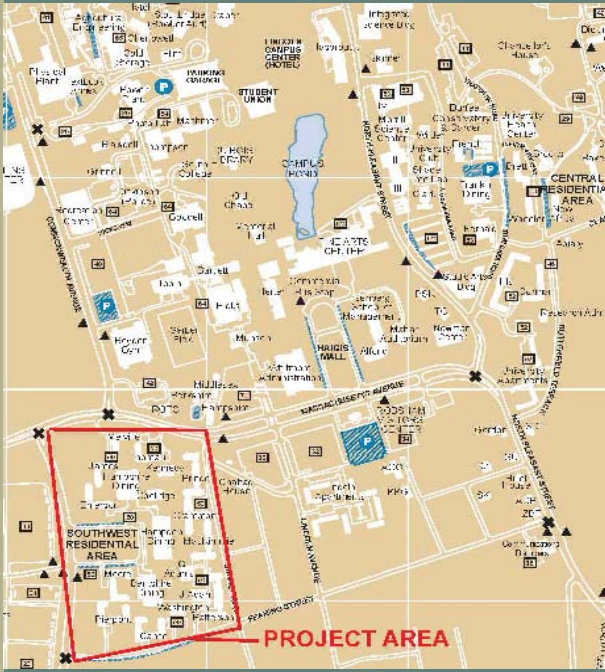
WOODARD & CURRAN

PCB COMPLETION REPORT

University of Massachusetts

Southwest Concourse

Amherst, Massachusetts



1.866.702.6371
35 New England Business Center
Andover, MA

223505.00
University of Massachusetts

February 2011

TABLE OF CONTENTS

SECTION **PAGE NO.**

LIST OF TABLES

LIST OF FIGURES

APPENDICES

1. INTRODUCTION

This Polychlorinated Biphenyl (PCB) Remediation Completion Report has been prepared by Woodard & Curran (W&C) on behalf of the University of Massachusetts (UMass) to comply with the requirements set forth in the U.S. Environmental Protection Agency's (EPA) Southwest Residential Area Concourse PCB Cleanup and Disposal Approval under 40 CFR 761.61(a), 761.61(c), and 761.79(h) (the Approval) for the subject work dated August 30, 2010. This Approval is provided in Appendix A to this Report.

This Report documents PCB remediation activities conducted at the UMass Southwest Residential Area Concourse (SWC) located on the UMass campus in Amherst, Massachusetts. The PCB Remediation work was conducted as part of a larger concourse revitalization project within the Southwest Residential Area.

1.1 BACKGROUND

The Site is a relatively small portion (approximately 5 acres) of the 1,450-acre parcel of land associated with the UMass Amherst campus. The Site is located at the southwestern end of the UMass campus east of University Drive, south of Massachusetts Avenue, and north of Fearing Street. The properties abutting the Site are all UMass-owned properties. A Site Locus Map is provided as Figure 1-1.

The Site is currently improved with five high-rise towers and eleven lower-rise buildings that serve to house approximately 5,500 UMass students. This area is referred to as the Southwest Residential Area and was constructed in the mid-1960s. The buildings are constructed of concrete and are surrounded by either grass or hardscapes (paving stones, concrete, or asphalt). Access to the Site is by driveways along Fearing Street, University Drive, and Massachusetts Avenue. A Site Plan is depicted as Figure 1-2.

The Southwest Concourse replacement project is a comprehensive revitalization of the pedestrian core of the Southwest Residential Area. Starting in May 2010, the southwest concourse underwent renovations to paved and unpaved ground surfaces within the Southwest Residence Area. The work within this approximately five-acre site included, but was not limited to: removal and disposal of existing ground surface coverings (pavement, concrete, etc.); regrading and excavating soils to support new ground surface coverings, landscaping areas, and utilities; removal and replacement of granite staircases; removal and disposal of select retaining walls; and restoring select ground surfaces with concrete, pavement, pavers, etc.

During the initiation of the project, caulking was observed along the ground level joints/seams at retaining walls, granite steps, concrete structures, and other paved surfaces. Given the potential for this caulking to contain PCBs (based on the date of construction in the mid-1960s) and that it would be disturbed during the work, samples were collected to assess proper management and disposal requirements. Eighteen caulking samples were collected for PCB analysis from joints between granite steps, various concrete walkways and ground surfaces, and one ceiling joint in a pedestrian underpass tunnel. These samples were reported with detectable concentrations of PCBs ranging between 63 and 130,000 parts per million (ppm).

Upon discovery of PCBs in the joint caulking and given that as part of this project existing soils and other adjacent materials (concrete pads, retaining walls, granite steps, etc.) would be either removed or replaced as part of the construction of the new concourse components, samples of various materials were tested to determine whether PCBs had migrated from the caulking into these materials. Samples collected in May and June 2010 detected PCBs at varying concentrations in these materials; samples collected closer to the caulking reported higher PCB concentrations with decreasing concentrations with increasing distance from the caulking.

1.2 CONCEPTUAL SITE MODEL

Certain joint caulking used as part of standard construction practices for masonry buildings and concrete structures erected between the 1950's and late 1970's is known to have been manufactured with PCBs. PCBs were added to caulking for durability, resistance to degradation, and as a softener/plasticizer for application. Production and approved usage of PCBs was halted in the United States in the late 1970s. As indicated above, the Southwest Residential Area was constructed during this time period.

