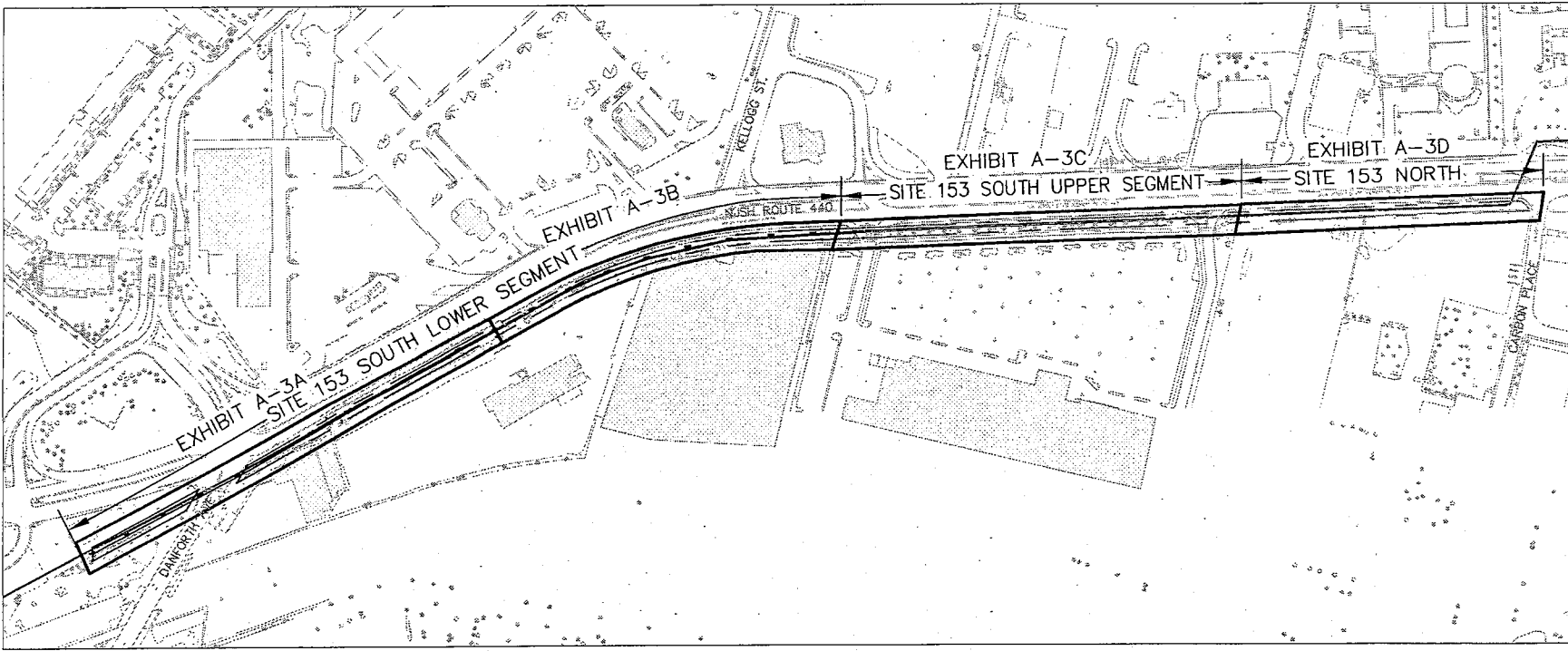
Tract II

Beginning at a point formed by the easterly line of new Jersey State Highway Route 440 with the southerly line of Danforth Avenue (70 feet wide); and running thence (1) South 1° 42' 05" East, 290.86 feet; thence (2) South 80° 59' 02" East, 30.53; thence (3) North 1° 42' 05" West, 246.00 feet; thence (4) North 32° 23' 37" West, 58.77 feet to the point or place of Beginning. Containing 8,052.2 square feet, or 0.1848 of an acre, more or less.

**Exhibit Figure A-3  
Property Map**




P:\CAD\NEWELL\JERSEY CITY\SA 5\153 DEED RESTRICTIONS\CURRENT DRAWINGS\153 ON WITH TRACT 2\EXHIBIT A-3 tract 2.dwg    Wed, 20 Oct 2010 -- 9:13pm    STROUBKH



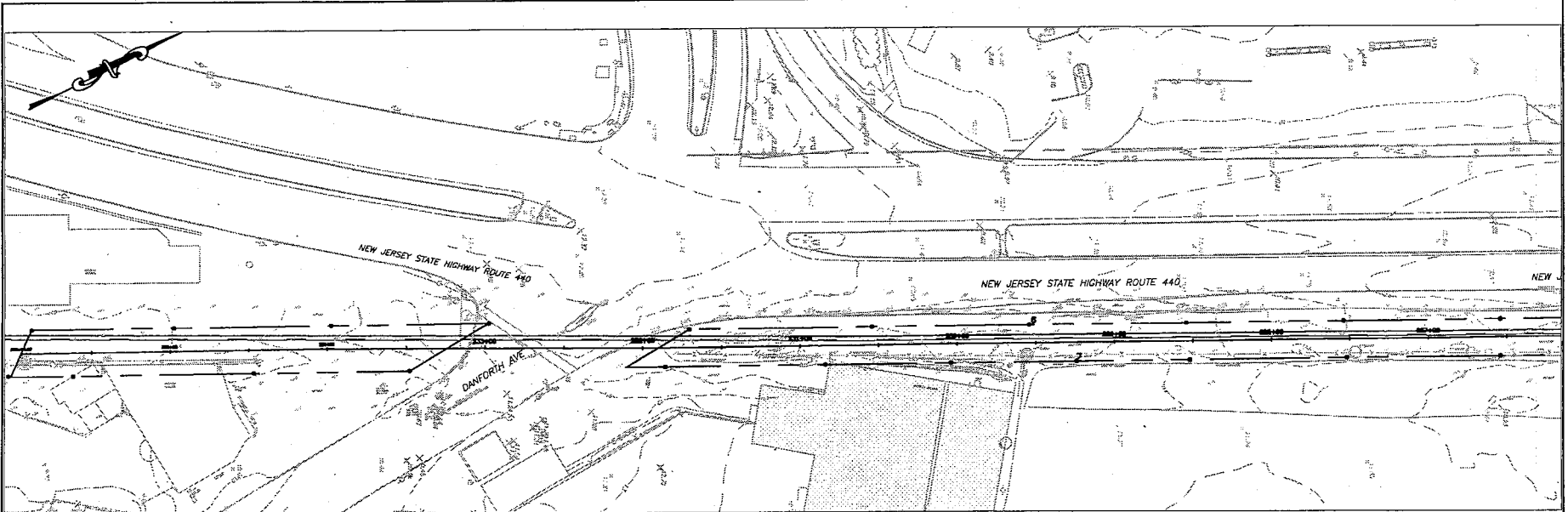
REV.	DATE	STATUS	DRFT BY	CHKD BY

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 PREPARED/DATE: STR 05/05/10    CHECKED/DATE: KS 05/05/10














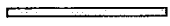

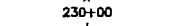
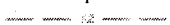
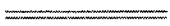

  
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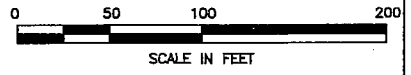
**EXHIBIT A-3**  
 PROPERTY MAP KEY  
 DEED NOTICE  
 BLOCK 1289.5, LOT E  
 SA 5 - SITE 153 FORMER MORRIS CANAL  
 JERSEY CITY, NEW JERSEY

P:\CARD\HONEYWELL\JERSEY CITY\SA 5\Site 153\153 DEED RESTRICTION\CURRENT DRAWINGS\153 DN WITH TRACT 2\EXHIBIT A-3 tract 2.dwg Wed, 20 Oct 2010 -- 9:11pm STRUDKIN



**LEGEND**

-  SIGN
-  UTILITY POLE
-  SURVEY PIN
-  SET PIN AND CAP
-  SANITARY MANHOLE
-  STORM MANHOLE
-  WELL
-  ELECTRIC MANHOLE
-  GAS VALVE
-  CATCH BASIN
-  SPOT ELEVATION  
x15.9
-  TREE/BRUSH LINE
-  EXISTING BUILDING
-  BMUA FORCEMAIN
-  PROPERTY LINE
-  FENCE LINE
-  CENTERLINE STATIONING  
230+00
-  GROUND ELEVATION CONTOUR
-  CONCRETE CURB



REV.	DATE	STATUS	DRAFT BY	CHECK BY

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 CHECKED/DATE: KS 05/05/10















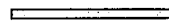
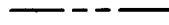
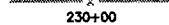
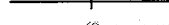
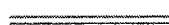

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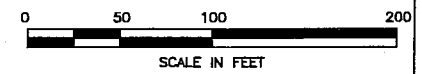
**EXHIBIT A-3A**  
 PROPERTY MAP  
 SITE 153 SOUTH LOWER SEGMENT  
 DEED NOTICE  
 BLOCK 1289.5, LOT E  
 SA 5 - SITE 153 FORMER MORRIS CANAL  
 JERSEY CITY, NEW JERSEY

P:\CADD\VIDEY\NEW JERSEY CITY\SA 5\153 DEED RESTRICTION\CURRENT DRAWINGS\153 DN WITH TRACT 2\EXHIBIT A-3 tract 2.dwg Wed, 20 Oct 2010 - 9:14pm STRUDKIN



**LEGEND**

-  SIGN
-  UTILITY POLE
-  SURVEY PIN
-  SANITARY MANHOLE
-  STORM MANHOLE
-  WELL
-  ELECTRIC MANHOLE
-  GAS VALVE
-  CATCH BASIN
-  SPOT ELEVATION
-  TREE/BRUSH LINE
-  EXISTING BUILDING
-  BMUA FORCEMAIN
-  PROPERTY LINE
-  FENCE LINE
-  CENTERLINE STATIONING
-  GROUND ELEVATION CONTOUR
-  CONCRETE CURB



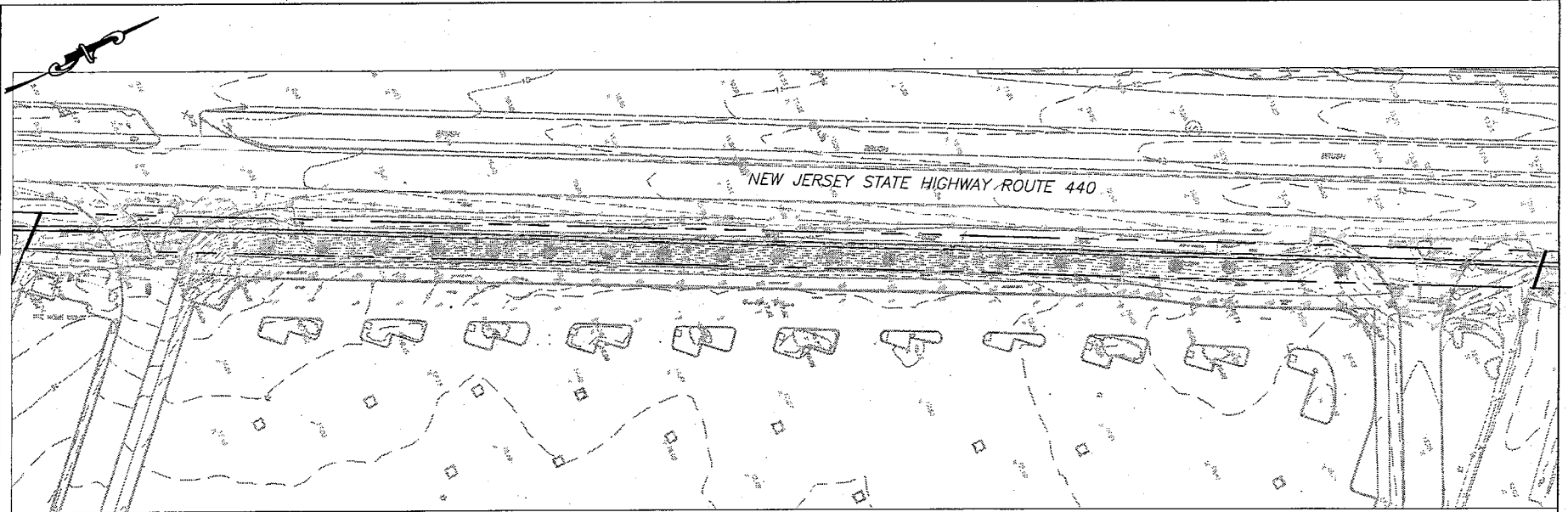
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 CHECKED/DATE: KS 05/05/10


  
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 Hamilton, NJ 08619

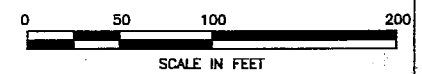
EXHIBIT A-3B  
 PROPERTY MAP  
 SITE 153 SOUTH LOWER SEGMENT  
 DEED NOTICE  
 BLOCK 1289.5, LOT E  
 SA 5 - SITE 153 FORMER MORRIS CANAL  
 JERSEY CITY, NEW JERSEY

P:\CADD\W09EYEWELL\JERSEY CITY SA 5 V10 153 DEED RESTRICTION\CURRENT DRAWINGS\EXHIBIT A-3.dwg Mon, 18 Oct 2010 - 3:20pm strudkin



**LEGEND**

- SIGN
- UTILITY POLE
- SURVEY PIN
- SET PIN AND CAP
- SANITARY MANHOLE
- STORM MANHOLE
- WELL
- ELECTRIC MANHOLE
- GAS VALVE
- CATCH BASIN
- SPOT ELEVATION
- TREE/BRUSH LINE
- EXISTING BUILDING
- BMUA FORCEMAIN
- PROPERTY LINE
- FENCE LINE
- CENTERLINE STATIONING
- GROUND ELEVATION CONTOUR
- CONCRETE CURB



REV.	DATE	STATUS	DRFT BY	CHKD BY

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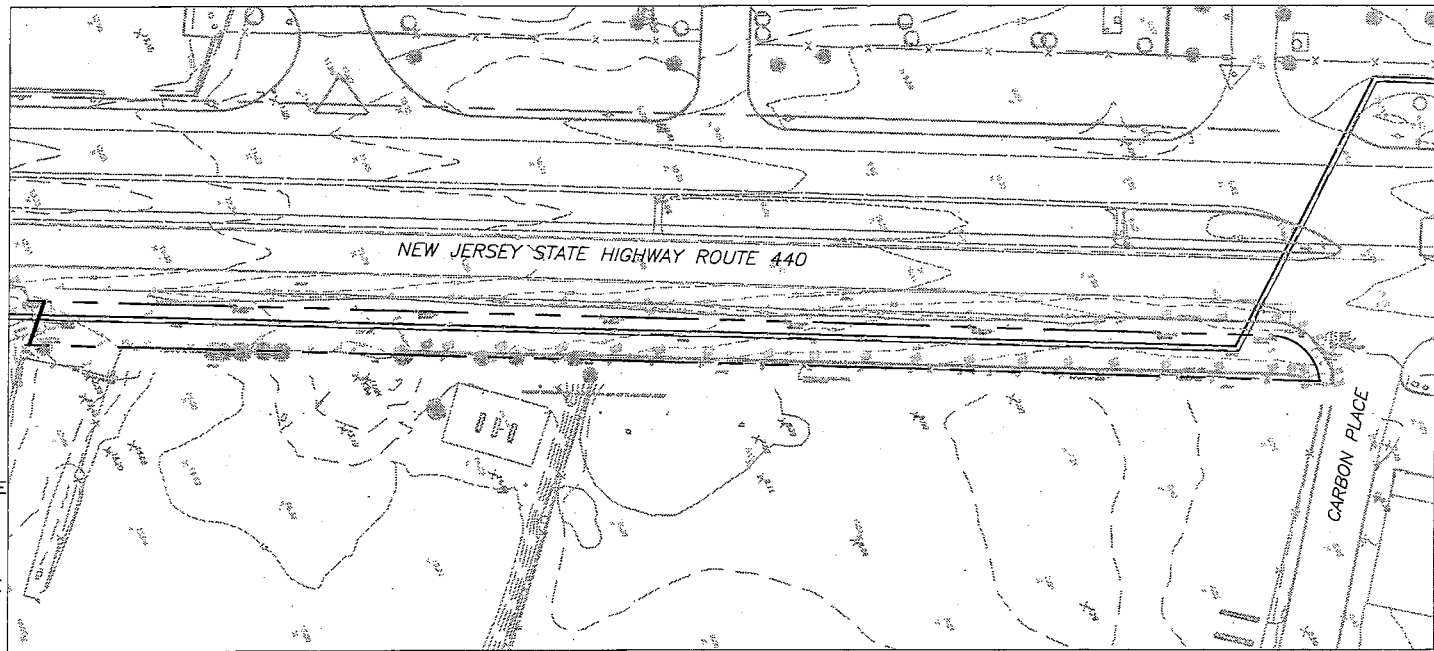
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 CHECKED/DATE: KS 05/05/10

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 MACTEC Engineering and Consulting  
 200 American Metro Boulevard, Suite 113  
 Hamilton, NJ 08619




















**EXHIBIT A-3C**  
 PROPERTY MAP  
 SITE 153 SOUTH UPPER SEGMENT  
 DEED NOTICE  
 BLOCK 1289.5, LOT E  
 SA 5 - SITE 153 FORMER MORRIS CANAL  
 JERSEY CITY, NEW JERSEY

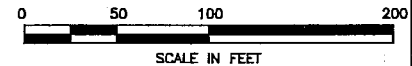


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**LEGEND**

-  SIGN
-  UTILITY POLE
-  SURVEY PIN
-  SET PIN AND CAP
-  SANITARY MANHOLE
-  STORM MANHOLE
-  WELL
-  ELECTRIC MANHOLE
-  GAS VALVE
-  CATCH BASIN
-  SPOT ELEVATION
-  TREE/BRUSH LINE
-  EXISTING BUILDING
-  BMUA FORCEMAIN
-  PROPERTY LINE
-  FENCE LINE
-  CENTERLINE STATIONING
-  GROUND ELEVATION CONTOUR
-  CONCRETE CURB



REV.	DATE	STATUS	DRFT BY	CHKD BY

MACTEC PROJ No.: 3480050164  
 DRAWING: EXHIBIT A-3  
 PREPARED/DATE: STR 05/05/10  
 CHECKED/DATE: KS 05/05/10


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**EXHIBIT A-3D**  
 PROPERTY MAP  
 SITE 153 NORTH  
 DEED NOTICE  
 BLOCK 1289.5, LOT E  
 SA 5 - SITE 153 FORMER MORRIS CANAL  
 JERSEY CITY, NEW JERSEY

## **EXHIBIT B**

### **B-1: Restricted Area Map and Engineering Controls**

### **B-2: Restricted Area Data Table**

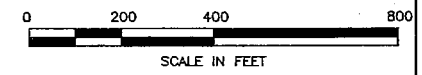
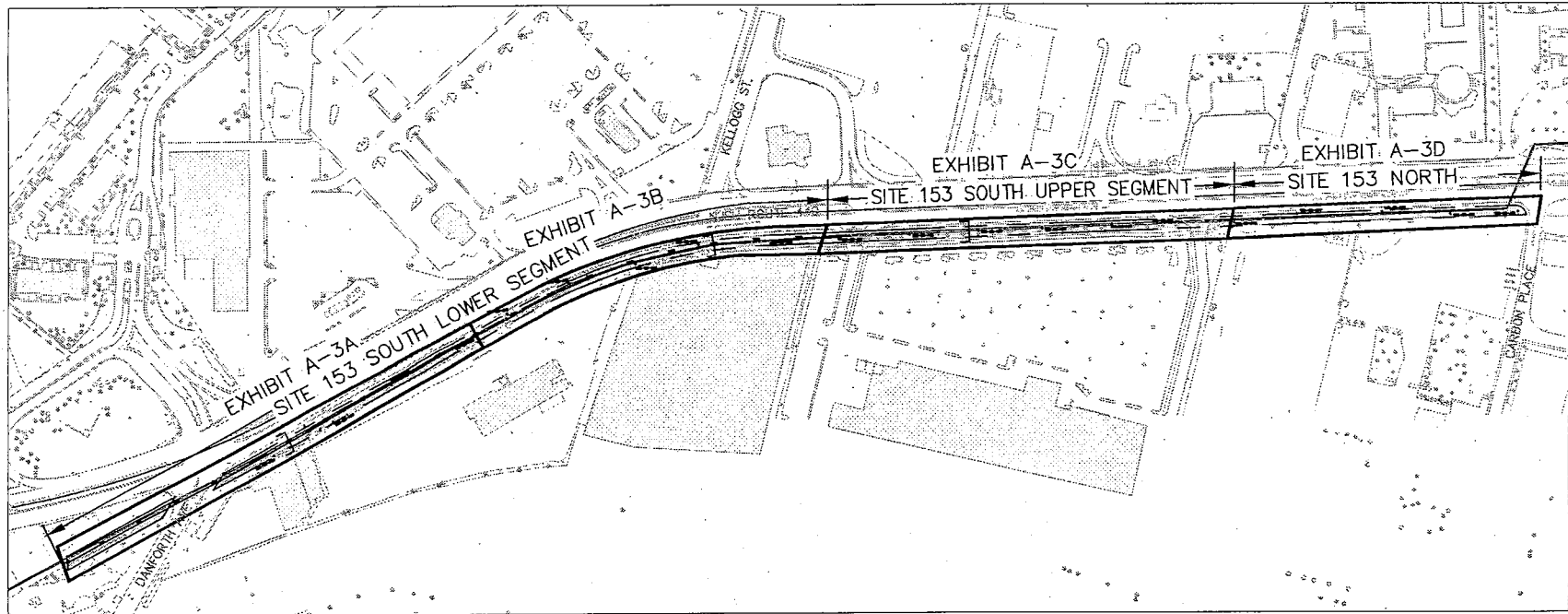
NJDEP Site No. 153 Former Morris Canal  
Block 1289.5, Lot E  
City of Jersey City, Hudson County, New Jersey

Exhibit B-1A through B-1D includes maps that illustrate the Restricted Area and engineering/institutional controls.

Exhibit B-2 includes data table which identify the Restricted Area containing soils that are in excess of NJDEP unrestricted soil cleanup standards.

**Exhibit Figures B-1A through B-1D  
Restricted Area Maps and Engineering Controls**

P:\CAD\HONERWELL\JERSEY CITY\SA 5 - SITE 153\153 DEED RESTRICTION\CURRENT DRAWINGS\153 ON WITH TRACT 2\EXHIBIT B-2 Tract 2.dwg Wed, 30 Oct 2010 11:51:27am STRUDRIN



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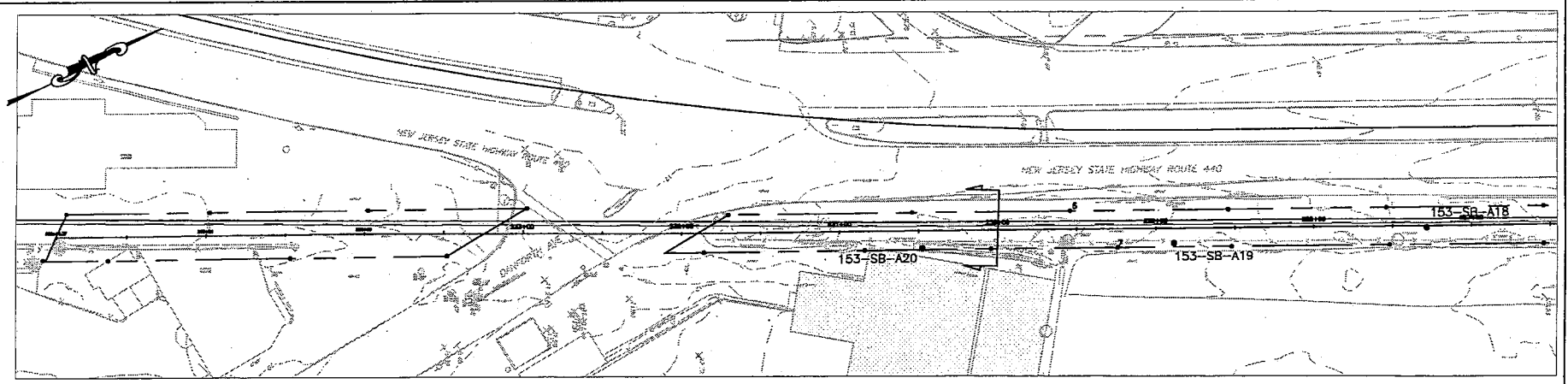
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CHECKED/DATE: KS 05/05/10

**MACTEC**

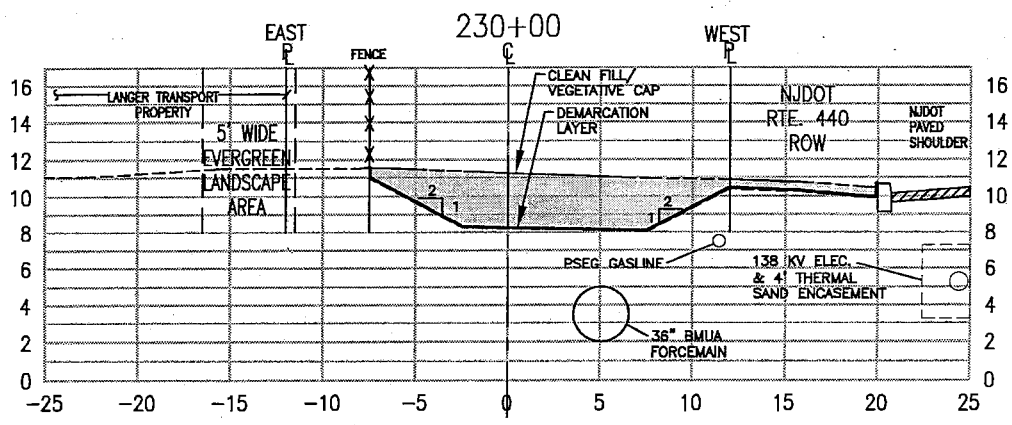
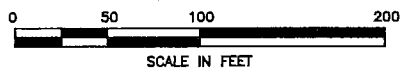
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Hamilton, NJ 08619

**EXHIBIT B-1**  
RESTRICTED AREA MAP KEY  
DEED NOTICE  
BLOCK 1289.5, LOT E  
SA 5 - SITE 153 FORMER MORRIS CANAL  
JERSEY CITY, NEW JERSEY

P:\CADD\HONEYWELL\JERSEY CITY\SA 5\Site 153\ISS DEED RESTRICTION\CURRENT DRAWINGS\153 DN WITH TRACT 2\EXHIBIT B-2 tract 2.dwg Wed, 20 Oct 2010 - 9:18pm STRUDKIN



PLAN VIEW



CROSS SECTION STA. 213+00  
 SCALE: 1"=10' HORIZONTAL  
 1"=1' VERTICAL

LEGEND

- 153-SB-AXX ● SAMPLE LOCATION
- ↔ CROSS SECTION DIRECTION & LOCATION
- ▭ DEED RESTRICTION AREA
- ▭ BMUA FORCEMAIN
- PROPERTY LINE
- 230+00 | CENTERLINE STATIONING

REV.	DATE	STATUS	DRAFT	CHKD	BY	BY

MACTEC PROJ No.: 3480050164  
 DRAWING: EXHIBIT B-2 tract 2

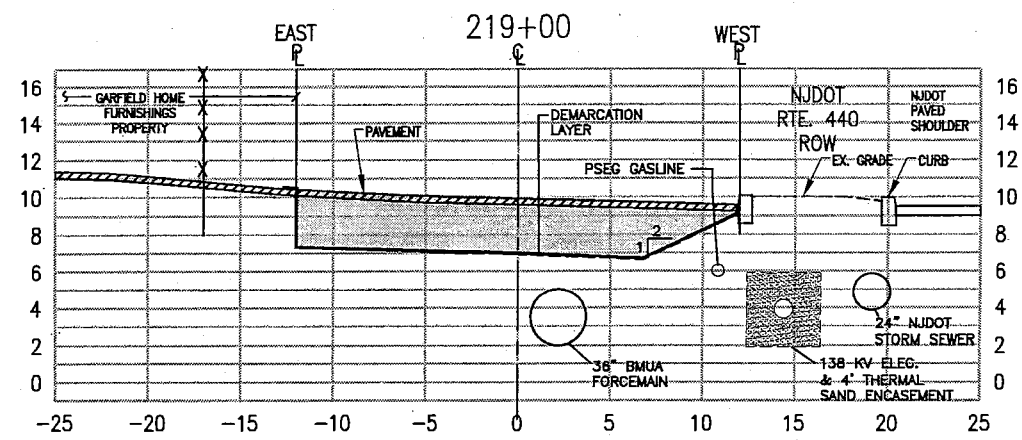
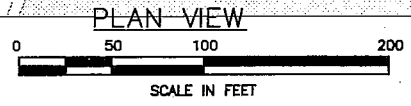
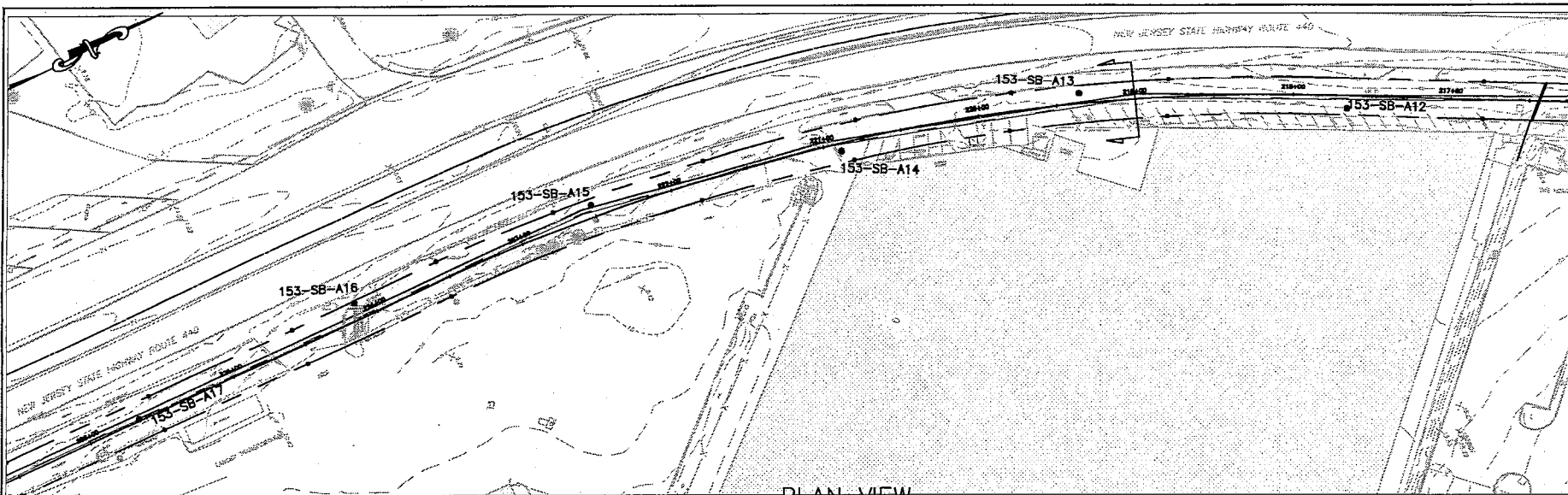
PREPARED/DATE: STR 05/05/10  
 CHECKED/DATE: KS 05/05/10

**MACTEC**

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EXHIBIT B-1A  
 RESTRICTED AREA MAP  
 SITE 153 SOUTH LOWER SEGMENT  
 DEED NOTICE  
 BLOCK 1289.5, LOT E  
 SA 5 - SITE 153 FORMER MORRIS CANAL  
 JERSEY CITY, NEW JERSEY

P:\CADD\HONENWELL\JERSEY CITY SA 5\site 153\153 DEED RESTRICTION\CURRENT DRAWINGS\153 DN WITH TRACT 2\EXHIBIT B-2 tract 2.dwg Wed, 20 Oct 2010 - 8:19pm STRUDKIN



**CROSS SECTION STA. 213+00**  
 SCALE: 1"=10' HORIZONTAL  
 1"=1' VERTICAL

- LEGEND**
- 153-SB-AXX • SAMPLE LOCATION
  - ↑ CROSS SECTION DIRECTION & LOCATION
  - ▭ DEED RESTRICTION AREA
  - ▭ BMUA FORCEMAIN
  - PROPERTY LINE
  - 230+00 CENTERLINE STATIONING

REV.	DATE	STATUS	DRFT BY	CHKD BY

MACTEC PROJ No.: 3480050164  
 DRAWING: EXHIBIT B-2 tract 2

PREPARED/DATE: STR 05/05/10  
 CHECKED/DATE: KS 05/05/10

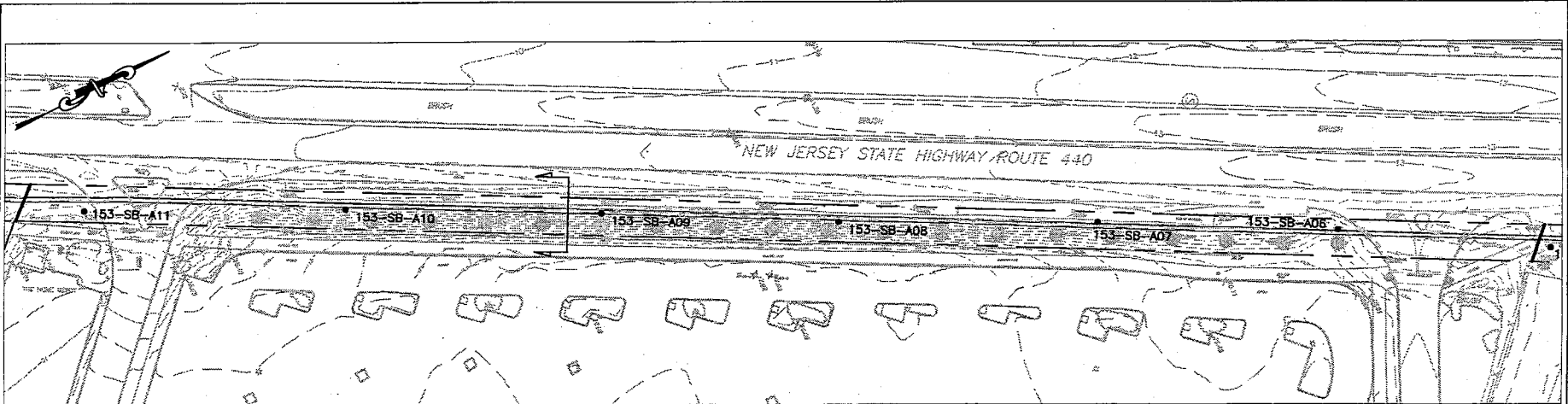
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 Hamilton, NJ 08619

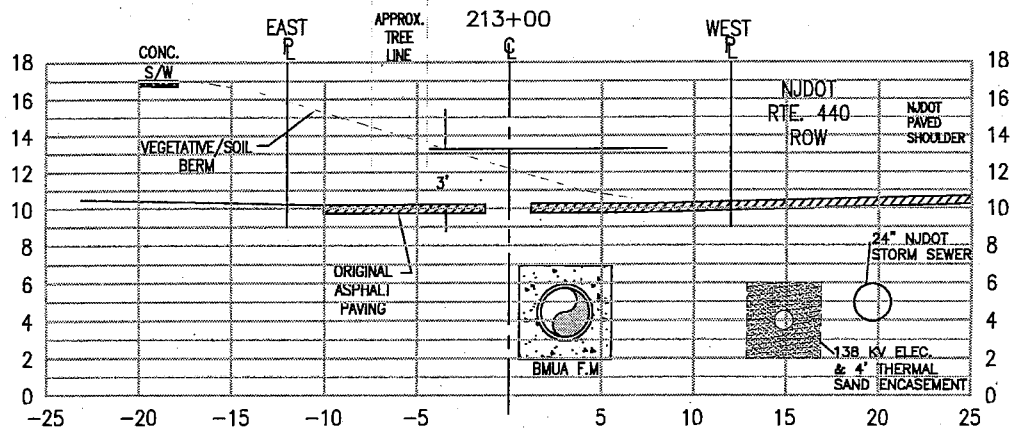
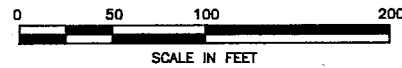
**EXHIBIT B-1B**  
 RESTRICTED AREA MAP  
 SITE 153 SOUTH LOWER SEGMENT  
 DEED NOTICE  
 BLOCK 1289.5, LOT E  
 SA 5 - SITE 153 FORMER MORRIS CANAL  
 JERSEY CITY, NEW JERSEY



P:\CADD\HONEYWELL\JERSEY CITY\SA 5\Site 153\ESD DEED RESTRICTION\CURRENT DRAWINGS\EXHIBIT B-2.dwg Mon, 16 Oct 2010 - 3:40pm str/rdk



PLAN VIEW



CROSS SECTION STA. 213+00

SCALE: 1"=10' HORIZONTAL  
1"=1' VERTICAL

- LEGEND**
- 153-SB-AXX • SAMPLE LOCATION
  - [Arrow symbol] CROSS SECTION DIRECTION & LOCATION
  - [Hatched area symbol] DEED RESTRICTION AREA
  - [Double line symbol] BMUA FORCEMAIN
  - [Dashed line symbol] PROPERTY LINE
  - [Vertical line with cross-ticks symbol] CENTERLINE STATIONING

REV.	DATE	STATUS	DRFT BY	CHKD BY

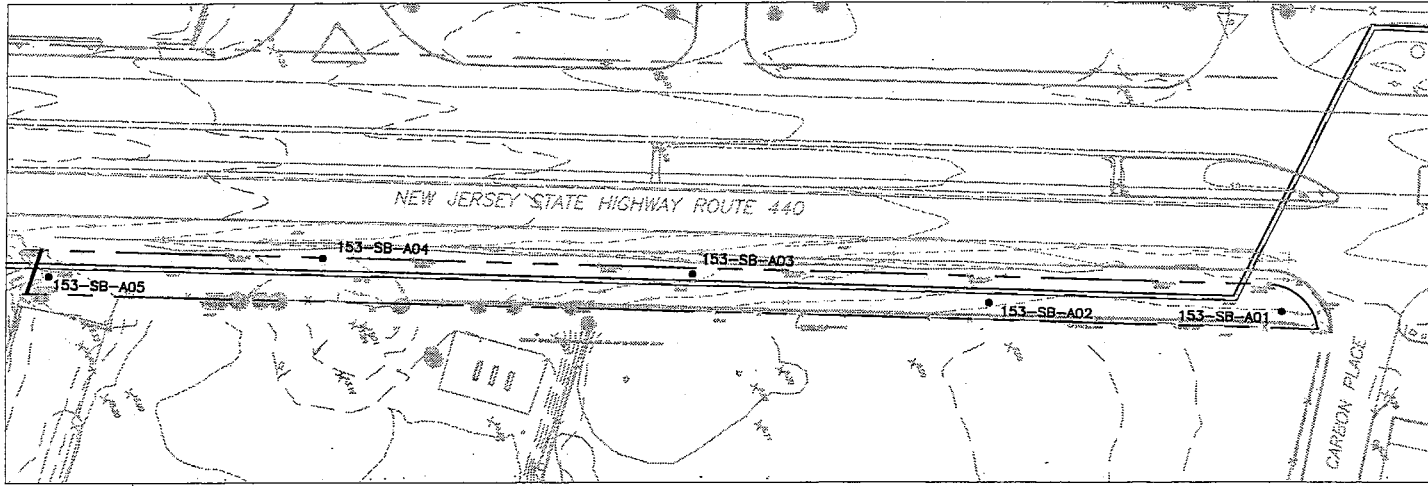
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DRAWING: EXHIBIT B-2

PREPARED/DATE: STR 05/05/10  
CHECKED/DATE: KS 05/05/10

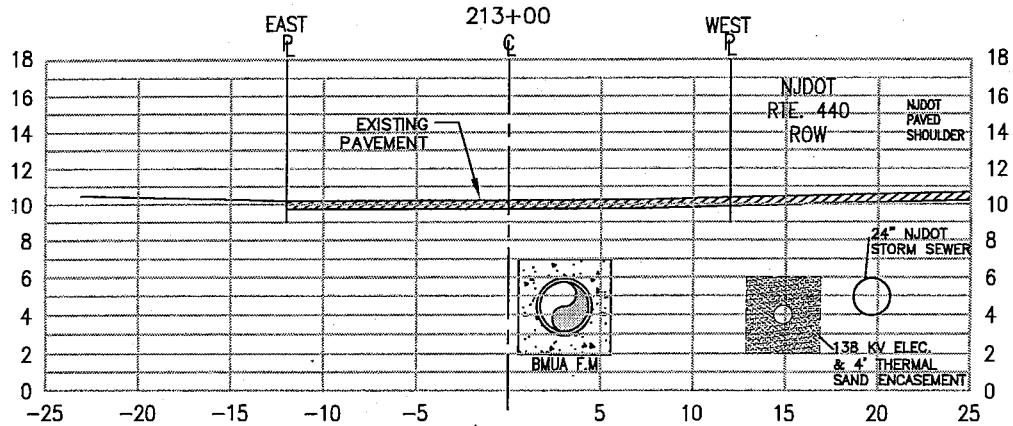
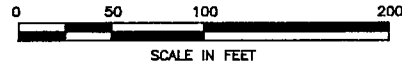
**MACTEC**  
MACTEC Engineering and Consulting  
200 American Metro Boulevard, Suite 113  
Hamilton, NJ 08619

**EXHIBIT B-1C**  
RESTRICTED AREA MAP  
SITE 153 SOUTH UPPER SEGMENT  
DEED NOTICE  
BLOCK 1289.5, LOT E  
SA 5 - SITE 153 FORMER MORRIS CANAL  
JERSEY CITY, NEW JERSEY