Due to the porous nature of concrete and other masonry surfaces, PCBs in caulking may penetrate into adjacent materials during application or over time, may leach or weather, and/or may be disturbed during renovations or other work. Characterization data indicated that percent level concentrations of PCBs have been detected in original caulking applied to expansion joints and along the horizontal seam between the ground surface covering and masonry structures along the concourse. Lower concentrations of PCBs were also detected in adjacent concrete, adjacent ground surface coverings, and soils.

Based on the concentration and distribution of PCBs detected in adjacent materials, it is apparent that the caulking used in original construction was the source of PCBs. In general, concentration gradients identified in the adjacent materials demonstrate a reduction in total PCBs with increasing distance from caulked joints and increasing depth from the ground surface.

1.3 REMEDIATION OVERVIEW

On June 15, 2010, Ms. Kimberly Tisa of the EPA was notified by telephone of the project and a general overview of the results and plans completed as of the date of the call were communicated to EPA. During the discussion, it was agreed to submit a Remediation Plan to document the current data and proposed remedial plans to remedy the issue. A Remediation Plan was submitted to the EPA on June 25, 2010 followed by a response to comments and Addendum #1 (July 27, 2010) and Addendum #2 (August 24, 2010). EPA issued a written Approval for the work on August 30, 2010.

As described in detail in the June 2010 Remediation Plan, a risk based remedial plan under 40 CFR 761.61(c) was prepared (and approved) for portions of the remediation work. This plan consisted of a two-prong remedial approach whereby the primary plan was to remove the source material and adjacent soils, concrete, asphalt and other materials impacted by PCBs with a secondary plan of utilizing a physical barrier approach to eliminate the direct contact exposure pathway and migration pathways of any residual PCBs remaining on materials that could not be removed during the project.

In summary, all caulking encountered/disturbed within the work area was removed and disposed off-site as a $\geq$ 50 ppm PCB waste. Soils and concrete removed during the work and in direct contact or immediately adjacent to the caulking and which exhibited concentrations of PCBs > 1 ppm were excavated and disposed off-site at their respective at-found concentrations. Soils not planned for removal and that met EPA's high occupancy cleanup levels (either $\leq$ 1 ppm for unrestricted use or $\leq$ 10 ppm beneath a compliant cap) remained in place. Granite steps formerly in direct contact with caulking were decontaminated with a chemical wash and, upon meeting the high occupancy cleanup levels of 10 µg/100cm^2, re-used on site.

Residual concentrations of PCBs on concrete retaining walls, masonry structures, and a pedestrian tunnel ceiling remained in place and were encapsulated by a protective coating (following caulking removal). These areas of concrete were not scheduled for removal during the project and were not planned to be removed during the remediation phases of the project and instead were proposed to be contained behind a barrier or encapsulant to prevent direct contact with PCBs and/or potential migration effects to other media. The rationale for this decision was that the concrete tunnel ceiling and concrete foundations are critical to the integrity of the structures and removal of portions of this concrete was not recommended. The on-site encapsulation of PCB remediation waste is an interim solution designed to shield impacted materials from the effects of weathering and leaching mechanisms, thereby eliminating potential exposure pathways and mitigating the potential for PCB transfer via direct contact and/or leaching to other media/materials.

Through the removal of the source materials (caulking), excavation and off-site disposal of those PCB-containing materials scheduled for removal (soil and concrete), reuse through decontamination to high occupancy cleanup levels (e.g., granite steps), and the application of an encapsulant on surfaces that contain residual PCBs, the remediation removed those PCB containing materials not authorized for continued use and either removed or restricted exposure pathways to residual PCBs, thereby, not posing an unreasonable risk of injury to health or the environment.

The encapsulation approach is considered a long-term interim solution given that all areas containing residual concentrations of PCBs will be managed and properly disposed of at the time of demolition and/or subsequent disturbance. To ensure the containment methods/products continue to perform as designed, a Monitoring and Maintenance Implementation Plan (MMIP) was developed and submitted to EPA (pursuant to the Approval) to monitor the continued effectiveness of the remedy.

Pursuant to EPA's Approval, a signed certification verifying that the authorized activities were implemented in accordance with the Approval is provided in Appendix A.

1.4 PROJECT TEAM

The remediation project team consisted of the following parties:

- University of Massachusetts – Owner
- Stephen Stimson Associates Landscape Architects – Architect for the concourse revitalization project
- Nauset Construction – General Contractor on the project
- Woodard & Curran (W&C) – Environmental consultant for the PCB related activities
- Triumvirate Environmental, Inc. (TEI) – Remediation Contractor completing the PCB remediation activities
- Con-Test Laboratory, Alpha Analytical Laboratory, and Analytics Laboratory – Laboratories used for sample analyses

1.5 REPORT ORGANIZATION

To facilitate review and maintain consistency with the remedial plan as well as the implementation of the Southwest Concourse replacement project, this report has been organized into specific material type or activity associated with the concourse work. A separate section has been developed to present the completed remediation and verification for each major task or category of work.

The components of the report have been organized into the following sections:

- Section 1 – Introduction (this section)
- Section 2 – Remedy Implementation
- Section 3 – Data Usability
- Section 4 – Deed Notice
- Section 5 – Monitoring and Maintenance of Encapsulated Surfaces
- Section 6 – Summary and Conclusions

2. REMEDY IMPLEMENTATION

PCB remediation activities were implemented at the Site in accordance with the Notification beginning in June 2010. For presentation purposes, a summary of the completed remediation activities have been organized into the following sections:

- Site controls and communications;
- Granite steps remediation;
- Concrete pads and walkways remediation;
- Pedestrian tunnel remediation;
- Retaining walls and ground level surfaces remediation;
- Soil remediation;
- Waste storage and disposal; and
- Site restoration

2.1 SITE CONTROLS AND COMMUNICATIONS

Prior to initiating any of the remediation activities, the following controls were implemented:

- A site-specific Health & Safety Plan was developed. All workers followed applicable Federal and State regulations regarding the work activities, including but not limited to OSHA regulations, respiratory protection, personal protective equipment, etc.
- Additional notifications and plans required for the work activities were prepared and submitted for approval, including Dig Safe permit and other excavation work related notifications required by the University;
- Given the amount of disruption to the concourse for the non-remediation-related activities, access to the entire concourse area was restricted by chain link fencing with controlled access points. Signage was posted on the fencing, and windows and doorways from the buildings to the concourse area. As a result, only project-related personnel accessed the active work areas.
- Further restrictions were applied during active PCB remediation activities within specific work areas; for example, when a granite staircase was being removed, the area was cordoned off with caution tape and/or construction fence to prevent access by non-remediation-related contractors;

- During the removal of PCB containing materials (caulking, soils, concrete), surficial wetting techniques were employed to control dust generation. In caulking removal areas, polyethylene sheeting was applied beneath the joint to collect any caulking during the removal.
- During the work activities, daily contractor meetings to review work activities and progress were conducted as well as a weekly meeting of all project stakeholders to review schedules, work progress, upcoming activities, etc. Because the project

work area was totally controlled and isolated from non-construction related personnel, communications on work activities and disruptions to non-project personnel was not warranted on a frequent basis.

- Perimeter ambient air monitoring within the support work zone and perimeter to this zone was conducted during active soil removal activities consistent with the Remediation Plan. To reduce particulate levels and exposures to airborne particulates, a combination of engineering controls (e.g., soil wetting) and personal protective equipment (PPE) was implemented as part of the work activities. The majority of results indicated that dust levels were below the action level of 0.1 mg/m^3 above background. Periodic dust readings above the action level were reported; however, these were attributed to other site activities not related to the PCB remediation work being conducted (i.e., passing trucks, soil work outside PCB impacted area, etc.). Copies of the perimeter air monitoring logs are included in Appendix B.

2.2 GRANITE STEPS REMEDIATION

This section presents the remediation and verification process completed for the granite steps. As presented in the Remediation Plan, based on pilot testing activities, this process consisted of gross removal of caulking, followed by decontamination of each step via dry-ice blasting and chemical washing, subgrade material removal and reforming, as needed, and replacement of the granite steps. A total of 21 sets of granite staircases in the southwest concourse work area constructed with PCB-containing caulking were subject to removal and decontamination. A drawing showing the location of each of the 21 sets of stairs is provided as Figure 2-1. An estimated total of 4,800 linear feet of caulking was present within the joints among a total of 809 individual granite steps. Some granite staircases were scheduled for removal and replacement so that the underlying concrete foundations can be re-established and the steps can be properly reset; whereas, some granite staircases were not reinstalled after step decontamination and the underlying concrete was removed.

During the initial assessment, suspect caulking materials were observed at two types of locations associated with granite stairs, as shown below:

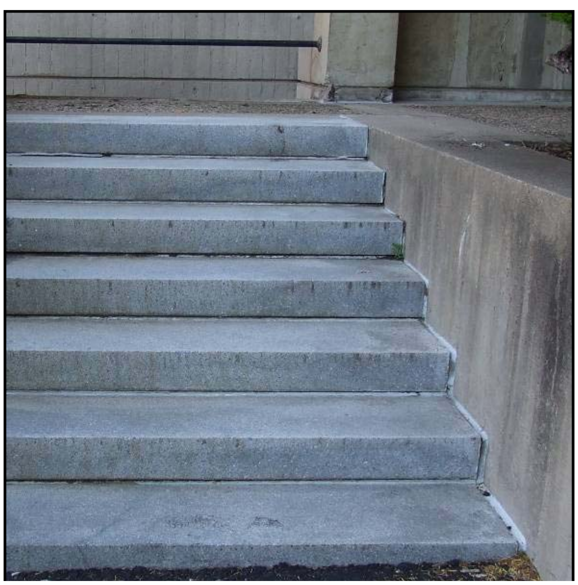


Photo above left: Horizontal joints spanning the width of the staircase, beneath the overlap between two consecutive granite slabs; also includes the joint at the top edge of the uppermost stair and the bottom edge of the lowest stair where these stairs abut concrete or another paved surface. Caulking is also present at the horizontal and vertical joints between the edge of the stairs and abutting walls.

Photo above right: Horizontal and vertical joints (the rise and run of each step) at the short edge of each stair where it abuts another slab in a wider staircase (often deteriorated or missing at many locations).

2.2.1 Caulking Removal and Granite Step Relocation

Gross removal of caulking was performed from each granite stair prior to its removal from the staircase. The caulking was removed by cutting or scraping with hand tools, or by using a mechanical caulking removal gun. No grinding or saw cutting (i.e., excessive dust-generating techniques) was used directly on the caulking. All removed caulking was containerized and disposed as > 50 ppm PCB wastes. During this process some remnants of caulking remained on the steps.