P:\CADD\HONEYWELL\JERSEY CITY\SA 5\Site 153\153 DEED RESTRICTION\CURRENT DRAWINGS\EXHIBIT B-2.dwg Mon, 18 Oct 2010 4:54:22pm s1r2d3k1n



PLAN VIEW



CROSS SECTION STA. 213+00  
SCALE: 1"=10' HORIZONTAL  
1"=1' VERTICAL

LEGEND

- 153-SB-AXX • SAMPLE LOCATION
- ↑ CROSS SECTION DIRECTION & LOCATION
- DEED RESTRICTION AREA
- BMUA FORCEMAIN
- PROPERTY LINE
- 230+00 CENTERLINE STATIONING

REV.	DATE	STATUS	DRIFT BY	CHKD BY

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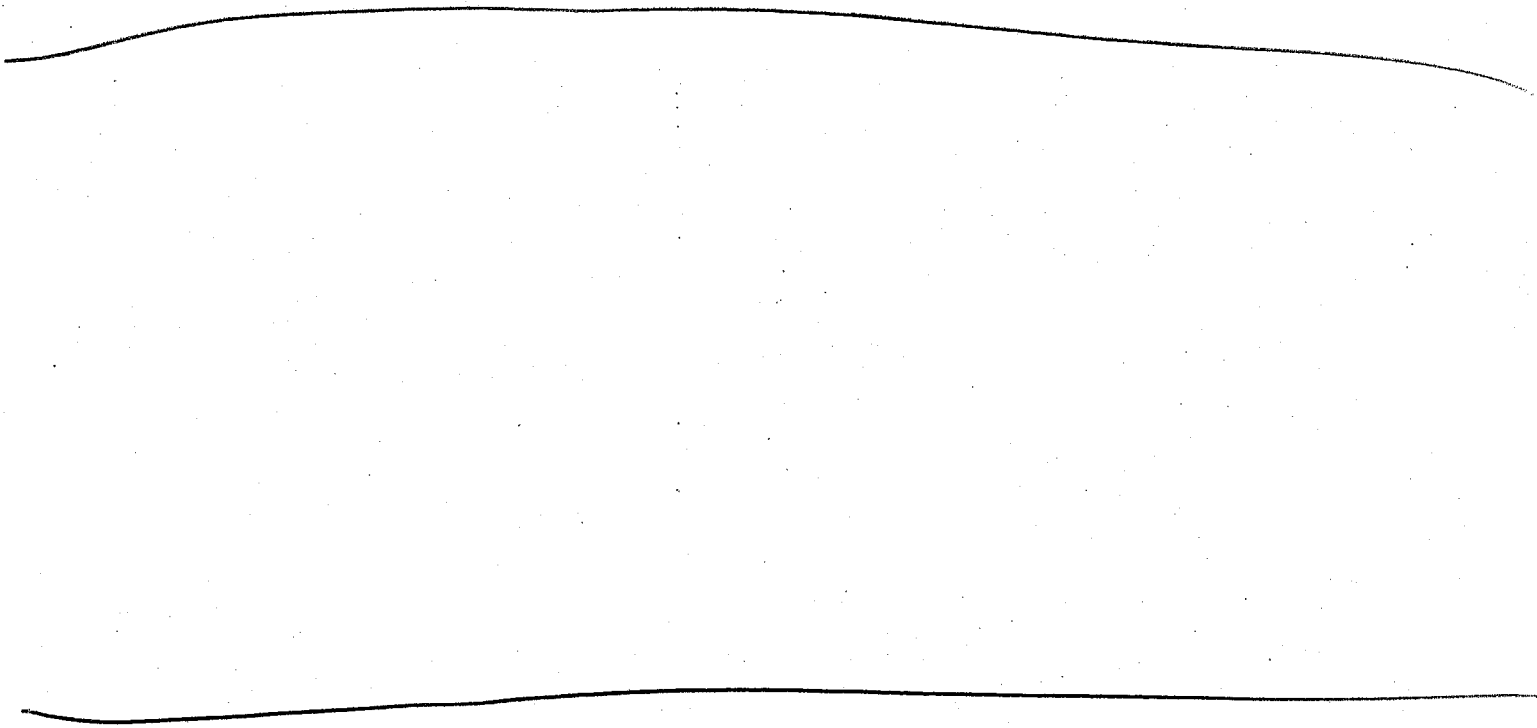
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CHECKED/DATE: KS 05/05/10



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EXHIBIT B-1D  
RESTRICTED AREA MAP  
SITE 153 NORTH  
DEED NOTICE  
BLOCK 1289.5, LOT E  
SA 5 - SITE 153 FORMER MORRIS CANAL  
JERSEY CITY, NEW JERSEY

**Exhibit B-2**  
**Restricted Area Data Table**



**Exhibit Table B-2**  
**Restricted Area Data**  
**Site 153 Former Morris Canal**  
**Block 1289.5, Lot E, Jersey City, New Jersey**

Location	Sample Date	Sample Depth (ft)	Elevation (ft msl)	Field Sample ID	Contaminant	CASR#	NJDEP RDCSRS (mg/kg)	NJDEP NRDSRS (mg/kg)	Soil Concentration (mg/kg)
153-SB-A01	5/21/1997	04-06	2.89 to 4.89	153-SB-A01-0406	Hex Chromium	18540-29-9	20	NA	7490J
153-SB-A01	5/21/1997	06-08	0.89 to 2.89	153-SB-A01-0608	Hex Chromium	18540-29-9	20	NA	7690J
153-SB-A01	5/21/1997	12-14	-5.11 to -3.11	153-SB-A01-1214	Hex Chromium	18540-29-9	20	NA	60.7J
153-SB-A01	5/21/1997	14-16	-7.11 to -5.11	153-SB-A01-1416	Hex Chromium	18540-29-9	20	NA	20.8J
153-SB-A02	5/21/1997	0-2	7.11 to 9.11	153-SB-A02-0002	Hex Chromium	18540-29-9	20	NA	281J
153-SB-A02	5/21/1997	02-04	5.11 to 7.11	153-SB-A02-0204	Hex Chromium	18540-29-9	20	NA	998J
153-SB-A02	5/21/1997	04-06	3.11 to 5.11	153-SB-A02-0406	Hex Chromium	18540-29-9	20	NA	361J
153-SB-A03	5/21/1997	0-2	8.54 to 10.54	153-SB-A03-0002	Hex Chromium	18540-29-9	20	NA	66.1J
153-SB-A03	5/21/1997	04-06	4.54 to 6.54	153-SB-A03-0406	Hex Chromium	18540-29-9	20	NA	1160J
153-SB-A03	5/21/1997	06-08	2.54 to 4.54	153-SB-A03-0608	Hex Chromium	18540-29-9	20	NA	49.7J
153-SB-A03	5/21/1997	08-10	0.54 to 2.54	153-SB-A03-0810	Hex Chromium	18540-29-9	20	NA	227J
153-SB-A03	5/21/1997	08-10	0.54 to 2.54	153-SB-A03-0810	Mercury	7439-97-6	23	65	32.9J
153-SB-A04	5/21/1997	04-06	5.11 to 7.11	153-SB-A04-0406	Hex Chromium	18540-29-9	20	NA	7680J
153-SB-A04	5/21/1997	06-08	3.11 to 5.11	153-SB-A04-0608	Hex Chromium	18540-29-9	20	NA	33.2J
153-SB-A04	5/21/1997	08-10	1.11 to 3.11	153-SB-A04-0810	Hex Chromium	18540-29-9	20	NA	93J
153-SB-A04	5/21/1997	10-12	-0.89 to 1.11	153-SB-A04-1012	Hex Chromium	18540-29-9	20	NA	222J
153-SB-A04	5/21/1997	10-12	-0.89 to 1.11	153-SB-A04-1012-D	Hex Chromium	18540-29-9	20	NA	229J
153-SB-A05	5/21/1997	0-2	10.14 to 12.14	153-SB-A05-0002	Hex Chromium	18540-29-9	20	NA	624J
153-SB-A05	5/21/1997	02-04	8.14 to 10.14	153-SB-A05-0204	Hex Chromium	18540-29-9	20	NA	4520J
153-SB-A05	5/21/1997	04-06	6.14 to 8.14	153-SB-A05-0406	Hex Chromium	18540-29-9	20	NA	8250J
153-SB-A05	11/18/1998	04-08	4.14 to 8.14	153-SB-A05-0408-GP1	Hex Chromium	18540-29-9	20	NA	8560J
153-SB-A05	11/18/1998	04-08	4.14 to 8.14	153-SB-A05-0408-GP2	Hex Chromium	18540-29-9	20	NA	5690J
153-SB-A05	11/18/1998	04-08	4.14 to 8.14	153-SB-A05-0408-GP3	Hex Chromium	18540-29-9	20	NA	5670J
153-SB-A05	11/18/1998	04-08	4.14 to 8.14	153-SB-A05-0408-GP4	Hex Chromium	18540-29-9	20	NA	3960J
153-SB-A05	5/21/1997	06-08	4.14 to 6.14	153-SB-A05-0608	Hex Chromium	18540-29-9	20	NA	9150J
153-SB-A05	5/21/1997	08-10	2.14 to 4.14	153-SB-A05-0810	Hex Chromium	18540-29-9	20	NA	7020J
153-SB-A05	5/21/1997	12-14	-1.86 to 0.14	153-SB-A05-1214	Hex Chromium	18540-29-9	20	NA	2570J
153-SB-A05	5/21/1997	14-16	-3.86 to -1.86	153-SB-A05-1416	Hex Chromium	18540-29-9	20	NA	187J
153-SB-A06	5/22/1997	0-2	10.8 to 12.8	153-SB-A06-0002	Hex Chromium	18540-29-9	20	NA	194J
153-SB-A06	5/22/1997	04-06	6.8 to 8.8	153-SB-A06-0406	Hex Chromium	18540-29-9	20	NA	159J
153-SB-A06	5/22/1997	06-08	4.8 to 6.8	153-SB-A06-0608	Hex Chromium	18540-29-9	20	NA	4110J
153-SB-A06	5/22/1997	08-10	2.8 to 4.8	153-SB-A06-0810	Hex Chromium	18540-29-9	20	NA	3230J
153-SB-A06	5/22/1997	08-10	2.8 to 4.8	153-SB-A06-0810-D	Hex Chromium	18540-29-9	20	NA	3600J
153-SB-A06	5/22/1997	10-12	0.8 to 2.8	153-SB-A06-1012	Hex Chromium	18540-29-9	20	NA	1070J
153-SB-A06	5/22/1997	12-14	-1.2 to 0.8	153-SB-A06-1214	Hex Chromium	18540-29-9	20	NA	1970J
153-SB-A06	5/22/1997	18-20	-7.2 to -5.2	153-SB-A06-1820	Hex Chromium	18540-29-9	20	NA	96.3J
153-SB-A06	5/22/1997	20-22	-9.2 to -7.2	153-SB-A06-2022	Hex Chromium	18540-29-9	20	NA	70.4J
153-SB-A06	5/22/1997	22-24	-11.2 to -9.2	153-SB-A06-2224	Hex Chromium	18540-29-9	20	NA	63.9J
153-SB-A07	5/22/1997	0-2	10.29 to 12.29	153-SB-A07-0002	Hex Chromium	18540-29-9	20	NA	179J
153-SB-A07	5/22/1997	0-4	6.29 to 8.29	153-SB-A07-0406	Hex Chromium	18540-29-9	20	NA	1520J
153-SB-A07	5/22/1997	6-8	4.29 to 6.29	153-SB-A07-0608	Hex Chromium	18540-29-9	20	NA	7750J
153-SB-A07	5/22/1997	6-8	4.29 to 6.29	153-SB-A07-0608	Vanadium	7440-62-2	78	1100	443
153-SB-A07	5/22/1997	8-10	2.29 to 4.29	153-SB-A07-0810	Hex Chromium	18540-29-9	20	NA	184
153-SB-A07	5/22/1997	16-18	-5.71 to -3.71	153-SB-A07-1618	Hex Chromium	18540-29-9	20	NA	30.4J
153-SB-A07	5/22/1997	18-20	-7.71 to -5.71	153-SB-A07-1820	Hex Chromium	18540-29-9	20	NA	34.1J
153-SB-A08	5/22/1997	0-2	9.71 to 11.71	153-SB-A08-0002	Hex Chromium	18540-29-9	20	NA	13100
153-SB-A08	5/22/1997	2-4	7.71 to 9.71	153-SB-A08-0204	Hex Chromium	18540-29-9	20	NA	4750
153-SB-A08	5/22/1997	04-06	5.71 to 7.71	153-SB-A08-0406	Hex Chromium	18540-29-9	20	NA	3110
153-SB-A08	5/22/1997	6-8	3.71 to 5.71	153-SB-A08-0608	Hex Chromium	18540-29-9	20	NA	9070
153-SB-A08	5/22/1997	6-8	3.71 to 5.71	153-SB-A08-0608-D	Hex Chromium	18540-29-9	20	NA	8970
153-SB-A08	5/22/1997	8-10	1.71 to 3.71	153-SB-A08-0810	Vanadium	7440-62-2	78	1100	433
153-SB-A08	5/22/1997	08-10	1.71 to 3.71	153-SB-A08-0810	Hex Chromium	18540-29-9	20	NA	5380
153-SB-A09	5/22/1997	0-2	9.09 to 11.09	153-SB-A09-0002	Hex Chromium	18540-29-9	20	NA	39.7
153-SB-A09	5/22/1997	4-6	5.09 to 7.09	153-SB-A09-0406	Hex Chromium	18540-29-9	20	NA	155
153-SB-A09	5/22/1997	06-08	3.09 to 5.09	153-SB-A09-0608	Hex Chromium	18540-29-9	20	NA	110
153-SB-A09	5/22/1997	8-10	1.09 to 3.09	153-SB-A09-0810	Arsenic	7440-38-2	19	19	250
153-SB-A09	5/22/1997	08-10	1.09 to 3.09	153-SB-A09-0810	Lead	7439-92-1	400	800	588J
153-SB-A09	5/22/1997	8-10	1.09 to 3.09	153-SB-A09-0810	Mercury	7439-97-6	23	65	299J
153-SB-A09	5/22/1997	08-10	1.09 to 3.09	153-SB-A09-0810	Benzo(A)anthracene	56-55-3	0.6	2	2.3J
153-SB-A09	5/22/1997	8-10	1.09 to 3.09	153-SB-A09-0810	Benzo(A)pyrene	50-32-8	0.2	0.2	1.5J
153-SB-A09	5/22/1997	08-10	1.09 to 3.09	153-SB-A09-0810	Benzo(B)fluoranthene	205-99-2	0.6	2	2.5J
153-SB-A09	5/22/1997	08-10	1.09 to 3.09	153-SB-A09-0810	Indeno(1,2,3-CD)pyrene	193-39-5	0.6	2	0.84J
153-SB-A10	5/22/1997	0-2	8.84 to 10.84	153-SB-A10-0002	Hex Chromium	18540-29-9	20	NA	59.8J
153-SB-A10	5/22/1997	02-04	6.84 to 8.84	153-SB-A10-0204	Hex Chromium	18540-29-9	20	NA	599J
153-SB-A10	5/22/1997	04-06	4.84 to 6.84	153-SB-A10-0406	Hex Chromium	18540-29-9	20	NA	2450J
153-SB-A10	5/22/1997	08-10	0.84 to 2.84	153-SB-A10-0810	Hex Chromium	18540-29-9	20	NA	3680J

**Exhibit Table B-2**  
**Restricted Area Data**  
**Site 153 Former Morris Canal**  
**Block 1289.5, Lot E, Jersey City, New Jersey**

Location	Sample Date	Sample Depth (ft)	Elevation (ft msl)	Field Sample ID	Contaminant	CASR#	NJDEP RDCSRS (mg/kg)	NJDEP NRDSRS (mg/kg)	Soil Concentration (mg/kg)
153-SB-A11	5/22/1997	0-2	8.76 to 10.76	153-SB-A11-0002	Hex Chromium	18540-29-9	20	NA	58.5J
153-SB-A11	5/22/1997	02-04	6.76 to 8.76	153-SB-A11-0204	Hex Chromium	18540-29-9	20	NA	10900J
153-SB-A11	5/22/1997	04-06	4.76 to 6.76	153-SB-A11-0406	Hex Chromium	18540-29-9	20	NA	67J
153-SB-A11	5/22/1997	06-08	2.76 to 4.76	153-SB-A11-0608	Hex Chromium	18540-29-9	20	NA	481J
153-SB-A11	5/22/1997	08-10	0.76 to 2.76	153-SB-A11-0810	Hex Chromium	18540-29-9	20	NA	675J
153-SB-A11	5/22/1997	08-10	0.76 to 2.76	153-SB-A11-0810-D	Hex Chromium	18540-29-9	20	NA	560
153-SB-A12	5/22/1997	04-06	4.05 to 6.05	153-SB-A12-0406	Hex Chromium	18540-29-9	20	NA	52.7J
153-SB-A12	5/22/1997	06-08	2.05 to 4.05	153-SB-A12-0608	Arsenic	7440-38-2	19	19	47.9
153-SB-A12	5/22/1997	06-08	2.05 to 4.05	153-SB-A12-0608	Hex Chromium	18540-29-9	20	NA	1470J
153-SB-A12	5/22/1997	06-08	2.05 to 4.05	153-SB-A12-0608	Mercury	7439-97-6	23	65	201J
153-SB-A12	5/22/1997	06-08	2.05 to 4.05	153-SB-A12-0608	Vanadium	7440-62-2	78	1100	599
153-SB-A12	5/22/1997	06-08	2.05 to 4.05	153-SB-A12-0608	Benzo(A)anthracene	56-55-3	0.6	2	300
153-SB-A12	5/22/1997	06-08	2.05 to 4.05	153-SB-A12-0608	Benzo(A)pyrene	50-32-8	0.2	0.2	290
153-SB-A12	5/22/1997	06-08	2.05 to 4.05	153-SB-A12-0608	Benzo(B)fluoranthene	205-99-2	0.6	2	340
153-SB-A12	5/22/1997	06-08	2.05 to 4.05	153-SB-A12-0608	Benzo(K)fluoranthene	207-08-9	6	23	120J
153-SB-A12	5/22/1997	06-08	2.05 to 4.05	153-SB-A12-0608	Carbazole	86-74-8	24	96	100J
153-SB-A12	5/22/1997	06-08	2.05 to 4.05	153-SB-A12-0608	Chrysene	218-01-9	62	230	300
153-SB-A12	5/22/1997	06-08	2.05 to 4.05	153-SB-A12-0608	Dibenzo(A,H)anthracene	53-70-3	0.2	0.2	39J
153-SB-A12	5/22/1997	06-08	2.05 to 4.05	153-SB-A12-0608	Fluorene	86-73-7	2300	24000	150
153-SB-A12	5/22/1997	06-08	2.05 to 4.05	153-SB-A12-0608	Indeno(1,2,3-CD)pyrene	193-39-5	0.6	2	180
153-SB-A12	5/22/1997	06-08	2.05 to 4.05	153-SB-A12-0608	Naphalene	91-20-3	6	17	170
153-SB-A13	5/22/1997	02-04	5.73 to 7.73	153-SB-A13-0204	Hex Chromium	18540-29-9	20	NA	54.5J
153-SB-A13	5/22/1997	04-06	3.73 to 5.73	153-SB-A13-0406	Hex Chromium	18540-29-9	20	NA	34.4J
153-SB-A13	5/22/1997	08-10	-0.27 to 1.73	153-SB-A13-0810	Hex Chromium	18540-29-9	20	NA	232J
153-SB-A14	5/22/1997	08-10	-0.07 to 1.93	153-SB-A14-0810	Hex Chromium	18540-29-9	20	NA	116J
153-SB-A15	5/22/1997	08-10	1.2 to 3.2	153-SB-A15-0810	Hex Chromium	18540-29-9	20	NA	315
153-SB-A16	5/22/1997	08-10	1.14 to 3.14	153-SB-A16-0810	Arsenic	7440-38-2	19	19	331
153-SB-A16	5/22/1997	08-10	1.14 to 3.14	153-SB-A16-0810	Lead	7439-92-1	400	800	710J
153-SB-A16	5/22/1997	08-10	1.14 to 3.14	153-SB-A16-0810	Mercury	7439-97-6	23	65	398J
153-SB-A16	5/22/1997	08-10	1.14 to 3.14	153-SB-A16-0810	Benzo(A)anthracene	56-55-3	0.6	2	1.1J
153-SB-A16	5/22/1997	08-10	1.14 to 3.14	153-SB-A16-0810	Benzo(A)pyrene	50-32-8	0.2	0.2	0.95J
153-SB-A16	5/22/1997	08-10	1.14 to 3.14	153-SB-A16-0810	Benzo(B)fluoranthene	205-99-2	0.6	2	1.5J
153-SB-A17	5/27/1997	02-04	7.72 to 9.72	153-SB-A17-0204	Hex Chromium	18540-29-9	20	NA	44.1J
153-SB-A18	5/27/1997	04-06	5.67 to 7.67	153-SB-A18-0406	Hex Chromium	18540-29-9	20	NA	42.2J
153-SB-A18	5/27/1997	8-10	1.67 to 3.67	153-SB-A18-0810	Hex Chromium	18540-29-9	20	NA	77.2J
153-SB-A19	5/27/1997	2-4	7.2 to 9.2	153-SB-A19-0204	Hex Chromium	18540-29-9	20	NA	21.6J
153-SB-A20	5/27/1997	12-14	-3.08 to -1.08	153-SB-A20-1214	Hex Chromium	18540-29-9	20	NA	92.7J

Notes:

NJDEP Residential Direct Contact Soil Remediation Standards (RDCSRS) N.J.A.C. 7:26D (last revised 11/4/09).

NJDEP Non-Residential Direct Contact Soil Remediation Standards (NRDCSRS) N.J.A.C. 7:26D (last revised 11/4/09).

CASR#: Chemical Abstract Service Registry Number

J: indicates estimated value based on data validation

Sample locations and data from the initial RI (TTNUS November 1999).

Samples from recent additional RI delineation sampling not included as work is still in progress as of May 2010.

## **EXHIBIT C**

### **C-1: Institutional Controls**

### **C-2: Engineering Controls**

NJDEP Site No. 153 Former Morris Canal  
Block 1289.5, Lot E  
City of Jersey City, Hudson County, New Jersey

Exhibit C-1 includes a description of the deed notice as institutional control including monitoring and reporting requirements.

Exhibit C-2 includes a description of engineering controls consisting of clean fill, vegetative cover and/or pavement; operations and maintenance, monitoring and reporting requirements.



### **C-1 Deed Notice as Institutional Control**

NJDEP Site No. 153 Former Morris Canal  
Block 1289.5, Lot E  
City of Jersey City, Hudson County, New Jersey

(A) General Description:

- (1) The Property shown on Exhibit B-1 known as Block 1289.5, Lot E is a Restricted Area. The estimated size of the Restricted Area is approximately 86,000 square feet or approximately 2 acres.
- (2) Proper precautions must be taken (i.e., excavation or digging) that may penetrate the bottom of the engineering controls on the Restricted Area. See subsections 6A and 6B of the Deed Notice for directions on Alterations, Improvements, Disturbances, and Emergencies.
- (3) The restrictions will prevent contact with soils above the NJDEP Soil Remediation Standards.

(B) Description of monitoring:

- (1) Annual visual inspections of the Restricted Area will be conducted to ensure that the engineering controls are good condition and to determine whether any disturbances of the soil in the Restricted Area may have resulted in unacceptable exposure to the soil contamination;
- (2) Annual visual inspections of the Restricted Area will be conducted to determine whether there have been any land use changes subsequent to the filing of this Deed Notice or the most recent biennial certification, whichever is more recent;
- (3) Annual visual inspections of the Restricted Area will be conducted to determine whether the current land use on the property is consistent with the restrictions in this Deed Notice;
- (4) A review will be conducted to determine if any newly promulgated or modified requirements of applicable regulations or laws apply to the site; and
- (5) A review will be conducted to determine if any new standards, regulations, or laws apply to the site that might necessitate additional sampling in order to evaluate the protectiveness of the remedial action which includes this Deed Notice. If necessary, this additional sampling will be performed.

(C) Biennial certification items:

A monitoring report will be included in the biennial certification. Components of the monitoring report will include the following:

- A report of all conditions set forth in Deed Notice subparagraph 14C.i.(C) to assure that they have been adhered to, including evaluation of any available documents created as a result of changes in land use or incidents.
- A report that determines whether or not the land use at the site has remained consistent with the restrictions in the Deed Notice.
- A report that determines whether or not the Deed Notice continues to be protective of the public health and safety and of the environment.

**C-2 Engineering Controls  
Clean Fill, Vegetative Cover, Pavement Cap and  
Access Point Warnings**

NJDEP Site No. 153 Former Morris Canal  
Block 1289.5, Lot E  
City of Jersey City, Hudson County, New Jersey

(A) General Description:

- (1) Site 153 North: Engineering controls for this portion of the Property consist of the existing pavement cap which is approximately six (6) inches thick.
- (2) Site 153 South – Lower Segment: Engineering controls for this portion of the Property include a nominal 24 feet wide, 1,150 feet long vegetated area from Danforth Avenue to the northern property limit of the adjacent Regnal Realty property (Block 1288.2, Lot 1) and a nominal 24 feet wide 425 feet long asphalt area from the Regnal Realty northern property limit to the Eden Wood Realty (Block 1275, Lot 4; Garfield Home Furnishing)/Jersey City Fields, LLC (Block 1285.5, Lot 1; The Home Depot) property limit. The vegetated cap area consists of 3 feet of clean soil with warning layer at the base and asphalt cap area consists of 12” of pavement surface on the top of 24” of granular fill with warning layer at the base. These areas were remediated in accordance with Interim Remedial Action Work Plan for Site 153 South Lower Segment submitted to NJDEP on October 15, 2009.
- (3) Site 153 South – Upper Segment: Engineering controls for this portion of the Property consist of existing landscaped vegetation areas and four-inch thick asphalt cap that extends under a sloped landscaped soil berm to the adjacent Jersey City Fields, LLC (Block 1285.5, Lot 1; The Home Depot) property line. The asphalt layer is used as a sidewalk along Route 440 and provides an acceptable engineering control where it is in good condition. Existing soil vegetation areas and asphalt areas in degraded condition will be remediated and restored in accordance with the Interim Remedial Action Plan for Site 153 South Upper Segment submitted to NJDEP on April 22, 2010.
- (4) Site 153 Tract 2: Engineering controls for this portion of the Property located south of Danforth Avenue consists of the existing pavement cap which consists of base gravel aggregate and asphalt pavement approximately six (6) inches average thickness.
- (5) Access Point Warnings: Access point warning signs will be installed within sewer manholes on the Property to communicate the presence of and prevent contact with contaminated soils.
- (6) The objective of the Engineering Controls is to prevent direct contact with soils that are above the applicable NJDEP Soil Remediation Standards.

(7) The Engineering Controls is intended to function as a barrier to underlying soils, which may be above the applicable NJDEP Soil Remediation Standards.

(B) Description of the operation and maintenance:

Visual inspections of the Property will be performed annually to ensure that:

- (1) Each engineering control is in good condition and to ensure the integrity, operability, and effectiveness of each engineering control;
- (2) Each engineering control continues as designed and intended to protect the public health and safety and the environment;
- (3) Each alteration, excavation or disturbance of any engineering control is timely and appropriately addressed to maintain the integrity of the engineering control (also, see subsections 6A and 6B of this Deed Notice for directions on Alterations, Improvements, Disturbances, and Emergencies.)
- (4) The integrity of each institutional control is maintained so that the remedial action continues to be protective of the public health and safety and of the environment; and,
- (5) Records of the inspections are to be maintained as listed in Deed Notice subparagraph 14C.ii.(B)(5). Should the visual inspection indicate that other activities are necessary, those activities will be listed and executed.
- (6) A review of any new standards, regulations, or laws will be conducted to evaluate the protectiveness of the remedial action, which includes this Deed Notice. Should the review indicate that other activities are necessary, those activities will be listed and executed.

(C) Biennial certification items:

The monitoring report will be included in the biennial certification. Components of the monitoring report will include the following:

- A report of all conditions set forth in Deed Notice subparagraph 14(C).ii.(C) to ensure that they have been adhered to, including an evaluation to determine whether the Engineering Controls are continuing to meet their original objectives and intended functions.
- A report to determine whether the Engineering Controls continue to operate as designed.
- A report to determine whether the Engineering Controls continue to be protective of the public health and safety and of the environment.

## EXHIBIT D

### Consent Decrees as Institutional Controls

#### D-1: Consent Decree Regarding Sites 79 and 153 South

#### D-2: Consent Decree Regarding Remediation of the NJCU Redevelopment Area

NJDEP Site No. 153 Former Morris Canal  
Block 1289.5, Lot E  
City of Jersey City, Hudson County, New Jersey

The Property subject to this Deed Notice is defined as Site 153 North and Site 153 South in the Consent Decree Regarding Sites 79 and 153 South and the Consent Decree Regarding Remediation of the New Jersey City University (NJCU) Redevelopment Area, which are attached hereto and were entered as an order of the Court in the following consolidated actions *JCMUA v. Honeywell International Inc.*, D.N.J., Civ. No. 05-05955; *JCIA v. Honeywell International Inc.*, D.N.J., Civ. No. 05-5993; and *Hackensack Riverkeeper, Inc. v. Honeywell International Inc.*, D.N.J., Civ. No. 06-22.

The Consent Decrees restrict the transfer, use and development of the Site 153 South and North portions of the Property without further remediation pursuant to the terms of the Consent Decrees. To the extent that there is any conflict or inconsistency between the terms of this Deed Notice and the terms of the Consent Decrees, the Consent Decrees shall govern. To the extent that any action to be taken pursuant to this Deed Notice is in conflict with or inconsistent with the Consent Decrees, the Consent Decrees shall govern.

**APPENDIX E**

**EXAMPLE ANNUAL/QUARTERLY INSPECTION FORM**



## NJCU Commercial AOC Inspection Report

<b>I. Site Information</b>	
<b>Site Name:</b>	SA5 NJCU- West Campus
<b>NJDEP Site Number:</b>	90, 184
<b>Block/Lot Numbers:</b>	Block 21902, Lots 14, 13, 2, and 3 (formerly Block 1286, Lots 5 and 6D; Block 1286.5, Lots 1 and 2)
<b>Date of Inspection:</b>	Annual Inspection:                      Date: Quarterly Inspection:                      Date:
<b>Inspected By:</b>	
<b>II. General Information</b>	
<b>Site Redevelopment Status:</b>	
<b>Number of Persons Working at Site:</b>	3 (security guards)
<b>Building Owner and Address:</b>	<b>Comments/Status</b>
NJCU – Main Campus (property owner) 2039 Kennedy Blvd Jersey City, NJ 07305	
NJCU – West Campus a. Commercial AOC – Block 6	No buildings; current parking lot
NJCU – West Campus b. Commercial AOC – Block 7	No buildings; current parking lot
<b>Tenants Name(s) and Address:</b>	<b>Comments/Status</b>
a. Block 6	No buildings; current parking lot
b. Block 7	No buildings; current parking lot

## NJCU Commercial AOC Inspection Report

<b>Current Site Use:</b> (Plant, Warehouse, Vacant, etc.):		Parking Lot		
<b>Summary of Previous Inspections:</b>				
<b>III. On-Site Documents &amp; Records</b>				
<b>Description</b>	<b>Readily available</b>	<b>Up to date</b>	<b>N/A</b>	<b>Remarks</b>
<b>O&amp;M Documents:</b>				
LTMP	X			Revisions in process
Worker Training Manual	X			Revisions in process
As-built drawings	X			
Maintenance logs	X			
OM Manual-Filter Station	X			
<b>Site Health &amp; Safety Plan:</b>				
Contingency Plan/ Emergency response plan	X			
<b>O&amp;M and OSHA Training Records:</b>				
O&M and OSHA Training Records	X			
<b>Permits and Service Agreements:</b>				
TWA Permit	X			
PVSC Discharge Permit	X			
NJDEP RA Permit – Soil	X			
<b>IV. Institutional Controls</b>				
<b>Status of Deed Notice</b>				
<b>Description</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>	<b>Remarks</b>
Site conditions imply Institutional Controls not properly implemented				
Site conditions imply Institutional Controls not being fully enforced				

## NJCU Commercial AOC Inspection Report

Biennial Certification Reports up-to-date	X			
Violations have been reported				
Previous suggested correction made				
<b>Other problems or suggestions:</b>				
None				
<b>V. Site Conditions</b>				
<b>Description</b>	<b>Inspected</b>			<b>Comments, Field Observations and Measurements (Dimensions and Depth of Disturbance of Cap), Reference Photo #</b>
	Yes	No	N/A	
<b>Pavement cap area</b>				
a.	Chromium Remedy (Check for cracking, spalling, and potholes)			
b.	Differential Settlement (Check for settlement or subsidence)			
c.	Disturbance (Check for disturbance e.g. construction or utility repair, etc.)			
<b>Description</b>	<b>Inspected</b>			<b>Comments, Field Observations and Measurements (Dimensions and Depth of Disturbance of Cap), Reference Photo #</b>
	Yes	No	N/A	
<b>Vegetative cap area</b>				
a.	Disturbance (Check for disturbance e.g. construction or utility repair, etc.)			
b.	Surface Grade (Check for sign of erosion, settlement or subsidence)			

## NJCU Commercial AOC Inspection Report

c.	Vegetative Cover (Check for missing vegetative cover or soil erosion, size of trees/shrubs, tree roots impacting nearby pavement)				
d.	Burrowing (check for animal borrowing)				
<b>Other</b>					
a.	Utility line (Check for any disturbance due to development of area or utility repair)				
b.	Manholes/Signage (Check for any disturbance and/or damage)				
c.	Building Exterior (Once Building 7 Constructed in Commercial AOC)			X	

## NJCU Commercial AOC Inspection Report

VI. Groundwater Monitoring Well Records						
<b>Monitoring Wells</b>						
Description	Properly secured/Locked	Routinely sampled	Condition	Remarks		
Monitoring wells						
<b>Groundwater Level Record</b>						
Description	Readily available	Up to date	N/A	Remarks		
Groundwater Level measurement record		X				
<b>Groundwater Level Measurement:</b>						
Well ID Location	Date	Time	Depth from TIC to		Measured by:	Remarks: Calibration data found on Instrument Calibration Record
			Water (feet)	Bottom (feet)		
184-MW-04						
184-MW-05						
184-MW-06						
Sump A						
Sump B						
PZ-05						
PZ-06						
VII. Overall Observations on Remedy Implementation & Site Conditions						

## Site 153 North Inspection Report

<b>I. Site Information</b>	
<b>Site Name</b>	SA-5 Site 153 North Segment
<b>NJDEP Site Number:</b>	153
<b>Block/Lot Numbers:</b>	Block 21902, Lot 1 (formerly Block 1289.5, Lot E)
<b>Date of Inspection:</b>	<b>Annual Inspection:</b> <b>Date:</b>
	<b>Quarterly Inspection:</b> <b>Date:</b>
<b>Inspected By:</b>	
<b>II. General Information</b>	
<b>Site Status:</b>	Utility Easement
<b>Number of Persons Working at Site (if applicable):</b>	None
<b>Building Owner and Address:</b>	<b>Comments/Status</b>
Honeywell (property owner) 101 Columbia Pike Morristown, NJ 07960	No buildings onsite
<b>Tenants Name(s) and Address (if applicable):</b>	Not applicable

<b>Current Site Use: (Plant, Warehouse, Vacant, etc.):</b>	Vacant
<b>Summary of Previous Inspections:</b>	



## Site 153 North Inspection Report

III. On-Site Documents & Records				
Description	Readily available	Up to date	N/A	Remarks
<b>O&amp;M Documents:</b>				
LTMP	X			Revisions in progress
Worker Training Manual	X			Revisions in progress
As-built drawings	X			
Maintenance logs	X			
<b>Site Health &amp; Safety Plan:</b>				
Contingency Plan/ Emergency response plan	X			
<b>O&amp;M and OSHA Training Records:</b>				
O&M and OSHA Training Records	X			
<b>Permits and Service Agreements:</b>				
None			X	
IV. Institutional Controls				
<b>Status of Deed Notice:</b>				
Description	Yes	No	N/A	Remarks
Site conditions imply Institutional Controls not properly implemented				
Site conditions imply Institutional Controls not being fully enforced				
Biennial Certification Reports up-to-date				
Violation have been reported				
Previous suggested correction made				
<b>Other problems or suggestions:</b>				

## Site 153 North Inspection Report

V. Site Conditions					
Description		Inspected			Comments, Field Observations and Measurements (Dimensions and Depth of Disturbance of Cap), Reference Photo #
		Yes	No	N/A	
Pavement cap area					
a.	Chromium Remedy (Check for cracking, spalling, and potholes)				
b.	Differential Settlement (Check for settlement or subsidence)				
c.	Disturbance (Check for disturbance e.g. construction or utility repair, etc.)				
Description		Inspected			Comments, Field Observations and Measurements (Dimensions and Depth of Disturbance of Cap), Reference Photo #
		Yes	No	N/A	
Vegetative cap area					
a.	Disturbance (Check for disturbance e.g. construction or utility repair, etc.)			X	N/A
b.	Surface Grade (Check for sign of erosion, settlement or subsidence)			X	N/A
c.	Vegetative Cover (Check for missing vegetative cover or soil erosion, size of trees/shrubs, tree roots impacting nearby pavement)			X	N/A
d.	Burrowing (check for animal borrowing)			X	N/A

## Site 153 North Inspection Report

Other						
a.	Utility line (Check for any disturbance due to development of area or utility repair)					
b.	Manholes/Signage (Check for any disturbance and/or damage)					
c.	Building Exterior			X	N/A	
VI. Groundwater Monitoring Well Records						
<b>Monitoring Wells</b> no monitoring wells on Site 153 North						
Description	Properly secured/Locked	Routinely sampled	Condition	Remarks		
Monitoring wells				N/A		
Groundwater Elevation Record						
Description	Readily available	Up to date	N/A	Remarks		
Groundwater Elevation measurement record				N/A		
Groundwater Elevation Measurement:						
Well ID Location	Date	Time	Depth from TIC to		Measure d by:	Remarks: Calibration data found on Instrument Calibration Record
			Water (feet)	Bottom (feet)		
N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>VII. Overall Observations on Remedy Implementation &amp; Site Conditions</b>						

**APPENDIX F**

**NJDEP REMEDIAL ACTION PROTECTIVENESS  
BIENNIAL CERTIFICATION FORM**



**New Jersey Department of Environmental Protection**  
 Site Remediation and Waste Management Program

**REMEDIAL ACTION PROTECTIVENESS /  
 BIENNIAL CERTIFICATION FORM – SOIL**

LSRP     Subsurface Evaluator (UHOT)

Date Stamp  
 (For Department use only)

**SECTION A. SITE NAME AND LOCATION**

Site Name: \_\_\_\_\_

List all AKAs: \_\_\_\_\_

Street Address: \_\_\_\_\_

Municipality: \_\_\_\_\_ (Township, Borough or City)

County: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Program Interest (PI) Number(s): \_\_\_\_\_

Case Tracking Number(s) \_\_\_\_\_

Municipal Block and Lot Numbers of the entire Site: \_\_\_\_\_

**SECTION B. FEES**

- Soil Remedial Action Protectiveness/Biennial Certification for a Remedial Action Permit (No fee)
- Soil Remedial Action Protectiveness/Biennial Certification Non-Remedial Action Permit \$375.00

**SECTION C. FEE BILLING CONTACT PERSON**

Changed Since Last Submission    Effective Date of Change: \_\_\_\_\_

Business Name: \_\_\_\_\_

First Name of Contact: \_\_\_\_\_ Last Name of Contact: \_\_\_\_\_

Title: \_\_\_\_\_

Phone Number: \_\_\_\_\_ Ext.: \_\_\_\_\_ Fax: \_\_\_\_\_

Mailing Address: \_\_\_\_\_

Municipality: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Email Address: \_\_\_\_\_

**SECTION D. CURRENT OWNER OF THE SITE**

- Changed Since Last Submission    Effective Date of Change: \_\_\_\_\_
- If same as Person Responsible for Monitoring the Protectiveness of the Remedial Action (Section K), check box and proceed to the next section.

Full Legal Name of the Owner: \_\_\_\_\_

First Name of Contact: \_\_\_\_\_ Last Name of Contact: \_\_\_\_\_

Title: \_\_\_\_\_

Phone Number: \_\_\_\_\_ Ext.: \_\_\_\_\_ Fax: \_\_\_\_\_

Mailing Address: \_\_\_\_\_

Municipality: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Email Address: \_\_\_\_\_

**SECTION E. CURRENT OPERATOR OF THE SITE**

Changed Since Last Submission      Effective Date of Change: \_\_\_\_\_

If same as Person Responsible for Monitoring the Protectiveness of the Remedial Action (Section K), check box and proceed to the next section.

Full Legal Name of the Operator: \_\_\_\_\_

First Name of Contact: \_\_\_\_\_ Last Name of Contact: \_\_\_\_\_

Title: \_\_\_\_\_

Phone Number: \_\_\_\_\_ Ext.: \_\_\_\_\_ Fax: \_\_\_\_\_

Mailing Address: \_\_\_\_\_

Municipality: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Email Address: \_\_\_\_\_

**SECTION F. CURRENT LESSEE OF THE SITE**

Changed Since Last Submission      Effective Date of Change: \_\_\_\_\_

If same as Person Responsible for Monitoring the Protectiveness of the Remedial Action (Section K), check box and proceed to the next section.