Each step was then lifted from the foundation, wrapped in polyethylene sheeting and transported via flat bed trick to a staging/decontamination area. This decontamination area was located in a vacated parking area adjacent but outside the limits of the Southwest concourse area. While staged and prior to decontamination, the steps were totally encapsulated in polyethylene sheeting. See photograph to the right.

2.2.2 Granite Decontamination and Verification

The decontamination area was established as a secure location surrounded by a fence to prevent access to the area. Each granite step, which has been labeled to ensure that it was returned to its original location, was staged on polyethylene sheeting in the decontamination area.

Initially, remnant caulking from the steps was removed by mechanical scraping and scrubbing; however, this method was not resulting in sufficient caulking removal (the first several steps were still observed to have remnant caulking adhered to some of the former joint locations). Dry ice blasting was pilot tested and shown to be effective in removal of the visible caulking remnants. As such, dry ice blasting was conducted within poly containment in the overall decontamination area. A photograph of the containment and step decontamination area is shown to the right (dry ice poly containment not shown).

Following the dry ice blasting, each step was decontaminated via chemical washing with a chemical extraction solvent (CAPSUR) following the manufacturer's recommended procedures for hand applications: the product was applied and scrubbed in using hand brushes for the full five minute dwell time; during the agitation, the surface of the granite was kept wet with CAPSUR at all times; following the five minute dwell time, all free liquid was vacuumed from the granite; and a layer of rinse water was applied to the granite and then vacuumed. This procedure was repeated three times followed by a triple water rinse after the final application.

After the decontamination process, the granite was inspected and verified that all residual caulking had been removed. Following decontamination, post-decontamination verification surface wipe samples were collected from decontaminated steps in accordance with the standard wipe test (40 CFR 761.123) from locations on the granite formerly in direct contact with caulking. All samples were extracted using USEPA Method 3540C (Soxhlet Extraction) and analyzed for PCBs using USEPA Method 8082.

A summary of the results is provided below.

- Per discussions with EPA during the Plan review, samples from the first 10 decontaminated stairs (from the Hampshire stairs) were sampled on July 6th and July 7th; all steps met the 10 ug/100cm^2 cleanup level, with five steps reported as non-detect.
- Given the above results, the sampling frequency was reduced from 100% to 25% of steps as specified in the June 25th Remediation Plan; Of the 206 samples collected at this frequency, the results were reported as follows:
    - 132 samples were reported as non-detect for PCBs (< 0.5 ug/100cm^2);
    - 56 samples were reported with PCBs below the cleanup level (> 0.5 and < 10 ug/100cm^2; average of 2.78 ug/100cm^2);
    - 18 samples were reported were PCBs above 10 ug/100cm^2 (ranging between 11.2 and 167 ug/100cm^2, average of 39 ug/100cm^2). It should be noted that nine steps initially reported with cleanup level exceedances were decontaminated and sampled before the dry ice blasting step was added to the decontamination process;
    - In summary, 92% of the verification samples met the clean-up level after the initial decontamination.
- Additional decontamination activities were conducted based on the results of the 18 samples over the cleanup level. Each individual stair reported with verification wipe results above 10 ug/100cm^2 as well as all steps immediately preceding the step with the cleanup level exceedance were re-decontaminated following the same CAPSUR decontamination process as outlined above and verification samples collected at off-set locations.
- Of the 18 samples collected after re-decontamination, the results were reported as follows:
    - 8 samples were reported as non-detect for PCBs (< 0.5 ug/100cm^2);
    - 6 samples were reported with PCBs below the cleanup level (> 0.5 and < 10 ug/100cm^2; average of 2.49 ug/100cm^2);
    - 4 samples were reported were PCBs above 10 ug/100cm^2 (ranging between 12.5 and 20.9 ug/100cm^2).
- For the four samples that still exceeded the level, the same process was repeated and all follow-up samples were either non-detect or below the cleanup level.

A summary table for all wipe data collected at each specific stair is provided as Table 2-1. The complete analytical laboratory reports are provided in Appendix C.

Following decontamination, the granite steps were again stored on polyethylene sheeting prior to transport back to the site for re-installation. All liquids, poly sheeting, and PPE was containerized in 55- gallon steel drums or lined roll-off containers (solids only) prior to off-site disposal. At no time, did any of the granite steps come in direct contact with the ground surface. Following completion of the decontamination activities, all materials were removed from the area.

2.2.3 Staircase Subgrade Management

After the granite stairs were removed, the underlying subgrade material (bedding sand) was removed and managed as ≥ 50 ppm PCB waste (per previous characterization sample results). Characterization samples were then collected from the underlying concrete forms in accordance with Remediation Plan and Approval at all granite stair locations. A total of 83 concrete samples were collected from the 21 separate concrete forms following the bedding material removal, with 96% of the samples reported as non-detect for PCBs or at concentrations ≤ 1 ppm. A summary table for the data collected at each specific stair location is provided as Table 2-2. The complete analytical laboratory reports are provided in Appendix C.

Concrete results at three locations were reported with PCBs above the 1 ppm cleanup level. At each of these locations, additional activities were conducted as summarized below:

- Prince South Stairs – one of the two concrete samples was reported at 3.28 ppm (the other was 0.358 ppm). At this location, additional concrete/mortar was removed from the form by jack hammering techniques and two follow-up post-removal samples collected for analyses. As indicated on Table 2-2, both samples were reported as non-detect for PCBs (< 1 ppm).

- Hampden North Stairs – Both concrete samples was reported as < 1 ppm; however, one of the samples was reported with a detection limit of 2.96 ppm. Given this limit, additional concrete/mortar was removed from the form by jack hammering techniques and two follow-up post-removal samples collected for analyses. As indicated on Table 2-2, both samples were reported as non-detect for PCBs (< 1 ppm).

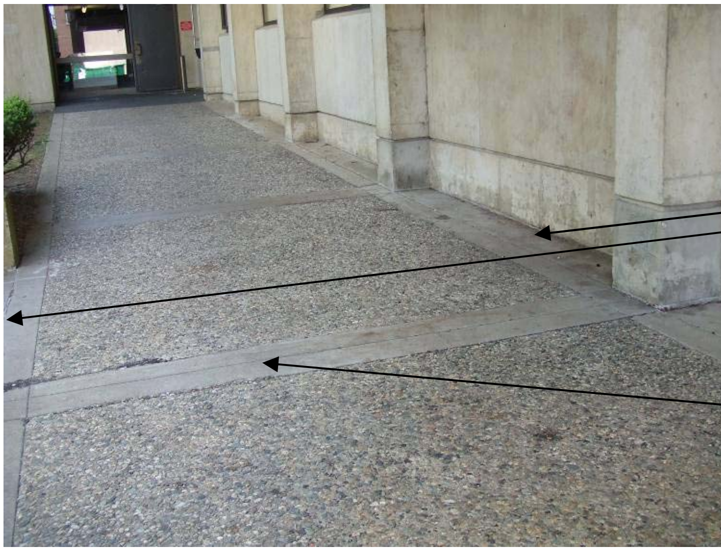
- Berkshire Plaza NE stairs - one of the two concrete samples was reported at 1.81 ppm (the other was non-detect). Given project schedules for this area of the concourse work, the entire concrete form was removed and disposed as < 50 ppm wastes. Following removal, a new concrete foundation for the stairs was installed and the granite stairs replaced.

All removed material was placed in lined roll-off containers for subsequent off-site disposal (see Section 2.7). Following this work, the forms at all locations for stair replacement were prepared and the granite stairs replaced. In areas where the granite steps were not replaced, the concrete foundations were removed or managed at the as-found concentration of PCBs (< 1 ppm).

2.3 CONCRETE PADS AND WALKWAYS REMEDIATION

This section presents the remediation and verification process completed for the concrete pads and walkways. As presented in the Remediation Plan, based on initial testing activities, this process included: removal of the existing caulking, removal of concrete and underlying soils on either side of caulked joints from a set distance and depth, and sampling to determine that remaining concrete and underlying soils met the cleanup levels for the planned activities in this area (e.g., ≤ 1 ppm if additional soil removals are required).

The concrete pads and walkways consist of concrete aggregate sections within concrete borders. These concrete pads are located throughout the concourse and were removed and replaced during this project. Caulking was observed where the concrete intersected a vertical structure, either a concrete retaining wall or building. Caulking was also observed in some expansion joints located within the pads, although this caulking was not consistently observed. Photographs of typical pads/walkways and caulking are provided below.



Typical Concrete Pads/Walkways

Caulking present along building wall and pad joint and at a concrete expansion joint within the pad

Caulking not present on joints within pad

Caulking at joint between pad and concrete retaining wall

Given the timing/schedule of the project, certain areas of the work area needed to be "cleared" to allow new construction to initiate in order to meet the overall schedule. A description of work and sample results in three areas were described in the Remediation Plan and this data was used as the basis for the remedial approach developed for the remainder of the concrete pads and walkways. The location and identification for each of the 20 concrete pads and walkways is presented on attached Figure 2-1.

As per the June 2010 Remediation Plan, initial verification concrete samples were collected from pads and walkways at 5 or 10 foot spacings depending on project conditions. Based on these results and the project schedule, the remediation of the remaining concrete pads and walkways consisted of removal of concrete and caulking (integral joints to the pad) on either side of the caulked joint to a distance of 12 inches and the full depth of the concrete pad using standard removal techniques (e.g., saw cut concrete at 12 inches and then removed concrete). One foot of the underlying soils was also removed at this time. All removed material was placed in lined roll-off containers for subsequent off-site disposal as > 50 ppm PCB wastes (see Section 2.7). During the removals, equipment and tools used in the process were decontaminated through spraying and wet wiping. Used PPE and decontamination materials were containerized for off-site disposal.

Following removal, verification concrete samples beyond the lateral extent of concrete removal were collected at a frequency of 1 sample per 10 linear feet (l.f.) of caulked joints to determine the PCB concentration of the concrete in these areas. Along caulked joints integral to the pad/walkways, verification samples were collected from concrete on both sides of the caulked joints. At the joints along buildings and retaining walls, samples were collected from the pad only (characterization and remediation of retaining walls and ground level surfaces are included in Section 2.5). On two pads, the Hampshire Pad and the Berkshire Plaza Pad, brick pavers were identified overlying a secondary concrete pad. These secondary pads were assessed following the same procedures as described above.

This process was followed for all 20 pads with the following exceptions: 1) Berkshire East Pad – upon inspection, no caulking was observed on any portion of the pad; therefore, no concrete samples were collected and these materials were not considered PCB-containing (no source present); 2) Hampden Southeast Landing – given the project schedule, importance of this area to other components of the concourse project, relatively small volume of concrete, and previous test results on the pad (see Remediation Plan), all concrete in this area was removed and disposed of as ≥ 50 ppm PCB wastes (underlying soil samples were collected following concrete removal and managed accordingly, see Section 2.6); and 3) Cance Pad – again due to project schedule constraints, a portion of the pad was removed prior to sample collection; all concrete from this portion was disposed as ≥ 50 ppm PCB wastes and samples of underlying soils, as well as concrete from areas not removed, were collected following the process outlined above.