Full Legal Name of the Lessee: \_\_\_\_\_

First Name of Contact: \_\_\_\_\_ Last Name of Contact: \_\_\_\_\_

Title: \_\_\_\_\_

Phone Number: \_\_\_\_\_ Ext.: \_\_\_\_\_ Fax: \_\_\_\_\_

Mailing Address: \_\_\_\_\_

Municipality: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Email Address: \_\_\_\_\_

**SECTION G. DEED NOTICE/DECLARATION OF ENVIRONMENTAL RESTRICTION (DER) INFORMATION**

1. Provide the filing date of each Deed Notice/DER: \_\_\_\_\_

2. For each Deed Notice/DER provide the Book and Page numbers in which the Deed Notice/DER was filed in the county recording office:

Book and Page Numbers: \_\_\_\_\_

3. Since the Deed Notice/DER was filed or the last submittal of the Soil Remedial Action Protectiveness/Biennial Certification Form, whichever is most recent, did the Municipal Block and Lot number(s) of the Deed Notice/DER change? .....  Yes  No

If "Yes," attach a current Tax Map of the property and list the former and new Municipal Block and Lot numbers of the Deed Notice/DER below:

Former Municipal Block and Lot Number(s): \_\_\_\_\_

New Municipal Block and Lot Number(s): \_\_\_\_\_

4. Is this form being submitted pursuant to a Soil Remedial Action Permit? .....  Yes  No  
*If "No", submit a completed Soil Remedial Action Permit Application with this form.*

5. Did you provide hard copies of this form to the municipal and county clerks for each municipality and county in which the site is located; the local, county and regional health department for each municipality and county in which the site is located; each current owner of the site; each current operator of the site; the Pinelands Commission as applicable; and the Highlands Commission as applicable? .....  Yes  No

6. Did you provide to NJDEP copies of this form in paper and electronically in Adobe PDF format?.....  Yes  No

7. Is this Deed Notice/DER for Historic Fill material at the site? .....  Yes  No

If "Yes," is the Historic Fill material impacting the ground water at the site? .....  Yes  No





7. Have you conducted periodic inspections pursuant to N.J.A.C. 7:26C-7.8(b)2 to determine if disturbances of the Remedial Action/engineering control(s) have taken place since the Deed Notice/DER was filed or the last submittal of the Soil Remedial Action Protectiveness/Biennial Certification Form, whichever is more recent? .....  Yes  No

*If "Yes," attach all inspection reports/logs that have been completed since the last submittal of the Soil Remedial Action Protectiveness/Biennial Certification Form.*

8. Have disturbances of the Remedial Action/engineering control(s) taken place since the Deed Notice/DER was filed or the last submittal of the Soil Remedial Action Protectiveness/Biennial Certification Form, whichever is more recent?.....  Yes  No

If "Yes," :

a) Provide the following information:

Date of Disturbance: \_\_\_\_\_ Duration of Disturbance: Months \_\_\_\_\_ Days \_\_\_\_\_

Date NJDEP Hotline contacted: \_\_\_\_\_ Hotline Incident Number assigned: \_\_\_\_\_

Describe the disturbance:

b) Was the Remedial Action/engineering control(s) restored to the conditions stated in the Deed Notice/DER?.....  Yes  No

If "No," briefly describe the reasons why:

9. Check the appropriate box(es) to indicate if any of the following have rendered the Remedial Action/engineering control(s) **not** protective of public health, safety and of the environment (check all that apply):

- An evaluation all relevant Soil Remediation Standards and guidance related to soil that have been modified subsequent to the filing of the Deed Notice/DER or the last submittal of the Soil Remedial Action Protectiveness/Biennial Certification Form, whichever is more recent;
- A change in property use since the Deed Notice/DER was filed;
- A zoning change or the pending zoning change;
- Land disturbance(s) of the engineering control(s).

If any of the boxes above are checked the Person Responsible for Monitoring the Protectiveness of the Remedial Action (the permittee/co-permittee) shall modify the Remedial Action, revise the Deed Notice (i.e., submit a Deed Notice Termination Document for the existing Deed Notice/DER and a new Deed Notice for the NJDEP's approval/signature with supporting documentation (i.e., a Remedial Action Report)), and apply for a modification of the Soil Remedial Action Permit as necessary pursuant to N.J.A.C. 7:26C-7.8(d)2.

## SECTION I. VAPOR INTRUSION

1. Are volatile organic compounds included in the Deed Notice/DER? .....  Yes  No  
*If "Yes," complete this section, otherwise proceed to the next section*

2. Were there any changes in property use that increased the risk of vapor intrusion? .....  Yes  No

3. Did you investigate the vapor intrusion pathway? .....  Yes  No

If "Yes,":

a) Attach a scaled site map indicating the location of all structures investigated for vapor intrusion.

b) Did the investigation indicate that an Immediate Environmental Concern (IEC) condition exists?.....  Yes  No

If "Yes," provide the date of IEC Contaminant Source Control Report: \_\_\_\_\_

c) Did the investigation indicate that a Vapor Concern (VC) condition exists?.....  Yes  No

If "Yes," provide the date of VC Mitigation Response Action Report: \_\_\_\_\_

d) Was public notification conducted to notify all applicable parties of the increased vapor intrusion risk? .....  Yes  No  N/A

4. Provide a written explanation of either how the vapor intrusion pathway was investigated or the reasons for not evaluating the vapor intrusion pathway.

5. Have any vapor intrusion engineering controls/mitigation systems been installed as a result of this soil contamination? .....  Yes  No

If "Yes," indicate the type of engineering control that was implemented: *(check all that apply)*

- Subsurface Depressurization System
- Subsurface Ventilation System
- Soil Vapor Extraction System
- HVAC Positive Pressure
- Other (specify): \_\_\_\_\_

Attach the Operation, Maintenance, and Monitoring (OMM) Plan for the vapor intrusion engineering control(s)/mitigation system(s) both in paper and electronically (in "MS Word" file format). The OMM Plan should clearly identify the building(s) and/or structure(s) and vapor intrusion engineering control(s)/mitigation system(s) that are in place (e.g., active or passive), including the address and block and lot of each impacted property.

**SECTION J. FINANCIAL ASSURANCE**

1. Does the Remedial Action/ Deed Notice/DER include an engineering control? .....  Yes  No

If "No," proceed to the next section.

2. Are **both** the "Person Responsible for Conducting the Remediation" and the current property owner exempt from establishing Financial Assurance pursuant to N.J.A.C. 7:26C-7.10(c)? .....  Yes  No

If "Yes," check the exemptions that apply, and then proceed to the next section.

Person Responsible for Conducting the Remediation – <u>Co-Permittee</u>	Current Owner of the Site – <u>Co-Permittee</u>
--	--

- .....  Government entity
- .....  A person not liable pursuant to the Spill Act that purchased contaminated property before May 7, 2009
- .....  A person that conducted remediation at their primary or secondary residence
- .....  Owner or operator of a child care center
- .....  Public school or private school
- .....  Owner or operator of a small business responsible for conducting remediation at the location of the business

If "No," - If either entity is not exempt, then establishment of the full amount of the Financial Assurance is required by the non-exempt permittee(s)- attach a completed Remediation Cost Review and RFS/FA Form.

3. Is the current owner of the site either a homeowner association or a condominium association pursuant to the New Jersey Common Interest Association Act, N.J.S.A. 46:8A-1 et seq.?.....  Yes  No

If "Yes," and the association is identified in Section D of this form, attach a copy of the association's annual budget that includes funds for the operation, maintenance, and monitoring of the engineering control(s) at the site.

**SECTION K. PERSON RESPONSIBLE FOR MONITORING THE PROTECTIVENESS OF THE REMEDIAL ACTION INFORMATION AND CERTIFICATION**

Full Legal Name of the Person Responsible for monitoring the protectiveness of the Remedial Action: \_\_\_\_\_

Representative First Name: \_\_\_\_\_ Representative Last Name: \_\_\_\_\_

Title: \_\_\_\_\_

Phone Number: \_\_\_\_\_ Ext: \_\_\_\_\_ Fax: \_\_\_\_\_

Mailing Address: \_\_\_\_\_

Municipality: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Email Address: \_\_\_\_\_

Relationship to the Site (check all that apply)

- I am the current Owner
- I am the current Operator
- I am the current Lessee
- I am the Person who conducted the remediation
- I am the Permittee
- I am the Co-Permittee

This certification shall be signed by the person responsible for submitting the Soil Remedial Action Protectiveness/Biennial Certification Form in accordance with the Administrative Requirements for the Remediation of Contaminated Sites rule at N.J.A.C. 7:26C-1.5(a).

*I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, including all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, to the best of my knowledge, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil penalties for knowingly submitting false, inaccurate or incomplete information and that I am committing a crime of the fourth degree if I make a written false statement which I do not believe to be true. I am also aware that if I knowingly direct or authorize the violation of any statute, I am personally liable for the penalties.*

*I also understand that engineering and institutional controls must be evaluated and maintained to ensure they remain protective of public health and safety and the environment.*

*Based upon the information provided herein, I hereby certify that the remedial action(s) implemented at the site that includes engineering and/or institutional controls remains protective of public health and safety and the environment.*

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Name/Title: \_\_\_\_\_

**SECTION L. LICENSED SITE REMEDIATION PROFESSIONAL INFORMATION AND STATEMENT**

LSRP ID Number: \_\_\_\_\_  
First Name: \_\_\_\_\_ Last Name: \_\_\_\_\_  
Phone Numbers: \_\_\_\_\_ Ext.: \_\_\_\_\_ Fax: \_\_\_\_\_  
Mailing Address: \_\_\_\_\_  
Municipality: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_  
Email Address: \_\_\_\_\_

This statement shall be signed by the LSRP who is submitting this notification in accordance with N.J.S.A. 58:10C-14, and N.J.S.A. 58:10B-1.3b(1) and (2).

- (1) *I certify, as a Licensed Site Remediation Professional authorized pursuant to N.J.S.A. 58:10C-1 et seq. to conduct business in New Jersey, that for the remediation described in this submission, and all attachments included in this submission, I personally: Managed, supervised, or performed the remediation conducted at this site that is described in this submission, and all attachments included in this submission; and/or periodically reviewed and evaluated the work performed by other persons that forms the basis for the information in this submission; and/or completed the work of another site remediation professional, licensed or not, after having: (1) reviewed all available documentation on which I relied; (2) conducted a site visit and observed the then-current conditions and verified the status of as much of the work as was reasonably observable; and (3) concluded, in the exercise of my independent professional judgment, that there was sufficient information upon which to complete any additional phase of remediation and prepare workplans and reports related thereto.*
- (2) *I certify:*
- *That I have read this submission and all attachments to this submission;*
  - *That in performing the professional services as the licensed site remediation professional for the entire site or each area of concern, I adhered to the professional conduct standards and requirements governing licensed site remediation professionals provided in N.J.S.A. 58:10C-16;*
  - *That the remediation conducted at the entire site or each area of concern, that is described in this submission and all attachments to this submission, was conducted pursuant to and in compliance with the remediation requirements in N.J.S.A. 58:10C-14.c;*
  - *That the remediation described in this submission, and all attachments to this submission, was conducted pursuant to and in compliance with the regulations of the Site Remediation Professional Licensing Board at N.J.A.C. 7:26I; and*
  - *That the information contained in this submission and all attachments to this submission is true, accurate, and complete.*
- (3) *I certify, when this submission includes a response action outcome, that the entire site or each area of concern has been remediated in compliance with all applicable statutes, rules, and regulations and is protective of public health and safety and the environment.*
- (4) *I certify that no other person is authorized or able to use any password, encryption method, or electronic signature that the Board or the Department have provided to me.*
- (5) *I certify that I understand and acknowledge that:*
- *If I knowingly make a false statement, representation, or certification in any document or information I submit to the Department I may be subject to civil and administrative enforcement pursuant to N.J.S.A. 58:10C-17.a.1(a)through (f) by the Board, including but not limited to license suspension, revocation, or denial of renewal; and*
  - *If I purposely, knowingly, or recklessly make a false statement, representation, or certification in any application, form, record, document or other information submitted to the Department or required to be maintained pursuant to the Site Remediation Reform Act, I shall be guilty, upon conviction, of a crime of the third degree and shall, notwithstanding the provisions of subsection b. of N.J.S.2C:43-3, be subject to a fine of not less than \$5,000 nor more than \$75,000 per day of violation, or by imprisonment, or both.*
- (6) *I certify that I have read this certification prior to signing, certifying, and making this submission.*

LSRP Signature: \_\_\_\_\_ Date: \_\_\_\_\_  
LSRP Name: \_\_\_\_\_  
Company Name: \_\_\_\_\_

**SECTION L. SUBSURFACE EVALUATOR INFORMATION AND STATEMENT**

*I certify under penalty of law that the work was performed under my oversight and I have reviewed the report and all attached documents, and the submitted information is true, accurate and complete in accordance with the requirements of N.J.A.C. 7:14B and N.J.A.C. 7:26E. I am aware that there are significant civil and criminal penalties for submitting false, inaccurate or incomplete information including fines and/or imprisonment.*

Name: _____	UST Cert. No.: _____
Firm: _____	Firm's UST Cert. Number: _____
Firm Address: _____	
Municipality: _____	State: _____ Zip Code: _____
Phone Number: _____	Ext: _____ Fax: _____
Email Address: _____	
Signature: _____	Date: _____

Completed forms should be sent to:

Bureau of Case Assignment & Initial Notice  
Site Remediation Program  
NJ Department of Environmental Protection  
401-05H  
PO Box 420  
Trenton, NJ 08625-0420

**APPENDIX G**

**SUBSURFACE WORK AUTHORIZATION FORM/DIGGING AND  
EXCAVATION PERMIT – NJCU WEST CAMPUS CHROMIUM REMEDY**

# SUBSURFACE WORK AUTHORIZATION FORM / DIGGING AND EXCAVATION PERMIT

NJCU West Campus – Chromium Remedy

<b>Prior to Performing Work (Completed by Contractor)</b>				<b>Permit ID #:</b>	
<b>Project Name:</b>					
<b>Request Date:</b>		<b>Est. Start Date:</b>		<b>Est. Duration:</b>	
<b>General Work Description:</b>					
<b>Depth of Digging/Excavation:</b>			<b>Developer:</b>		
<b>Contractor Performing Work:</b>					
<b>Contractor Contact:</b>			<b>Phone No.:</b>		
<b>NJCU Project Contact:</b>			<b>Phone No.:</b>		
<b>Location of Work:</b> <input type="checkbox"/> <b>Commercial Area</b> <input type="checkbox"/> <b>Residential Area</b>					
<input type="checkbox"/> Contractor Contact acknowledges that, before performing work in the Commercial Area (if applicable), they have received a copy of the Worker Training Manual (WTM), have distributed the WTM to workers performing the work, and that personnel either supervising or performing the work in the Commercial Area have received and reviewed the contents of the WTM, and have appropriate training as indicated in the WTM.					
<b>Prior to Performing Work (Completed by NJCU and Honeywell)</b>					
<b>Commercial Area Work<sup>1</sup></b> Yes <input type="checkbox"/> No <input type="checkbox"/>					
<input type="checkbox"/> Contact Honeywell to review proposed work activity. <input type="checkbox"/> Provide drawings showing proposed subsurface work or design drawings (if applicable). <input type="checkbox"/> Schedule project meeting to review proposed work and coordination with Honeywell.					
<b>Yes</b> <input type="checkbox"/> <b>No</b> <input type="checkbox"/> Does proposed work involve disturbance to engineering controls? If yes, review deed notice requirements for disturbances, restoration, notification, reporting.					
<b>Yes</b> <input type="checkbox"/> <b>No</b> <input type="checkbox"/> NJDEP to be notified per Deed Notice.      Estimated date of notification: _____					
<b>Yes</b> <input type="checkbox"/> <b>No</b> <input type="checkbox"/> Plaintiffs and Owner/Tenants to be notified if applicable per Consent Decree requirements. Estimated date of notification: _____					
<b>Residential Area Work<sup>2</sup></b> Yes <input type="checkbox"/> No <input type="checkbox"/>					
<b>Does the proposed work extend deeper than 4 ft below the site elevations on Figure 1 (Dig Permit Guidance Drawing, 3/7/2016)</b>					
<b>Yes</b> <input type="checkbox"/> Contact Honeywell to review proposed work activity. <input type="checkbox"/> Schedule project meeting to review proposed work, appropriate level of supervision, coordination with Honeywell. <input type="checkbox"/> Determine if proposed work will require soils to be segregated/managed to prevent commingling or will require offsite disposal.					
<b>No</b> <input type="checkbox"/> Proceed with work with no further input from Honeywell.					
<b>Field Work Phase (Prior to Digging) (Completed by NJCU and Honeywell)</b>					
1. Honeywell field oversight or contractor coordination required?		<b>Yes</b> <input type="checkbox"/>		- coordinate with Honeywell representative.	
		<b>No</b> <input type="checkbox"/>		- proceed with work/no further input from Honeywell.	
2. Will the project involve excavation and offsite disposal of chromium soils?		<b>Yes</b> <input type="checkbox"/>		- coordinate with Honeywell representative.	
		<b>No</b> <input type="checkbox"/>		- proceed with work/no further input from Honeywell.	

**HONEYWELL AND OWNER (NJCU) APPROVAL REQUIRED TO PROCEED WITH WORK.**

<b>Comments (Completed by Contractor, NJCU and Honeywell)</b>					
<b>Contractor Signature:</b>			<b>Date:</b>		
<b>Owner (NJCU) Signature:</b>			<b>Date:</b>		
<b>Honeywell Signature:</b>			<b>Date:</b>		

**COMPLETE PAGE 1 BEFORE FIELD WORK COMMENCES**



# SUBSURFACE WORK AUTHORIZATION FORM / DIGGING AND EXCAVATION PERMIT

NJCU West Campus – Chromium Remedy

## COMPLETE THIS SECTION ONLY IF THERE ARE DESIGN OR FIELD CHANGES

<b>Field Work Changes</b> (Completed by Contractor, NJCU and Honeywell)			
<b>IN THE EVENT OF ANY DESIGN OR FIELD CHANGES DURING WORK IMPLEMENTATION, PROVIDE A BRIEF DESCRIPTION OF DESIGN AND/OR FIELD CHANGE AND OBTAIN HONEYWELL AND OWNER (NJCU) APPROVAL TO PROCEED WITH WORK.</b>			
<b>Describe Changed Conditions</b> (Completed by Contractor, NJCU and Honeywell)			
<b>Contractor Signature:</b>		<b>Date:</b>	
<b>Owner (NJCU) Signature:</b>		<b>Date:</b>	
<b>Honeywell Signature:</b>		<b>Date:</b>	

## COMPLETE THE SECTION BELOW AFTER WORK IS COMPLETE

<b>Post-Work Phase/Closeout Requirements – Commercial Area</b> (Completed by Contractor, NJCU and Honeywell)			
<b>Actual Start Date:</b>		<b>Actual Finish Date:</b>	
<b>Actual NJDEP Notification Date:</b>		<b>Actual Plaintiff Notification Date:</b>	
<input type="checkbox"/> 1. Compile representative photographs showing work progress, restoration of engineering controls. <input type="checkbox"/> 2. Prepare as-built figure or other appropriate drawing(s) showing work area, relevant site features. <input type="checkbox"/> 3. Prepare and submit deed notice disturbance report.			
<b>Post-Work Phase/Closeout Requirements – Residential Area</b> (Completed by NJCU and Honeywell)			
<input type="checkbox"/> Prepare follow-up report and/or figure if needed to document work activities.			
<b>HONEYWELL AND OWNER (NJCU) SIGN-OFF REQUIRED AT COMPLETION OF WORK.</b>			
<b>Comments</b> (Completed by Contractor, NJCU and Honeywell)			
<b>Contractor Signature:</b>		<b>Date:</b>	
<b>Owner (NJCU) Signature:</b>		<b>Date:</b>	
<b>Honeywell Signature:</b>		<b>Date:</b>	

**Notes:**

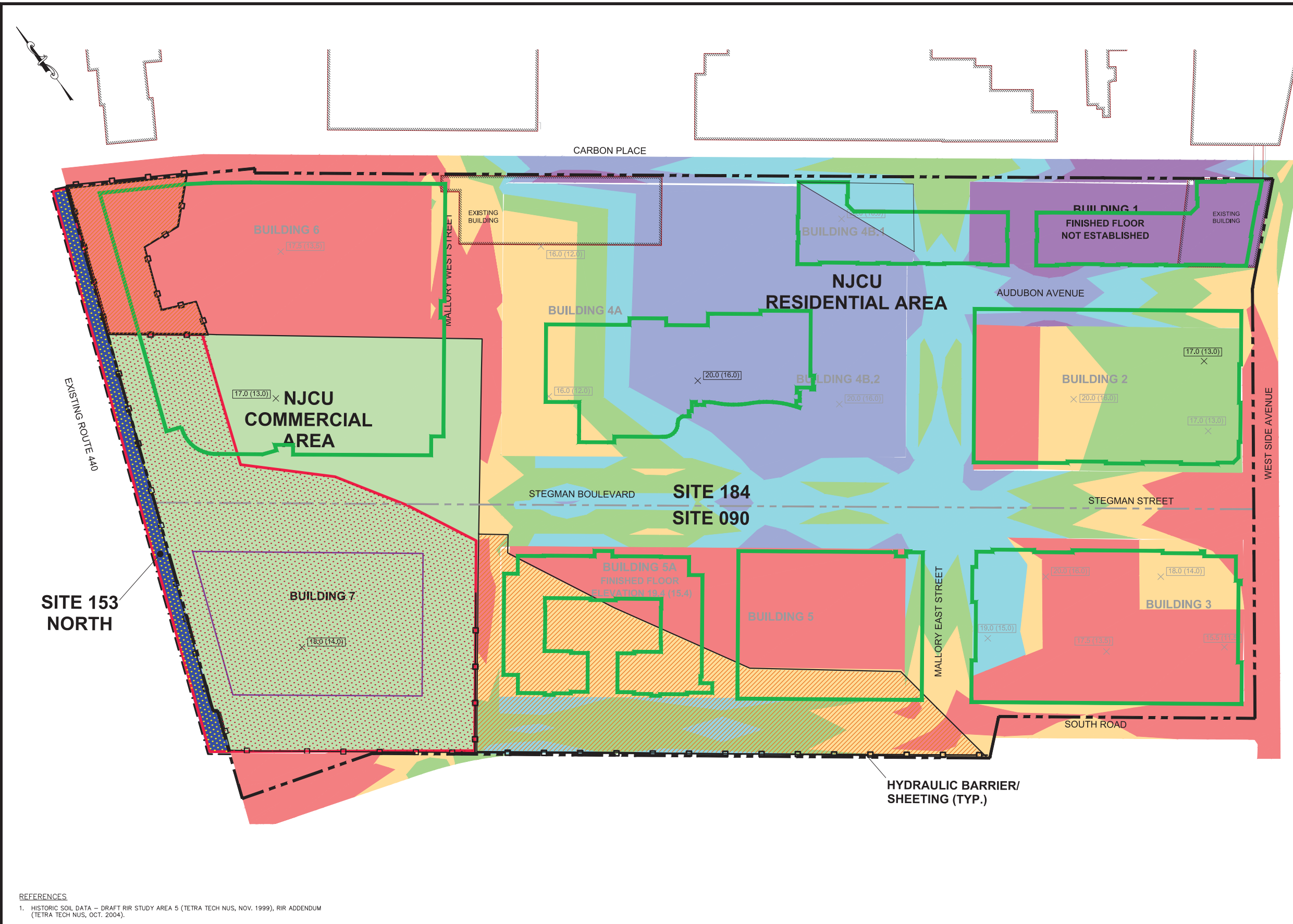
(1) Commercial Area Work:

- Field verification of the exact location of permanent remedy components including the warning layer and liner is required in all intrusive activities within the commercial area.
- Mechanical digging is restricted within the commercial area. Excavation greater than 12 inches below existing grade or within 12 inches of cap materials (i.e., at or below warning layer) must be performed using soft dig techniques or other method approved by Honeywell.
- Driving of fence posts or use of drilling/Geoprobe is also restricted within the commercial area and shall not be initiated unless the approach is approved by Honeywell.

(2) Residential Area Work:

The attached Figure 1 (Dig Permit Guidance Drawing, dated 3/7/2016) is intended for guidance purposes only. Actual requirements for soil management will be determined prior to field work mobilization. Finished grade elevations shown on Figure 1 are based on drawing entitled "New Jersey City University – West Campus Redevelopment – Overall Grading Plan," Drawing Number 21.00, dated 16 September 2010, by Langan Engineering & Environmental Services, 619 River Drive, Elmwood Park, NJ 07407.

UNLESS OTHERWISE NOTED BY A NOTICE CONTAINED HEREIN, THESE DRAWINGS AND THE INFORMATION CONTAINED THEREIN ARE THE PROPERTY OF AMEC FOSTER WHEELER AND SHALL REMAIN CONFIDENTIAL AND NOT BE COPIED OR DISCLOSED IN ANY MANNER WITHOUT THE WRITTEN CONSENT OF AMEC FOSTER WHEELER. THE CLIENT IN THE CONTRACT AND FOR THE EXCLUSIVE PURPOSE OF THIS CONTRACT, WHICH IT HAS BEEN DELIVERED, ANY OTHER USE OR RELIANCE ON THIS DOCUMENT BY ANY THIRD PARTY IS AT THAT PARTY'S SOLE RISK AND RESPONSIBILITY.



**LEGEND:**

- SITE BOUNDARY - SA-5 NJCU
- SITE BOUNDARY - SITE 153 NORTH
- SITE BOUNDARY - SITE 184 & SITE 090
- EXISTING BUILDINGS
- PROPOSED BUILDINGS
- NJCU RESIDENTIAL >20 ppm EXCAVATION AOC
- NJCU COMMERCIAL AREA
- NJCU COMMERCIAL CAP AREA
- SITE 153 NORTH AOC
- EXTENT OF CAP
- SHEETING

**ELEVATION LEGEND:**

ELEVATION SHADING REFERS TO FINISHED GRADE FROM REFERENCE 3, MINUS 4 FEET IN RESIDENTIAL AREA.

- GREATER THAN 17
- BETWEEN 16 AND 17
- BETWEEN 15 AND 16
- BETWEEN 14 AND 15
- BETWEEN 13 AND 14
- LESS THAN 13

SPOT ELEVATIONS REFER TO FINISHED FLOOR ELEVATIONS FROM REFERENCES 4 AND 5. ORIGINAL ELEVATION AND ELEVATION MINUS 4 FEET ARE SHOWN.

$\times$  20.0 (16.0) FINISHED FLOOR ELEVATION (AND ELEVATION MINUS 4 FEET)



- REFERENCES**
- HISTORIC SOIL DATA - DRAFT RIR STUDY AREA 5 (TETRA TECH NUS, NOV. 1999), RIR ADDENDUM (TETRA TECH NUS, OCT. 2004).
  - BASEMAP: PHASE I CONCEPT PLAN, LANGAN 2 MARCH 2007. UTILITIES NOT SHOWN.
  - FINISHED GRADE ELEVATIONS ARE PER A DRAWING ENTITLED "NEW JERSEY CITY UNIVERSITY - WEST CAMPUS REDEVELOPMENT - OVERALL GRADING PLAN", DRAWING NUMBER 21.00, DATED 16 SEPTEMBER 2010, BY LANGAN ENGINEERING & ENVIRONMENTAL SERVICES, 619 RIVER DRIVE, ELMWOOD PARK, NJ 07407.
  - FINISHED FLOOR ELEVATION FOR BUILDING 5A - "GRADING PLAN", NUMBER CG101, DATED 11/18/2014, BY NILES BOLTON ASSOCIATES AND LANGAN.
  - FINISHED FLOOR ELEVATIONS FOR OTHER BUILDINGS - "PRELIMINARY GRADING PLAN (ROADWAYS & PROPOSED FINISHED FLOOR GRADES WITHIN BLOCKS)", DATED 05 FEBRUARY 2010, BY LANGAN.

REV.	DATE	STATUS	PRPD BY	CHKD BY

Amec Foster Wheeler PROJECT No. 3480130369  
DRAWING: NJCU DIG PERMIT GUIDANCE DWG 2016-03-07

PREPARED/DATE: SPM 3/7/2016  
CHECKED/DATE: BOD 3/7/2016

**amec foster wheeler**

ENVIRONMENT & INFRASTRUCTURE, Inc.  
200 AMERICAN METRO BLVD, SUITE 113  
HAMILTON, NEW JERSEY 08619

**FIGURE 1**  
DIG PERMIT GUIDANCE DRAWING  
SA-5 NJCU SITE 90/184 AND SITE 153 NORTH  
JERSEY CITY, NEW JERSEY

**APPENDIX H**

**SUBSURFACE WORK AUTHORIZATION FORMS/DIGGING AND  
EXCAVATION PERMIT – SITE 153 FORMER MORRIS CANAL**

**APPENDIX H-1**

**SITE 153 DIG PERMIT FOR WORK BY BMUA**

## SUBSURFACE WORK AUTHORIZATION FORM / DIGGING AND EXCAVATION PERMIT

Site 153 Morris Canal – Chromium Remedy – Work Performed by BMUA

Prior to Performing Work (Completed by BMUA or Contractor)			
<b>Project Name:</b>			
<b>Request Date:</b>		<b>Est. Start Date:</b>	<b>Est. Duration:</b>
<b>General Work Description:</b>			
<b>Depth of Digging/Excavation:</b>			
<b>Contractor Performing Work:</b>			
<b>Contractor Supervisor:</b>		<b>Phone No.:</b>	
<b>BMUA Project Contact:</b>		<b>Phone No.:</b>	
<b>Location of Work:</b>	<input type="checkbox"/> Site 153 North (next to NJCU) <input type="checkbox"/> Site 153 South		
Prior to Performing Work <sup>1</sup> (Completed by BMUA and Honeywell)			
<input type="checkbox"/> Contact Honeywell to review proposed work activity. <input type="checkbox"/> Provide drawings showing proposed subsurface work or design drawings (if applicable). <input type="checkbox"/> Schedule project meeting to review proposed work and coordination with Honeywell.			
<b>Yes</b> <input type="checkbox"/>	<b>No</b> <input type="checkbox"/>	Does proposed work involve disturbance to engineering controls? If yes, review deed notice requirements for disturbances, restoration, notification, reporting; and confirm that workers receive and review Worker Training Manual and Standard Operating Procedure for Site 153.	
<b>Yes</b> <input type="checkbox"/>	<b>No</b> <input type="checkbox"/>	NJDEP to be notified per Deed Notice. Estimated date of notification: _____	
<b>Yes</b> <input type="checkbox"/>	<b>No</b> <input type="checkbox"/>	Plaintiffs to be notified if applicable per Consent Decree requirements. Estimated date of notification: _____	
Field Work Phase (Prior to Digging) (Completed by BMUA and Honeywell)			
1. Honeywell field oversight or contractor coordination required?	<b>Yes</b> <input type="checkbox"/>	- coordinate with Honeywell representative.	
	<b>No</b> <input type="checkbox"/>	- proceed with work/no further input from Honeywell.	
2. Will the project involve excavation and offsite disposal of chromium soils?	<b>Yes</b> <input type="checkbox"/>	- coordinate with Honeywell representative.	
	<b>No</b> <input type="checkbox"/>	- proceed with work/no further input from Honeywell.	
HONEYWELL AND BMUA APPROVAL REQUIRED TO PROCEED WITH WORK.			
Comments (Completed by Contractor, BMUA and Honeywell)			
<b>Contractor Signature:</b>		<b>Date:</b>	
<b>BMUA Signature:</b>		<b>Date:</b>	
<b>Honeywell Signature:</b>		<b>Date:</b>	

**COMPLETE PAGE 1 BEFORE FIELD WORK COMMENCES**

**SUBSURFACE WORK AUTHORIZATION FORM / DIGGING AND EXCAVATION PERMIT**

Site 153 Morris Canal – Chromium Remedy – Work Performed by BMUA

**COMPLETE THIS SECTION ONLY IF THERE ARE DESIGN OR FIELD CHANGES**

<b>Field Work Changes</b> (Completed by Contractor, BMUA and Honeywell)			
<b>IN THE EVENT OF ANY DESIGN OR FIELD CHANGES DURING WORK IMPLEMENTATION, PROVIDE A BRIEF DESCRIPTION OF DESIGN AND/OR FIELD CHANGE AND OBTAIN HONEYWELL AND BMUA APPROVAL TO PROCEED WITH WORK.</b>			
<b>Describe Changed Conditions</b> (Completed by Contractor, BMUA and Honeywell)			
<b>Contractor Signature:</b>		<b>Date:</b>	
<b>BMUA Signature:</b>		<b>Date:</b>	
<b>Honeywell Signature:</b>		<b>Date:</b>	

**COMPLETE THE SECTION BELOW AFTER WORK IS COMPLETE**

<b>Post-Work Phase/Closeout Requirements</b> (Completed by Contractor, BMUA and Honeywell)			
<b>Actual Start Date:</b>		<b>Actual Finish Date:</b>	
Actual NJDEP Notification Date:		Actual Plaintiff Notification Date:	
<input type="checkbox"/>	1. Compile representative photographs showing work progress, restoration of engineering controls.		
<input type="checkbox"/>	2. Prepare as-built figure or other appropriate drawing(s) showing work area, relevant site features.		
<input type="checkbox"/>	3. Prepare and submit deed notice disturbance report.		
<b>HONEYWELL AND BMUA SIGN-OFF REQUIRED AT COMPLETION OF WORK.</b>			
<b>Comments</b> (Completed by Contractor, BMUA and Honeywell)			
<b>Contractor Signature:</b>		<b>Date:</b>	
<b>BMUA Signature:</b>		<b>Date:</b>	
<b>Honeywell Signature:</b>		<b>Date:</b>	

- Notes:**
- (1) Field Work Restrictions:
- Field verification of the exact location of remedy components including the warning layer and liner (where present) is required in all intrusive activities.
  - Mechanical digging is restricted. Excavation within 12 inches of the force main or warning layer (where present) must be performed using soft dig techniques or other method approved by the BMUA and Honeywell.
  - Driving of fence posts or use of drilling/Geoprobe is also restricted and shall not be initiated unless the approach is approved by Honeywell.

**APPENDIX H-2**

**SITE 153 DIG PERMIT FOR WORK BY NON-BMUA ENTITIES**



**SUBSURFACE WORK AUTHORIZATION FORM / DIGGING AND EXCAVATION PERMIT**

Site 153 Morris Canal – Chromium Remedy – Work Performed by Non-BMUA Entities

<b>Prior to Performing Work (Completed by Honeywell)</b>			
<b>Project Name:</b>			
<b>Request Date:</b>		<b>Est. Start Date:</b>	<b>Est. Duration:</b>
<b>General Work Description:</b>			
<b>Depth of Digging/Excavation:</b>			
<b>Contractor Performing Work:</b>			
<b>Contractor Supervisor:</b>		<b>Phone No.:</b>	
<b>Utility Contact:</b>		<b>Phone No.:</b>	
<b>Location of Work:</b>	<input type="checkbox"/> <b>Site 153 North (next to NJCU)</b>		<input type="checkbox"/> <b>Site 153 South</b>
<b>Prior to Performing Work<sup>1</sup> (Completed by Honeywell)</b>			
<input type="checkbox"/> Honeywell and contractor to review proposed work activity. <input type="checkbox"/> Contractor to provide drawings showing proposed subsurface work or design drawings (if applicable). <input type="checkbox"/> Schedule project meeting to review proposed work and coordination requirements.			
<b>Yes</b> <input type="checkbox"/>	<b>No</b> <input type="checkbox"/>	Does proposed work involve disturbance to engineering controls? If yes, review deed notice requirements for disturbances, restoration, notification, reporting; and confirm that workers receive and review Worker Training Manual and Standard Operating Procedure for Site 153.	
<b>Yes</b> <input type="checkbox"/>	<b>No</b> <input type="checkbox"/>	NJDEP to be notified per Deed Notice. Estimated date of notification: _____	
<b>Yes</b> <input type="checkbox"/>	<b>No</b> <input type="checkbox"/>	Plaintiffs and BMUA to be notified if applicable per Consent Decree requirements. Estimated date of notification: _____	
<b>Field Work Phase (Prior to Digging) (Completed by Honeywell and Contractor)</b>			
1. Honeywell field oversight or contractor coordination required?	<b>Yes</b> <input type="checkbox"/>	- coordinate with Honeywell representative.	
	<b>No</b> <input type="checkbox"/>	- proceed with work/no further input from Honeywell.	
2. Will the project involve excavation and offsite disposal of chromium soils?	<b>Yes</b> <input type="checkbox"/>	- coordinate with Honeywell representative.	
	<b>No</b> <input type="checkbox"/>	- proceed with work/no further input from Honeywell.	
<b>HONEYWELL AND CONTRACTOR APPROVAL REQUIRED TO PROCEED WITH WORK.</b>			
<b>Comments (Completed by Contractor, BMUA and Honeywell)</b>			
<b>Contractor Signature:</b>		<b>Date:</b>	
<b>Honeywell Signature:</b>		<b>Date:</b>	

**COMPLETE PAGE 1 BEFORE FIELD WORK COMMENCES**

**SUBSURFACE WORK AUTHORIZATION FORM / DIGGING AND EXCAVATION PERMIT**

Site 153 Morris Canal – Chromium Remedy – Work Performed by Non-BMUA Entities

**COMPLETE THIS SECTION ONLY IF THERE ARE DESIGN OR FIELD CHANGES**

<b>Field Work Changes</b> (Completed by Honeywell and Contractor)			
<b>IN THE EVENT OF ANY DESIGN OR FIELD CHANGES DURING WORK IMPLEMENTATION, PROVIDE A BRIEF DESCRIPTION OF DESIGN AND/OR FIELD CHANGE AND OBTAIN HONEYWELL APPROVAL TO PROCEED WITH WORK.</b>			
<b>Describe Changed Conditions</b> (Completed by Honeywell and Contractor)			
<b>Contractor Signature:</b>		<b>Date:</b>	
<b>Honeywell Signature:</b>		<b>Date:</b>	

**COMPLETE THE SECTION BELOW AFTER WORK IS COMPLETE**

<b>Post-Work Phase/Closeout Requirements</b> (Completed by Honeywell and Contractor)			
<b>Actual Start Date:</b>		<b>Actual Finish Date:</b>	
<b>Actual NJDEP Notification Date:</b>		<b>Actual Plaintiff Notification Date:</b>	
<input type="checkbox"/> 1. Compile representative photographs showing work progress, restoration of engineering controls. <input type="checkbox"/> 2. Prepare as-built figure or other appropriate drawing(s) showing work area, relevant site features. <input type="checkbox"/> 3. Prepare and submit deed notice disturbance report.			
<b>HONEYWELL AND CONTRACTOR SIGN-OFF REQUIRED AT COMPLETION OF WORK.</b>			
<b>Comments</b> (Completed by Honeywell and Contractor)			
<b>Contractor Signature:</b>		<b>Date:</b>	
<b>Honeywell Signature:</b>		<b>Date:</b>	

- Notes:**  
 (1) Field Work Restrictions:
- Field verification of the exact location of remedy components including the warning layer (where present) is required in all intrusive activities.
  - Mechanical digging is restricted. Excavation within 12 inches of the force main or warning layer (where present) must be performed using soft dig techniques or other method approved by the BMUA and Honeywell.
  - Driving of fence posts or use of drilling/Geoprobe is also restricted and shall not be initiated unless the approach is approved by Honeywell.

**APPENDIX I**

**MAP SHOWING LOCATIONS OF WARNING SIGNS IN THE NJCU  
COMMERCIAL AOC AND EXAMPLE SIGNAGE**

18"

**NOTICE**



**CALL  
BEFORE  
DIGGING**

**855-727-2658**

12"





440



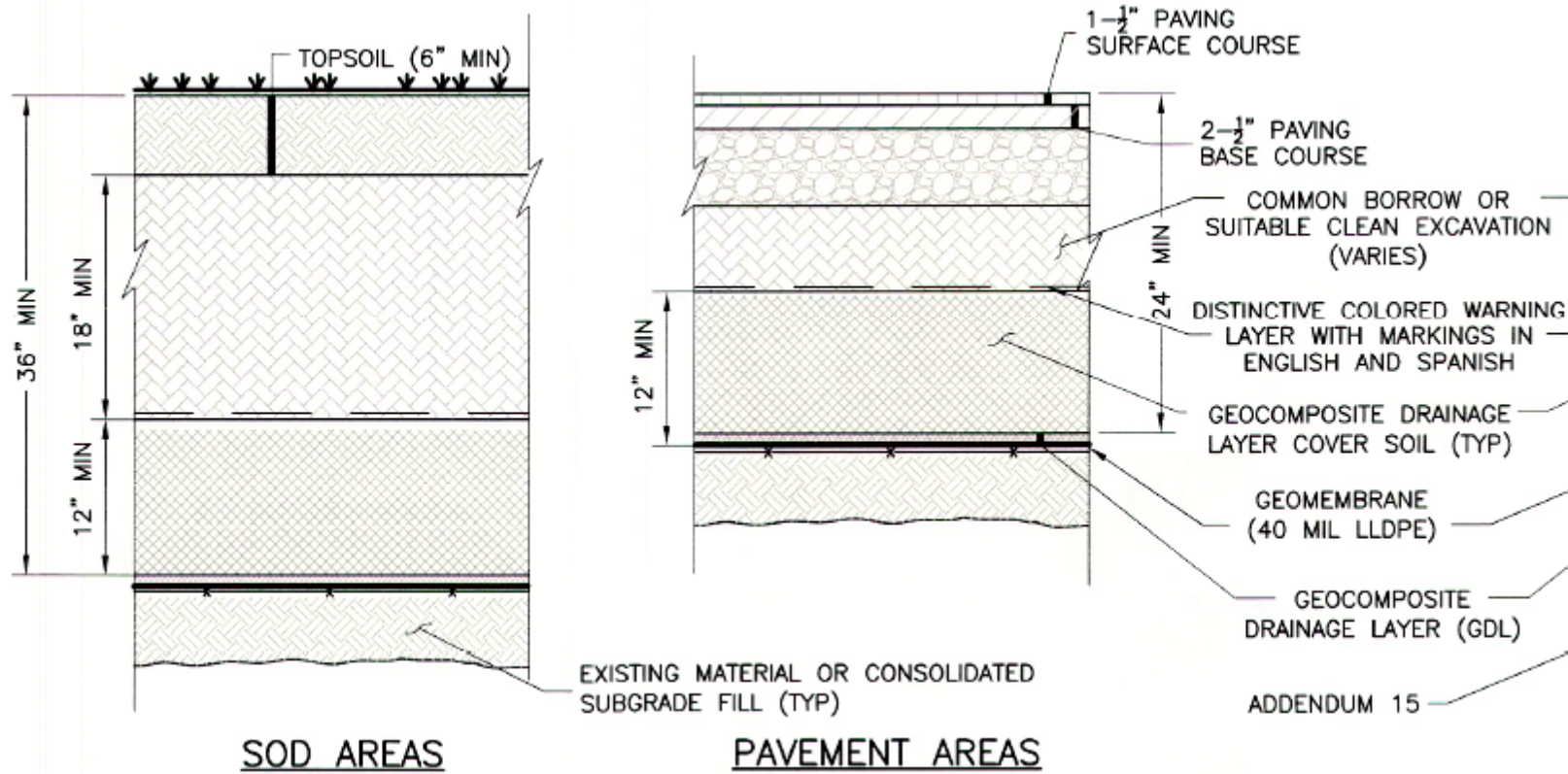
● Sign Location



**APPENDIX J**

**REFERENCE CAP/LINER REPAIR INFORMATION  
FOR NJCU COMMERCIAL AREA**

## SA-5 NJCU: Cap Details



\*Details are excerpted from Drawing C-303 – Cap Details, Addendum 15, dated April 11, 2011.



## **Geocomposite Drainage Layer Product Data**

September 29, 2010  
Iwt/Cargo Guard  
P.O. Box 454  
Waretown, NJ 08758

**Ref. : Severson - SA5, NJ**  
**Customer P.O. #**  
**Transnet 330-2-6**

We certify that the Transnet 330-2-6 drainage composite, meets the project requirements as stated in the specifications. The properties listed in this section are:

Property	Test Method	Unit	Required Value	Qualifier
<b>Geonet<sup>4</sup></b>				
Mass per Unit Area	ASTM D 5261	lbs/ft <sup>2</sup>	0.3	Minimum
Thickness	ASTM D 5199	mil	300	Minimum
Carbon Black	ASTM D 4218	%	2.0	Minimum
Tensile Strength	ASTM D 5035	lbs/in	75	Minimum
Melt Flow	ASTM D 1238 <sup>3</sup>	g/10 min	1.0	Maximum
Density	ASTM D 1505	g/cm <sup>3</sup>	0.94	Minimum
<b>Composite</b>				
Ply Adhesion	ASTM D 7005	lb/in	0.5	MARV <sup>6</sup>
Transmissivity <sup>1</sup>	ASTM D 4716	m <sup>2</sup> /sec	1.1 x 10 <sup>-3</sup>	MARV
Transmissivity <sup>2</sup>	ASTM D 4716	m <sup>2</sup> /sec	1.25 x 10 <sup>-3</sup>	MARV
<b>Geotextile<sup>4 &amp; 5</sup></b>				
Fabric Weight	ASTM D 5261	oz/yd <sup>2</sup>	6.0	MARV
Grab Strength	ASTM D 4632	lbs	150	MARV
Grab Elongation	ASTM D 4632	%	50	MARV
Puncture Resistance	ASTM D 4833	lbs	90	MARV
Water Flow Rate	ASTM D 4491	gpm/ft <sup>2</sup>	110	MARV
Permittivity	ASTM D 4491	sec <sup>-1</sup>	1.5	MARV
AOS	ASTM D 4751	US Sieve	70	MARV
UV Resistance	ASTM D 4355	%/hrs	70/500	MARV

**Notes:**

- 1 Transmissivity measured using water at 21 ± 2 °C (70 ± 4 °F) with a gradient of 0.33 and a confining pressure of 1000 psf between sand & liner after 100 hours.
- 2 Transmissivity measured using water at 21 ± 2 °C (70 ± 4 °F) with a gradient of 0.2 and a confining pressure of 1000 psf between sand & liner after 100 hours.
- 3 Condition 190/2.16
- 4 Geotextile and Geonet properties are prior to lamination.
- 5 Geotextile data is provided by the supplier.
- 6 MARV is statistically defined as mean minus two standard deviations and it is the value which is exceeded by 97.5% of all the test data.

Sincerely,

*Nilay Patel*

Nilay Patel  
QA Manager

**Product :** TN330-2-6  
**Project :** Severson - SA5, NJ

We, the Geocomposite Manufacturer, hereby certify the following for the material delivered to the above referenced project :

Roll	Geocomposite Roll Number	Geonet Roll Number	Geotextile Roll Number		Ply Adhesion (lb/in)		Geocomposite Transmissivity (m <sup>2</sup> /sec)
			Side A	Side B	Minimum	Average	
1	393610001	393610001 - N	3936.003	3936.005	1.25	2.33	
2	393610002	393610002 - N	3936.003	3936.005			
3	393610003	393610003 - N	3936.003	3936.005			
4	393610004	393610004 - N	3936.003	3936.005			
5	393610005	393610005 - N	3936.003	3936.005			
6	393610006	393610006 - N	3936.003	3936.005			
7	393610007	393610007 - N	3936.003	3936.005			
8	393610008	393610008 - N	3936.006	3936.001			
9	393610009	393610009 - N	3936.006	3936.001			
10	393610010	393610010 - N	3936.006	3936.001	1.51	2.72	
11	393610011	393610011 - N	3936.006	3936.001			
12	393610012	393610012 - N	3936.006	3936.001			
13	393610013	393610013 - N	3936.006	3936.001			
14	393610014	393610014 - N	3936.006	3936.001			
15	393610015	393610015 - N	3936.004	3936.007			
16	393610016	393610016 - N	3936.004	3936.007			
17	393610017	393610017 - N	3936.004	3936.007			
18	393610018	393610018 - N	3936.004	3936.007			
19	393610019	393610019 - N	3936.004	3936.007			
20	393610020	393610020 - N	3936.004	3936.007	1.36	2.45	
21	393610021	393610021 - N	3936.004	3936.007			
22	393610022	393610022 - N	3936.008	3936.002			
23	393610023	393610023 - N	3936.008	3936.002			
24	393610024	393610024 - N	3936.008	3936.002			
25	393610025	393610025 - N	3936.008	3936.002			
26	393610026	393610026 - N	3936.008	3936.002			
27	393610027	393610027 - N	3936.008	3936.002			



**Product :** TN330-2-6  
**Project :** Severson - SA5, NJ

We, the Geonet Manufacturer, hereby certify the following for the material sent to the above referenced project :

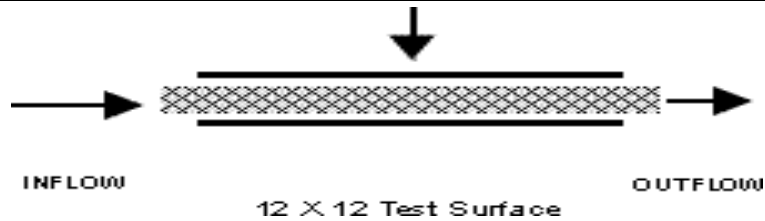
Geonet Roll Number	Resin Lot Number	Geonet Density (gm/cc)	Mass Per Unit Area (lb/ft <sup>2</sup> )	Thickness (mils)	Carbon Black (%)	Tensile Strength (MD) (lb/in)	Transmissivity (m <sup>2</sup> /sec)
393610001 - N	27287-10	0.9547	0.360	313	2.42	112	
393610002 - N	27287-10	0.9547					
393610003 - N	27287-10	0.9547					
393610004 - N	27287-10	0.9547					
393610005 - N	27287-10	0.9547					
393610006 - N	27287-10	0.9547					
393610007 - N	27287-10	0.9547					
393610008 - N	27287-10	0.9547					
393610009 - N	27287-10	0.9547					
393610010 - N	27287-10	0.9547	0.367	318	2.71	115	
393610011 - N	27287-10	0.9547					
393610012 - N	27287-10	0.9547					
393610013 - N	27287-10	0.9547					
393610014 - N	27287-10	0.9547					
393610015 - N	27287-10	0.9547					
393610016 - N	27287-10	0.9547					
393610017 - N	27287-10	0.9547					
393610018 - N	27287-10	0.9547					
393610019 - N	27287-10	0.9547					
393610020 - N	27287-10	0.9547	0.358	310	2.34	110	
393610021 - N	27287-10	0.9547					
393610022 - N	27287-10	0.9547					
393610023 - N	27287-10	0.9547					
393610024 - N	27287-10	0.9547					
393610025 - N	27287-10	0.9547					
393610026 - N	27287-10	0.9547					
393610027 - N	27287-10	0.9547					



**Client:** Iwt/Cargo Guard  
**Project:** Severson - SA5, NJ  
**Product:** TN330-2-6  
**Roll #** 393610001

**Job #** 3936

**Test Configuration:**



**Test Information:**

**Boundary Conditions:** Sand  
 Geocomposite  
 Liner

**Normal Load:** 1000 psf  
**Gradient:** 0.33 ft  
**Seating Time:** 100 hours  
**Flow Direction:** MD

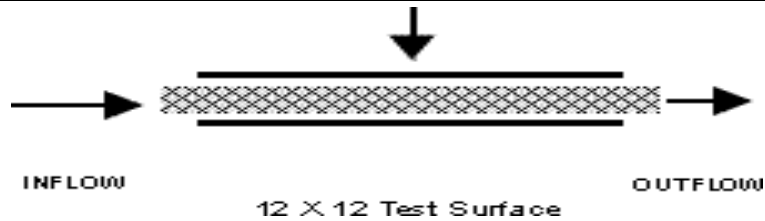
**Test Results:**

Pressure (psf)	Gradient, ft	Transmissivity, m <sup>2</sup> /sec
		100 hours
1000	0.33	1.32 x 10 <sup>-3</sup>

**Client:** Iwt/Cargo Guard  
**Project:** Severson - SA5, NJ  
**Product:** TN330-2-6  
**Roll #** 393610001

**Job #** 3936

**Test Configuration:**



**Test Information:**

**Boundary Conditions:** Sand  
 Geocomposite  
 Liner

**Normal Load:** 1000 psf  
**Gradient:** 0.2 ft  
**Seating Time:** 100 hours  
**Flow Direction:** MD

**Test Results:**

Pressure (psf)	Gradient, ft	Transmissivity, m <sup>2</sup> /sec
		100 hours
1000	0.2	1.51 x 10 <sup>-3</sup>



### POLYETHYLENE RESIN CERTIFICATION

**Customer Name :** Iwt/Cargo Guard  
**Project Name :** Severson - SA5, NJ  
**Geocomposite Manufacturer :** SKAPS Industries  
**Geocomposite Production Plant :** Commerce, GA  
**Geocomposite Brand Name :** TN330-2-6

We, the Geonet Manufacturer, hereby certify the following for the material delivered to the above referenced project:

Resin Supplier	Resin Production Plant	Resin Brand Name	Resin Lot Number	Property	Test Method	Units	Resin Supplier Value	Tested Value*
New South Polymers, Inc	Chevron, TX	HDPE	27287-10	Density	ASTM D 1505	gm/cc	0.950	0.950
				Melt Flow Index	ASTM D 1238 <sup>(a)</sup>	gm/10 min	0.30	0.31

(a) Condition 190/2.16  
\* Data from SKAPS Quality Control







**Engineered Synthetic  
Products, Inc.**

**Product : TN330-2-6**  
**Project : Severson - SA5, NJ**

We, the Geocomposite Manufacturer, hereby certify the following for the material delivered to the above referenced project :

<b>GEOCOMP ROLL#</b>	<b>FABRIC ROLL#</b>	<b>WEIGHT oz/sq yd</b>	<b>MD TENSILE lbs.</b>	<b>MD ELONG %</b>	<b>XMD TENSILE lbs.</b>	<b>XMD ELONG %</b>	<b>PUNCTURE lbs.</b>	<b>AOS us sieve</b>	<b>WATER- FLOW gpm/sq f</b>	<b>PERM- ITY sec<sup>-1</sup></b>
393610001	3936.003	6.27	165	69	171	80	98	70	133	1.78
	3936.005	6.66	169	74	180	84	98	70	133	1.78

# Skaps Industries

571 Industrial Parkway  
Commerce GA 30529  
Phone (770)564-1857 Fax (770) 564-1818

## DRAINAGE PRODUCT DESCRIPTION SHEET

### TRANSNET 330-2-6

Transnet 330-2-6 is a superior quality drainage media made by extruding two sets of HDPE strands together to form a diamond shaped net. The net is then heat laminated on two sides to a 6 ounce non-woven fabric. This three dimensional structure provides excellent planar liquid flow. The Transnet 330-2-6 conforms to the physical property values listed below:

NET PROPERTY	TEST METHOD	UNITS	MINIMUM AVERAGE ROLL VALUE
Mass Per Unit Area	ASTM D-5261	lbs/ft <sup>2</sup>	0.340
Thickness	ASTM D-5199	inches	0.330 +/- 0.03
Density of Polymer	ASTM D-1505	g/cm <sup>2</sup>	0.94
Carbon Black	ASTM D-4218	%	2-3
Tensile Strength	ASTM D-5035	lb/in	95
Transmissivity	ASTM D-4716	m <sup>2</sup> /sec	5 x 10 <sup>-3</sup> *
Transmissivity (geocomposite)	ASTM D-4716	m <sup>2</sup> /sec	1.25 x 10 <sup>-3</sup> and 1.1 x 10 <sup>-3</sup> *
Ply Adhesion	ASTM D-7005	lb/in	0.5

\*Transmissivity measured using water at 20 Degrees C with the gradient of 0.2 and 0.33 respectively, between soil and liner, after 100 hours under a confining pressure of 1,000 psf. Values may vary based on dimension of the transmissivity specimen and specific laboratory.

### STYLE GE160

GE160 is a superior quality, nonwoven geotextile produced by needlepunching together 100% polypropylene staple fibers in a random network to form a high strength dimensionally stable fabric. The polypropylene fibers are specially formulated to resist ultraviolet light deterioration, and are inert to commonly encountered soil chemicals. The fabric will not mildew, is non-biodegradable, and is resistant to damage from insects and rodents. Polypropylene is stable within a ph range of 2 to 13. GE160 conforms to the physical property values below and meets strength class 2:

FABRIC PROPERTY	TEST METHOD	UNITS	MINIMUM AVERAGE ROLL VALUE
Weight	ASTM D-5261	oz/sy	6.0
Grab Tensile	ASTM D-4632	lbs	160
Grab Elongation	ASTM D-4632	%	50
Trap Tear	ASTM D-4533	Lbs	65
Puncture	ASTM D-4833	Lbs	95
Water Flow Rate*	ATMD D-4491	gpm/ft <sup>2</sup>	125
Permittivity*	ASTM D-4491	sec <sup>-1</sup>	1.63
Permeability*	ASTM D-4491	cm/sec	0.48
AOS	ASTM D-4751	US Sieve	70 max
UV Resistance	ASTM D-4355	% hrs	70 @ 500

\*At time of manufacturing. Handling may change these properties.

To the best of our knowledge the information contained herein is accurate. However, ESP, Inc. cannot anticipate all conditions under which ESP's product information and our products, or the products of other manufacturers in combination with our products, may be used. We accept no responsibility for results obtained by the application of this information or the safety or suitability of our products either alone or in combination with other products. Final determination of the suitability of any information or material for the use contemplated, of its manner of use, and whether the suggested use infringes any patents is the sole responsibility of the user.

## **Geomembrane Liner Product Data**



# TECHNICAL DATA SHEET

## Geomembrane LLDPE Textured DS<sup>(3)</sup>

Solmax International Inc., 2801 Boul. Marie-Victorin, Varennes, Qc, Canada, J3X 1P7  
 Tel.: (450) 929-1234 Fax: (450) 929-2550 www.solmax.com

PROPERTY	TEST METHOD	FREQUENCY <sup>(1)</sup>	UNIT Imperial	Solmax 840T-1000
<b>SPECIFICATIONS</b>				
Thickness (min. avg.)	ASTM D-5994	Every roll	mils	38.0
Lowest individual for 8 out of 10 values			mils	36.0
Lowest individual for 10 out of 10 values			mils	34.0
Asperity Height (min. avg.) (3)	ASTM D-7466	Every roll	mils	15
Resin Density	ASTM D-1505	1/Batch	g/cc	< 0.926
Melt Index - 190/2.16 (max.)	ASTM D-1238	1/Batch	g/10 min	1.0
Sheet Density	ASTM D-1505	Every 2 rolls	g/cc	< 0.939
Carbon Black Content	ASTM D-4218	Every 2 rolls	%	>2.0 / <3.0
Carbon Black Dispersion	ASTM D-5596	Every 6 rolls	Category	Cat. 1 & Cat. 2
Oxidative Induction Time (min. ave)	ASTM D-3895	1/Batch	min	100
Tensile Properties (min. avg) (2)	ASTM D-6693	Every 2 rolls		
Strength at Break			ppi	100
Elongation at Break			%	400
2% Modulus (max.)	ASTM D-5323	Per formulation	ppi	2,400
Tear Resistance (min. avg.)	ASTM D-1004	Every 6 rolls	lbf	26
Puncture Resistance (min. avg.)	ASTM D-4833	Every 6 rolls	lbf	56
Dimensional Stability	ASTM D-1204	Every 6 rolls	%	± 2
Multi-Axial Tensile (min.)	ASTM D-5617	Per formulation	%	30
Oven Aging - % retained after 90 days	ASTM D-5721	Per formulation		
STD OIT (min. avg.)	ASTM D-3895		%	35
HP OIT (min. avg.)	ASTM D-5885		%	60
UV Resistance - % retained after 1600 hr	GRI-GM-11	Per formulation		
HP-OIT (min. avg.)	ASTM D-5885		%	35
<b>SUPPLY SPECIFICATIONS</b> (Roll dimensions may vary ±1%)				
Roll Dimension - Width	-		ft	22.3
Roll Dimension - Length	-		ft	780
Area (Surface/Roll)	-		sf	17,394

### NOTES

- Testing frequency based on standard roll dimensions and one batch is approximately 180,000 lbs (or one railcar).
- Of 10 readings; 8 out of 10 must be >7 mils (0.18 mm), and lowest individual reading must be >5 mils (0.13 mm). ASTM D7466 is identical to GRI-GM12.
- Machine Direction (MD) and Cross Machine Direction (XMD or TD) average values should be on the basis of 5 specimens each direction.

\* All values are nominal test results, except when specified as minimum or maximum.

\* The information contained herein is provided for reference purposes only and is not intended as a warranty of guarantee. Final determination of suitability for use contemplated is the sole responsibility of the user. SOLMAX assumes no liability in connection with the use of this information.

## **Demarcation Layer Product Data**



Sales Office:  
 Engineered Synthetic Products, Inc.  
 Phone (770) 564-1857  
 Fax (770) 564-1818  
 www.espgeosynthetics.com

## Geotextile Product Description Sheet

# SKAPS GT-160 Orange 6 oz Nonwoven Geotextile

SKAPS GT-160 is a needle-punched nonwoven geotextile made of 100% polypropylene staple fibers, which are formed into a random network for dimensional stability. SKAPS GT-160 resists ultraviolet deterioration, rotting, biological degradation, naturally encountered basics and acids. Polypropylene is stable within a pH range of 2 to 13. SKAPS GT-160 conforms to the physical property values listed below:

PROPERTY	TEST METHOD	UNIT	M.A.R.V. (Minimum Average Roll Value)
Weight (Typical)	ASTM D 5261	oz/sy (g/sm)	6.0 (203)
Grab Tensile	ASTM D 4632	lbs (kN)	160 (.711)
Grab Elongation	ASTM D 4632	%	50
Trapezoid Tear Strength	ASTM D 4533	lbs (kN)	65 (.289)
Puncture Resistance	ASTM D 4833	lbs (kN)	90 (.40)
Permittivity*	ASTM D 4491	l/sec	1.6
Water Flow*	ASTM D 4491	gpm/sf (l/min/sm)	110 (4480)
AOS*	ASTM D 4751	US Sieve (mm)	70 (.212)
UV Resistance	ASTM D 4355	%/hrs	70/500

\* At the time of manufacturing. Handling, storage, and shipping may change these properties.

\*\* Factory Seams only.

PACKAGING	
Roll Dimensions (W x L) – Feet	15 x 300
Square Yards Per Roll	500
Estimated Roll Weight - Lbs	195

This information is provided for reference purposes only and is not intended as a warranty or guarantee. SKAPS assumes no liability in connection with the use of this information.

SKAPS Industries, 316 S. Holland Dr., Pendergrass, GA 30567, Phone (706) 693-3440, Fax (706) 693-3450, Email: info@skaps.com

**Made in U.S.A.**

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REVISIONS

ZONE	REV	DESCRIPTION	DATE	APPROVED
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C

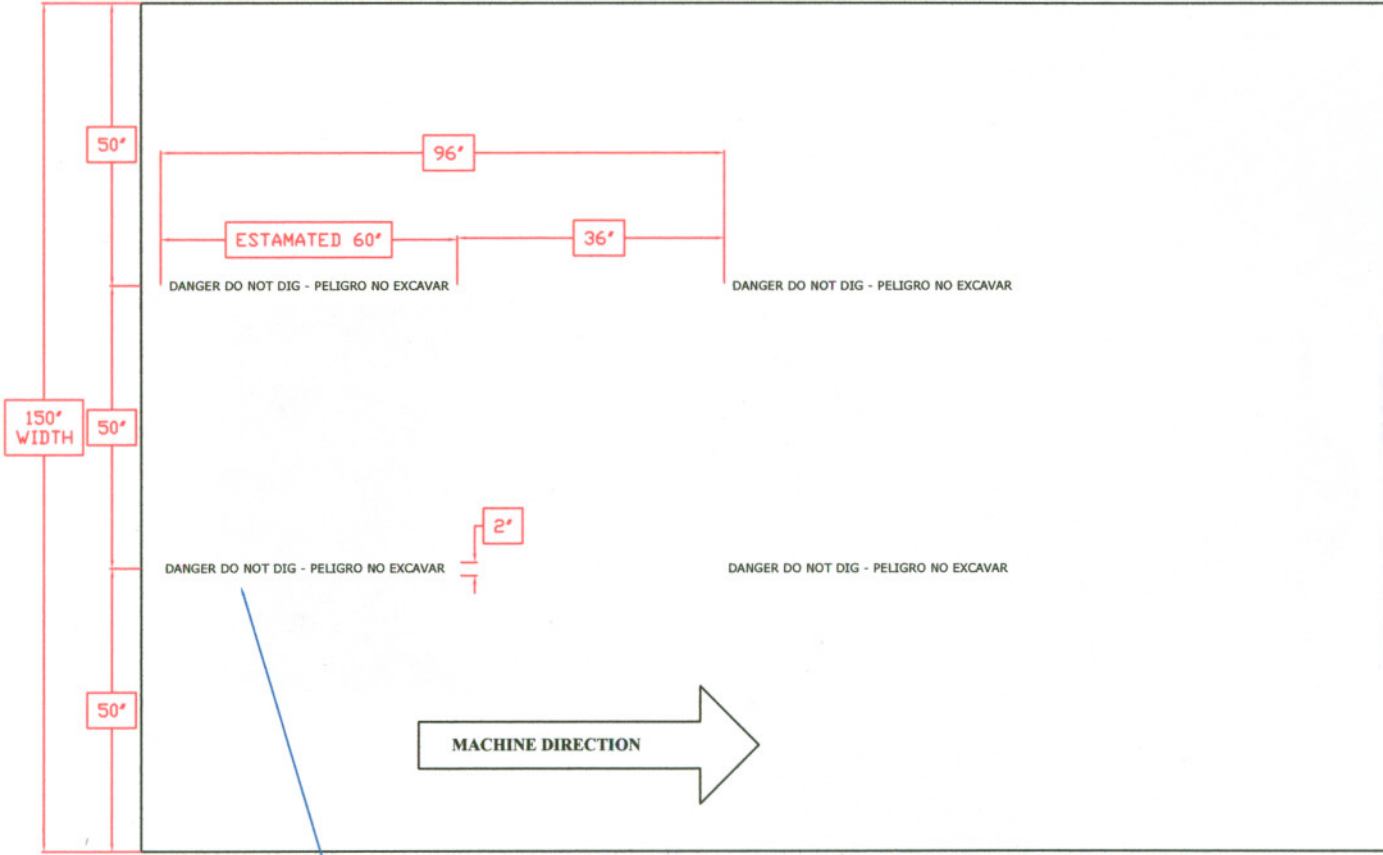
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A

A



**DANGER DO NOT DIG - PELIGRO NO EXCAVAR**

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## **Non-woven Geotextile Product Data**

## Geotextile Product Description Sheet

### Skaps GT - 116

#### 16 oz Nonwoven Geotextiles

SKAPS GT-116 is a needle-punched nonwoven geotextile made of 100% polypropylene staple fibers, which are formed into a random network for dimensional stability. SKAPS GT-116 resists ultraviolet deterioration, rotting, biological degradation, naturally encountered basics and acids. Polypropylene is stable within a pH range of 2 to 13. SKAPS GT-116 conforms to the physical values listed below:

PROPERTY	TEST METHOD	UNIT	M.A.R.V. (Minimum Average Roll Value)
Weight (Typical)	ASTM D5261	oz/yd <sup>2</sup> (g/m <sup>2</sup> )	16.0 (542)
Grab Tensile	ASTM D4632	lbs (kN)	380 (1.69)
Grab Elongation	ASTM D4632	%	50
Trapezoid Tear Strength	ASTM D4533	lbs (kN)	145 (.644)
Puncture Resistance	ASTM D4833	lbs (kN)	240 (1.07)
Mullen Burst	ASTM D3786	psi (kPa)	800 (5512)
Permittivity*	ASTM D4491	sec <sup>-1</sup>	0.7
Water Flow*	ASTM D4491	gpm/ft <sup>2</sup> (l/min/m <sup>2</sup> )	50 (2035)
A.O.S.*	ASTM D4751	U.S. Sieve (mm)	100 (0.150)
U.V. Resistance	ASTM D4355	%/hrs	70/500

\* At the time of manufacturing. Handling, storage, and shipping may change these properties.

PACKAGING	
Roll Dimension (W x L) - Ft	15 x 150
Square Yards per Roll	250
Estimated Roll Weight - lbs	250

\* At the time of manufacturing. Handling may change these properties.

This information is provided for reference purposes only and is not intended as a warranty or guarantee. SKAPS assumes no liability in connection with the use of this information.



# PRODUCT DATA SHEET

## WINFAB 800N

WINFAB 800N is manufactured using polypropylene fibers that are needed to form a dimensionally stable network, which allows the fibers to maintain their relative position. WINFAB 800N resists ultraviolet deterioration, rotting and biological degradation and is inert to commonly encountered soil chemicals.

PROPERTY	TEST METHOD	MARV ENGLISH	MARV METRIC
Weight (Typical)	ASTM D-5261	8.0 oz/yd <sup>2</sup>	271 g/m <sup>2</sup>
Tensile Strength (Grab)	ASTM D-4632	205 lbs	910 N
Elongation	ASTM D-4632	50%	50%
Puncture	ASTM D-4833	130 lbs	578 N
Mullen Burst	ASTM D-3786	400 psi	2756 kPa
Trapezoidal Tear	ASTM D-4533	85 lbs	378 N
UV Resistance (at 500 hrs)	ASTM D-4355	70%	70%
Apparent Opening Size (AOS)*	ASTM D-4751	80 US Std. Sieve	0.180 mm
Permittivity	ASTM D-4491	1.40 sec <sup>-1</sup>	1.40 sec <sup>-1</sup>
Water Flow Rate	ASTM D-4491	90 gpm/ft <sup>2</sup>	3657 l/min/m <sup>2</sup>
Roll Sizes		12.5' x 360' 15.0' x 300'	3.81 m x 109.8 m 4.57 m x 91.5 m

\*Maximum average roll value.

***Willacoochee Industrial Fabrics***  
***Quality at Competitive Prices.***

***769 West Main Street***  
***PO Box 599***  
***Willacoochee, GA 31650***

***PH: 912-534-5757***  
***FAX: 912-534-5533***  
***www.winfabusa.com***

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## SECTION 02315

### EARTHWORK

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

- A. The Contractor shall furnish all labor, equipment, and materials necessary for excavation, filling/backfilling, compaction, testing, and grading. The Work shall be as shown on the Drawings and as specified herein. Work includes, but is not limited to, the following:
1. Borrow source testing of imported fill materials;
  2. Installation of decontamination facilities;
  3. Excavation of soils/materials;
  4. Placement and compaction of non-chromium impacted excavated soils/materials to remain on-site;
  5. Placement and compaction of chromium impacted excavated soils/materials to remain on-site;
  6. Placement and compaction of imported fill materials;
  7. Field quality control testing of all fill materials;
  8. Restoration of all disturbed areas; and
  9. Other miscellaneous earthwork activities, as necessary.
- B. Control of surface water run-on and run-off during construction shall be in accordance with Section 02370, "Erosion and Sedimentation Control".

##### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01010: Summary of Work (RFP Section III).
- B. Section 01100: Remediation Construction Requirements (RFP Section III).
- C. Section 01330: Submittal Procedures.
- D. Section 01560: Dust Control.
- E. Section 01600: Materials Handling and Management.
- F. Section 02230: Clearing and Grubbing.
- G. Section 02242: Deep Pump Wells.
- H. Section 02370: Erosion and Sedimentation Control.

##### 1.03 REFERENCES

- A. The publications listed below form a part of this Specification to the extent referenced. The current version/edition of the publication is referenced, unless otherwise noted. The publications are referred to in the text by basic designation only.
- B. American Society for Testing and Materials (ASTM):
1. ASTM C 88 Standard Test for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
  2. ASTM C 136 Sieve Analysis of Fine and Coarse Aggregates;
  3. ASTM D 422 Standard Test Method for Particle-Size Analysis of Soils;
  4. ASTM D 535 Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine;

5. ASTM D 698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup>)
  6. ASTM D 854 Test Method for Specific Gravity of Soils;
  7. ASTM D 1140 Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve;
  8. ASTM D 1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup>);
  9. ASTM D 2216 Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soils and Rock by Mass;
  10. ASTM D 2487 Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System);
  11. ASTM D 2922 Standard Test Methods for Density of Soil and Soil-Aggregate In Place by Nuclear Methods (Shallow Depth);
  12. ASTM D 3017 Standard Test Method for Water Content of Soil and Rock by Nuclear Methods (Shallow Depth);
  13. ASTM D 3740 Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction;
  14. ASTM D 4318 Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils; and
  15. ASTM D 5519 Standard Test Method for Particle Size Analysis of Natural and Man-Made Riprap Materials.
- C. New Jersey Soil Erosion and Sediment Control Standards, July 1999.
- D. N.J.A.C. 7:26E Technical Requirements for Site Remediation ("Tech Rule")

#### 1.04 DEFINITIONS

- A. Satisfactory Soils:
1. Satisfactory soils shall meet the requirements specified in Part 2 of this Section and shall be used in areas as shown on the Drawings and as approved by the Engineer. In addition, satisfactory soils shall satisfy the following conditions:
    - a. Satisfactory soils shall be free of material greater than 6 inches any direction, unless otherwise specified or approved by the Engineer. Furthermore, the maximum particle size shall not exceed ½ of the lift thickness, unless otherwise specified.
    - b. Satisfactory soils shall be certified clean from the borrow source of origin, based on analytical testing data, as approved by the Engineer.
    - c. Satisfactory soils shall be free of all unsatisfactory soils/materials listed below.
- B. Unsatisfactory Soils/Materials:
1. Unsatisfactory soils/materials include but are not limited to highly plastic/fat silt and clay, organic soils, and/or peat (classified as MH, CH, OL, OH, or PT via ASTM D 2487), stumps/brush, trash, refuse, debris, frozen soils, soils containing materials greater than the allowable size (see above), saturated soils, fine-grained soils above their liquid limit at the time of compaction, and soils that are either too wet or too dry to compact.

2. Unless otherwise indicated, soils/materials removed from on-site excavations identified as chromium impacted material or, as shown on the Drawings, shall be restricted from re-use on-site.
- C. Cohesionless and Cohesive Soils:
1. Cohesionless soils include gravels, sand-gravel mixtures, sands, and gravelly-sands, classified as GW, GP, SW, or SP by the Unified Soil Classification System (ASTM D 2487).
  2. Cohesive soils include clayey gravels, sand-clay mixtures, clayey sands, clays, and silts, classified as GC, SC, CL, CH, ML, or MH by the Unified Soil Classification System (ASTM D 2487).
  3. Soils classified as GM and SM will be identified as cohesionless only when the "fines" are determined to be non-plastic.
  4. Testing required for the classification of soil shall be in accordance with ASTM D 4318, ASTM C 136, ASTM D 422, and/or ASTM D 1140.
- D. Structural and Non-structural Fills
1. Structural fills include soils be placed under or in the vicinity of proposed structures or under pavement.
  2. Non-structural fills include soils not placed under the vicinity of proposed structures or pavement.
- E. Percent Compaction:
1. Degree of compaction (percent compaction) required is expressed as a percentage of the maximum dry density, at the optimum moisture content.
  2. Maximum dry density and optimum moisture content for structural fills shall be obtained by the test procedures presented in ASTM D 1557, unless otherwise specified.
  3. Maximum dry density and optimum moisture content for non-structural fills shall be obtained by the test procedures presented in ASTM D 698, unless otherwise specified.

## 1.05 QUALITY ASSURANCE

- A. Codes and Standards:
1. Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

## 1.06 SUBMITTALS

- A. Submit to the Engineer for approval (unless otherwise specified) the following in accordance with Section 01330, "Submittal Procedures":
1. Surveyor:
    - a. The name, qualifications, and proposed survey means/methods of an independent third-party Land Surveyor to complete site topographic surveys as required for measurement and payment shall be submitted within 7 days following notice to proceed.
    - b. The Land Surveyor shall be registered in the State of New Jersey.

2. Borrow Source(s):
  - a. The Contractor shall provide the proposed source(s) of borrow materials prior to initiation of work. Any available/previous geotechnical laboratory testing data shall be provided.
3. Contractor's Quality Control Testing Laboratory (QCTL):
  - a. The name and qualifications of an independent third-party geotechnical testing laboratory to be used for borrow source testing and field quality control testing shall be submitted within 7 days following notice to proceed.
  - b. The Contractor's QCTL shall meet the requirements of ASTM D 3740, at a minimum.
4. Test Reports:
  - a. The Contractor's QCTL shall submit 2 copies of the following test reports directly to the Engineer, with at least 1 copy to the Contractor:
    - (1). All test reports for borrow source materials; and
    - (2). Field quality control test reports (for review).

## 1.07 SITE CONDITIONS

- A. Subsurface Information:
  1. Any reuse of historic soil boring logs, well/piezometer data, or other subsurface information shall be at the Contractor's (and/or Subcontractor's) own risk and without legal liability on the Engineer, Honeywell, or the Owner. The Contractor (and/or Subcontractors) shall indemnify and hold the Engineer, Honeywell, and the Owner harmless from all claims, damages, expenses or costs resulting from the Contractor's (and/or Subcontractor's) interpretation of this information.
  2. Site Subsurface soils identified within the limits of excavation contain hexavalent chromium in excess of NJDEP's most stringent Non-Residential Soil Cleanup Criteria of 20 mg/kg, based on available analytical testing data.
- B. Existing Utilities and Underground Structures:
  1. Known existing utilities and underground structures are shown on the Drawings. The location of existing utilities and underground structures should be considered approximate.
    - a. The approximate footprints of former/historic structures are shown on the Drawings. The presence and/or condition of below-grade foundations, slabs, walls, etc. is not known.
  2. Prior to the commencement of site activities, the Contractor shall locate and identify all existing utilities in the areas of Work. If utilities are to remain in place, provide adequate means of protection.
  3. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult the Utility Owner immediately for directions. Cooperate with the Owner and utility companies in keeping respective services and facilities in operation. The Contractor shall repair damaged utilities to satisfaction of the Utility Owner.
  4. Do not interrupt existing utilities serving facilities occupied and used by the Owner or others, except when permitted in writing by the Engineer and then only after acceptable temporary utility services have been provided.



- C. Use of Explosives:
  - 1. Use of explosives shall not be allowed.
- D. Protection of Persons and Property:
  - 1. Barricade and mark open excavations occurring as part of this Work in accordance with applicable standards.
  - 2. Protect wooded areas, facilities, structures, utilities, pavements, sidewalks, fences, and other facilities designated to remain from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations and heavy truck/equipment traffic.
    - a. Unless otherwise noted, existing monitoring wells are to remain. The Contractor shall take necessary precautions to protect existing wells during the work.
    - b. Unless otherwise noted, existing storm water inlets and sanitary sewer manholes are to remain. The Contractor shall take necessary precautions to protect existing storm water inlets sanitary sewer manholes during the work.
    - c. Any damage to facilities, structures, utilities, etc. designated to remain shall be repaired and/or replaced by the Contractor at no additional expense to Honeywell.

## PART 2 - PRODUCTS

### 2.01 NON-CHROMIUM IMPACTED SOILS/MATERIALS

- A. Location/Use:
  - 1. Non-Chromium Impacted Soils/Materials removed and stockpiled to access the chromium impacted soils shall be used initially to achieve the subgrade elevations indicated on the Drawings.

### 2.02 CHROMIUM IMPACTED SOILS/MATERIALS

- A. Location/Use:
  - 1. Chromium Impacted Soils/Materials removed as directed by the Engineer may be used to achieve the subgrade elevations necessary for capping within the Commercial Areas of Concern. Excess chromium impacted soils shall be stockpiled within the proposed Building 7 footprint and capped or transported off-site for disposal.

### 2.03 COMMON BORROW

- A. Location/Use:
  - 1. Common Borrow shall be used to supplement the non-chromium impacted soils in order to reinstate the subgrade in areas of excavation as indicated on the Drawings.
- B. Common Borrow shall consist of soil suitable for embankment construction. It shall be free from frozen materials, perishable rubbish, peat, and other unsatisfactory soils/materials. It shall be of such a nature and character that it can be compacted to the specified density (Sub-Part 3.12 of this Section).
  - 1. Common Borrow shall have a maximum nominal particle size of 6 inches or less when placed in lifts of 12 inches (prior to compaction) or less and

compacted by heavy compaction equipment (i.e. vibratory roller), unless otherwise specified. The maximum nominal particle size shall be no more than 1/2 of the lift thickness when placed in lifts less than 12 inches thick (prior to compaction).

2. Common Borrow shall be certified clean from the borrow source or origin, based on analytical testing data, as approved by the Engineer.
  - a. Soils shall be tested and certified "clean" relative to the NJDEP Technical Requirements pursuant to 7:26E 6.4(b) 2.
3. Imported Common Borrow shall meet the following particle size gradation which shall be determined in accordance with ASTM D 422:

Allowable Gradation Envelope	
U.S. Standard Sieve Size	Percent Finer by Weight
2"	100
1"	80-100
3/8"	70-100
No. 10	50-100
No. 30	30-85
No. 60	15-65
No. 200	5-15

- C. The moisture content shall be sufficient to provide the required compaction and a stable embankment and/or subgrade. In no case shall the moisture content exceed 3% above optimum, which shall be determined in accordance with ASTM D 1557 for structural fills; ASTM D 698 for non-structural fills, or approved equal testing method.

#### 2.04 PROTECTIVE COVER SOIL

- A. Protective Cover Soil shall consist of a compacted 12-inch layer of soil material placed directly above the geocomposite drainage layer for the cap. The protective cover soil shall be free of trash, ice, snow, tree stumps, and other unsuitable and deleterious materials. The maximum particle size shall be 3/8" inch or less, with less than 5% passing the #200 sieve. It shall be of such a nature and character that it can be compacted to the specified dry density of 90% (measured as a percentage of the max. dry density as determined by ASTM D 698) with a reasonable compaction effort. The protective cover soil will have a compacted (90% of the maximum dry density as determined by ASTM D 698) in-place hydraulic conductivity not greater than  $1 \times 10^{-4}$  cm/sec.

Protective cover soil will meet the following gradation, retention, and clogging requirements for contact with the drainage geocomposite:

Gradation/Stability: For soil to be classified as both well graded and stable, it must meet the following criteria:

Well Graded:  $D_{60}/D_{10} > 4$  and

Stable:  $D_{30}^2 / (D_{10} \times D_{60}) < 3$

Where:

$D_{10}$  = the diameter at which 10 percent of the soil is finer

$D_{30}$  = the diameter at which 30 percent of the soil is finer

$D_{60}$  = the diameter at which 60 percent of the soil is finer

Retention: The ability of the geocomposite drainage geotextile to retain the cover soil can be verified using the following criterion:

$O_{95} / D_{85} < B$

Where: B is a function of coefficient of uniformity ( $D_{60}/D_{10}$ ).

$B = 1$   $D_{60}/D_{10} < 2$  or  $> 8$

$B = 0.5 \times D_{60}/D_{10}$   $2 < D_{60}/D_{10} < 4$

$B = 8 / (D_{60}/D_{10})$   $4 < D_{60}/D_{10} < 8$

$B = 1.8$  for silts and clays

$O_{95}$  = the 95 % opening size of the geotextile (in mm)

$D_{85}$  = the diameter at which 85 percent of the soil is finer

Clogging: To minimize particulate clogging:

$O_{95} > 3D_{15}$

Where:

$O_{95}$  = the 95 % opening size of the geotextile (in mm)

$D_{15}$  = the diameter at which 15 percent of the soil is finer

In place of the requirement for clogging, the materials may be analyzed directly for hydraulic performance with the geosynthetic used in the drainage composite by the gradient ratio test (ASTM D 5101).