A total of 349 concrete and brick paver samples were collected and submitted for PCB analysis to verify the extent of concrete removal or for waste segregation purposes. A summary table of the data collected at each specific pad location is provided as Table 2-3. The complete analytical laboratory reports are provided in Appendix C.

A summary of the results of the verification samples is as follows:

- 198 samples were non-detect
- 124 samples were ≤ 1 ppm (average concentration of 0.47 ppm)
- 27 samples were greater than 1 ppm (concentrations ranged from 1.1 to 7.7 ppm)

As indicated above, approximately 92% of the sample results were reported with PCB concentrations either as non-detectable or ≤ 1 ppm. Figures depicting the locations of the individual concrete samples are provided as Figures 2-2 (Hampshire Plaza), Figure 2-3 (Berkshire Plaza), and Figure 2-4 (Washington Plaza).

Depending on the results of the verification testing, either the concrete was segregated for off-site disposal based on its concentration of PCBs (> 1, < 50 ppm PCB wastes or < 1 ppm PCBs) or additional samples were collected to aid in the segregation. In addition, at some locations, given the project schedule, if concrete samples were > 1 ppm, areas of concrete (delineated to adjacent initial concrete samples) were removed as ≥ 50 ppm PCB wastes. In summary, following the initial removal of caulking and concrete (managed as ≥ 50 ppm wastes), the remaining concrete was managed at the 19 locations as follows:

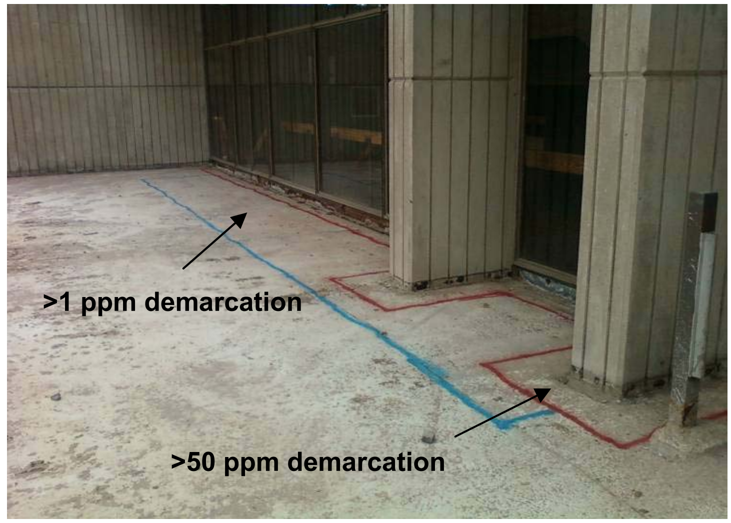
- 10 locations – remaining concrete was managed as ≤ 1 ppm PCBs;

- 2 locations – remaining concrete was managed as > 1 ppm, < 50 ppm PCB wastes (Kennedy/Coolidge pad and Thoreau Pad);
- 3 locations – the entire concrete pad was managed as ≥ 50 ppm PCB wastes (Hampden Southeast Landing; Prince South Landing, and Washington Landing);
- 4 locations –
    - Hampden Pad – 4 samples exceeded 1 ppm (1.1, 1.1, 1.2, and 1.2 ppm); at each location a second sample was collected 12 inches away from the first sample and each sample was reported as non-detect for PCBs; at each of these locations concrete was removed to 2 feet from the caulked joint and this concrete managed as ≥ 50 ppm PCB wastes; following this removal, the remaining concrete pad was managed as ≤ 1 ppm PCB.
    - Prince Pad - 4 samples exceeded 1 ppm (1.17, 2.14, 2.99, and 7.7 ppm); at each location, an area of concrete was marked out to the next adjacent sample point with < 1 ppm PCBs; all concrete in this area was removed along with the caulking/concrete and managed as ≥ 50 ppm PCB wastes; following this removal, the remaining concrete pad was managed as ≤ 1 ppm PCB.
    - Hampden West Pad - 4 samples exceeded 1 ppm (1.13, 1.942, 2.062, and 3.363 ppm); at each location a second sample was collected 12 inches away from the first sample and each sample was reported as non-detect or ≤ 1 ppm PCBs; at each of these locations, concrete was removed to 2 feet from the caulked joint and this concrete managed as ≥ 50 ppm PCB wastes; following this removal, the remaining concrete pad was managed as ≤ 1 ppm PCB. A portion of this pad was also located at the western limits of the project work area. In this area, a caulked joint was present within a 5 inch concrete border (see previous photographs). This border could be removed; however, concrete within the pad outside of the project work limits was not planned for removal. Given this condition, samples were collected within the 5 inch concrete border along this face of concrete and 2 of the 5 samples detected PCBs > 1 ppm (3.5 and 5.09 ppm). This concrete was subsequently removed and managed as ≥ 50 ppm PCB wastes.
    - Hampshire Pad – this pad was constructed of brick pavers underlain by bedding sand and then a secondary concrete pad. A description of the sequence of testing and removals for this pad are described below.