## 2.05 CUSHION FILL

- A. Cushion Fill material will be placed directly beneath the cover system geomembrane. The cushion fill shall be a material capable of being compacted to 90% of maximum dry density as determined by ASTM D 698 with a reasonable compactive effort. The material selected will be a clean fill with a maximum particle size of 1/2-inch meeting the requirements of a Unified Soil Classification System SP material.

## 2.06 CRUSHED STONE

- A. Crushed stone shall be used around drainage control structures, pipes, and other locations as shown on the Drawings. Crushed Stone shall consist of clean, inert, hard durable grains of rock free from vegetable matter, shale, and lumps or balls of clay, meet the requirements of NJDOT 901.01, 901.02, 901.03 and 901.04 and conform to the following gradation requirements provided below. No in-place compaction requirements will be required.

Sieve Size	Gradation (percent passing, by dry weight)	
	1-1/2 – inch stone (NJDOT No. 4 size)	3/8 –inch stone (NJDOT No. 8 size)
1 ¾ - inch	100	
1 - ½ inch	90-100	
1 – inch	20-55	
¾ - inch	0-15	
½ - inch		100
3/8 – inch	0-5	85-100
No. 4 sieve		10-30
No. 8 sieve		0-10
No. 16 sieve		0-5
No. 200 sieve	0-2	0-2

## 2.07 DENSE GRADED AGGREGATE

- A. Location/Use:
- Dense Graded Aggregate shall be used as indicated in the Construction Documents.
  - Dense Graded Aggregate shall conform to Section 901 of the NJDOT Standard Specifications.

## 2.08 TOPSOIL

- A. Topsoil shall be in accordance with Section 02900, "Topsoil and Seeding".
- Topsoil shall be certified clean from the borrow source or origin, based on analytical testing data, as approved by the Engineer.

## 2.09 BORROW SOURCE TESTING

- A. Borrow source testing, including geotechnical characterization requirements, shall be conducted on all soil materials proposed for construction. Minimum third-party geotechnical laboratory testing requirements and frequency for materials are listed as follows:

- Common Borrow, Protective Cover Soil, Cushion Fill, Dense Graded Aggregate:

<u>Test</u>	<u>Methodology</u> <sup>1</sup>	<u>Frequency</u> <sup>2</sup>
Particle-Size Analysis test/source/material (to #200 Sieve)	ASTM D 422	1
Standard Proctor test/source/material	ASTM D 698	1
Modified Proctor test/source/material	ASTM D 1557	1

- Topsoil:
  - Refer to Section 02900, "Topsoil and Seeding".

3.	Crushed Stone:		
	<u>Test</u>	<u>Methodology</u> <sup>1</sup>	<u>Frequency</u> <sup>2</sup>
	Particle-Size Analysis test/source/material (to #200 Sieve)	ASTM D 422	1

Borrow Source Testing Notes:

1. Other testing methods may be considered acceptable, based on prior approval of the Engineer.
2. Testing frequency shall be as listed, at any change in borrow source, or at any discernable change in material delivered to the site (as determined by the Engineer).

### PART 3 - EXECUTION

#### 3.01 NOTIFICATION

- A. The Contractor shall also comply with the New Jersey's Underground Facility Protection Act and notify the New Jersey's One Call System before performing Work on the Project. The One Call System can be reached by calling 1-800-272-1000.

#### 3.02 INSPECTION

- A. Examine the areas and conditions under which excavating, filling, and grading are to be performed and notify the Engineer, in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in an acceptable manner.

#### 3.03 TOPOGRAPHIC SURVEYS

- A. General:
  1. Pre-Construction, Post-Excavation, and Final/Post-Construction Topographic Surveys, at a minimum, shall be completed for the purposes of quantifying excavation volumes, backfill (i.e., Non-Chromium Impacted Fill and Common Borrow) volumes, restored surface areas (i.e. Topsoil and Seed).
  2. Topographic surveys completed for the purposes of quantifying work completed shall be performed by an independent/third-party surveyor licensed in the State of New Jersey.
  3. Topographic surveys shall correspond to the state plane coordinate system.
  4. Topographic surveys for the purposes of measurement and payment shall be surveyed on a grid with points spaced no greater than 25 feet by 25 feet with suitable detail to provide one-foot elevation contours, unless otherwise approved by the Engineer.
  5. Topographic surveys shall be submitted to the Engineer in both printed and electronic form (AutoCAD 2008 format/compatible).

- B. Pre-Construction Survey:
  - 1. The pre-construction topographic survey shall be completed within the Limits of Disturbance, as shown on the drawings, plus 50 feet beyond the perimeter.
  - 2. Survey data shall provide the basis for measurements of excavation volume.
- C. Post-Excavation Survey:
  - 1. Upon completion of excavation, the Contractor shall provide for a topographic survey of the limits and subgrade elevations of the final excavation footprint(s), as approved by Honeywell and the Engineer.
  - 2. The post-excavation survey shall be completed within the limits of excavation, plus 25 feet.
  - 3. Survey data shall provide the basis for measurements of excavation volume.
- D. Final/Post-Construction Survey:
  - 1. The Contractor shall provide for a topographic survey of the final restored surface to provide final grades.
  - 2. The final/post-construction survey shall be completed for the final disturbed (and restored) footprint, plus 25 feet.
  - 3. Survey data shall provide the basis for measurements of the volume of Non-Chromium Impacted Fill and Common Borrow.

### 3.04 EXCAVATION DEWATERING AND DISCHARGE

- A. General:
  - 1. Perform dewatering as necessary for the control, collection and discharge of groundwater and surface water entering excavations in accordance with Section 02242 "Deep Pump Wells".
  - 2. Perform dewatering as necessary for provide a safe working environment.

### 3.05 STABILITY OF EXCAVATIONS

- A. General:
  - 1. Slope sides of excavations to comply with applicable codes and ordinances.
    - a. Shore and brace excavations where sloping is not possible because of space restrictions or stability of material excavated.
  - 2. Maintain excavations in a safe condition until completion of backfilling, or longer, if specified or directed by the Engineer.
- B. Shoring, Sheeting, and Bracing:
  - 1. Utilize where necessary to meet safety requirements and/or as shown on the Drawings.
    - a. Establish requirements for trench shoring, sheeting, and bracing to comply with codes and ordinances of authorities having jurisdiction.
  - 2. Provide materials for shoring, sheeting, and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition.

### 3.06 COLD WEATHER PROTECTION

- A. Protect exposed subgrade surfaces against freezing when atmospheric temperature is less than 35°F.
  - 1. Fill materials shall not be placed atop frozen subgrade surfaces.

### 3.07 EXCAVATION

- A. General:
  - 1. Excavation consists of removal of material encountered when establishing required subgrade elevations/depths as shown on the Drawings.
  - 2. During construction, excavation and fill shall be performed in a manner and sequence that will provide proper drainage at all times.
  - 3. Excavated materials shall be segregated as shown on the Drawings.
    - a. Refer to Section 01600, "Material Handling and Management", for additional information.
- B. General Site Excavation/Grading:
  - 1. Before removal of bituminous materials, a neat saw cut shall be performed to provide for the complete removal of the asphalt material without damage to the remaining adjacent material.
  - 2. The work includes a total excavation depth of approximately 20 feet bgs of soils/materials which shall be completed as shown on the Contract Drawings. Phasing of the work will allow for excavation and staging of both chromium impacted and non-chromium impacted soils/materials for future reuse on-site as backfill or for disposal.
  - 3. Excavated material containing excess water shall be mixed with dryer soils and or absorbents prior to loading. Prior to off-site transportation and disposal, the Contractor shall inspect the truck to ensure that soil shipped off-site for disposal does not contain standing water.

### 3.08 POST-EXCAVATION VERIFICATION/CONFIRMATION SAMPLING

- A. Post-excavation verification/confirmation sampling will not be conducted following completion of specified excavation activities; however, the Contractor shall not begin backfilling excavations prior to review and acceptance by the Engineer.

### 3.09 TRANSPORTATION AND DISPOSAL OF EXCAVATED MATERIALS

- A. Honeywell shall arrange for the off-site transportation and disposal of chromium impacted solid waste materials (exclusive of cleared materials, asphalt and concrete debris, and general rubbish/trash), under separate contract.
- B. The Contractor shall be responsible for coordination and day to day scheduling of Honeywell's designated transporters for chromium impacted solid waste materials.
- C. The Contractor shall provide all equipment, labor, and personnel necessary to load the transporter's trucks and/or containers in a timely manner.



### 3.10 SUBGRADE PREPARATION

- A. General:
  - 1. Remove vegetation, debris, unsatisfactory soils/materials, obstructions, and deleterious materials from subgrade surfaces prior to placement of fills.
  - 2. Bench, plow, strip, scarify, or break-up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.
- B. Subgrade Compaction:
  - 1. Prior to placing Common Borrow, subgrade surfaces shall be compacted to a firm and unyielding condition, as approved by the Engineer.
    - a. The Engineer's subgrade evaluation shall include visual observations, hand-rod probing, and/or compaction testing
  - 2. Subgrade surfaces shall be relatively smooth/even, free of loose soil, ponded water, and debris. Any loose, soft, wet, frozen, or otherwise unsuitable/unsatisfactory soils or materials observed should either be re-compacted or undercut to a suitable subgrade, as approved by the Engineer.
  - 3. Any undercut/excavated material should be replaced/backfilled with Common Borrow, as approved by the Engineer.
    - a. Fill materials shall be placed and compacted as specified herein.

### 3.11 PLACEMENT OF FILL MATERIALS

- A. General:
  - 1. Place specified fill materials in lifts as specified herein as required to achieve specified subgrade elevations.
  - 2. Do not place fill material on surfaces that are muddy, frozen, or contain frost or ice.
  - 3. Backfill excavations as promptly as work permits, but not until completion of the following:
    - a. Acceptance by Engineer of any construction below finish grade.
    - b. Removal of trash and debris.
- B. Fill Placement:
  - 1. Place fill materials in layers not more than 12 inches (prior to compaction) for material to be compacted by heavy compaction equipment (i.e. vibratory roller, sheepsfoot roller, etc.), unless otherwise specified.
  - 2. Place fill materials in layers not more than 8 inches (prior to compaction) for material to be compacted by hand-operated walk-behind equipment, unless otherwise specified.
  - 3. Before compaction, moisten or aerate each layer as necessary to provide the optimum moisture content. Compact each layer to required percentage of maximum dry density (Sub-Part 3.12).

### 3.12 COMPACTION

- A. General:
  - 1. Provide soil compaction during construction as necessary to achieve minimum percent/degree of compaction, as specified herein.

- B. Percent Compaction Requirements:
  - 1. All structural fill shall be compacted to at least 95% maximum dry density as determined by ASTM D 1557, unless otherwise approved by the Engineer.
  - 2. All non-structural fill shall be compacted to at least 90% maximum dry density as determined in accordance with ASTM D 698, unless otherwise approved by the Engineer.
- C. Moisture Control:
  - 1. Where the subgrade or a layer of fill/backfill must be moisture-conditioned before compaction, uniformly apply water to the surface, in proper quantities to prevent free water appearing on surface during or subsequent to compaction operations.
  - 2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
  - 3. Soil material that has been removed because it is too wet to permit compaction may be stockpiled as specified herein or spread and allowed to dry. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory level.

### 3.13 FIELD QUALITY CONTROL TESTING

- A. Quality Control Testing During Construction:
  - 1. Allow testing service to examine and test subgrade surfaces and fill/backfill layers. Before further construction work is performed, test results meeting the requirements of Sub-Parts 3.10 and 3.12 of this Section shall be obtained.
  - 2. Perform field density tests on imported materials in accordance with ASTM D 2922 (nuclear method), or other Engineer approved methods, as applicable.
    - a. For each layer of fill placed, conduct at least 1 compaction test for every 2,500 square feet, but in no case less than 3 tests per lift.
    - b. Re-used on-site historic fill material will not be tested for compaction.
  - 3. If in opinion of Engineer, based on testing service reports and inspection, subgrade soils or fill/backfill materials which have been placed are below specified density, the Contractor shall provide additional compaction and testing at no additional expense to the Honeywell.

### 3.14 ASPHALT RESTORATION

- A. Asphalt areas shall be restored as indicated in the Construction Documents.

### 3.15 TOPSOILING

- A. Refer to Section 02900, "Topsoil and Seeding".

### 3.16 FINAL GRADING

#### A. General:

1. The Contractor shall uniformly grade areas within the Limits of Work/Disturbance, as shown on the Drawings. Smooth finished surface within specified tolerances, with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

### 3.17 MAINTENANCE

#### A. Protection of Graded Areas:

1. Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

#### B. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

#### C. Reconditioning Compacted Areas:

1. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction.

--END OF SECTION--

## SECTION 02372

### CAP GEOMEMBRANE LINER

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

Work provided in this Section includes furnishing labor, materials, equipment and incidentals required to install a 40-mil textured (both sides) Linear Low Density Polyethylene (LLDPE) geomembrane as part of the multi-layer cap construction as shown on the Drawings and as specified herein.

##### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01330: Submittal Procedures
- B. Section 02315: Earthwork
- C. Section 02374: Geocomposite Drainage Layer

##### 1.03 REFERENCES

The publications listed below, latest edition unless otherwise noted, form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

#### AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 698	Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbs/ft <sup>3</sup> (600 kN-m/m <sup>3</sup> ))
ASTM D 792	Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
ASTM D 1004	Standard Test Method for Initial Tear Resistance of Plastic Film and Sheeting
ASTM D 1238	Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer
ASTM D 1505	Standard Test Method for Density of Plastics by the Density-Gradient Technique
ASTM D 1603	Standard Test Method for Carbon Black in Olefin Plastics
ASTM D 3895	Standard Test Method for Oxidative-Induction Time of Polyolefins By Differential Scanning Calorimetry
ASTM D 4218	Standard Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique

ASTM D 4437	Standard Practice for Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Sheet Geomembranes
ASTM D 4833	Standard Test Method for Index Puncture Resistance of Geotextile, Geomembranes and Related Products
ASTM D 5321	Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method
ASTM D 5323	Standard Practice for Determination of 2% Secant Modulus for Polyethylene Geomembranes
ASTM D 5596	Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics
ASTM D 5617	Standard Test Method for Multi-Axial Tension Test for Geosynthetics
ASTM D 5721	Standard Practice for Air-Oven Aging of Polyolefin Geomembranes
ASTM D 5885	Standard Test method for Oxidative Induction Time of Polyolefin Geosynthetics By High-Pressure Differential Scanning Calorimetry
ASTM D 5994	Standard Test Method for Measuring the Core Thickness of Textured Geomembrane
ASTM D 6392	Standard Test Method for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods
ASTM D6693	Standard Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes

#### GEOSYNTHETIC RESEARCH INSTITUTE (GRI) STANDARDS

GRI GM11	Accelerated Weathering of Geomembranes using a Fluorescent UVA-Condensation Exposure Device
GRI GM12	Measurement of the Asperity Height of Textured Geomembranes Using a Depth Gage
GRI GM17	Test Properties, Testing Frequency and Recommended Warranty for Linear Low Density Polyethylene (LLDPE) Smooth and Textured Geomembranes

## 1.04 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures".

- A. Submittals relating to liner Manufacturer and liner material:
1. Manufacturing:
    - a. List of material properties of the liner proposed for the project meeting the requirements herein with attached certified test results.
    - b. Manufacturer's quality control program and manual including description of in-house laboratory facilities.
    - c. A list of ten completed facilities totaling a minimum of ten million square feet, for which the Manufacturer has manufactured LLDPE geomembrane. The following information shall be provided for each facility.
      1. Name and purpose of facility, its location and date of installation.
      2. Name of Owner, Project Manager, Design Engineer and Installer.
      3. Geomembrane thickness and surface area.
    - d. Qualifications statement in accordance with Section 1.06 "Qualifications".
  2. The origin of the resin to be used in the manufacturing of geomembrane used on-site including the suppliers name and production plant, as well as brand name and tracking number.
  3. Copy of quality control certificates in conformance with Section 2.01. Certifications that the LLDPE geomembrane and extrudate produced for this project have compatible properties. Quality control reports for the time period materials were produced for this project.
  4. A "Sample Warranty" in accordance with Section 1.08.
  5. Prior to shipment of liner material to the site, provide 5 samples (roll width by 3 feet) from 5 random rolls to be provided. Only ship to site material that is approved by the Contractor.
- B. Submittals relating to the Installer:
1. Installation Capabilities:
    - a. Information on equipment and personnel.
    - b. Anticipated average daily production.
    - c. Number of crews employed and number available for this work.
    - d. Qualifications in accordance with Section 1.06 "Qualifications".
  2. A list of five completed facilities totaling 2 million square feet for which the Installer has installed LLDPE geomembrane. The following information shall be provided for each facility:
    - a. Name and purpose of facility, its location and date of installation.
    - b. Name of Owner, Design Engineer, Manufacturer and name and telephone number of Manufacturer's Representative at the facility who can discuss the project.
    - c. Surface area of the installed LLDPE geomembrane.
    - d. Type of seaming, patching and tacking equipment.
    - e. A copy of the Manufacturer's certification or approval letter.

- C. Within 2 days prior to liner installation submit the following:
1. Shop Drawings:
    - a. Proposed panel layout showing the installation layout identifying field seams as well as any variance or additional details which deviate from the Drawings.
    - b. Details of seaming the geomembrane, anchoring, connections, penetrations and other construction details, which deviate from these specifications.
  2. Installation Quality Control:
    - a. A quality control manual that specifically defines the quality control program during installation for this project. The manual shall include daily procedures, welding techniques, field testing procedures, lab testing procedures, specific steps that are to be taken in the event of a failure or defect, personnel requirements, levels of authority and other information necessary to ensure a high quality geomembrane installation.
    - b. Resume of the Installation Supervisor to be assigned to and on-site during the project.
    - c. Resume of the Master Seamer to be assigned to and on-site during the project.
    - d. A list of personnel performing field seaming operations along with pertinent experience information.

#### 1.05 QUALITY CONTROL

- A. In addition to Manufacturer and Installer requirements for qualifications and certification specified in Paragraph 1.06, Quality Control consists of conformance testing of the material prior to delivery to the site and field quality control during installation.
- B. Manufacturer conformance testing requirements are specified in Paragraph 2.02. The purpose of conformance testing is to verify that the supplied material conforms to the Specifications and to the Manufacturer's quality control certificates.
- C. Field quality control testing requirements are specified in Paragraph 3.06 and 3.07. The purpose of field quality control procedures is to verify that the geomembrane has been installed in accordance with the specifications and Manufacturer's recommendations.
- D. Field Quality Control Forms:

The forms in attached Appendix A shall be used for field installation documentation. Alternative forms may be used for documentation as submitted and approved by the Contractor.
- E. Geomembrane Quality Control Documentation:
  1. Project Files:
    - a. Two duplicate project files shall be maintained. One shall be maintained by the Contractor's Field Representative and the other shall be maintained by the Installer. The Installer shall provide the Contractor's Field Representative with complete daily documentation by the end of the following work day. At the end of each work week, the Contractor and Installer will update and



check the files to assure that copies of pertinent project information are included in each file.

- b. Blank copies of the project forms shall be available onsite throughout the duration of the project and are included in attached Appendix A.

## 1.06 QUALIFICATIONS

### A. Manufacturer:

The Manufacturer of the lining material described hereunder shall have previously demonstrated its ability to produce this geomembrane by having at least 5 years continuous experience in the manufacturing of LLDPE geomembrane and successfully manufactured a minimum of 10 million square feet of similar material for hydraulic liner installations.

### B. Installer:

The Installer shall be the Manufacturer or a Manufacturer approved Installer trained to install the Manufacturer's geomembrane. Installation shall be performed under the constant direction of a single Installation Supervisor who shall remain on site and be in responsible charge, through the subgrade approval, geomembrane installation, for geomembrane layout, seaming, patching, testing, repairs and other site activities required by the Installer. The Installer shall also provide a Master Seamer (who may also be the Installation Supervisor). The Installation Supervisor/Master Seamer shall have installed or supervised the installation and seaming of a minimum of two million square feet of LLDPE geomembrane liner.

## 1.07 DELIVERY, STORAGE AND HANDLING

- A. The geomembrane rolls shall be packaged and shipped by appropriate means to prevent damage of the geomembrane rolls. Off-loading, handling, and storage of the geomembrane is the responsibility of the Installer. The Installer shall be responsible for replacing any damaged or unacceptable material at no additional cost to the Contractor.

### B. Roll Identification:

The Manufacturer shall provide geomembrane rolls marked or tagged with the following information:

1. Manufacturer's name;
2. Product identification;
3. Thickness;
4. Roll dimensions;
5. Manufacturer's roll and lot number; and
6. Date of manufacture.

- C. Damage during off-loading shall be documented by the Contractor's Field Representative. Damaged rolls must be separated from the undamaged rolls and removed by the Manufacturer.

- D. The geomembrane rolls shall be stored so as to be protected from puncture, dirt, grease, water, mud, mechanical abrasions and excessive heat or cold that may damage the geomembrane material. The rolls shall be stored on a prepared surface (not wooden pallets or hard abrasive surfaces) and shall not be stacked more than two rolls high.

## 1.08 MATERIAL WARRANTY

The LLDPE geomembrane Manufacturer shall warrant the geomembrane against manufacturing defects and material degradation under outdoor exposure for a period of 5 years on a prorated basis from the date of final payment and acceptance. The Manufacturer shall repair or replace, including material and labor, at no expense to the Owner, any material which fails from the above causes within the warranty period. The Manufacturer shall furnish a written warranty covering the requirements of this Paragraph.

## 1.09 GUARANTEE

The Installer shall guarantee the LLDPE geomembrane against defects in installation and workmanship for the period of 1 year commencing with the date of final payment and acceptance by the Contractor. The guarantee shall include the services of qualified personnel, all materials required for the repairs and testing at no expense to the Contractor.

## 1.10 DEFINITIONS AND RESPONSIBILITIES

### A. Contractor:

The Contractor is the firm or corporation with whom the Owner has entered into agreement to construct the project. The Contractor is responsible for review of submittals by the Manufacturer and the Installer as required by the Specifications. The Contractor is also responsible for scheduling and coordination of the required work with the Manufacturer and the Installer to complete the project.

### B. Contractor's Field Representative:

The Contractor's field representative shall oversee the installation of the geomembrane by the Installer. The Contractor's field representative will be responsible for inspections and reviewing testing results for conformance with the specified requirements. The Contractor's field representative will compile QC test results daily and document all QC activities in weekly reports.

### C. Engineer:

The Engineer shall be the individual or firm responsible for the design and preparation of the project's Contract Drawings and Specifications and shall provide technical guidance and review when required.

### D. Manufacturer:

The Manufacturer is the firm or corporation contracted by the Contractor for production of the geomembrane material to be used in the project. The Manufacturer shall produce a consistent product meeting or exceeding the project specifications and shall provide quality control documentation for the product specified herein.

### E. Installer:

The Installer is the firm or corporation contracted by the Contractor for installation of the geomembrane. The Installer shall be the Manufacturer or a Manufacturer approved Installer trained and certified to install the Manufacturer's geomembrane. The Installer shall be responsible for field handling, storing, placing, seaming, sampling, testing, protecting and other aspects of the geomembrane installation.

- F. Quality Control Laboratory:  
An independent Quality Control Laboratory (QCL) hired by the Contractor to perform conformance testing of the liner material with demonstrated qualifications for conducting required testing.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General:

1. The resin from which the geomembrane is made shall generally be in the density range of 0.926 g/cc or lower, and have a melt index value per ASTM D 1238 of less than 1.0 g/10 min. Formulated sheet density shall be 0.939 g/cc or lower.
2. The blended resin shall contain two to three percent carbon black, anti-oxidants and heat stabilizer, but no fillers or extenders. The resin shall be virgin material, with no more than ten (10) percent rework. If rework is used, it must be of the same formulation as the parent material. No post-consumer resin of any type shall be added to the formulation.
3. The geomembrane material shall be so produced as to be free of holes, blisters, thin areas, inconsistent texturing, undispersed raw materials, or any sign of contamination by foreign matter.
4. The sheets shall be manufactured in a minimum 15-ft seamless width.

B. Properties:

1. The geomembrane rolls shall be textured LLDPE and shall meet the specified physical, mechanical, and chemical property requirements listed in attached Table 02372-1. Manufacturing Quality Control testing shall be conducted at the frequencies recommended in GRI GM 17 unless otherwise noted.
2. **Interface Strength Requirements:** In addition to the general material properties requirements, the Manufacturer shall provide geomembrane material meeting the following minimum project-specific interface strength requirements when required:

Interface	Peak Shear Strength <sup>1</sup>	Residual Shear Strength <sup>1</sup>
Geocomposite/Geomembrane	$\delta = 26$ degrees	$\delta = 22.5$ degrees
Geomembrane/Soil <sup>4</sup>	$\delta = 26$ degrees	$\delta = 22.5$ degrees

Notes:

1. Conducted in accordance with ASTM D 5321. Cohesion = 0 conditions.
2. Site-specific soils taken from samples used for borrow source testing in Specification 02315 will be provided to the QCL along with the Manufacturer provided geomembrane material. The interface friction testing between the Textured Geomembrane to Geocomposite Drainage Material and the Textured Geomembrane to Site-specific Soil used at the site shall be performed in accordance with the requirements of this Section. Both interfaces shall demonstrate adequate interface

friction and cohesion to provide an acceptable factor of safety. The interface friction and cohesion values obtained by the Contractor from quality control testing, as described in this Section, shall be evaluated by the Engineer. Any materials that have been placed and do not provide an acceptable factor of safety shall be removed or reworked by the Installer at no additional cost to the Contractor.

3. Site-specific testing shall be conducted at the frequency of 1 test/100,000 square feet per soil material.
4. Soils includes base soil (cushion or subgrade) or cover soil where used. Interface Friction - Textured Geomembrane to Geocomposite and Geomembrane to Site-specific Soil
5. For textured LLDPE; perform test at normal stresses of 1.5, 3, and 4.5 psi with a displacement rate of at least 0.2 in/min, under inundated conditions, report peak and residual values.
6. Site-specific soil material shall be compacted to 90% of density, as a percentage of the maximum dry density as determined by ASTM D 698 with the moisture content of a maximum of 3% wet of optimum.

C. Other Materials:

1. Extrudate welding rods (for fusion welds) shall be compatible and similar to the geomembrane and supplied by the Manufacturer and shall be delivered in the original sealed containers. Each container shall have a label bearing the brand name, Manufacturer's lot number and complete directions as to proper storage.
2. Boots and shrouds for pipe penetration shall fit snugly around the pipe. Prefabricated material shall be designed to fit site specific conditions for the intended slope and size of pipe and be made of compatible and identical materials as the geomembrane.

## 2.02 CONFORMANCE TESTING

A. Tests:

Conformance testing shall be performed by the independent Quality Control Laboratory (QCL) provided and paid for by the Contractor. The Manufacturer shall obtain the samples from the roll, mark the machine direction and identification number and ship the samples to the QCL. The following conformance tests shall be conducted at the laboratory prior to shipment to the site:

1. Thickness
2. Density
3. Tensile properties
4. Tear resistance
5. Puncture resistance
6. Carbon black content
7. Carbon black dispersion
8. Asperity height
9. Interface Strength

B. Frequency:

These conformance tests shall be performed in accordance with Table 02372-1 and paragraph 2.1.B.2 for interface strength, at a frequency of one sample per per 100,000 square feet unless otherwise noted or approved by the Contractor.

- C. Acceptance or Rejection:  
Conformance test results shall be reviewed by the Contractor and accepted or rejected, prior to shipment of the geomembrane. Test results shall meet, or exceed, the property values listed in Table 02372-1. The course of action implemented for retesting failing tests shall be approved by the Contractor. In case of failing test results, the Manufacturer may request that another sample be retested by the independent laboratory with Manufacturer's technical representative present during the testing procedures. This retesting shall be paid for by the Manufacturer. The Manufacturer may also have the sample retested at two different laboratories approved by the Contractor, paid for by the Manufacturer. If both laboratories report passing results, the material shall be accepted. If both laboratories do not report passing results, geomembrane material from the lot or bracketed square footage representing the failing sample will be considered out of specification and rejected.

## PART 3 - EXECUTION

### 3.01 SUBGRADE PREPARATION

- A. Preparation of the subgrade using cushion fill for the cover system geomembrane (40-mil geomembrane) shall be as specified in Section 02315, "Earthwork".
- B. The surface of the subgrade shall be smooth, uniform, relatively free from abrupt changes in grade, rocks and stones greater than 1/2-inch for 40-mil geomembrane, sharp objects, debris and deleterious materials. During actual placing and seaming of the geomembrane, the subgrade surface shall be kept free of standing water. If the subgrade below the geomembrane becomes wet and unstable, it shall be recompacted in accordance with Section 02315, "Earthwork". Before the geomembrane installation begins, the Contractor and Installer shall verify and sign off that the surface area to be lined has been properly prepared.

### 3.02 ANCHOR TRENCH

- A. The anchor trench shall be constructed as shown on the Drawings and/or as specified herein.
- B. The anchor trench shall be adequately drained to prevent water ponding and softening of adjacent soils. The anchor trench shall be backfilled and compacted.
- C. Geosynthetic material in the anchor trench shall be temporarily anchored with sandbags or other suitable materials until final approvals are obtained.
- D. Backfilling of the anchor trench shall be conducted when the geomembrane is in its most contracted (taut) state.
- E. Care shall be taken when backfilling and compacting the trenches to prevent any damage to the lining materials.

### 3.03 GEOMEMBRANE PLACEMENT

- A. Weather Conditions:  
Geomembrane placement shall not proceed at an ambient temperature below 32 degrees F or above 104 degrees F unless otherwise authorized, in writing, by the Contractor. Geomembrane placement shall not be performed during precipitation,

excessive moisture, in an area of ponded water, or excessive winds that adversely affect the geomembrane placement.

B. Method of Placement:

1. Each panel of the geomembrane shall be rolled out and installed in accordance with the approved shop drawings prepared by the Installer. The layout shall be designed to keep field seams of the LLDPE geomembrane liner to a minimum and consistent with proper methods of LLDPE geomembrane installation. Panel layout and deployment shall be such that seams run down slope (i.e., perpendicular to top of slope). End seams across slopes greater than 25 percent shall be avoided. See additional seam requirements in Section 3.04.
2. Geomembrane rolls shall be placed in a manner to prevent the material from being stretched during deployment.
3. The Contractor's field representative shall inspect each panel, after placement and prior to seaming, for damage and/or defects. Also, inspect geomembrane prior to geocomposite drainage layer installation. Defective or damaged panels shall be replaced or repaired, in accordance with Section 3.7.7 of the specifications.
4. The Installer shall avoid dragging the geomembrane sheets on rough soil subgrade.
5. Geomembrane shall be anchored as shown on the Drawings and/or consistent with Manufacturer's recommendations.
6. Personnel working on the geomembrane shall not smoke, wear damaging shoes or involve themselves in any activity that may damage the geomembrane.
7. Edges and large exposed areas of the geomembrane shall be properly weighted to avoid uplift due to wind and to prevent lateral movement of the geomembrane when no anchor trench is to be constructed.
8. Vehicular traffic except for proper installation vehicles (ATVs) across the geomembrane shall not be allowed. Any vehicle used prior to or after liner placement shall be first approved by the Contractor's field representative.
9. Repaired areas and destructive sample locations shall be recorded and indicated on the as-built drawings.
10. When tying into previously installed geomembrane, excavation, if required, adjacent to installed liner shall be performed by hand to prevent damage.
11. The geomembrane shall be kept free of debris, unnecessary tools and materials. In general, the geomembrane area shall remain neat in appearance.
12. Equipment necessary to perform the installation (generators, compressors, etc) at a minimum shall have a scrap geomembrane sheet placed underneath to protect the installed geomembrane from possible damage.
13. No welder or testing equipment shall be allowed to remain on top of the installed geomembrane overnight. Equipment must be removed and stored off the installed geomembrane.
14. No fueling of equipment will be allowed on top of the installed geomembrane. No fuel containers shall be allowed on the geomembrane.

- C. Liner Boots (Penetrations):
1. LLDPE boots or shrouds for liner penetrations shall be furnished and installed where indicated on the Drawings. Prefabricated material shall be designed to fit site specific conditions for the intended slope and size of pipe and be made of compatible and similar materials as the geomembrane.
  2. The geomembrane end of the boots shall terminate in a skirt section suitable for welding to the geomembrane liner. The overlap between the boot and the geomembrane shall be approximately 18-in. The boot shall be welded to the geomembrane as specified herein.
  3. Boots and shrouds shall fit snugly around the pipe, pole, wells or vaults.
  4. A neoprene rubber gasket and/or silicone caulking shall be used between the boot or shroud and the penetration structure and secured with a 1-in wide stainless steel clamp. An LLDPE sacrificial sheet shall be used between the boot or shroud and the clamp for protection.
  5. For pipes, poles, wells, vaults larger than 4-in diameter, a second clamp shall be used. The fastener of the second clamp shall be located on the opposite side from the first clamp, to compensate for uneven pressure and elongation.

### 3.04 FIELD SEAMS

- A. Individual panels of geomembrane shall be laid out and overlapped by a minimum of 4-inches prior to welding. The area to be welded shall be cleaned and prepared in accordance with the quality control welding procedures approved by the Contractor's field representative.
- B. Double track hot wedge fusion welds shall be used for straight long seams to the maximum extent possible.
- C. Extrusion welds shall be used in areas inaccessible for double track hot wedge fusion welding, including patches, repairs and penetration boots.
- D. The welding equipment used shall be capable of continuously monitoring and controlling the temperatures in the zone of contact where the machine is actually fusing the geomembrane material so as to ensure that changes in environmental conditions will not affect the integrity of the weld.
- E. No "fish mouths" or wrinkles will be allowed within the seam area. Where "fish mouths" or wrinkles occur, the material shall be cut, overlapped and an extrusion weld patch shall be applied. Welds upon completion of the work shall be tightly bonded. Any geomembrane area showing injury due to excessive scuffing, puncture, or distress from any cause shall be replaced or repaired with an additional piece of geomembrane. The number of patches per 100-ft length of seam length shall not exceed five. If more than five patches per 100-ft length are necessary, then the entire 100-ft length of seam shall be removed. Further welding will cease at this time and the Contractor's field representative shall be notified.
- F. Seams shall have a seam number that corresponds with the panel layout numbers. The numbering system shall be used in the development of the as-built drawings. Seam numbers shall be derived from the combination of the two panel numbers that are to be welded together. Patches, boots and repairs shall be numbered using a system that includes the panel number where the patch, boot or repair is located.



- G. Fusion welded "T" seams (i.e., the result of the geomembrane panels placed perpendicular to each other) shall be double welded where possible. The extrusion process shall be used for the second weld.
- H. Extrudate shall be free of dirt, dry and protected from damage.
- I. If an extrusion welder is stopped for longer than one minute, it shall be purged to remove heat degraded extrudate. Purged extrudate shall not be placed on the installed geomembrane.
- J. Seams constructed on sloped surfaces shall be perpendicular to the top and toe of the slope (vertical seams).
- K. Panels placed on sloped surfaces (steeper than 25%) shall extend a minimum of 5-ft inward (on the flat) from the top of slope or edge of trench.
- L. End seams shall be staggered a minimum of 5-ft in length between contiguous panels. No end seams are allowed on slopes 25 percent (4 horizontal and 1 vertical) or greater, unless otherwise approved by the Contractor.
- M. To prevent moisture buildup during fusion welding, it may be necessary to place a movable protective layer of plastic (skid sheet) directly below each overlap of geomembrane that is to be seamed.
- N. Seam welds shall extend the full extent into the anchor trench.
- O. Factory seams, field seams and repair welds shall meet seam strength requirements specified in Table 02372-2.
- P. Seams shall be "shingled" or "rain-lapped."

### 3.05 SEAMING WEATHER CONDITIONS

- A. Normal Weather Conditions:
  - 1. The normal required weather conditions for seaming are:
    - a. Ambient temperature higher than 32 degrees F and lower than 104 degrees F.
    - b. No precipitation or other excessive moisture, such as fog or dew.
    - c. No excessive winds.
  - 2. These weather conditions shall be fulfilled during seaming process.
- B. Cold Weather Conditions:
  - 1. If the ambient air temperature is below 32 degrees F, the following procedures shall be implemented:
    - a. Preheating the surface of the geomembrane to achieve normal temperature range.
    - b. Preheating may be waived by the Contractor's field representative if the Installer demonstrates that satisfactory welds of equivalent quality may be obtained without preheating at the expected temperature of installation.
    - c. Preheating devices shall be approved by the Manufacturer.
    - d. Care shall be taken to assure that surface temperatures are not lowered below the minimum required surface temperature for welding due to winds.
    - e. Additional destructive test samples shall be taken at the discretion of the Contractor's field representative.
    - f. Test seams, as described in Paragraph 3.6.1, shall be performed under similar ambient temperature conditions as the actual seams.

- C. Warm Weather Conditions:
1. If the ambient air temperature is above 104 degrees F, no seaming of geomembrane shall be permitted unless the Installer can demonstrate, to the satisfaction of the Contractor's field representative that geomembrane seam quality is not adversely impacted.
  2. Test seams shall be performed under similar ambient air temperature conditions as the actual seams.
  3. Additional destructive tests shall be taken at the discretion of the Contractor's field representative.

### 3.06 FIELD QUALITY CONTROL

- A. Start-up Testing:
1. A test weld 3-ft long from each welding machine shall be run upon the beginning of each shift and every five hours thereafter, under the same conditions as exist for the geomembrane welding. The test weld shall be marked with date, time of day, Seamer's initials, temperature and speed settings (for fusion welds) or temperature and preheat settings (for extrusion welds), and machine number. The Installer shall provide a calibrated tensiometer, on-site before and during geomembrane installation for the purpose of testing samples. Six 1-in wide specimens shall be cut from each test weld and tested on-site in the presence of the Contractor's field representative (three for peel and three for shear strength) in accordance with Table 02372-2. To account for minor variations in conditions, the Seamer may reduce the weld speed by a maximum of 15% without the need to perform additional test welds.
  2. Test seams shall be performed under the same conditions as the actual seams and shall be at least 3-ft long and 1-ft wide after seaming. Material for test seams shall be cut out of the approved geomembrane rolls.
- B. Nondestructive Seam Testing:
1. The Installer shall perform a nondestructive test on field seams over their full length. The purpose of this test is to assure continuity and integrity of the seams. Vacuum and air pressure tests shall be used for nondestructive testing. The vacuum test shall be used for extrusion welds. The air pressure test shall be used for double track fusion welds.
  2. Vacuum Testing:
    - a. Equipment for testing single wedge fusion seams and extrusion seams shall be comprised of the following:
      1. A vacuum box assembly consisting of a rigid housing, a transparent viewing window, a soft rubber gasket attached to the bottom, port hole or valve assembly and a vacuum gauge.
      2. A vacuum tank and pump assembly equipped with a pressure controller and pipe connections.
      3. A rubber pressure/vacuum hose with fittings and connections.
      4. A plastic bucket and wide paint brush or mop.
      5. A soapy solution.

- b. The following procedures shall be followed by the Installer:
    - 1. Excess sheet overlap shall be trimmed away.
    - 2. Clean the window, gasket surfaces and check for leaks.
    - 3. Energize the vacuum pump and reduce the tank pressure to approximately 5 psi.
    - 4. Wet a strip of geomembrane approximately 12-in by 48-in (length of box) with the soapy solution.
    - 5. Place the box over the wetted area and compress.
    - 6. Close the bleed valve and open the vacuum valve.
    - 7. Ensure that a leak-tight seal is created.
    - 8. For a minimum period of 10 seconds, examine the geomembrane through the viewing window for the presence of soap bubbles.
    - 9. If no bubbles appear after 10 seconds, close the vacuum valve and open the bleed valve, move the box over the next adjoining area with a minimum of 3-in overlap and repeat the process.
    - 10. Areas where soap bubbles appear shall be marked and repaired in accordance with Paragraph 3.7.7 and then retested.
  - c. If the seam is not accessible to vacuum box equipment and cannot be tested prior to final installation, the seaming operations shall be observed by the Contractor's field representative for uniformity and completeness.
3. Air Pressure Testing (for double track fusion seams only):
- a. The following procedures are applicable to those processes which produce a double seam with an enclosed space.
  - b. Equipment for testing double fusion seams shall be comprised of the following:
    - 1. An air pump equipped with pressure gauge capable of generating and sustaining a pressure between 25 and 30 psi and mounted on a cushion to protect the geomembrane.
    - 2. A manometer equipped with a sharp hollow needle, or other approved pressure feed device.
  - c. The following procedures shall be followed by the Installer:
    - 1. Seal both ends of the seam to be tested. The length of seam shall not exceed 500-ft without approval by the Contractor's field representative.
    - 2. Insert needle or other approved pressure feed device into the tunnel created by the double wedge fusion weld.
    - 3. Energize the air pump to a pressure between 25 and 30 psi. After allowing two minutes for relaxation, the pressure shall be monitored over a test period not less than five minutes.
    - 4. If the loss of pressure exceeds 4-psi or the pressure does not stabilize, the weld shall be considered faulty (unless the Installer can demonstrate that monitoring for an additional five minutes does not cause an additional loss in pressure in excess of 1 psi, and that the pressure

stabilizes within the second monitoring period). Locate the faulty area, repair in accordance with Paragraph 3.7.7 and retest.

5. If the pressure loss is less than 4 psi after five minutes, cut the air channel on the opposite end the pressure device to confirm there is no blockage and verify the length of the seam tested. Remove needle of other approved pressured feed device and seal both ends with an extrusion weld. Remove needle or other approved pressure feed device and seal.

### 3.07 DESTRUCTIVE SEAM TESTING

#### A. Purpose:

The purpose of the destructive testing is to evaluate seam strength properties. An initial minimum sampling interval of one test per 500-ft of performed seam length shall be used for a minimum start-up batch of 50 samples. With 0 to 1 failures out of 50 samples, the sampling interval may be increased to a maximum of one test per 1000-ft of seam length with the approval of the Contractor's field representative. With more than 4 failures out of 50 samples, the sampling interval may be decreased as determined by the Contractor's field representative. The location of samples shall be determined by the Contractor's field representative. Selection of such locations may be prompted by suspicion of overheating, contamination, or other potential cause that may adversely impact the welds. Location of samples shall not be revealed to Installer in advance. Sampling shall be performed by the Installer. Testing of field samples shall be performed by the Contractor's QCL.

#### B. Sampling Procedures:

1. Samples shall be cut by the Installer at locations chosen by the Contractor's field representative as the seaming progresses.
2. The seams shall not be covered by another material before they have been tested and accepted by Contractor's field representative.
3. Upon obtaining each sample, assign a number to the sample and mark it accordingly.
4. Record sample location on layout drawing.
5. Record purpose of the sample, statistical routine or suspicious weld area.
6. Holes in the geomembrane resulting from destructive seam testing shall be immediately repaired in accordance with Paragraph 3.7.7.

#### C. Size and Disposition of Samples:

1. Two samples, 12-inch wide by 6-inch shall be taken for field testing. Each of these samples shall be cut with a 1-in wide die, with the seam centered parallel to the width. The distance between these two samples shall be 36-in. If all samples pass the field test described in Paragraph 3.7.4, a sample for laboratory testing shall be taken from the 36-inch portion.
2. The laboratory sample shall be cut into three parts and distributed as follows:
  - a. One portion to the Installer for optional laboratory testing, 12-in by 12-in.
  - b. One portion for QCL testing, 12-in by 12-in.
  - c. One portion to the Contractor for archive storage, 12-in by 12-in.

D. Field Testing:

1. The following shall be performed by the Installer in the presence of the Contractor's field representative:
  - a. The Installer shall cut six 1-in wide replicate specimens from the field testing samples to be tested for shear and peel strength, in accordance with the criteria set in Table 02372-2.
  - b. The Installer shall test three specimens for shear seam strength and three for peel strength. Replicate test specimens shall pass for the seam to be acceptable.
  - c. Samples shall be tested with a tensiometer equipped with a drive/pull apparatus adjusted to a pull rate of 20 inches per minute for both peel and sheer testing in accordance with ASTM D 6392. Each sample shall be tested until film tearing bond (FTB) is achieved. At a minimum, the required pass criteria for peel shall be as specified in Appendix A.

(Note: The machine shall be capable of pulling the geomembrane seams at both 2 or 20 inches per minute. At the start of the first production work day. If the results are similar, both numerically and visually, the specified test speed shall be 20 inches per minute for all field and laboratory destructive seam tests. If it appears that the faster speed may be affecting the testing results, then the specified speed shall be 2 inches per minute for all field and laboratory destructive seam testing.)
  - d. Any specimen that fails through the weld or through the fusion at the weld sheet interface is a non-FTB break and shall be considered a failure even if it achieves the acceptable strengths.
  - e. A specimen that does not break at the full extent of the test apparatus will be considered a passing test.
  - f. Alternate testing to evaluate both sides of dual wedge welds.

E. Quality Control Laboratory Testing:

1. The Installer shall package and ship destructive test samples to the Contractor's independent Quality Control Laboratory (QCL) as directed by the Contractor's field representative by overnight delivery service. Shipping costs and destructive tests are to be paid by the Contractor.
2. Laboratory testing shall include shear and peel strength tests performed in accordance with ASTM D 6392. The minimum acceptable values obtained in these tests shall be in accordance with Table 02372-2.
3. At least five specimens shall be tested each for shear and peel strength. A passing test shall meet the minimum required values in the five specimens tested for each method.
4. The QCL shall provide verbal test results to the Contractor's field representative no more than 24 hours after they receive the samples. The Contractor's field representative shall review the laboratory results as soon as they become available.

F. Procedures for Destructive Test Failure:

1. The following procedures shall apply whenever a sample fails a destructive test, whether that test is conducted in the field or by the QCL. The Installer has two options:

- a. The Installer can repair the seam between (1/2 distance or as directed by the Contractor's field representative) any two passing test locations in accordance with Paragraph 3.7.7.
  - b. The Installer can retrace the welding path to an intermediate location a minimum of 10-ft on each side of the failed sample. The sample shall be tested in the field. Subsequent failure of test samples shall cause the testing to move further down the seam until the extent of faulty seam has been determined.
2. Acceptable repaired seams shall be bound by two passing locations on each side of the original sample. In cases where repaired seam exceeds 150-ft, a sample taken from the zone in which the seam has been repaired must pass destructive testing. Repairs shall be made in accordance with Paragraph 3.7.7.
  3. The Contractor's field representative shall document all actions taken in conjunction with destructive test failures.
- G. Repair Procedures:
1. Any portion of the geomembrane exhibiting signs of any kind of defect, or failing a destructive or a nondestructive test, shall be repaired. Several procedures exist for the repair of these areas. The final decision as to the appropriate repair procedure shall be made by the Contractor's field representative.
  2. The repair procedures available include:
    - a. Patching, used to repair large holes, tears, undispersed raw materials and contamination by foreign matter.
    - b. Spot welding or seaming, used to repair small tears, pinholes, or other minor, localized defects.
    - c. Capping, is used to repair large lengths of failed seams.
    - d. Removing bad seam and replacing with a strip of new material welded in place.
  3. For any repair method, the following provisions shall be satisfied:
    - a. Surfaces of the geomembrane which are to be repaired using extrusion methods shall be abraded no more than one hour prior to the repair.
    - b. Surfaces shall be clean and dry at the time of the repair.
    - c. Seaming equipment used in repairing procedures shall be qualified.
    - d. Patches and caps shall extend at least 4-inches beyond the edge of the defect.
    - e. Patches shall have rounded corners.
- H. Repair Verification:
- Each repair shall be numbered and logged by the Installer. Each repair shall be nondestructively tested using the methods described in Paragraph 3.6.2 as appropriate. Repairs which pass the nondestructive test shall be taken as an indication of an adequate repair. Repairs more than 150-ft long may be of sufficient length to require destructive test sampling, at the discretion of the Contractor's field representative. A failed test of the repaired section indicates that the repair shall be redone and retested until passing test results are achieved. The Contractor's field representative shall observe nondestructive testing of repairs. The Installer shall record the number of each repair, date and test outcome.

I. Wrinkles:

Large wrinkles that remain in the sheet as result of temperature expansion or uneven surface preparation may need removal as determined by the Contractor's field representative in consideration of applied loads on the wrinkle. Should the wrinkle need removing, the lower down-slope edge of the wrinkle shall be cut, overlapped and repaired as described in 3.7.6. Both ends of the wrinkle repair shall be patched. Caution must be taken in removing any wrinkles. Wrinkles are needed to allow for future contraction of the geomembrane liner, especially in cold weather.

3.08 DISPOSAL OF WASTE MATERIAL

Upon completion of installation, the Installer shall properly remove and dispose of all trash, waste material, tools, and equipment used in connection with the performed work and shall leave the premises in a neat and acceptable condition.

3.09 AS-BUILT DRAWINGS AND INSTALLATION DOCUMENTATION

The Installer shall prepare and submit to the Contractor an as-built drawing reflecting the actual installation of geomembrane liner, including the location of seams, the location of destructive samples, and the location of repair work. The as-built drawing shall be submitted to the Contractor within seven days of the completion of the geomembrane. In addition, a copy of the complete installation documentation package will accompany the as-built drawing.



TABLE 02372-1  
MATERIAL PROPERTIES  
LINEAR LOW DENSITY POLYETHYLENE (LLDPE) GEOMEMBRANE  
TEXTURED (Both Sides) SHEET

Property	Unit	Test Method	Value
Thickness – specified	Mils	ASTM D 5994	40
Thickness – min average.	Mils	ASTM D 5994	38
• lowest individual for 8 of 10 values	Mils	ASTM D 5994	36
• lowest individual for any 10 values	Mils	ASTM D 5994	34
Asperity height (min. avg.) <sup>(1,2)</sup>	Mils	GRI GM12	10
Tensile Properties (min. avg.) <sup>(3)</sup>		ASTM D 6693 (Type IV)	
1. Break Strength	lb/in		60
2. Break Elongation	%		250
Tear Resistance (min. avg.)	lb	ASTM D 1004	22
Puncture Resistance (min. avg.)	lb	ASTM D 4833	44
Density (max.)	g/cc	ASTM D 1505/D 792	0.939
Carbon Black Content (range)	%	ASTM D 1603 <sup>(4)</sup>	2.0 to 3.0
Carbon Black Dispersion	N/A	ASTM D 5596	Note 5
2% Modulus (max.)	lb/in	ASTM D 5323	2400
Oxidative Induction Time (OIT) (min. avg.) <sup>(6)</sup>			
- Standard OIT		ASTM D 3895	100
or			
- High Pressure OIT		ASTM D 5885	400
Axi-Symmetric Break Resistance Strain (min.)	%	ASTM D 5617	30
Oven Aging at 85° C - retained after 90 days (min. ave.) <sup>(9)</sup>		ASTM D 5721	
- Standard OIT	%	ASTM D 3895	35
- High Pressure OIT	%	ASTM D 5885	60
UV Resistance – High Pressure OIT – retained after 1600 hrs (min. ave.) <sup>(7)(8)</sup>	%	ASTM D 5885	35

Table 02372-1 Notes:

1. Of 10 readings, 8 of 10 must be  $\geq 7$  mils, and the lowest individual reading must be  $\geq 5$  mils.
2. Alternate the measurement side for double sided textured sheet.
3. Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of 5 test specimens each direction. Break elongation is calculated using a gage length of 2.0 inches at 2.0 in./min.
4. Other methods such as ASTM D 4218 (muffle furnace) or microwave methods are acceptable if an appropriate correlation to ASTM D 1603 (tube furnace) can be established.
5. Carbon black dispersion (only near spherical agglomerates) for 10 different views: 9 in Categories 1 or 2 and 1 in Category 3.
6. The manufacturer has the option to select either one of the OIT methods listed to evaluate the antioxidant content in the geomembrane.
7. The condition of the test should be 20 hr. UV cycle at 75° C followed by 4 hr. condensation at 60° C.
8. UV resistance is based on percent retained value regardless of the original HP-OIT value.
9. It is also recommended to evaluate samples at 30 and 60 days to compare with the 90 day response.

The above tests shall be performed by the manufacturer of the LLDPE geomembrane for identification of the manufacturer's product. The above test results shall be submitted to the Contractor for approval of the product. The geomembrane to be supplied for the project shall meet these properties.

TABLE 02372-2

SEAM PROPERTIES  
 LINEAR LOW DENSITY POLYETHYLENE (LLDPE) GEOMEMBRANE  
 TEXTURED (Both Sides) SHEET

Property	Unit	Test Method	40-mil Value
Shear Strength (min. avg.)	lb/in	ASTM 6392	D 53
Peel Strength (min. avg.)	lb/in	ASTM 6392	D 44 & FTB

-- END OF SECTION --

SECTION 02374

GEOCOMPOSITE DRAINAGE LAYER

PART 1 - GENERAL

1.01 DESCRIPTION

Furnish labor, materials, tools and equipment and perform operations necessary to furnish, deploy, and install the geocomposite drainage layer (GDL) in the areas indicated on the contract drawings or as required to construct the multi-layer cap.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 02315: Earthwork  
Section 02372: Cap Geomembrane Liner

1.03 REFERENCES

The publications listed below, latest edition unless otherwise noted, form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 1238	Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer
ASTM D 1505	Standard Test Method for Density of Plastics by the Density-Gradient Technique
ASTM D 1603	Standard Test Method for Carbon Black in Olefin Plastics
ASTM D 4218	Standard Test Method for Determination of Carbon Black Content in Polyethylene Compounds By the Muffle-Furnace Technique
ASTM D 4355	Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus
ASTM D 4491	Standard Test Methods for Water Permeability of Geotextiles by Permittivity
ASTM D 4533	Standard Test Method for Trapezoid Tearing Strength of Geotextiles
ASTM D 4595	Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method

ASTM D 4632	Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
ASTM D 4716	Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head
ASTM D 4751	Standard Test Method for Determining Apparent Opening Size of a Geotextile
ASTM D 4833	Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
ASTM D 5035	Standard Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Method)
ASTM D 5199	Standard Test Method for Measuring Nominal Thickness of Geosynthetics
ASTM D 5261	Standard Test Method for Measuring Mass per Unit Area of Geotextiles
ASTM D 5321	Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method
ASTM F 904	Standard Test Method for Comparison of Bond Strength or Ply Adhesion of Similar laminates Made from Flexible Materials
ASTM G 154	Standard Practice for operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials

#### GEOSYNTHETIC RESEARCH INSTITUTE (GRI)

GRI GC-7	Determination of Adhesion and Bond Strength of Geocomposites
GRI GC-8	Determination of the Allowable Flow Rate of a Drainage Geocomposite

#### ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA/600/R-93/182	Daniel, D.E. and R.M. Koerner, (1993), <i>Technical Guidance Document: Quality Assurance and Quality Control for Waste Containment Facilities</i> ,
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#### 1.04 DEFINITIONS

- A. Engineer: The individual or firm responsible for the design and preparation of the Project's Contract Drawings and Specifications.
- B. Geocomposite Manufacturer (Manufacturer): The Manufacturer is the firm or corporation contracted for production of the GDL material to be used in the project. The Manufacturer shall produce a consistent product meeting the project specifications and shall provide quality control documentation for the product specified herein.
- C. Quality Control Laboratory (QCL): Party independent from the Manufacturer and Installer, hired by the Contractor, responsible for conducting laboratory tests on samples of geosynthetics obtained at the site or during manufacturing. The QCL shall have GRI certification.
- D. Installer: The Installer is the firm or corporation contracted by the Contractor for field handling, transporting, storing and deploying the GDL. The Installer shall be the Manufacturer or an approved Installer trained and certified to install the Manufacturer's product. The Installer shall be responsible for field handling, storing, placing, seaming, sampling, testing and other aspects of the GDL.
- E. Lot: A quantity of resin (usually the capacity of one rail car) used to manufacture polyethylene geocomposite rolls. The finished rolls will be identified by a roll number traceable to the resin lot.

#### 1.05 QUALIFICATIONS

- A. Manufacturer: Manufacturer shall have manufactured a minimum of 10,000,000 square feet of polyethylene geocomposite material during the last year.
- B. Installer:
  - 1. Installation shall be performed by a Manufacturer Approved Dealer/ Installer and/or the Installer shall have installed a minimum of 1,000,000 square feet of geocomposite in the last 3 years.
  - 2. Installer shall have worked in a similar capacity on at least 3 projects similar in complexity to the project described in the contract documents.
  - 3. The Installation Supervisor shall have worked in a similar capacity on projects similar in size and complexity to the project described in the Contract Documents.

#### 1.06 MATERIAL LABELING, DELIVERY, STORAGE AND HANDLING

- A. Labeling: Each roll of geocomposite delivered to the site shall be wrapped and labeled by the Manufacturer. The label will identify:
  - 1. manufacturer's name
  - 2. product identification
  - 3. roll dimensions
  - 4. geotextile type
  - 5. finished product lot
  - 6. roll number

- B. Delivery: Rolls of geocomposite will be prepared to ship by appropriate means to prevent damage to the material and to facilitate off-loading.
- C. Storage and Handling: The Installer shall be responsible for the offloading, handling, storage and care of the GDL material from the time of delivery to the site until final acceptance of the completed work by the Contractor. Material storage and handling practices will meet the manufacturer's recommendations. The Installer shall take any necessary precautions to prevent damage to underlying layers during placement of the geocomposite.

#### 1.07 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures".

- A. Prior to transporting the GDL material to the Site, the Manufacturer shall submit the following information to the Engineer:
  - 1. Mill Certificate – Submit a copy of the mill certificate or affidavit signed by a legally authorized official of the Manufacturer for the GDL attesting that the GDL meets the physical and manufacturing requirements stated in this Specification Section
  - 2. Sample - One 12" x 12" sample of the GDL product.
  - 3. A copy of the Manufacturer's product specification data sheet listing test methods and property values as listed in this Specification Section.
- B. The Installer shall submit to the Engineer the following information for the GDL delivered to the site:
  - 1. Manufacturing quality control certificates for each shift's production, signed by the responsible parties employed by the Manufacturer.
  - 2. The quality control certificate shall include:
    - a. Roll numbers and identification;
    - b. The results of quality control tests, including identification of the test methods, frequency used. As a minimum, the Manufacturing Quality Control test results and frequency of testing shall be as shown in Table 02372-4 in paragraph 2.2.
    - c. Manufacturer's recommendations for shipping, storage and handling.

#### 1.08 WARRANTY

- A. Material: Material shall be warranted, on a pro-rata basis against defects for a period of 1-year from the date of the geocomposite installation.
- B. Installation: Installation shall be warranted against defects in workmanship for a period of 1-year from the date of geocomposite completion.

PART 2 - PRODUCTS

2.01 GEOCOMPOSITE DRAINAGE MATERIAL

A. Bi-Planar Geocomposite

The bi-planar geocomposite shall be manufactured by extruding polyethylene two crossing strands to form a bi-planar drainage net structure with a non-woven geotextile bonded to both sides. The locations where bi-planar geocomposite is to be installed are shown on the Drawings. Provide a material meeting the requirements specified in Table 02374-1.

Table 02374-1

Bi-Planar Drainage Geocomposite		
Property	Test Method	Value <sup>(b)</sup>
<b>Geonet Component<sup>(a)</sup></b>		
Thickness, mil	ASTM D 5199	300 (MAV)
Density, g/cm <sup>3</sup>	ASTM D 1505	0.94 (MAV)
Tensile Strength (MD), lb/in	ASTM D 5035	75 (MAV)
Carbon Black Content, %	ASTM D 1603 or D 4218	2 to 3 (range)
<b>Geotextile Component<sup>(a)</sup></b>		
Mass Per Unit Area, oz/yd <sup>2</sup>	ASTM D 5261	6 (MARV)
AOS, US Sieve (mm)	ASTM D 4751	70 (0.212) (MaxARV)
Permittivity, sec <sup>-1</sup>	ASTM D 4491	1.5 (MARV)
Flow Rate, gpm/ft <sup>2</sup>	ASTM D 4491	110 (MARV)
Grab Tensile, lbs	ASTM D 4632	150 (MARV)
Puncture Strength, lbs	ASTM D 4833	90 (MARV)
UV Resistance, % retained	ASTM D 4355 or G 154 (after 500 hours)	70 (MARV)
<b>Geocomposite</b>		
Ply Adhesion, lb/in (min.)	GRI GC-7 or ASTM F 904 (mod)	0.5 (MAV)
Transmissivity <sup>(c)</sup> , m <sup>2</sup> /sec	ASTM D 4716	(MAV) 1.25x10 <sup>-3</sup> @ gradient 0.20 1.1x10 <sup>-3</sup> @ gradient 0.33

Table 02374-1 Notes:

- (a) Component properties prior to lamination.
- (b) Values: minimum average values (MAV); minimum average roll value (MARV); maximum average roll value (MaxARV).
- (c) The normal compressive load shall be 1000 psf at hydraulic gradients 0.20 and 0.33. Testing boundary conditions shall be steel plate/soil/geocomposite/geomembrane/steel plate with a minimum seating time of 100 hours.

B. Resin

Resin shall be new first quality, compounded polyethylene resin. No post-consumer reclaimed polymer shall be added to the resin during the manufacture of the geonet material. Natural resin



(without carbon black) shall meet the following additional minimum requirements provided in Table 02374-2.

**Table 02374-2**

Property	Test Method	Value
Density (g/cm <sup>3</sup> )	ASTM D 1505	>0.94
Melt Flow Index (g/10 min)	ASTM D 1238	≤1.0

C. Ties

Ties used to secure adjacent sheets of GDL shall be plastic fasteners or polymer braid. Metallic ties will not be allowed. Ties shall be yellow or white to facilitate inspection.

D. Thread

Thread used to seam geotextile portion of GDL material shall be polymeric material with chemical resistance properties equal to or exceeding those of the geotextile. The thread shall be a different color than the geotextile to facilitate inspection.

2.02 MANUFACTURING QUALITY CONTROL

The geocomposite shall be manufactured in accordance with the Manufacturer's Quality Control Plan submitted to and approved by the Engineer. The GDL shall be tested according to the test methods and frequencies listed below:

**Table 02374-3**

GDL Manufacturing Quality Control Test Frequencies			
Characteristics	Test Method	Units	FREQUENCY
<b>Bi-Planar</b>			
<i>Resin</i>			
Polymer Density	ASTM D 1505	g/cm <sup>3</sup>	Once Per Lot
Melt Flow Index	ASTM D 1238	g/10 min	Once Per Lot
<i>Geonet Test</i>			
Thickness	ASTM D 5199	Mil	50,000 ft <sup>2</sup>
Carbon Black	ASTM D 4218 or	%	50,000 ft <sup>2</sup>
Tensile Strength, MD	ASTM D 4595	lbs/ ft	50,000 ft <sup>2</sup>
<i>Geotextile Tests</i>			
Mass per Unit Area	ASTM D 5261	oz/yd <sup>2</sup>	Every 100,000 ft <sup>2</sup>
Grab Tensile	ASTM D 4632	lbs.	Every 100,000 ft <sup>2</sup>
Puncture	ASTM D 4833	lbs.	Every 100,000 ft <sup>2</sup>
AOS, US Sieve	ASTM D 4751	Mm	Every 500,000 ft <sup>2</sup>
Permittivity	ASTM D 4491	sec <sup>-1</sup>	Every 500,000 ft <sup>2</sup>
UV Resistance	ASTM 4355 or G 154 (after 500 hrs)	%	Once per resin formulation
<i>Geocomposite Tests</i>			
Ply Adhesion	GRI GC-7 or ASTM F 904(mod)	lbs/ in.	100,000 ft <sup>2</sup>
Transmissivity	ASTM D 4716	m <sup>2</sup> /sec	200,000 ft <sup>2</sup>

## 2.3 SITE-SPECIFIC REQUIREMENTS

Conduct interface friction testing using site-specific soil and geomembrane materials. The test methods and required results shall be as outlined below

**Table 02374-4**

<b>Drainage Geocomposite Site-Specific Properties<sup>(a)</sup></b>		
<b>Property</b>	<b>Test Method</b>	<b>Minimum Value</b>
Interface – Geocomposite/Geomembrane <sup>(b)(c)</sup>	ASTM D 5321	See Section 02372, “Cap Geomembrane Liner”
Interface – Geocomposite/Protective Cover Soil <sup>(b)(c)</sup>	ASTM D 5321	Peak = 26 degrees Residual = 22.5 degrees
<b>Bi-Planar<sup>(c)(d)(e)</sup></b>		
Transmissivity, m <sup>2</sup> /sec	ASTM D 4716	Table 02374-1

Table 02374-4 notes:

- (a) Site-specific testing shall be conducted at the frequency of 1 test/100,000 square feet unless otherwise noted.
- (b) Perform interface tests at normal stresses of 1.5, 3, and 4.5 psi with a displacement rate of at least 0.2 in/min, under inundated conditions, report peak and residual values.
- (c) Site-specific soils taken from samples used for borrow source testing in Specification 02315 will be provided to the QCL along with the Manufacturer provided geocomposite/geomembrane materials that are proposed to be used at the site. Site-specific soil material shall be compacted to 90% of density, as a percentage of the maximum dry density as determined by ASTM D 698 with the moisture content of a maximum of 3% wet of optimum

## PART 3 - EXECUTION

### 3.01 FAMILIARIZATION

Prior to implementing any of the work in the area to be lined, the Installer shall carefully inspect the installed work of all other areas and verify that work is complete to the point where the installation of the area may properly commence without adverse impact. If the Installer has any concerns regarding the installed work of other areas, he shall notify the Contractor.

### 3.02 PROTECTION

GDL in storage shall not be placed on the ground and shall be covered in such a manner as to keep it dry and out of direct sunlight.

### 3.03 INSTALLATION

- A. General: GDL shall be installed in accordance with manufacturer's recommendations and as shown on the contract drawings and specified herein. Folds or excessive wrinkling of deployed GDL material shall be removed to the extent practicable. Minimize dragging of the GDL over the geomembrane during installation. No equipment shall be operated directly on the GDL surface. Cover soil shall be placed in such a manner as to prevent damaging or unnecessarily stressing the GDL.

B. Handling and Placement:

1. After the geomembrane has been installed, tested, and is approved by the Quality Control field representative, the surface shall be cleaned and free of excess dirt and debris.
2. The Installer shall handle the GDL in such a manner as to ensure it is not damaged. Precautions shall also be taken to prevent damage to underlying layers during the GDL placement.
3. The predominant flow direction of the GDL is in the machine direction (roll direction) and the GDL should be installed in the direction of flow (deploying the GDL directly down the slope) unless an alternative drainage path is approved or specified by the Engineer.
4. If the installation contains long, steep slopes, installation shall be conducted by using full length rolls from the top of the slope to the toe. At anchor trench locations, prevent compaction equipment from coming into direct contact with the GDL during trench backfilling.
5. At obstructions or penetrations (pipes, wells, catch basins), the GDL shall be cut in a manner to fit around the object without a gap. Cut lower geotextile and geonet shall be in close contact with the object. Provide excess upper geotextile material at the penetration to allow the excess material to be tucked back under the GDL to protect the geonet core and prevent soil particles from migrating into the geonet core.

C. Seaming Procedures: In general, no horizontal seams shall be allowed on sideslopes greater than 25 percent thus seams shall be along, not across, the slope, except as part of a patch. If horizontal seams are required, offset adjacent horizontal seams. At a minimum, the following requirements shall be met:

1. Adjacent geocomposite shall be overlapped so that the geonet overlaps by 2 to 3 in. and geotextile overlap by at least 4 in.
2. Tying shall be at a maximum of every 5 feet along the slope, every 6 in. in the anchor trench, and every 12 in. along end-to-end seams.
3. When more than one layer of GDL material is installed, joints shall be staggered.
4. Once geonet is tied, the geotextile of the GDL material shall be seamed on the top geotextile material. Geotextile seams shall be continuously sewn. Thermally bonded seaming may be permitted as approved by the Engineer. Spot sewing or bonding is not allowed. The Installer shall pay particular attention to seams to ensure that no earth cover material could be inadvertently inserted beneath the geotextile if applicable.
5. Any sewing shall be done using polymeric thread with chemical and ultraviolet light resistance properties equal to or exceeding those of the geotextile. Sewing shall be done using sewing machines specifically designed for this purpose as recommended by the GDL manufacturer or as approved in writing by the Engineer.
6. Thermally bonded seams may be bonded using hot plate, hot knife, or ultrasonic devices. Manual or automatic machine driven seaming devices may be used; however, machine driven seaming equipment is preferred. Locations where heat bonding has melted through either geotextile panel shall be repaired. Adjacent geotextile panels shall overlap 6-inches prior to seaming. The geotextile panels shall be completely clean prior to seaming. The geotextile panel edges shall lay flat against each other prior to seaming such that no gaps are formed in the seam. Heat seaming shall not be performed during rain or snow. Ambient temperatures for seaming should be above freezing, i.e. 32°F, unless it can be demonstrated that

satisfactory seams (comparable to seams conducted at higher temperatures without melt through) can be fabricated at lower temperatures. The use of a seaming board or slip sheet is recommended for some seaming operations. A seaming board or slip sheet may be a wood board or piece of geomembrane which is placed below the geotextile panels at the location of seaming. The board or sheet may be pulled with a rope or strap as seaming progresses. The purpose of the seaming board or slip sheet is to provide a firm, clean surface for seaming.

7. No end seams shall be installed in areas with 3H:1V slopes unless approved by the Engineer. Provide run-out of a minimum of 8 feet above 3H:1V slopes. Provide adequate anchorage on run-out prior to placing cover on 3H:1V slopes, to prevent sliding of GDL on the geomembrane liner.
  8. Prior to seaming of the geotextile of the GDL, all ties shall be inspected by the Contractor and the Installer.
- D. Inspection: Prior to covering installed GDL with cover soils, all areas shall be inspected by the Contractor and the Installer. During the inspections, the Installer shall repair defect areas identified to the satisfaction of the Contractor. A surface verification form shall be prepared indicating covering of the GDL can be conducted following a successful inspection.
- E. Repair: Rips, tears, or damaged areas of the GDL shall be removed and patched. The patch for damaged geonet shall be secured to the deployed geonet by tying every 6 inches with plastic fasteners or polymeric braid. The patch shall be extended 12 inches beyond the edges of the damaged area.
- F. Cover Soil Placement:
1. See Section 02315, "Earthwork" for additional requirements.
  2. Placement of the cover soil is recommended to proceed immediately. If cover soil placement can not be conducted immediately, cover the GDL with a temporary cover (black plastic sheeting). The GDL shall not be left exposed to sunlight for more than 2 weeks or as recommended by the GDL manufacturer.

-- END OF SECTION--

**APPENDIX K**

**WORKER TRAINING MANUAL  
(Separate Bound Document)**

**APPENDIX L**

**SHALLOW GROUNDWATER MONITORING  
AND EXTRACTION SYSTEM OPERATION PLAN**

APPENDIX L  
SHALLOW GROUNDWATER  
MONITORING AND EXTRACTION SYSTEM  
OPERATION PLAN

STUDY AREA 5

SITES 090 AND 184  
NEW JERSEY CITY UNIVERSITY WEST CAMPUS  
COMMERCIAL AREA OF CONCERN (AOC)

JERSEY CITY, NEW JERSEY

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**May 2019**

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- Figure 1: Existing Site Features  
Figure 2: Post-Remediation Monitoring Locations and Results  
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### TABLES

- Table 1: Summary of Long Term Groundwater Monitoring Program  
Table 2: Operational Criteria for CGWET System

### ATTACHMENTS

- Attachment A: Reference Documentation



## **1.0 INTRODUCTION**

This document addresses post-remediation groundwater monitoring requirements, and performance requirements and activation criteria, for the contingent groundwater extraction and treatment (CGWET) system installed in the Commercial Area of Concern (AOC) at the New Jersey City University (NJCU) West Campus at Study Area 5 (SA-5) Sites 090/184 (“NJCU Site”). This document incorporates information from post-remediation groundwater monitoring data collected since 2012, and recent data in conjunction with activation of the CGWET system on April 20, 2016. This document supersedes all versions of the Groundwater Trigger Document that was initially developed as part of the 100% Chromium Remedy Design dated June 2010, including Appendix L of the NJDEP approved Remedial Action Report (RAR) dated September 2012, and the revised version submitted to the New Jersey Department of Environmental Protection (NJDEP) on October 16, 2015.

In accordance with Paragraphs 97, 98 and 99 of the Amended Consent Decree Regarding Remediation of the NJCU Redevelopment Area (“Consent Decree”) (ECF No. 1506 in Civ. No. 95-2097), Honeywell has developed a Long Term Monitoring Plan (LTMP) to monitor and maintain the ongoing effectiveness of the Chromium Remedy as defined in the Consent Decree.<sup>1</sup> This Shallow Groundwater Monitoring and Extraction System Operation Plan is incorporated into the LTMP as an attachment.

This document addresses shallow groundwater monitoring as part of the Chromium Remedy as defined in the Consent Decree and the associated remedial action performance monitoring requirements consistent with the NJDEP Groundwater Technical Guidance dated April 3, 2012. The deeper groundwater zones (below the shallow fill and meadow mat) are being addressed as part of the SA-7 regional investigation and remedy. The SA-7 regional groundwater remedy includes monitoring to evaluate and document groundwater conditions within the SA-5/6/7 area and Honeywell’s performance of remedial activities. In addition, regional Classification Exception Areas (CEAs) have been established for chromium-impacted groundwater (shallow zone, deep overburden, bedrock) in the area of SA-5/6/7 which includes the NJCU Commercial AOC.

The groundwater monitoring requirements have been incorporated into a Remedial Action Permit for Groundwater issued by the NJDEP on August 10, 2018. A Remedial Action Soil Permit for the NJCU Commercial AOC was issued by the NJDEP on May 4, 2012; modified January 4, 2019.

## **2.0 REMEDIAL OBJECTIVES AND 100% DESIGN**

Paragraph 86(c) of the Consent Decree approved by the Court on January 21, 2010, specified that the groundwater remedy would include an underground hydraulic barrier wall partially enclosing

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<sup>1</sup> As explained below, the Consent Decree was initially entered by the Court on January 21, 2010 (ECF No. 302 in Civ. No 05-5955) and was amended in 2017 (ECF No. 1506; *see also* Consent Order Regarding Amended NJCU Consent Decree Filed as ECF No. 1506, ECF No. 1551). February 15, 2018). Paragraphs 97, 98 and 99 were not amended in the Amended Consent Decree.

the area of the RCRA-type cap, which was placed above the remaining contaminated soil and groundwater at the NJCU Commercial AOC, and a contingency groundwater extraction system designed to maintain an inward gradient within the Commercial AOC capped area. Among the purposes of this groundwater remedy was to fulfill the remedial action objectives for groundwater specified in the NJCU Remedial Action Work Plan approved by the NJDEP on July 26, 2007, namely, to:

- Mitigate the potential for surface water infiltration and leaching of contaminants of concern (total and hexavalent chromium) from fill soils (vadose zone) to groundwater;
- Mitigate off-site migration of chromium concentrations above the Groundwater Quality Standard (GWQS);
- Reduce chromium concentrations in groundwater; and
- Prevent exposure to groundwater with chromium concentrations above the GWQS.

Initially, the 2010 Consent Decree and the 100% Design did not include a hydraulic barrier wall on eastern side of the capped area. In 2017, upon the agreement of all parties, the NJCU Consent Decree was amended to require the installation of an extension of the hydraulic barrier wall to fully enclose the capped area. ECF No. 1505 in Civil No. 95-2097. In May and June 2017, Honeywell conducted the additional remedial work to install the barrier wall extension as shown in Figure 4. See Section 5.0 for more information regarding the barrier wall extension.

Groundwater beneath the NJCU Site and surrounding area is not used as a source of potable water; the NJCU Site and surrounding area of Jersey City are served by the municipal water supply system (Suez Water Company), which obtains water from sources outside of Hudson County. Potential future receptors may include construction workers, utility workers, or NJCU Site occupants, who may have the potential for contact with contaminated groundwater or soil in the event of disturbance of the capping system during future subsurface work in the Commercial AOC. The risk of exposure to NJCU Site occupants or construction/utility workers will be mitigated by following the procedures of the Worker Training Manual and implementation of a health and safety plan during future construction or remedial activities.

## **2.1 Basis of Original Design – Conceptual Site Model**

Prior to remediation at the NJCU Site, groundwater flow direction and quality were documented in the Final Groundwater Investigation Report (FGIR) [HydroQual, 2007]. Groundwater elevations in the Shallow Zone (Figure 4.2-1 of the FGIR) indicated that regional groundwater flow was generally from east to west with elevations ranging from 11 feet above mean sea level (msl) near West Side Avenue to 4 feet above msl near Route 440. Groundwater flow in the Intermediate Zone below the meadow mat (Figure 4.4-1 of the FGIR) was also from east to west with elevations ranging from 9 to 5 feet above msl. A comparison of these figures indicates a relatively strong downward vertical gradient in the southwest corner of the NJCU Site with a head difference of approximately 2 feet. The above-referenced figures from the FGIR are included in **Attachment A**.

The distribution of hexavalent chromium in the Shallow Zone prior to the NJCU remediation was generally limited to the southwestern corner of the NJCU site as illustrated on Figure 3. The fact

that this shallow plume has not progressed further west or north is consistent with these strong, vertically downward gradients. As indicated in Section 3.1 of the FGIR, the primary source of the chromium plume in this area is from historical discharges of sodium chromate associated with the building F area of the former Mutual Chemical facility located on Site 117.

The NJCU Chromium Remedy includes a capping and hydraulic barrier wall system for the Commercial AOC and a groundwater extraction and treatment component as a contingency measure. The hydraulic barrier wall was installed to facilitate soil excavation, protect remedial areas from re-contamination, and to mitigate offsite migration of contaminated groundwater. The barrier wall also continues to protect the remediated Residential AOC from chromium-impacted groundwater to the south and west. Key NJCU Site features and existing monitoring locations are shown on **Figure 1**.

## **2.2 Contingent Groundwater Extraction and Treatment (CGWET) System**

The originally planned remedial actions were completed during 2010 to 2012 and documented in the RAR dated September 2012. The CGWET system infrastructure (including collection piping, power and control wiring, and monitoring wells) was installed during implementation of the remedy. The system includes two piping trenches and sumps for pumping of groundwater to the existing pre-treatment filter station facility (located on Honeywell-owned land adjacent to the NJCU Site) prior to conveyance to the Passaic Valley Sewerage Commission (PVSC) facility in Newark. A sewer use permit from PVSC for discharge from the filter station to the PVSC Newark facility was obtained on November 1, 2011 (Permit # 31630007).

## **2.3 Repair or Replacement of the Chromium Remedy for Shallow Groundwater**

Pursuant to paragraph 99 of the NJCU Consent Decree and Section 3.0 of the LTMP, if required, the Shallow Groundwater Chromium Remedy shall be repaired or replaced to conform to the Final 100% Chromium Remedy Design as defined in the LTMP.

## **3.0 GROUNDWATER MONITORING RESULTS (2012-2018)**

Post-remediation groundwater monitoring has been performed on a quarterly basis since 2012 and includes water level measurements and water quality monitoring. Groundwater level monitoring initially included three sentinel wells (184-MW-04, -05, -06), two piezometers (090-PZ-05, 090-PZ-06) and two trench drain sumps (A & B) as specified in the 100% Design and RAR. Groundwater quality monitoring initially included quarterly sampling of the three above-referenced sentinel wells for total and hexavalent chromium. Groundwater quality monitoring results (six years of data from March 2012 through December 2018) are shown on **Figure 2**. In June 2016, four new monitoring wells (184-MW-101 through 104) were installed adjacent to the cap area to provide better definition of the water table and hydraulic gradient and an earlier warning of chromium migration in groundwater. In April-May 2017, four additional monitoring wells (184-MW-105 through 108) were installed to provide eight monitoring wells (4 well pairs) along the hydraulic barrier wall extension (completed in June 2017 as discussed in Section 5).

Groundwater elevation contour maps indicate that the general direction of groundwater flow has been relatively consistent throughout the monitoring program. Shallow groundwater flow comes from the east across the NJCU Site and then diverts toward the north as it is forced around the

various barriers that block flow. In the southwest portion of the NJCU Site, groundwater flow is significantly slowed due to the geometry of the barrier walls, the low permeability of the soils, and the elimination of recharge resulting from the overlying low permeability cap constructed using a synthetic liner. Refer to annual Integrated Groundwater Monitoring Reports for groundwater elevation data and contour maps showing Honeywell's interpretation of the data.

Groundwater quality data from the original sentinel wells indicate that hexavalent chromium has not been detected in the nearest well (184-MW-05) nor in the down-gradient well (184-MW-04). Total chromium has been detected in unfiltered samples occasionally above the GWQS of 70 parts per billion (ppb); however, filtered sample results have been non-detect or below 70 ppb, indicating that unfiltered sample results may be influenced by sample turbidity. Hexavalent chromium has been detected above the reporting limit but below 70 ppb in 184-MW-06, located up-gradient of the Commercial AOC.

The recently installed monitoring wells (184-MW-101 through -108) have been sampled quarterly since the time of installation in 2016-2017. Total chromium has been detected occasionally above 70 ppb in unfiltered samples from some wells; however, results for dissolved total chromium and hexavalent chromium were non-detect or below 70 ppb in all monitoring wells. These results indicate that hexavalent chromium-impacted groundwater has not migrated to the cap boundary where monitoring wells 184-MW-101 through -108 are located.

The extent of the historical chromium impacts within the shallow groundwater zone on the NJCU property is shown on **Figure 3**. This figure incorporates pre-remediation data from temporary monitoring wells/piezometers installed during remedial investigation and design investigations. The SA-7 regional groundwater remedy includes monitoring to evaluate and document groundwater conditions within the SA-5/6/7 area and performance of the regional groundwater remedy.

#### **4.0 CGWET SYSTEM ACTIVATION (2016)**

The CGWET system was initially constructed and operationally tested in February of 2012. On April 20, 2016, the system was activated via pumping from Sump B. A summary of results of system operation follows.

The initial pumping rate of Sump B was set at 3 gpm. However, since the maximum yield of the formation along the drain was less than this rate, the pump cycled on and off. Flow data during the first four months of operation indicated that the average yield of the drain was limited by properties of the subsurface formation. It has ranged from approximately 0.3 gpm to 0.5 gpm. The relatively low yield of Sump B suggests that the permeability of the soils along the drain is likely on the low end of the expected range.

Samples from the Sump B discharge water were collected during system testing and startup in April 2016 and approximately monthly through August 2016. At the time of system startup in April 2016, total and hexavalent chromium results were on the order of 4,000 to 6,000 ppb and increased over time at a declining rate. Measurements from later in 2016 are between 8,000 and 9,000 ppb. These data are consistent with pre-remediation groundwater data within the southwest corner of the Commercial AOC and reflect an increase in concentration with time as groundwater from the southwest corner of the Commercial AOC was drawn into the Sump B drain through

pumping. Samples are collected from ports within the filter station vault upstream of the bag filters (the filters are 25 microns in size, larger than the 0.45 micron filters commonly used for groundwater sampling). Samples from Sump A discharge water were collected in May 2016 and indicate hexavalent chromium and total chromium results of 61 ppb and 165 ppb, respectively. The discrepancy between total and hexavalent chromium concentrations may result from measurement error, sample turbidity, or both.

## **5.0 BARRIER WALL EXTENSION**

Honeywell has extended the underground barrier wall on the eastern side of the Commercial AOC cap to create a fully continuous barrier wall around the cap area. The barrier wall extension is an addition to the shallow groundwater remedy approved earlier and will facilitate achieving Consent Decree requirements for maintaining an inward gradient for shallow groundwater in the Commercial AOC cap area.