Hampshire Pad - characterization samples of the brick paving stones were collected at a distance of one foot from caulked joints at a frequency of one sample every 10 linear feet of caulked joint. Following sampling, the individual brick paving stones and the underlying bedding sand were removed to access the underlying secondary concrete pad. Characterization samples of the concrete were then collected at the same frequency from locations beneath the paving stone samples.

Results from the brick characterization samples were used to segregate the brick and underlying bedding sand materials for disposal. Brick and sand materials within one foot of all caulked joints were removed for disposal as ≥ 50 ppm PCB waste. The remaining materials were segregated for disposal as either > 1 and < 50 ppm PCB waste (one brick sample with a reported PCB concentration of 3.0 ppm) or as general demolition debris (non-PCB).

Following complete removal of all brick pavers and bedding sand from the pad, additional characterization samples of the underlying concrete were collected to delineate areas of > 1 ppm PCBs identified along the west side of the pad. Results from the concrete characterization samples were used to segregate the concrete materials for disposal. As described above, concrete materials within one foot of all caulked joints were removed for disposal as ≥ 50 ppm PCB wastes. The remaining concrete was segregated as either > 1 and < 50 ppm PCB waste or general demolition debris. Soils beneath the concrete were also initially excavated and segregated for disposal based on the concrete characterization sample results. Markings depicting the pre-removal areas of concrete from the underlying pad are shown on the photograph to the right.



Segregation of Concrete Pad

Upon removal of the concrete pad and subsequent soil excavation as described above, it was observed that caulking between the pad and the building had been in direct contact with metal plates beneath the storefront windows and doors of the Hampshire Building. Following removal of all visible caulking from the plates, a verification wipe sample was collected from the metal plate to confirm that PCBs were not present above the clean up criteria for non-porous surfaces of 10 µg/100cm^2 (verification wipe sample SWC-VWC-1986 was reported as non-detect for PCBs).

As per the June 2010 Plan, following the removal of concrete materials surrounding the caulked joints, soils beneath the concrete removal areas were excavated to a depth of 1 foot below the base of the concrete pad. Soil samples were collected from the base of the excavation at a frequency of 1 sample per 10 l.f. of excavation. If soils detected PCBs above cleanup levels and additional removal was needed in these areas, then additional soil was excavated and disposed of at its as found concentration. A presentation of the verification sampling strategy, number of samples, and analytical results for soils is provided in Section 2.6 of this report.

2.4 PEDESTRIAN TUNNEL REMEDIATION

An outdoor pedestrian tunnel is located on the northern end of the project work area and consists of an approximately 94 foot long concrete archway tunnel beneath Massachusetts Avenue. As presented in Section 7 of the Remediation Plan, PCB containing caulking was located at an expansion joint at approximately the mid point of the concrete ceiling archway (40 linear feet) and at caulked expansion joints approximately every 10 feet along a concrete curbing on both sides of the tunnel.

The work within the Tunnel as part of the concourse revitalization project included replacing the concrete slab on the ground surface, painting the archway ceiling (including removing/replacing the expansion joint caulking on the ceiling), and installing other aesthetic features to promote the use of the tunnel as opposed to students using the street surface crossing.

A summary of the completed remediation activities followed by the results of the baseline sampling is presented in the following sections.

2.4.1 Remediation Implementation

As described in the Remediation Plan, characterization samples indicted that PCBs were detected in caulking, adjacent concrete of the ceiling (within 12 inches of the joint), and soils at the base of the joint (within a riprap embankment on the sides of the tunnel). A photograph of the archway caulked joint is shown above. No PCBs were detected in concrete samples collected from the curbing. Given the structural limitation of the archway ceiling, extensive concrete removal was not a feasible remedial alternative; therefore, a containment remedial plan was developed incorporating the existing plans to re-paint the ceiling.

The first component of the plan was to remove the caulking, which was removed following the procedures described in Section 4 of the Remediation Plan. All caulking was removed by physical means and containerized for off-site disposal as $\geq$ 50 ppm PCB wastes. Following removal, the joint was visually inspected to ensure that all caulking was removed to the maximum extent practicable. This process was also repeated for the caulking on the concrete curb. The archway caulking was replaced (as described below); however, new caulking was not applied to the concrete curbing.

The second component of the plan involved incorporating the current planned activities into the remediation plan for PCBs - sand blasting the archway ceiling in preparation for repainting. This was accomplished by providing PCB awareness training for the sandblasting workers (workers used respirators and were already entered into a respirator program), totally encapsulating the tunnel area with polyethylene sheeting (e.g., poly on the tunnel floor and side openings), and collection of all sand blast media and paint residuals with the polyethylene sheeting and managing this material as $\geq$ 50 ppm PCB wastes.

Prior to pouring a new concrete slab at the base of the Tunnel, three soil samples were collected at locations spatially distributed throughout the tunnel, including one beneath the archway joint. All three samples were non-detect for PCBs (< 0.033 ppm). Subsequently, the new concrete pad was poured at the base of the Tunnel.

In addition to the base samples, two soil samples were collected at the point where the archway caulked joint entered into the rip rap (stone and soil) sides of the tunnel. The soil sample on the east side of the Tunnel reported PCBs at 0.78 ppm and the sample from the west side reported PCBs at 8.36 ppm. Based on construction drawings, the archway concrete (and caulked joint) terminates approximately one foot below grade into a concrete thrust block. Given this data, soils in an approximate two foot area around the joint to a depth of 21 inches feet were removed from the west side and managed as $\geq$ 50 ppm PCB wastes. Following soil removal, three verification samples were collected from the south, north, and base of the excavation and analyzed for PCBs. All three samples were reported as non-detect for PCBs (< 0.1 ppm).