The barrier wall extension was completed in June 2017 and is shown on **Figure 4**. The wall consists of sheet pile installed just outside the northeastern perimeter of the existing cap to an approximate average depth of 17 feet below current grade, corresponding to the depth of the meadow mat and/or native soils (minimum elevation -1.0 feet msl). The existing geomembrane liner has been extended over the sheet pile and was sealed along the sheet pile alignment with sand/bentonite (consistent with the existing sheet pile along the northern end of the cap next to the proposed Building 6 area). Along the Mallory West corridor, geosynthetic clay liner was combined with bentonite to seal between the liner and sheet pile. A drain pipe conveys water from above the liner to an infiltration trench outboard of the barrier wall extension. In conjunction with the barrier wall extension, the groundwater monitoring program has been modified to include well pairs inside and outside of the wall to monitor head differences across the barrier wall.

## **6.0 FUTURE GROUNDWATER MONITORING**

### **6.1 CGWET System Performance Objectives**

As discussed in Section 4, the CGWET system was activated during April 2016 by pumping from Sump B and monitoring of system performance is ongoing. Hydraulic (water level) monitoring locations for system performance monitoring are shown on **Figure 5**. The CGWET system performance objectives are as follows:

- Maintain inward gradient for shallow groundwater in the Commercial AOC cap area based on groundwater elevation data from well pairs. Refer to Section 7 for performance criteria.
- Prevent migration of hexavalent chromium in groundwater above the GWQS beyond the limits of the Commercial AOC cap and avoid expansion of the area of groundwater contamination within the capped area.

An additional engineering design consideration, not part of the Chromium Remedy, concerns groundwater impacted with TCE located northeast of the NJCU Commercial AOC. The operation of the CGWET system should avoid causing this water to migrate toward the southwest.

## 6.2 CGWET System Operation

The CGWET was designed for potential operation in two modes: pumping from both Sumps A and B together or from Sump B alone. Pumping from Sump A alone risks drawing highly contaminated groundwater from the southwest corner of the NJCU property northward into areas of lesser or no groundwater contamination.

In the area of Sump B, the Meadow Mat is shallower and the soils less permeable than were expected. As a result, the elevation of the Sump B drain is 4.7 feet and its average yield is on the order of 0.3 to 0.5 gpm. The elevation of the Sump A drain is 2.7 feet; its sustainable yield was estimated prior to construction as 1.5 to 2.5 gpm and will be confirmed in the field in the event of future activation.

To date, the contingent pumping system has been operated using Sump B only. This will continue unless groundwater quality data indicate that the plume has moved beyond the limits of the cap area based on results from the sentinel wells or if an inward gradient within the Commercial AOC cannot be maintained by pumping Sump B only. Criteria for activation of Sump A are discussed in Section 7.

The Sump B pump will operate at a maximum of 5 gpm and be allowed to cycle on and off such that the average head in the sump is at or close to the drain invert of 4.7 feet above msl.

## 6.3 Long Term Groundwater Monitoring Program

**Water Level Monitoring.** The groundwater monitoring program as of 2017 consisted of measurements of water levels from three original sentinel wells (184-MW-04, -05, -06), eight new sentinel wells (184-MW-101 through -108) along the barrier wall extension, two piezometers (PZ-05, PZ-06) and two trench drain sumps (A & B), and water quality sampling of the eleven sentinel wells<sup>2</sup>. Water quality sampling in the three original sentinel wells was discontinued at the end of 2018, and water level measurements in 184-MW-05 will be discontinued if and when the well is abandoned as anticipated for site development. Monitoring locations are shown on **Figure 4**. The eight new sentinel wells are arranged as four well pairs along the barrier wall extension, to facilitate the determination of head gradients across the wall. The long term monitoring program is summarized on **Table 1**. Failure to include an activity on Table 1 that is otherwise required by this document, does not excuse a failure to conduct the activity.

Water levels will be measured quarterly in the monitoring wells, piezometers and sumps, and more frequently in the following circumstances:

- Water levels will be monitored using automatic data loggers for one year beginning in July 2017 at each inboard well along the barrier wall extension.

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<sup>2</sup> The NJDEP Remedial Action Groundwater Permit issued August 10, 2018 specifies water level monitoring from the eight sentinel wells along the hydraulic barrier wall (184-MW-101 through 108) and two piezometers (PZ-05, PZ-06), and water quality monitoring from the eight sentinel wells (184-MW-101 through 108).

- Water levels will be measured monthly for one year (1) beginning in July 2017 after installation of the barrier wall extension, and (2) after any future changes in the hydraulic control system, such as initiation of pumping from Sump A.
- In the event of construction above or near the NJCU Commercial AOC cap, such as for Building 6 or 7, the parties will consult and reach agreement as to whether additional water level measurements are needed during the construction activities. In the absence of an agreement, each party retains its rights to seek appropriate relief under the terms of the Consent Decree.

***Water Quality Monitoring.*** Groundwater quality sampling from the four well pairs along the barrier wall extension (184 MW-101 through 108 as shown on Figure 4) will be conducted in accordance with NJDEP low-flow sampling methodology and submitted for laboratory analysis of total and hexavalent chromium (unfiltered and filtered samples).

Groundwater quality will be monitored quarterly beginning in September 2017 in the eight wells located at the barrier wall extension (184-MW-101 to 184-MW-108). If dissolved total chromium has not been detected at concentrations above 70 µg/L in the four inboard wells (184-MW-105, 184-MW-102, 184-MW-107, and 184-MW-108) for the one year period following the installation of the barrier wall extension, Honeywell may propose to reduce the frequency of groundwater quality sampling to semi-annual or annual. If dissolved total chromium has not been detected at concentrations above 70 µg/L in the four outboard wells (184-MW-101, 184-MW-106, 184-MW-103, and 184-MW-104) for the one year period following the installation of the barrier wall extension, Honeywell may discontinue water quality sampling at the four outboard wells. If the CGWET system does not maintain an inward gradient, groundwater quality sampling frequency will return to quarterly at the four inboard monitoring wells as discussed below in Section 7.0.

Groundwater quality sampling of monitoring wells located on the inside of the barrier wall, other than the four wells along the inboard side of the barrier wall extension (184-MW-105, 184-MW-102, 184-MW-107, and 184-MW-108), will be optional, if needed for evaluation of water quality within the capped area, to be determined based on groundwater level and groundwater quality data from other wells. Groundwater quality monitoring at sentinel wells 184-MW-04 and -184-MW-06 will continue for one year following completion of the barrier wall extension and then Honeywell may propose to reduce or discontinue the monitoring based on the evaluation of water quality results in the new wells. Existing sentinel well 184-MW-05 is located beneath the proposed Building 6 footprint and thus is expected to be sealed and abandoned by a NJ licensed driller when Building 6 is constructed.

***Periodic Re-Evaluation of the Water Level and Water Quality Monitoring Programs.*** The groundwater sampling frequency and analytical program will be re-evaluated 1) after the first year of monitoring at the new wells (following installation of the barrier wall extension), 2) if there is construction on or near the Commercial AOC, or 3) in the event of future detection of dissolved total chromium at concentrations above 70 µg/L at the barrier wall extension. The shallow groundwater monitoring program may be modified as part of the LTMP annual review and update process.

In addition to the more immediate information on gradients from water level measurements, data from the sentinel monitoring wells will allow sufficient time for remedial response to prevent potential migration of contamination outside of the Commercial Area. The groundwater seepage

velocity in the Shallow Zone is estimated to be on the order of 0.18 feet per day, corresponding to approximately 65 feet per year. Based on this rate, and assuming no retardation or chemical reactions (i.e., reduction to trivalent chromium), it would take approximately 1 to 2 years for the plume to travel from the sentinel wells adjoining the extended hydraulic barrier wall that was installed in June 2017 to the Residential Area north of the cap area. The groundwater monitoring program and criteria for CGWET system operations meet the requirements of the NJDEP technical guidance for post-remediation performance monitoring. Although the GWQS is based on total chromium in unfiltered samples, the use of total chromium filtered (dissolved) sample results is appropriate for decision-making regarding monitoring frequency and CGWET system operation when results from filtered analysis and hexavalent chromium analysis demonstrate that the detected total chromium in the unfiltered sample is background levels of trivalent chromium contained in suspended particulates. The criteria for CGWET system operations are addressed in the following section.

## 7.0 PERFORMANCE CRITERIA FOR CGWET OPERATIONS

As previously stated, Sump B of the CGWET system was activated in April 2016. The performance criterion for the remedy will be to maintain an inward gradient of 0.1 foot or greater across the barrier wall. The CGWET system will be activated when heads outside of the wall are less than 0.1 foot higher than those inside of the wall at any of the four monitoring well pairs along the barrier wall extension. Criteria for CGWET system operations and activation/deactivation are provided in **Table 2**. Failure to include an activity in Table 2 that is otherwise required by this document does not excuse a failure to conduct the activity.

The CGWET system will be operated as necessary to maintain the head difference performance criterion for an inward gradient and to minimize causing contaminated groundwater to move from the southern portion of the capped area to the north. Operational modes may include no pumping, pumping Sump B alone, pumping from Sumps A and B at equal rates, or some combination of these modes to maintain inward gradients. However, Sump A will not be pumped at a rate greater than pumping from Sump B to minimize the risk of drawing contaminated groundwater from the southern portion of the capped area to the north.

In the event that Sump B is activated and the head difference between well pairs does not meet the above criterion for inward gradient, Honeywell will evaluate whether or not the performance criterion can be met by pumping from Sump A in conjunction with Sump B at a rate no greater than the pumping rate from Sump B. This evaluation will include review of water quality data. If water quality data from inboard wells along the barrier wall extension indicate that dissolved total chromium is less than 70 µg/L, then pumping from Sump A is not necessary. Honeywell will make a recommendation to Plaintiffs and NJCU regarding proposed next steps to achieve an inward gradient while minimizing the risk of expanding the area of groundwater contamination. In the absence of an agreement regarding Honeywell's recommendation as to proposed next steps to achieve an inward gradient, each party retains its rights to seek appropriate relief under the terms of the Consent Decree.

Once the CGWET system has been activated by pumping either Sump B alone or Sumps A and B in conjunction, the system may not be deactivated until there have been six consecutive months (or two consecutive quarters) of an inward gradient across the barrier wall extension as provided in **Table 2**.



Head monitoring at the four monitoring wells pairs along the barrier wall extension will consist of manual water level readings at the frequencies shown on **Table 1**. In the event that water level data is generated by automatic data loggers in well pairs, the head difference determination will be calculated using arithmetic mean values over the monitoring period or one month, whichever is shorter.

If the performance criterion cannot be met by pumping from the existing CGWET system, water quality sampling at the four inboard monitoring wells will resume a quarterly schedule. If dissolved total chromium is detected at concentrations exceeding 70 µg/L in two consecutive sampling events at any well that is not able to maintain an inward gradient of 0.1 foot or greater, Honeywell will meet the performance criterion by pumping from the CGWET system (Sump B or Sump A in conjunction with Sump B) and/or by constructing and operating additional hydraulic controls. This may require extraction trenches beneath the cap on the inboard side of the wall, or pumping of Sump A at a greater rate than Sump B.

The inclusion of artificial recharge into the existing infiltration trench outboard of the barrier wall extension will be further evaluated as an option to achieve an inward gradient across the wall following completion of various upcoming construction activities by NJCU. These activities include storm drainage improvements and paving associated with NJCU's Phase 2 infrastructure and roadway work in the area of the Commercial AOC, relocation of outboard well 184-MW-106 with screen interval at similar depth as 184-MW-102, and a review of design plans for Building 6. It is expected that most of these construction activities are estimated to be substantially complete by the end of 2019, with paving work estimated to be completed by approximately mid-2020. After the completion of the construction activities, some additional months must pass before shallow groundwater levels adjust to reflect the long-term effect of these changes. The need for inclusion of the artificial recharge option will be evaluated as part of the next annual review/update of the LTMP.

The additional hydraulic controls, including any increased pumping of Sump A, will be designed and operated to minimize spreading of contamination within the capped area. In particular, groundwater extraction inboard of the wall will be limited to the portion of the wall where elevated dissolved total chromium has been detected.

## **8.0 REPORTING**

Pursuant to the NJCU Consent Decree, groundwater monitoring results are provided by Honeywell to the Parties of the Consent Decree (Plaintiffs, NJCU, BMUA) on a quarterly basis, within 30 days of the conclusion of each calendar quarter. All groundwater monitoring results will also be reported annually by Honeywell as part of the Integrated Annual Groundwater Performance Reports for Study Areas 5, 6 and 7 (currently prepared by Honeywell's contractor Cornerstone). Voluminous data such as continuous water level monitoring and pumping records may be summarized in the annual report. Reporting requirements also include Remedial Action Protectiveness Biennial Certification Reports for Groundwater to be submitted by Honeywell to NJDEP pursuant to the Remedial Action Groundwater Permit issued by NJDEP on August 10, 2018. The first biennial report is due August 17, 2020 and every 2 years thereafter. Refer to Section 4.1 of the LTMP for details regarding reporting requirements for monitoring results.

In the event of changes in the functioning and/or operation of the hydraulic controls or the CGWET system, or construction requiring additional monitoring pursuant to Section 6.3, Honeywell will provide monthly reports until resumption of normal system operation has been verified or construction activities and additional monitoring are complete. These reports will include all data collected and an evaluation of the engineering performance and effectiveness of the Chromium Remedy and the CGWET system in maintaining hydraulic control.

## 9.0 REFERENCES

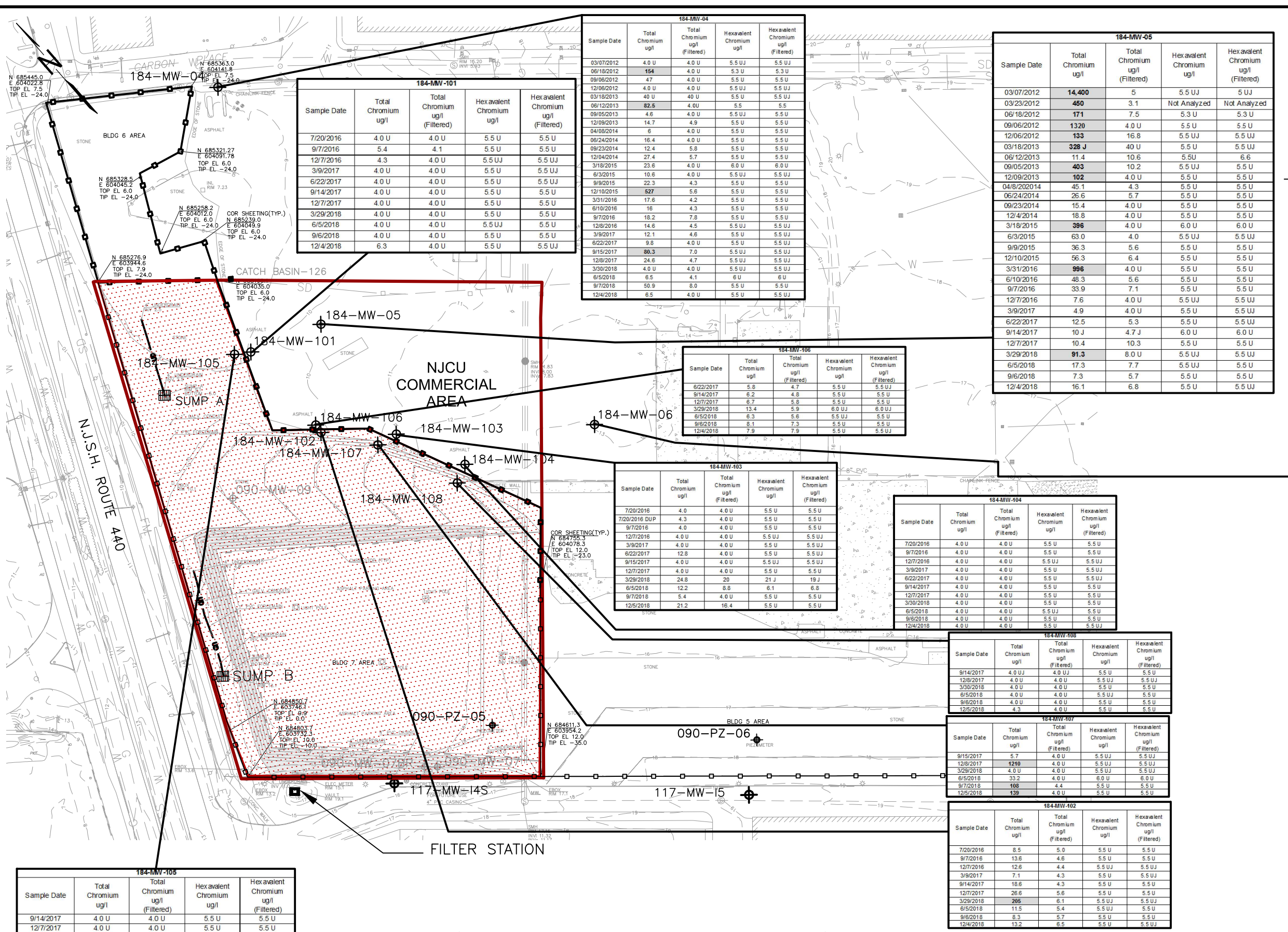
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## **FIGURES**





UNLESS OTHERWISE SPECIFIED, ALL MONITORING DATA REPORTED HEREIN IS THE PROPERTY OF WOOD GROUP, INC. AND IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF WOOD GROUP, INC. THE USER OF THIS DOCUMENT SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE APPROPRIATE AGENCIES. THE USER SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE APPROPRIATE AGENCIES. THE USER SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE APPROPRIATE AGENCIES.



**LEGEND**

- EXISTING MONITORING WELL
- PIEZOMETER
- SUMP
- COMMERCIAL AREA BOUNDARY
- CAP AREA
- SHEET PILE WALL

U - COMPOUND NOT DETECTED AT THE REPORTING LIMIT  
 J - VALIDATION QUALIFIER INDICATING ESTIMATED CONCENTRATION  
 ug/L - MICROGRAMS PER LITER

SHADED RESULTS INDICATE AN EXCEEDANCES OF THE GROUNDWATER QUALITY STANDARD OF 70 UG/L

**NOTE:**

1. POST-REMEDIATION DATA FROM CURRENT EXISTING MONITORING WELLS (COLLECTED FROM 2012-PRESENT) IS PROVIDED WITH POST-REMEDIATION MONITORING REPORTS PREPARED PER THE LONG TERM MONITORING PLAN. DUPLICATE SAMPLE RESULTS FOR 184-MW-05 ARE NOT SHOWN.

**184-MW-101**

Sample Date	Total Chromium ug/l	Total Chromium ug/l (Filtered)	Hexavalent Chromium ug/l	Hexavalent Chromium ug/l (Filtered)
7/20/2016	4.0 U	4.0 U	5.5 U	5.5 U
9/7/2016	5.4	4.1	5.5 U	5.5 U
12/7/2016	4.3	4.0 U	5.5 UJ	5.5 UJ
3/9/2017	4.0 U	4.0 U	5.5 U	5.5 UJ
6/22/2017	4.0 U	4.0 U	5.5 U	5.5 UJ
9/14/2017	4.0 U	4.0 U	5.5 U	5.5 U
12/7/2017	4.0 U	4.0 U	5.5 U	5.5 U
3/29/2018	4.0 U	4.0 U	5.5 U	5.5 U
6/5/2018	4.0 U	4.0 U	5.5 UJ	5.5 U
9/6/2018	4.0 U	4.0 U	5.5 U	5.5 U
12/4/2018	6.3	4.0 U	5.5 U	5.5 UJ

**184-MW-04**

Sample Date	Total Chromium ug/l	Total Chromium ug/l (Filtered)	Hexavalent Chromium ug/l	Hexavalent Chromium ug/l (Filtered)
03/07/2012	4.0 U	4.0 U	5.5 UJ	5.5 UJ
06/18/2012	154	4.0 U	5.3 U	5.3 U
09/06/2012	47	4.0 U	5.5 U	5.5 U
12/06/2012	4.0 U	4.0 U	5.5 UJ	5.5 UJ
03/18/2013	40 U	40 U	5.5 U	5.5 UJ
06/12/2013	82.5	4.0U	5.5	5.5
09/05/2013	4.6	4.0 U	5.5 UJ	5.5 U
12/09/2013	14.7	4.9	5.5 U	5.5 U
04/08/2014	6	4.0 U	5.5 U	5.5 U
06/24/2014	16.4	4.0 U	5.5 U	5.5 U
09/23/2014	12.4	5.8	5.5 U	5.5 U
12/04/2014	27.4	5.7	5.5 U	5.5 U
3/18/2015	23.6	4.0 U	6.0 U	6.0 U
6/3/2015	10.6	4.0 U	5.5 UJ	5.5 UJ
9/9/2015	22.3	4.3	5.5 U	5.5 U
12/10/2015	527	5.8	5.5 U	5.5 U
3/3/2016	17.6	4.2	5.5 U	5.5 U
6/10/2016	18	4.3	5.5 U	5.5 U
9/7/2016	18.2	7.8	5.5 U	5.5 U
12/8/2016	14.6	4.5	5.5 UJ	5.5 UJ
3/9/2017	12.1	4.8	5.5 U	5.5 UJ
6/22/2017	9.3	4.0 U	5.5 U	5.5 UJ
9/15/2017	80.3	7.0	5.5 UJ	5.5 UJ
12/8/2017	24.6	4.7	5.5 UJ	5.5 UJ
3/29/2018	4.0 U	4.0 U	5.5 UJ	5.5 UJ
6/5/2018	6.5	4.1	6 U	6 U
9/7/2018	59.9	8.0	5.5 U	5.5 U
12/4/2018	6.5	4.0 U	5.5 U	5.5 UJ

**184-MW-05**

Sample Date	Total Chromium ug/l	Total Chromium ug/l (Filtered)	Hexavalent Chromium ug/l	Hexavalent Chromium ug/l (Filtered)
03/07/2012	14,400	5	5.5 UJ	5 UJ
03/23/2012	450	3.1	Not Analyzed	Not Analyzed
06/18/2012	171	7.5	5.3 U	5.3 U
09/06/2012	1320	4.0 U	5.5 U	5.5 U
12/06/2012	133	16.8	5.5 UJ	5.5 UJ
03/18/2013	328 J	40 U	5.5 U	5.5 UJ
06/12/2013	11.4	10.6	5.5U	6.6
09/05/2013	403	10.2	5.5 UJ	5.5 U
12/09/2013	102	4.0 U	5.5 U	5.5 U
04/8/2014	45.1	4.3	5.5 U	5.5 U
06/24/2014	26.6	5.7	5.5 U	5.5 U
09/23/2014	15.4	4.0 U	5.5 U	5.5 U
12/4/2014	18.8	4.0 U	5.5 U	5.5 U
3/18/2015	396	4.0 U	6.0 U	6.0 U
6/3/2015	63.0	4.0	5.5 UJ	5.5 UJ
9/9/2015	36.3	5.6	5.5 U	5.5 U
12/10/2015	56.3	6.4	5.5 U	5.5 U
3/3/2016	996	4.0 U	5.5 U	5.5 U
6/10/2016	48.3	5.6	5.5 U	5.5 U
9/7/2016	33.9	7.1	5.5 U	5.5 U
12/7/2016	7.6	4.0 U	5.5 UJ	5.5 UJ
3/9/2017	4.9	4.0 U	5.5 U	5.5 UJ
6/22/2017	12.5	5.3	5.5 U	5.5 UJ
9/14/2017	10 J	4.7 J	6.0 U	6.0 U
12/7/2017	10.4	10.3	5.5 U	5.5 U
3/29/2018	91.3	8.0 U	5.5 UJ	5.5 UJ
6/5/2018	17.3	7.7	5.5 UJ	5.5 U
9/6/2018	7.3	5.7	5.5 U	5.5 U
12/4/2018	16.1	6.8	5.5 U	5.5 UJ

**184-MW-106**

Sample Date	Total Chromium ug/l	Total Chromium ug/l (Filtered)	Hexavalent Chromium ug/l	Hexavalent Chromium ug/l (Filtered)
6/22/2017	5.8	4.7	5.5 U	5.5 UJ
9/14/2017	6.2	4.8	5.5 U	5.5 U
12/7/2017	6.7	5.8	5.5 U	5.5 U
3/29/2018	15.4	5.9	6.0 UJ	6.0 UJ
6/5/2018	8.3	5.6	5.5 UJ	5.5 U
9/6/2018	8.1	7.3	5.5 U	5.5 U
12/4/2018	7.9	7.9	5.5 U	5.5 UJ

**184-MW-103**

Sample Date	Total Chromium ug/l	Total Chromium ug/l (Filtered)	Hexavalent Chromium ug/l	Hexavalent Chromium ug/l (Filtered)
7/20/2016	4.0	4.0 U	5.5 U	5.5 U
7/20/2016 DUP	4.3	4.0 U	5.5 U	5.5 U
9/7/2016	4.0	4.0 U	5.5 U	5.5 U
12/7/2016	4.0 U	4.0 U	5.5 UJ	5.5 UJ
3/9/2017	4.0 U	4.0 U	5.5 U	5.5 UJ
6/22/2017	12.8	4.0 U	5.5 U	5.5 UJ
9/15/2017	4.0 U	4.0 U	5.5 UJ	5.5 UJ
12/7/2017	4.0 U	4.0 U	5.5 U	5.5 U
3/29/2018	24.8	20	21 J	19 J
6/5/2018	12.2	8.8	8.1	8.8
9/7/2018	5.4	4.0 U	5.5 U	5.5 U
12/5/2018	21.2	16.4	5.5 U	5.5 U

**184-MW-104**

Sample Date	Total Chromium ug/l	Total Chromium ug/l (Filtered)	Hexavalent Chromium ug/l	Hexavalent Chromium ug/l (Filtered)
7/20/2016	4.0 U	4.0 U	5.5 U	5.5 U
9/7/2016	4.0 U	4.0 U	5.5 U	5.5 U
12/7/2016	4.0 U	4.0 U	5.5 UJ	5.5 UJ
3/9/2017	4.0 U	4.0 U	5.5 U	5.5 UJ
6/22/2017	4.0 U	4.0 U	5.5 U	5.5 UJ
9/14/2017	4.0 U	4.0 U	5.5 U	5.5 U
12/7/2017	4.0 U	4.0 U	5.5 U	5.5 U
3/30/2018	4.0 U	4.0 U	5.5 U	5.5 U
6/5/2018	4.0 U	4.0 U	5.5 UJ	5.5 U
9/6/2018	4.0 U	4.0 U	5.5 U	5.5 U
12/4/2018	4.0 U	4.0 U	5.5 U	5.5 UJ

**184-MW-108**

Sample Date	Total Chromium ug/l	Total Chromium ug/l (Filtered)	Hexavalent Chromium ug/l	Hexavalent Chromium ug/l (Filtered)
9/14/2017	4.0 UJ	4.0 UJ	5.5 U	5.5 U
12/8/2017	4.0 U	4.0 U	5.5 UJ	5.5 UJ
3/30/2018	4.0 U	4.0 U	5.5 U	5.5 U
6/5/2018	4.0 U	4.0 U	5.5 UJ	5.5 U
9/6/2018	4.0 U	4.0 U	5.5 U	5.5 U
12/5/2018	4.3	4.0 U	5.5 U	5.5 U

**184-MW-107**

Sample Date	Total Chromium ug/l	Total Chromium ug/l (Filtered)	Hexavalent Chromium ug/l	Hexavalent Chromium ug/l (Filtered)
9/15/2017	5.7	4.0 U	5.5 UJ	5.5 UJ
12/8/2017	1210	4.0 U	5.5 UJ	5.5 UJ
3/29/2018	4.0 U	4.0 U	5.5 UJ	5.5 UJ
6/5/2018	33.2	4.0 U	6.0 U	6.0 U
9/7/2018	108	4.4	5.5 U	5.5 U
12/5/2018	139	4.0 U	5.5 U	5.5 U

**184-MW-102**

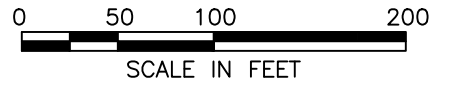
Sample Date	Total Chromium ug/l	Total Chromium ug/l (Filtered)	Hexavalent Chromium ug/l	Hexavalent Chromium ug/l (Filtered)
7/20/2016	8.5	5.0	5.5 U	5.5 U
9/7/2016	13.6	4.6	5.5 U	5.5 U
12/7/2016	12.6	4.4	5.5 UJ	5.5 UJ
3/9/2017	7.1	4.3	5.5 U	5.5 UJ
9/14/2017	18.6	4.3	5.5 U	5.5 U
12/7/2017	26.6	5.6	5.5 U	5.5 U
3/29/2018	205	6.1	5.5 UJ	5.5 UJ
6/5/2018	11.5	5.4	5.5 UJ	5.5 U
9/6/2018	8.3	5.7	5.5 U	5.5 U
12/4/2018	13.2	6.5	5.5 U	5.5 UJ

**184-MW-06**

Sample Date	Total Chromium ug/l	Total Chromium ug/l (Filtered)	Hexavalent Chromium ug/l	Hexavalent Chromium ug/l (Filtered)
03/07/2012	17.7	14.6	8J	9.7J
06/18/2012	38.3	32.4	13	6.2
09/06/2012	24.3	10.6	5.5 U	5.5 U
12/06/2012	17.6	7.9	5.5 UJ	5.5 UJ
03/18/2013	70.1 J	40 U	17	14 J
06/12/2013	Not Analyzed (1)	Not Analyzed (1)	Not Analyzed (1)	Not Analyzed (1)
09/05/2013	15.6	13.1	11J	11
12/09/2013	37.3	15.3	12	15
04/8/2014	30.9	28.8	25	28
06/24/2014	81.4	5.1	15	15
09/23/2014	12.9	11.8	7.7	9.9
12/04/2014	9.9	9.8	8.8	8.8
3/18/2015	10.9	8	9.1	9.2
6/3/2015	21.6	20.3	23 J	21 J
9/9/2015	36.2	30.7	37	31
12/10/2015	10.3	8.9	9.8	9.6
3/3/2016	15.6	13.1	17	15
6/10/2016	28.6	26.3	28	27
9/7/2016	28	8	8.8	8.8
12/7/2016	9.4	9.1	9 J	8.6 J
3/9/2017	20.8	19.8	20	23 J
6/22/2017	17.2	12.1	16	15 J
9/14/2017	14.4 J	12.1 J	13	13
12/7/2017	6.2	5.3	7.3	8.3
3/30/2018	8.1	7.6	7.6	6.4
6/5/2018	9.2	7.8	6.0	6.3
9/7/2018	5.6	4.9	5.5 U	5.5 U
12/5/2018	6.9	5.2	5.5 U	5.5 U

**NOTES:**

1. 184-MW-06 WAS DAMAGED AND WAS UNABLE TO BE SAMPLED FOR SECOND QUARTER 2013.



**184-MW-105**

Sample Date	Total Chromium ug/l	Total Chromium ug/l (Filtered)	Hexavalent Chromium ug/l	Hexavalent Chromium ug/l (Filtered)
9/14/2017	4.0 U	4.0 U	5.5 U	5.5 U
12/7/2017	4.0 U	4.0 U	5.5 U	5.5 U
3/29/2018	4.0 U	4.0 U	5.5 UJ	5.5 UJ
6/5/2018	4.0 U	4.0 U	5.5 UJ	5.5 U
9/6/2018	4.0 U	4.0 U	5.5 U	5.5 U
12/4/2018	4.0 U	4.0 U	5.5 U	5.5 UJ

REV.	DATE	STATUS	DRFT BY	CHKD BY
4	04/16/18	UPDATED CHEMBOXES	CW	JH
3	08/24/17	UPDATED CHEMBOXES	CW	JH
2	06/29/17	UPDATED SHEET PILE WALL & ADDED NEW WELL LOCATIONS	CW	JH
1	11/17/16	ADD UPDATED DAT BOXES	STR	JH

WOOD PROJECT No. 7772180033  
 DRAWING: 7772180033-6100-MWCB-100RBB2

PREPARED/DATE: STR 09/14/16  
 CHECKED/DATE: JH 09/16/16



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 200 AMERICAN METRO BLVD, SUITE 113  
 HAMILTON, NEW JERSEY 08619






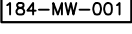


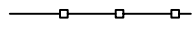
**FIGURE 2**  
 POST-REMEDIATION GROUNDWATER MONITORING LOCATIONS AND RESULTS  
 STUDY AREA 5 NEW JERSEY CITY UNIVERSITY  
 JERSEY CITY, NEW JERSEY

**SOURCE MAP REFERENCE:**  
 "AS-BUILT SURVEY FINAL EXISTING CONDITIONS" BLOCK 1286.5, LOT 1 & BLOCK 1286, LOT 5 JERSEY CITY, NEW JERSEY HONEYWELL SITE ID 37288, 37811 & 37460 KENNON SURVEYING SERVICES INC. WARREN, NEW JERSEY SHEET 1 OF 2, PROJECT NUMBER 2201, DATED 01-13-12



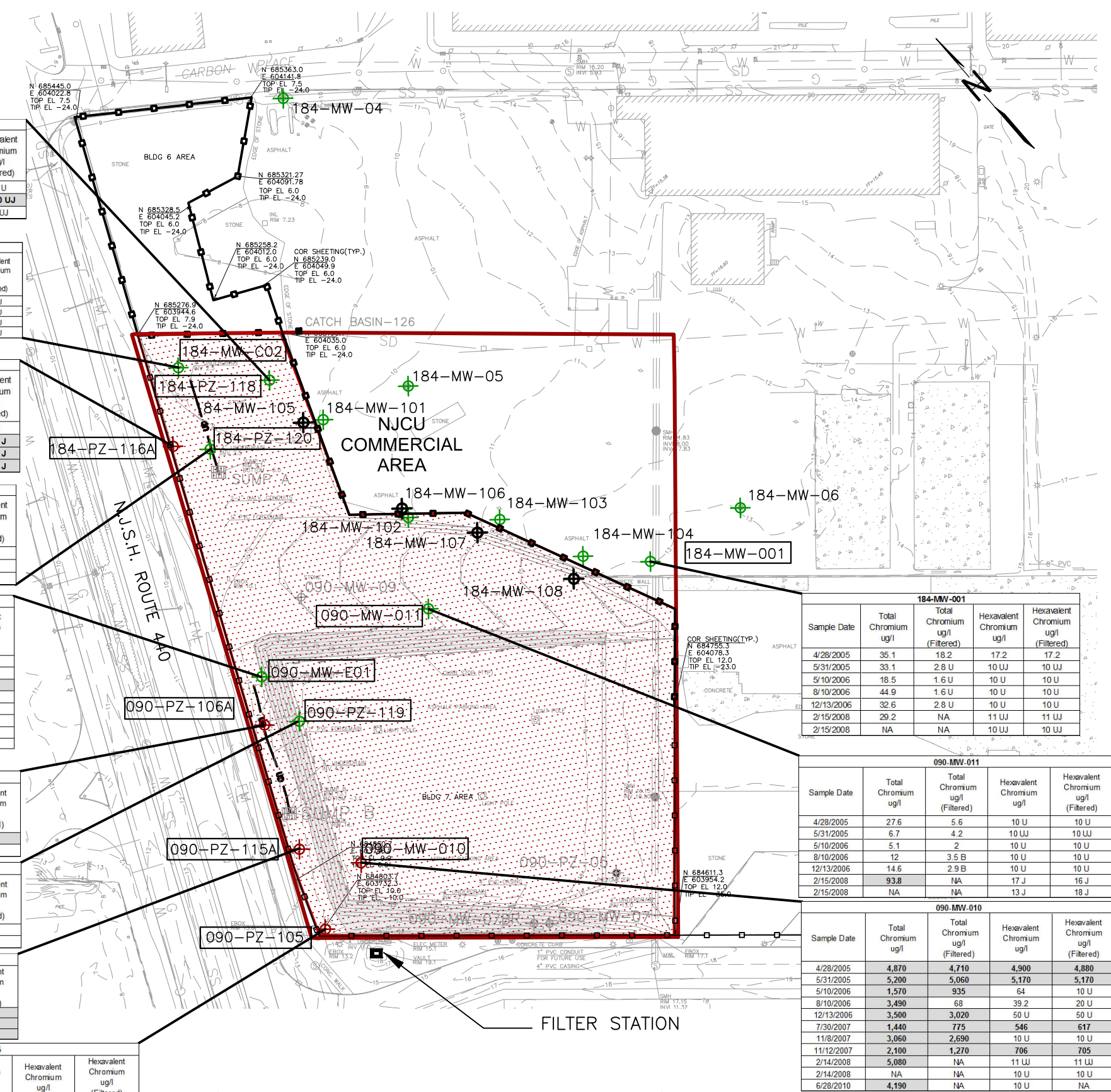
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**LEGEND**

-  MONITORING WELL
  -  PIEZOMETER
  -  SUMP
  -  MONITORING WELL WITH HEXAVALENT CHROMIUM CONCENTRATIONS GREATER THAN 70 ug/L
  -  MONITORING WELL WITH HEXAVALENT CHROMIUM CONCENTRATIONS LESS THAN 70 ug/L
  -  184-MW-001 INDICATES PREVIOUS MONITORING POINT (ABANDONED PRIOR TO REMEDIAL ACTIONS)
  -  COMMERCIAL AREA BOUNDARY
  -  CAP AREA
  -  SHEET PILE WALL
- U - COMPOUND NOT DETECTED AT THE REPORTING LIMIT  
 J - VALIDATION QUALIFIER INDICATING ESTIMATED CONCENTRATION  
 ug/L - MICROGRAMS PER LITER  
 SHADED RESULTS INDICATE AN EXCEEDANCES OF THE GROUNDWATER QUALITY STANDARD OF 70 UG/L

**REFERENCE NOTES:**

- THIS FIGURE INCLUDES SHALLOW GROUNDWATER DATA FOR THE COMMERCIAL AREA, INCLUDING PRE-REMEDIATION DATA FROM SHALLOW MONITORING WELLS DURING THE RI AND TEMPORARY MONITORING POINTS/PIEZOMETERS FROM DESIGN INVESTIGATIONS.
- DATA FROM MONITORING WELLS DURING THE RI (2005-2006) WAS INCLUDED WITH THE RAWP DATED JULY 2007. DATA FROM PIEZOMETERS ALONG THE WESTERN PERIMETER OF THE SITE (2007-2008) WAS COLLECTED AS PART OF INITIAL RA DESIGN FOR EVALUATION OF A PERMEABLE REACTIVE BARRIER, WHICH WAS NOT USED AND SUBSEQUENTLY REPLACED WITH A SHEET PILE BARRIER WALL IN THE FINAL REMEDIAL DESIGN. OTHER DATA FROM MONITORING WELLS (2007-2010) WAS COLLECTED TO PROVIDE ADDITIONAL DATA DURING REMEDIAL DESIGN.



**184-PZ-118**

Sample Date	Total Chromium ug/l	Total Chromium ug/l (Filtered)	Hexavalent Chromium ug/l	Hexavalent Chromium ug/l (Filtered)
12/12/2007	10 U	10 U	10 U	10 U
2/15/2008	35.4	NA	1,100 UJ	1,100 UJ
2/15/2008	NA	NA	10 UJ	10 UJ

**184-MW-C02**

Sample Date	Total Chromium ug/l	Total Chromium ug/l (Filtered)	Hexavalent Chromium ug/l	Hexavalent Chromium ug/l (Filtered)
7/14/1998	76.1	6.9 B	10 U	10 U
7/14/1998 DUP	70.3	7.2 B	10 U	10 U
7/7/1999	18.7	5.8	10 U	10 U
4/14/2003	9.5 B	2.7 B	10 U	10 U

**184-PZ-116A**

Sample Date	Total Chromium ug/l	Total Chromium ug/l (Filtered)	Hexavalent Chromium ug/l	Hexavalent Chromium ug/l (Filtered)
12/11/2007	808	10 U	10 U	10 U
2/15/2008	8,820	NA	10,900 J	8,800 J
2/15/2008	NA	NA	9,900 J	8,200 J
4/30/2008	2,680	4,970	2,000 J	5,300 J

**184-PZ-120**

Sample Date	Total Chromium ug/l	Total Chromium ug/l (Filtered)	Hexavalent Chromium ug/l	Hexavalent Chromium ug/l (Filtered)
12/12/2007	14.5	10 U	10 U	10 U
2/15/2008	10 U	NA	11 UJ	11 UJ
2/15/2008	NA	NA	10 UJ	10 UJ

**090-MW-E01**

Sample Date	Total Chromium ug/l	Total Chromium ug/l (Filtered)	Hexavalent Chromium ug/l	Hexavalent Chromium ug/l (Filtered)
10/29/1997	52.4	14.5	10 U	10 U
7/13/1998	18	6.3 B	10 U	10 U
4/15/2003	781	695	707	583
4/28/2005	21	3.2	10 U	10 U
5/31/2005	117	2.8 U	10 UJ	10 UJ
5/10/2006	27.6	1.6 U	10 U	10 U
8/10/2006	8.6 B	1.8 B	10 U	10 U
12/13/2006	10.3	2.8 B	10 U	10 U

**090-PZ-106A**

Sample Date	Total Chromium ug/l	Total Chromium ug/l (Filtered)	Hexavalent Chromium ug/l	Hexavalent Chromium ug/l (Filtered)
12/11/2007	1,120	1,050	890	910
2/12/2008	129	NA	46	NA

**090-PZ-119**

Sample Date	Total Chromium ug/l	Total Chromium ug/l (Filtered)	Hexavalent Chromium ug/l	Hexavalent Chromium ug/l (Filtered)
12/11/2007	60.2	10 U	10 U	10 U
2/12/2008	2,610	NA	10 U	NA

**090-PZ-115A**

Sample Date	Total Chromium ug/l	Total Chromium ug/l (Filtered)	Hexavalent Chromium ug/l	Hexavalent Chromium ug/l (Filtered)
12/11/2007	2,950	3,450	3,000	2,900
2/14/2008	3,320	NA	3,000	3,000
2/14/2008	NA	NA	2,900	2,800

**090-PZ-105**

Sample Date	Total Chromium ug/l	Total Chromium ug/l (Filtered)	Hexavalent Chromium ug/l	Hexavalent Chromium ug/l (Filtered)
12/11/2007	33,300	35,600	35,100	32,300
2/14/2008	25,100	NA	28,100	27,800
2/14/2008	NA	NA	26,800	25,900

**184-MW-001**

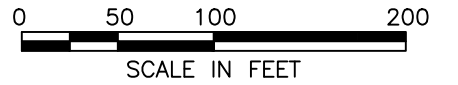
Sample Date	Total Chromium ug/l	Total Chromium ug/l (Filtered)	Hexavalent Chromium ug/l	Hexavalent Chromium ug/l (Filtered)
4/28/2005	35.1	18.2	17.2	17.2
5/31/2005	33.1	2.8 U	10 UJ	10 UJ
5/10/2006	18.5	1.6 U	10 U	10 U
8/10/2006	44.9	1.6 U	10 U	10 U
12/13/2006	32.6	2.8 U	10 U	10 U
2/15/2008	29.2	NA	11 UJ	11 UJ
2/15/2008	NA	NA	10 UJ	10 UJ

**090-MW-011**

Sample Date	Total Chromium ug/l	Total Chromium ug/l (Filtered)	Hexavalent Chromium ug/l	Hexavalent Chromium ug/l (Filtered)
4/28/2005	27.6	5.6	10 U	10 U
5/31/2005	6.7	4.2	10 UJ	10 UJ
5/10/2006	5.1	2	10 U	10 U
8/10/2006	12	3.5 B	10 U	10 U
12/13/2006	14.6	2.9 B	10 U	10 U
2/15/2008	93.8	NA	17 J	16 J
2/15/2008	NA	NA	13 J	18 J

**090-MW-010**

Sample Date	Total Chromium ug/l	Total Chromium ug/l (Filtered)	Hexavalent Chromium ug/l	Hexavalent Chromium ug/l (Filtered)
4/28/2005	4,870	4,710	4,900	4,880
5/31/2005	5,200	5,060	5,170	5,170
5/10/2006	1,570	935	64	10 U
8/10/2006	3,490	68	39.2	20 U
12/13/2006	3,500	3,020	50 U	50 U
7/30/2007	1,440	775	546	617
11/8/2007	3,060	2,690	10 U	10 U
11/12/2007	2,100	1,270	706	705
2/14/2008	5,080	NA	11 UJ	11 UJ
2/14/2008	NA	NA	10 U	10 U
6/28/2010	4,190	NA	10 U	NA



**SOURCE MAP REFERENCE:**

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REV.	DATE	STATUS	DRFT BY	CHKD BY

WOOD PROJECT No. 7772180033  
DRAWING: 7772180033-6100-MWCB-100RCA1

PREPARED/DATE:  
STR 09/14/16

CHECKED/DATE:  
JH 09/16/16

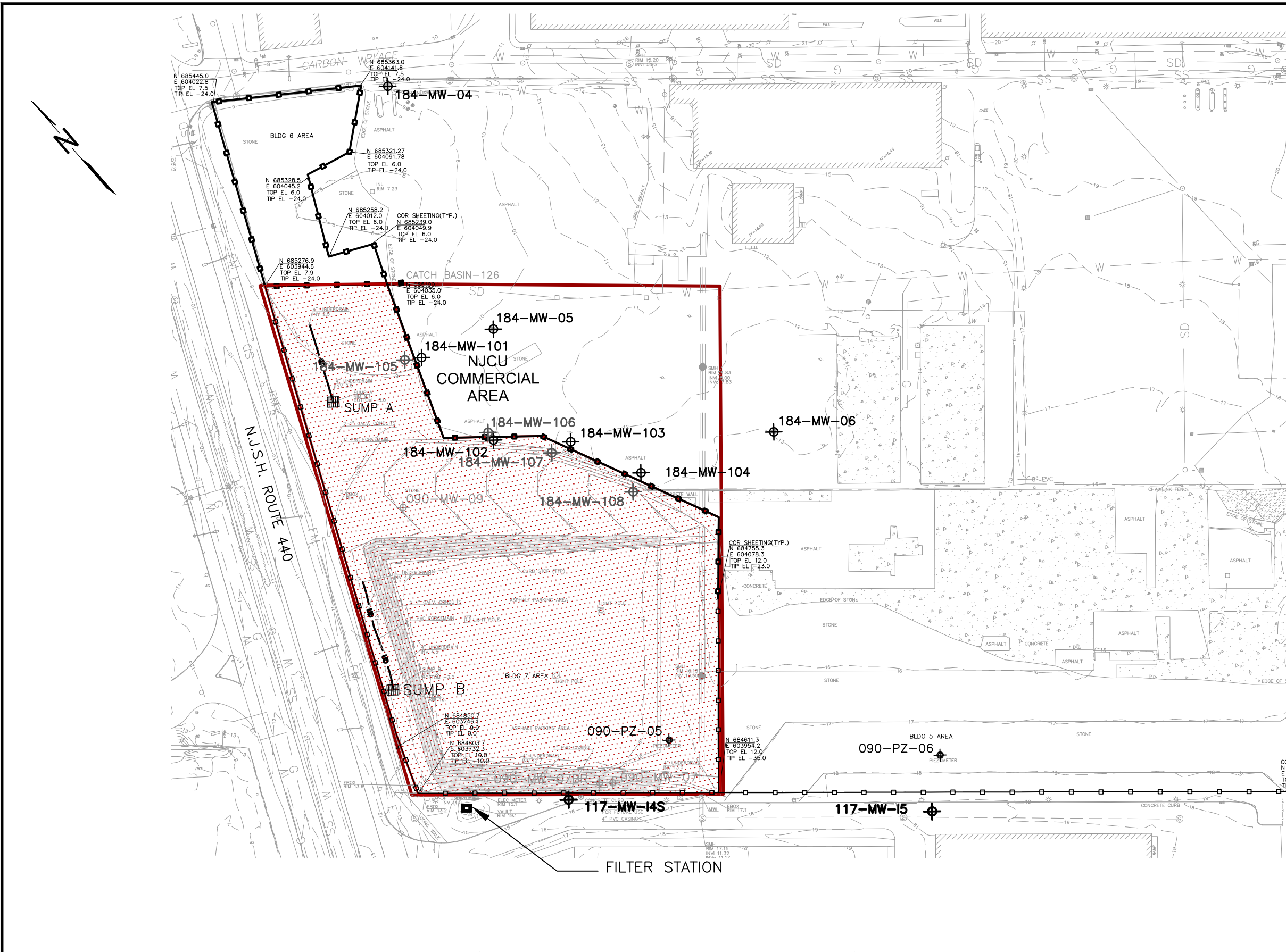


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**FIGURE 3**  
PRE-REMEDIATION SHALLOW  
GROUNDWATER SAMPLING RESULTS  
STUDY AREA 5 NEW JERSEY CITY UNIVERSITY  
JERSEY CITY, NEW JERSEY

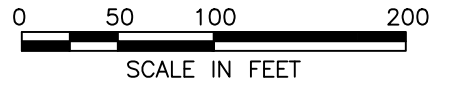


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**LEGEND**

- EXISTING MONITORING WELL
- PIEZOMETER
- SUMP
- COMMERCIAL AREA BOUNDARY
- CAP AREA
- SHEET PILE WALL



SOURCE MAP REFERENCE:  
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 LOT 5 JERSEY CITY, NEW JERSEY HONEYWELL SITE ID 37288, 37811 & 37460 KENNON  
 SURVEYING SERVICES INC. WARREN, NEW JERSEY SHEET 1 OF 2, PROJECT NUMBER 2201,  
 DATED 01-13-12

REV.	DATE	STATUS	CW DRFT BY	JH CHKD BY
1	06/29/17	UPDATED SHEET PILE WALL & ADDED NEW WELL LOCATIONS	CW	JH

WOOD PROJECT No. 7772180033  
 DRAWING: 7772180033-6100-MWCB-100RBA

PREPARED/DATE:  
STR 09/14/16

CHECKED/DATE:  
JH 09/16/16

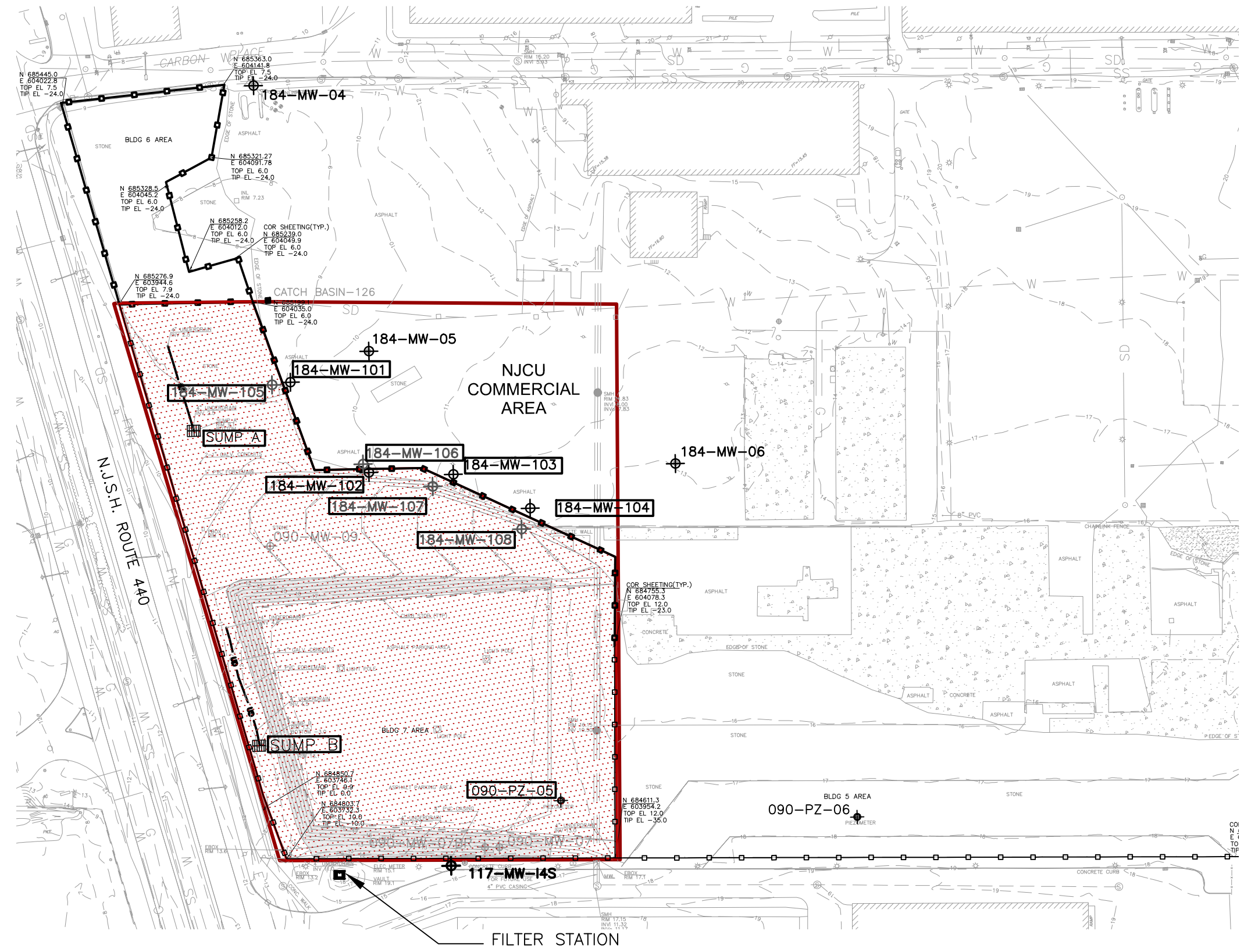
**wood.**

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 200 AMERICAN METRO BLVD, SUITE 113  
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**FIGURE 4**  
 POST-RA GROUNDWATER  
 MONITORING WELL LOCATIONS  
 STUDY AREA 5 NEW JERSEY CITY UNIVERSITY  
 JERSEY CITY, NEW JERSEY

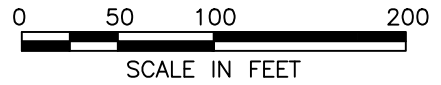


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**LEGEND**

- EXISTING MONITORING WELL
- PIEZOMETER
- SUMP
- COMMERCIAL AREA BOUNDARY
- CAP AREA
- SHEET PILE WALL
- 184-MW-105 SHALLOW MONITORING WELLS WITH DATA LOGGERS INSTALLED



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 SURVEYING SERVICES INC. WARREN, NEW JERSEY SHEET 1 OF 2, PROJECT NUMBER 2201,  
 DATED 01-13-12

REV.	DATE	STATUS	DRFT BY	CHKD BY

WOOD PROJECT No. 7772180033  
 DRAWING: 7772180033-6100-MWCB-100HML

PREPARED/DATE:  
CW 03/18/19

CHECKED/DATE:  
JH 03/18/19

**wood.**

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**FIGURE 5**  
 HYDRAULIC MONITORING  
 LOCATIONS  
 STUDY AREA 5 NEW JERSEY CITY UNIVERSITY  
 JERSEY CITY, NEW JERSEY

## **TABLES**

**Table 1**  
**Summary of Long Term Groundwater Monitoring Program**  
**SA-5 Sites 090/184 - NJCU Commercial Area Shallow Groundwater**

<b>Monitoring Well</b>	<b>Location</b>	<b>Hydraulic (Water Level) Monitoring</b>	<b>Water Quality Sampling</b>	<b>Comments/Rationale</b>
184-MW-04	Northern site boundary	Quarterly	Quarterly through 2018; discontinue after 2018	Discontinue water quality sampling after 2018 based on results of well pairs along barrier wall (one year of quarterly data showing dissolved total chromium non-detect or less than 70 ppb).
184-MW-05	Northeast of cap area (within proposed Building 6 footprint)	Quarterly through 2018	Quarterly through 2018; discontinue after 2018	Same as above. Within proposed Building 6 footprint; anticipated to be abandoned in favor of new sentinel wells nearer to cap area. This well is no longer needed following completion of barrier wall extension.
184-MW-06	East of cap area near Building 5	Quarterly	Quarterly through 2018; discontinue after 2018	Discontinue water quality sampling after 2018 based on results of well pairs along barrier wall (one year of quarterly data showing dissolved total chromium non-detect or less than 70 ppb).
184-MW-101	Northeast side of cap; outside of barrier wall	Quarterly <sup>1</sup>	Quarterly through 2018: future frequency TBD <sup>2</sup>	Well location may need to be adjusted pending final design of Building 6. Future water quality monitoring frequency to be determined after first year of quarterly monitoring following wall extension.
184-MW-102	Northeast side of cap; inside of barrier wall	Quarterly <sup>1</sup>	Quarterly <sup>3</sup>	Paired with 184-MW-106
184-MW-103	Northeast side of cap; outside of barrier wall	Quarterly <sup>1</sup>	Quarterly through 2018: future frequency TBD <sup>2</sup>	Future water quality monitoring frequency to be determined after first year of quarterly monitoring following wall extension.
184-MW-104	Northeast side of cap; outside of barrier wall	Quarterly <sup>1</sup>	Quarterly through June 2018: future frequency TBD <sup>2</sup>	same as above for 184-MW-103
184-MW-105	Inside of barrier wall	Quarterly <sup>1</sup>	Quarterly <sup>3</sup>	Paired with 184-MW-101
184-MW-106	Outside of barrier wall	Quarterly <sup>1</sup>	Quarterly through 2018: future frequency TBD <sup>2</sup>	Future water quality monitoring frequency to be determined after first year of quarterly monitoring following wall extension.
184-MW-107	Inside of barrier wall	Quarterly <sup>1</sup>	Quarterly <sup>3</sup>	Paired with 184-MW-103
184-MW-108	Inside of barrier wall	Quarterly <sup>1</sup>	Quarterly <sup>3</sup>	Paired with 184-MW-104
090-PZ-05	Within cap area	Quarterly	Not applicable	No changes to current monitoring
090-PZ-06	East of cap area	Quarterly	Not applicable	No changes to current monitoring

Notes:

- 1 - Water level monitoring: current quarterly; data loggers and monthly measurements for one year following barrier wall extension; return to quarterly thereafter.
  - 2 - Water quality sampling of wells outside the barrier wall may be reduced or discontinued following first year of quarterly sampling after completion of barrier wall extension if chromium analyses meet specified limits.
  - 3 - Water quality sampling of wells inside the barrier wall quarterly for one year (through 2018); future sampling frequency subject to modification after 2018 by agreement of the parties.
  - 4 - Refer to Section 6.3 of the Shallow Groundwater Monitoring and Extraction System Operation Plan for details regarding water level monitoring and water quality sampling.
- Reporting of groundwater monitoring results is currently performed on a quarterly and annual basis as follows. Refer to the LTMP for details on reporting requirements.
- (a) Groundwater monitoring results are provided by Honeywell to the Parties of the Consent Decree (Plaintiffs, NJCU, BMUA) within 30 days after each calendar quarter.
  - (b) Annual reporting of groundwater monitoring results is performed as part of the Integrated Annual Groundwater Performance Reports for Study Areas 5, 6 and 7.
  - (c) Future reporting requirements will include Remedial Action Protectiveness Biennial Certification Reports for Groundwater as part of a Remedial Action Groundwater Permit.

**Table 2**  
Operational Criteria for Contingent Ground Water Extraction and Treatment System  
Sites 090/184 NJCU Commercial Area Shallow Groundwater

	<b>Activation/Reactivation</b>	<b>Shutdown</b>
Sump B <sup>1</sup>	In any one monitoring well pair, groundwater elevation measurements do not show an inward gradient of 0.1 foot or greater <sup>2</sup>	<ul style="list-style-type: none"> <li>Two consecutive quarters or six consecutive months<sup>3</sup> during which measurements at all four monitoring well pairs show an inward gradient of 0.1 foot or greater<sup>2</sup></li> </ul>
Evaluation of Sump A Pumping	<ul style="list-style-type: none"> <li>Sump B running for at least 2 consecutive months; and</li> <li>In any one monitoring well pair, groundwater elevation measurements do not show an inward gradient of 0.1 foot or greater<sup>2</sup>; and</li> <li>&gt;70 ppb dissolved total chromium in any one inside monitoring well<sup>4</sup></li> </ul>	<ul style="list-style-type: none"> <li>Two consecutive quarters or six consecutive months<sup>3</sup> during which measurements at all four monitoring well pairs show an inward gradient of 0.1 foot or greater<sup>2</sup></li> </ul>
Evaluation of Additional Measures <sup>5</sup>	<ul style="list-style-type: none"> <li>CGWET system unable to maintain an inward gradient of 0.1 foot or greater; and</li> <li>&gt;70 ppb dissolved total chromium in any one inside monitoring well<sup>4</sup> at which the water level comparison to the paired well does not show an inward gradient of 0.1 foot or greater<sup>2</sup></li> <li>Refer to Section 7 of the Plan for additional measures to be considered</li> </ul>	<ul style="list-style-type: none"> <li>Two consecutive quarters or six consecutive months<sup>3</sup> during which measurements at all four monitoring well pairs show an inward gradient of 0.1 foot or greater<sup>2</sup></li> </ul>

Notes:

Monitoring well pairs along the barrier wall are indicated on Table 1. Refer to Section 7 of the Shallow Groundwater Monitoring and Extraction System Operations Plan (“Section 7 of the Plan”) for further information regarding performance criteria for CGWET operations.

<sup>1</sup> Sump B is activated. In the event that the Sump B operations are discontinued by agreement of the Parties that criteria for shutdown have been met, the criteria in Table 2 apply to the reactivation of Sump B.

<sup>2</sup> Section 7 of the Plan specifies that the remedy performance criterion is to maintain an inward gradient of 0.1 feet or greater across the barrier wall (higher heads outside the wall and lower heads inside the wall). During automated head logging, the gradient across the barrier shall be calculated by comparing the average monthly head difference at each monitoring well pair based on automatic logger data recorded at 3-hour intervals. When manual head measurements are used, the gradient across the barrier shall be determined by comparing the head differential in the single quarterly manual water level measurement at each monitoring well pair.

<sup>3</sup> Two consecutive quarters (i.e., a six-month period) shall be required during periods in which only manual quarterly measurements are used; six consecutive months shall be required in any six-month period during which automatic data loggers are used or manual head measurements are more frequent than quarterly.

<sup>4</sup> Well pairs to be sampled upon first month’s indication of failure to maintain an inward gradient of 0.1 feet or greater across the barrier wall; then quarterly thereafter. A finding of hexavalent chromium and/or dissolved total chromium detection above 70 ppb will be confirmed by resampling after approximately 2 weeks.

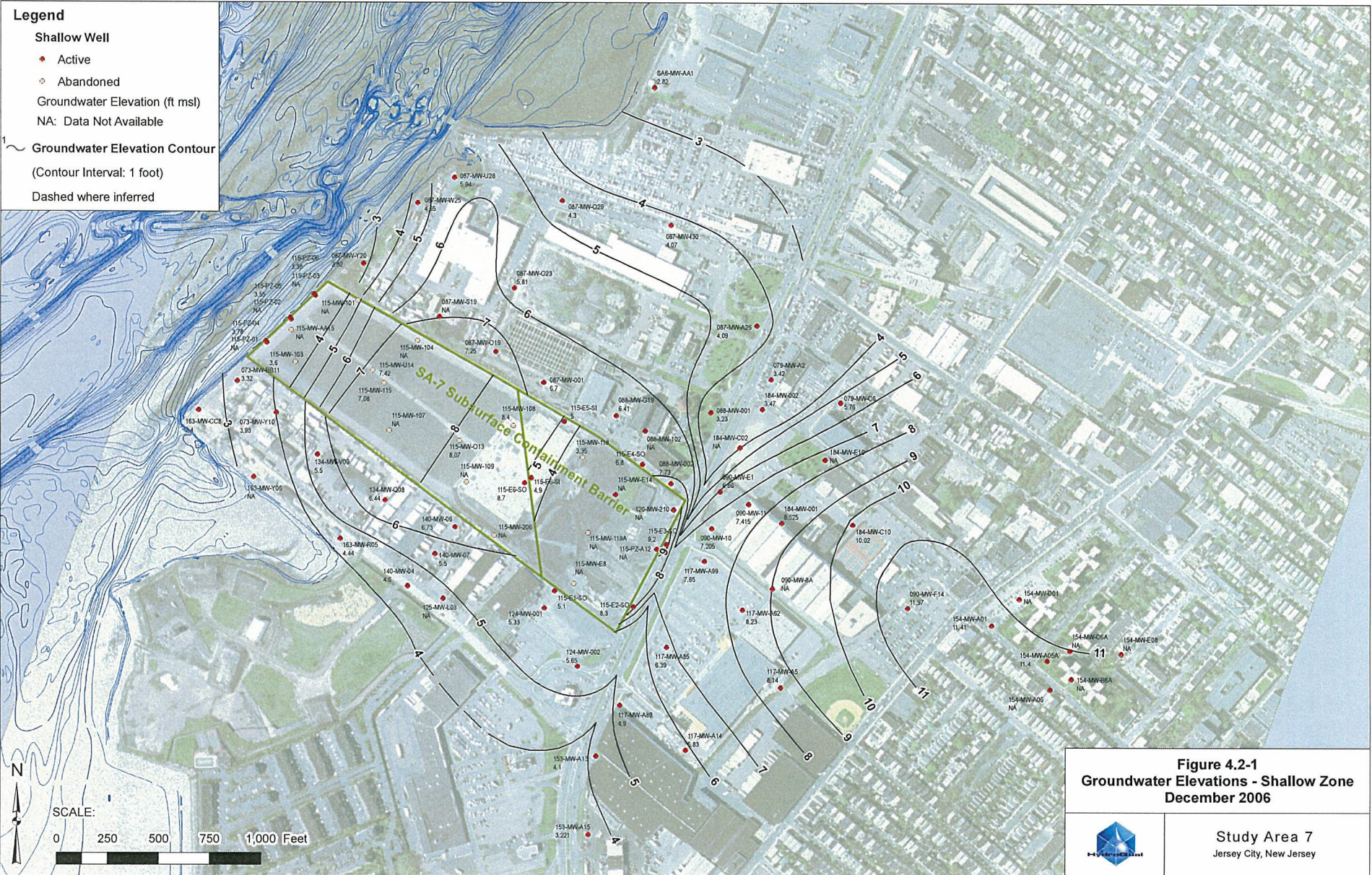
<sup>5</sup> Additional measures are applicable if performance criteria cannot be met by pumping from CGWET system.

**ATTACHMENT A**

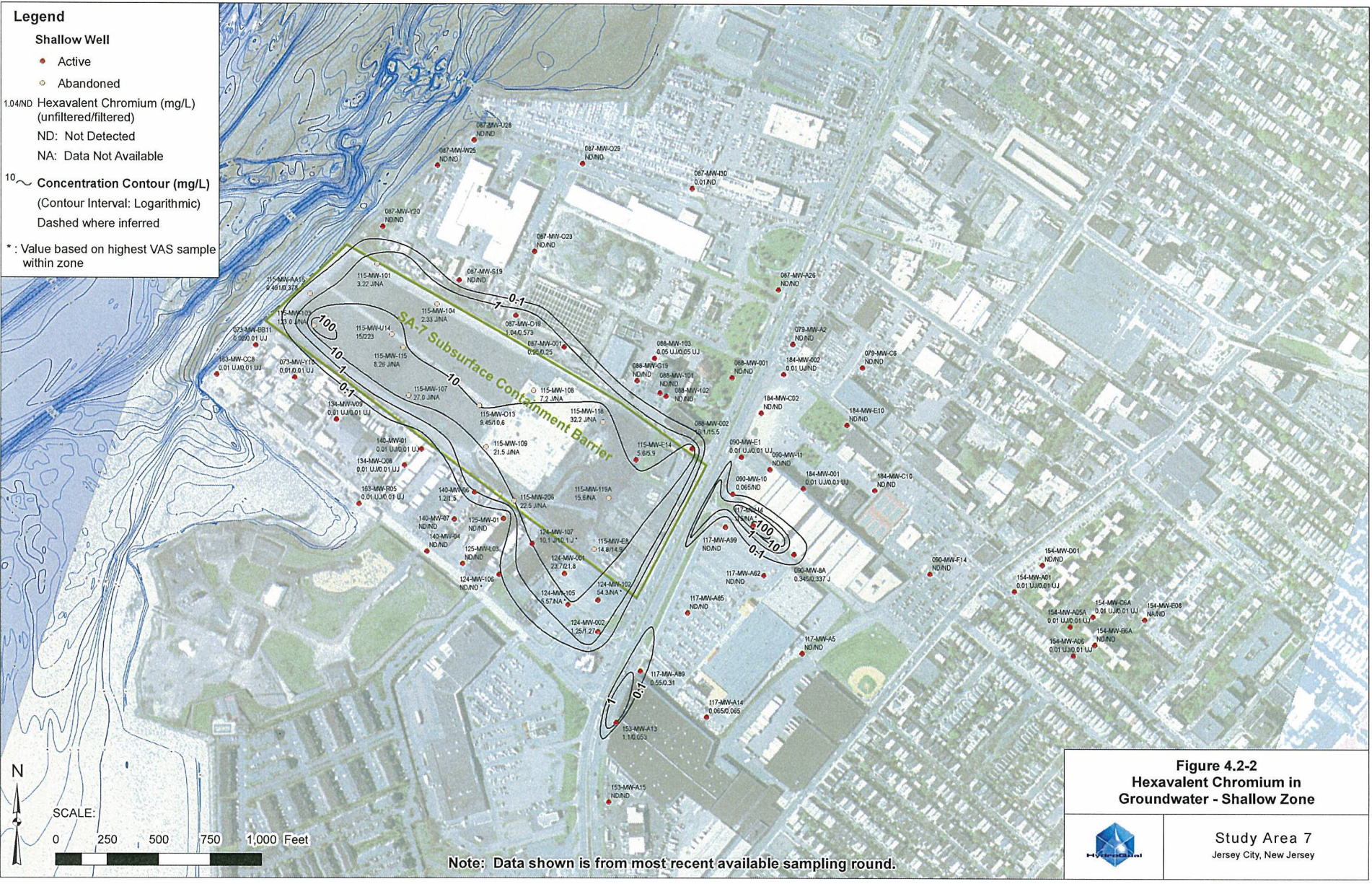
**REFERENCE DOCUMENTATION**

**Regional Maps Showing Groundwater Elevations and Hexavalent Chromium Results  
Maps Showing Extent of Meadow Mat at Sites 090/184**











**Legend**

- Intermediate Well
- Active
- Abandoned
- Groundwater Elevation (ft msl)
- NA: Data Not Available
- Groundwater Elevation Contour  
(Contour Interval: 1 foot)  
Dashed where inferred



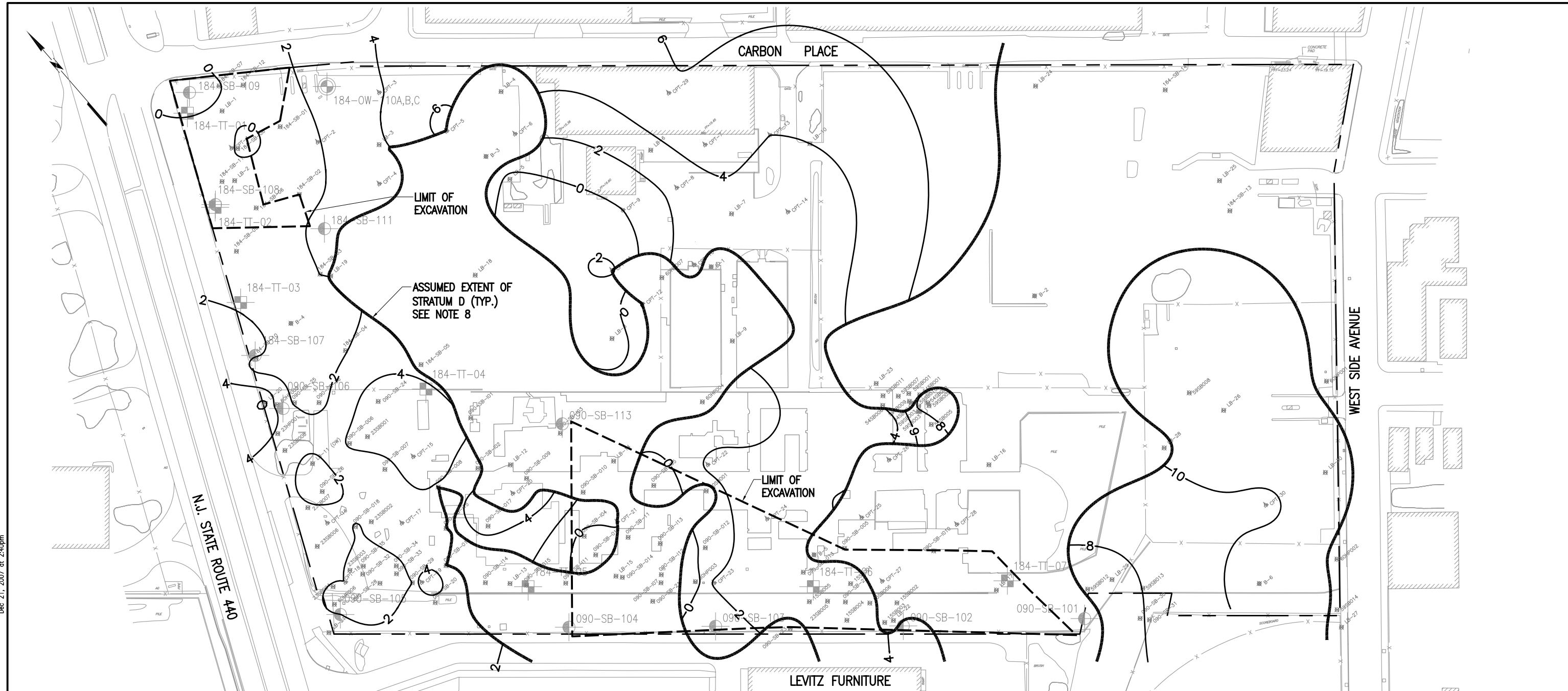
**Figure 4.4-1**  
Groundwater Elevations - Intermediate Zone  
December 2006

 Study Area 7  
Jersey City, New Jersey



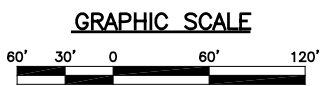
Dec 21, 2007 at 2:40pm

C:\DWGCS\109\10962\Geotech\GC-1.dwg



**NOTES:**

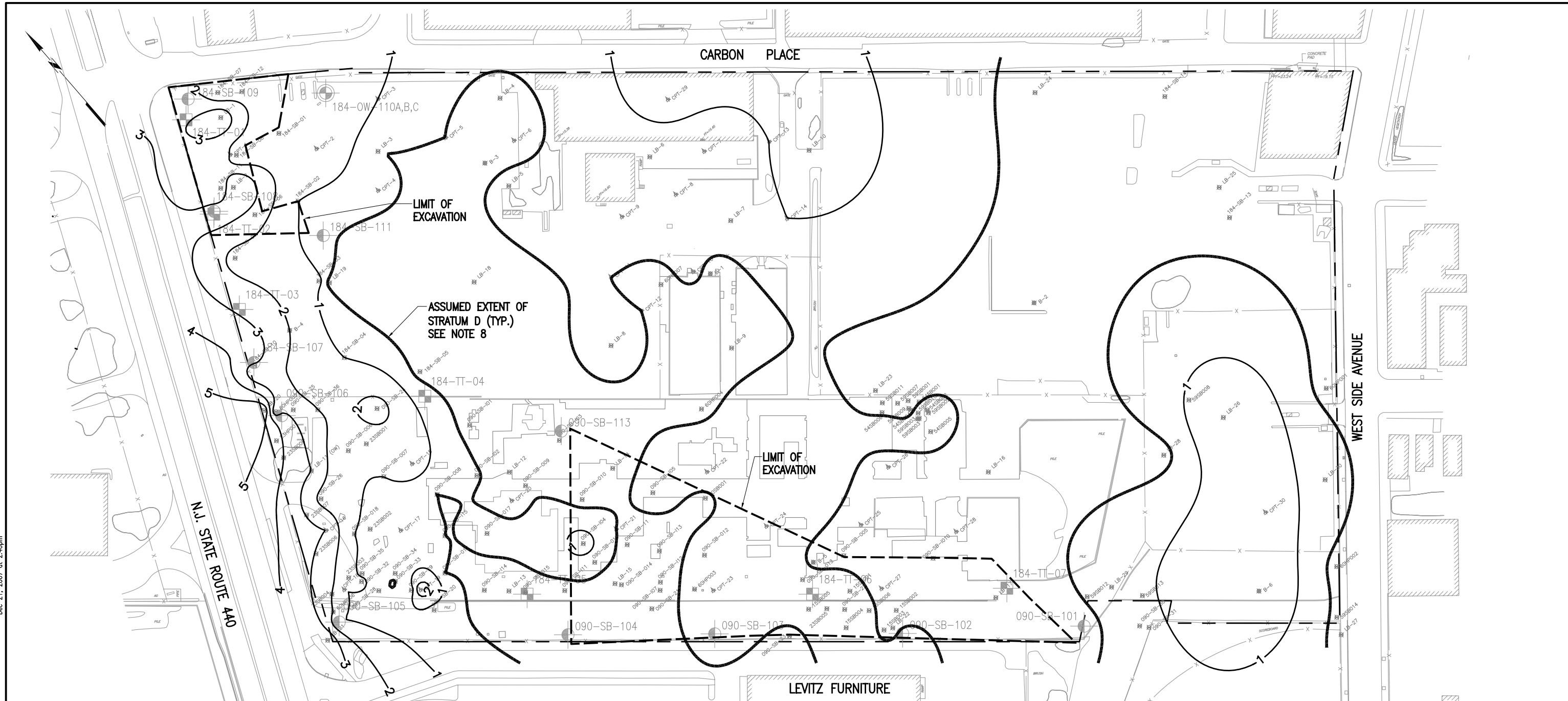
1. For boring legend see Drawing No. B-1.
2. Contour labels are elevations in feet.
3. Strata break depths used to generate contours were interpreted from boring logs. Boring logs for existing borings were provided by MACTEC. See report text for additional information on interpretation of existing boring logs.
4. Top of Stratum D Contours are necessary interpolations between borings that encountered Stratum D and may not represent actual field conditions.
5. Boring locations used to generate contours are as shown in Drawing No. B-1.
6. Ground surface elevations for 2007 borings and 2003 Parsons borings used to generate contours are taken from the boring logs. Ground surface elevations for all other existing borings used to generate contours are interpreted from ground surface contours on Drawing No. B-1.
7. Borings adjusted to project vertical datum as needed, and may not match elevations shown on boring logs.
8. Stratum D is assumed to be discontinuous where the encountered thickness is less than 3" and has not been contoured.



<b>STUDY AREA 5</b>			
JERSEY CITY		NEW JERSEY	
<b>Honeywell</b>			
101 COLUMBIA RD. BOX 2105 MORRISTOWN, NJ 07962			
<b>MACTEC</b>		MACTEC Engineering and Consulting, Inc. P.O. Box 7050, 511 Congress Street Portland, Maine 04112-7050 (207) 775-5401	
<b>MUESER RUTLEDGE CONSULTING ENGINEERS</b>			
14 PENN PLAZA - 225 W. 34TH STREET, NY, NY 10122			
SCALE AS NOTED	MADE BY B.B. CH'KD BY A.L.S.	DATE 12-21-07 12-21-07	FILE NO. 10962 DRAWING NO. GC-1
<b>CONTOUR MAP OF TOP OF STRATUM D</b>			<b>GC-1</b>

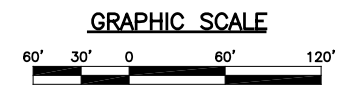
Dec 21, 2007 at 2:40pm

C:\DWGCS\109\10962\Geotech\GC-2.dwg



**NOTES:**

1. For boring legend see Drawing No. B-1.
2. Contour labels are thickness in feet.
3. Strata break depths used to generate contours were interpreted from boring logs. Boring logs for existing borings were provided by MACTEC. See report text for additional information on interpretation of existing boring logs.
4. Top of Stratum D Contours are necessary interpolations between borings that encountered Stratum D and may not represent actual field conditions.
5. Boring locations used to generate contours are as shown in Drawing No. B-1.
6. Ground surface elevations for 2007 borings and 2003 Parsons borings used to generate contours are taken from the boring logs. Ground surface elevations for all other existing borings used to generate contours are interpreted from ground surface contours on Drawing No. B-1.
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<b>MUESER RUTLEDGE CONSULTING ENGINEERS</b>			
14 PENN PLAZA - 225 W. 34TH STREET, NY, NY 10122			
SCALE AS NOTED	MADE BY CH'KD BY	DATE DATE	FILE NO. DRAWING NO.
	B.B. A.L.S.	12-21-07 12-21-07	10962 GC-2
<b>CONTOUR MAP OF THICKNESS OF STRATUM D</b>			

**APPENDIX M**

**QUARTERLY GROUNDWATER AND SOIL CHROMIUM REMEDY  
MONITORING REPORT FORMAT**

# Memo

---

**Date:**

**From:**

**To:**

**cc:**

**Subject:** Quarterly Monitoring for *[Quarter – Year]*  
Study Area 5 – Sites 090/184 and 153 North

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Amec Foster Wheeler is transmitting quarterly cap inspection reports, groundwater monitoring results, and Contingent Groundwater Extraction and Treatment System monitoring data [as applicable] for the *[Quarter]* of *[Year]* in accordance the Long Term Monitoring Plan (LTMP) for New Jersey City University (Sites 090/184) and the Former Morris Canal (Site 153 North). The attached monitoring records are being submitted in conformance with Section 4.1 of the LTMP.

## **NJCU Commercial AOC Cap Inspection**

The cap inspection reports for *[Month and Year]* for the NJCU Commercial Area and Site 153 North are provided in **Attachment A**.

*[Discussion of inspection results and any disturbances to the cap during the reporting period.]*

## **Groundwater Elevation Data**

Groundwater elevations were measured on *[Date]* to determine current conditions. A table containing groundwater elevation data and the groundwater elevation contour map from *[Date]* are provided in **Attachment B**.

*[Brief discussion of groundwater flow and comparison to past results.]*

## **Groundwater Quality Results**

Groundwater quality sampling of the shallow monitoring wells was performed on *[Date]*. Groundwater sampling results are shown on the figure in **Attachment C**.

*[Brief discussion of data and comparison to past trends.]*

### **Contingent Groundwater Extraction and Treatment System Monitoring Data**

The Sump B pump was activated on April 20, 2016. Monitoring has been conducted in accordance with the startup procedures as provided in the April 21, 2016 Memorandum (startup memo) regarding Sump B activation.

System monitoring data (e.g. flow rates, volume, and pressure) are provided in **Attachment D**. The average net yield of Sump B (i.e. the yield of the formation around the drain line) averaged approximately *[rate]* gpm during *[Quarter]* of *[Year]*. Pressure within the force main has remained consistent at *[pressure]* psi.

*[Add information on Sump A metrics, if applicable.]*

*[Add further discussion or comparison to past trends.]*

**Attachment A**

**Cap Inspection Monitoring Reports**  
*[Month Year]*



**Attachment B**

**Summary of Groundwater Elevation Data – [Date]**  
**Groundwater Elevation Contour Map – [Date]**

**Attachment C**

**Groundwater Results Figure – Updated with Data Collected during *[Quarter Year]***

**Attachment D**

**Contingent GW Extraction and Treatment System  
Monitoring Data**