Given the description and use of the Tunnel ceiling, the concrete on the archway ceiling with residual PCBs can be considered a low occupancy area (per 40 CFR 761.3). However, the area that exhibited concentrations > 1 ppm (the high occupancy criteria) was contained via encapsulation techniques (note: the entire tunnel ceiling was also painted/coated as part of the concourse project).

The concrete in former direct contact with the caulking (inside the return of the joint with PCBs at 309 ppm) was encapsulated with two coats of the Sikagard 62 epoxy coating (tan color), followed by new caulking. The Sikagard 62 epoxy was also applied to the concrete located within 12 inches of the joint in two coats of contrasting color followed by an elastomeric acrylic coating as a top coat (white color). The remaining portions of the ceiling were coated with the white elastomeric acrylic coating. A photograph of the encapsulated area is shown to the right.

2.4.2 Baseline Sample Collection

Following the application of the encapsulants, baseline wipe samples were collected for PCB analyses. Given the accelerated project schedule, weekend work was on-going throughout the project. During a weekend activity, the new caulking was applied to the archway joint prior to collecting the baseline wipe samples. Upon inspection, new caulking was not applied to a small section of the joint near the base of the joint; therefore, a wipe sample was collected from this location. As indicated on Table 2-4, a result of 7 ug/wipe (calculated to be 24 ug/100cm^2) was detected in this sample. To confirm this result, new caulking from a section of the joint was removed and a wipe sample collected from the underlying epoxy surface. This wipe sample result was 4.1 ug/wipe (calculated to be 7.16 ug/100cm^2). Given these results, a wipe of the new caulking was collected and detected PCBs at 3.66 ug/100cm^2. A sample from the encapsulated concrete adjacent to the joint was collected and PCBs were not detected in this sample above the laboratory's minimum reporting limit. All sample results are summarized on Table 2-4 and the laboratory reports are provided in Appendix C.

Per the Approval conditions, a Monitoring and Maintenance Implementation Plan describing the planned monitoring activities to be conducted on encapsulated surfaces at the site was submitted to the EPA in December 2010. An evaluation of additional activities due to these residual PCB concentrations on the surface of the encapsulants is on-going (e.g., continued monitoring, potentially apply another top coating to the caulked joint, etc.). However, given the location of the caulked joint in relation to the tunnel use and potential receptors (transient pedestrian use), an immediate action is not warranted at this time.

2.5 RETAINING WALLS AND GROUND LEVEL SURFACES REMEDIATION

As presented in Section 8 of the Remediation Plan (and Addendum #1), during the initial characterization assessment, suspect caulking materials were observed at three types of locations associated with retaining walls and ground-level structures:

- Joints between granite stairs and walls (horizontal and vertical seams; see Photo 1)
- Joints between paved ground surfaces and walls (horizontal seams; see Photo 2)
- Joints between a building wall and the end of a retaining wall (vertical seams; see Photo 3)

Photo 1 (Top Left): Caulking joints between stairs and walls.

Photo 2 (Top Right): Caulking joints between paved ground surfaces and walls.

Photo 3 (Bottom Left): Caulking joints between a building wall and the end of a retaining wall.

PCB impacts to retaining walls with caulking and scheduled to be removed were managed in a simailr approach to that of the concrete pads and walkways except that given schedule constraints segregation of the concrete was not conducted and all portions of the concrete walls that were removed were managed as ≥ 50 ppm wastes. PCB impacts to retaining walls and ground level structures scheduled to remain in place were managed through the encapsulation of PCB remediation waste as an interim solution designed to shield impacted materials from the effects of weathering and leaching mechanisms, thereby eliminating potential exposure pathways and mitigating the potential for PCB transfer via direct contact and/or leaching to other media/materials. A description of the remediation activities and baseline sampling is presented in the following sections.

2.5.1 Additional Characterization and Pilot Testing Activities

As part of the initial assessment, concrete samples were collected from three retaining walls where previous caulking samples were analyzed. Samples were collected from concrete in direct contact with the caulking (after removal of caulking) and at select distances away from the joint. The results indicated that concrete in direct contact with the caulking exhibited concentrations of PCBs. PCBs were also detected in three of the four samples collected at distances up to 6 inches from the caulking. A summary of the sample results was provided as Table 8-1 in the June 2010 PCB Remediation Plan. Based on this data, it was concluded that concrete on these structures adjacent to the caulking was impacted by PCBs.

For those structures scheduled for removal, this material was managed as PCB wastes. For those structures not scheduled for removal, additional sampling and pilot testing was conducted to support the containment remedial approach. A description of these activities is provided below.

2.5.1.1 Characterization Sampling

Following removal of caulk via mechanical removal techniques, samples of adjacent concrete were collected at six locations to evaluate the nature and extent of PCB concentrations at various distances from the caulked joints. The locations for the profiles were selected as follows:

- Horizontal joints at different concrete surfaces above and below proposed final grades:
    - Along concrete retaining walls (2 locations) – samples collected from the retaining wall west of the Crampton Building approximately 11 feet south of the Crampton West Stairs and from the east retaining wall in the Berkshire Plaza approximately 12 feet south of the Hampshire South stairs.
    - Along building surfaces (1 location) – samples collected from a column on the Prince Building along the Prince concrete pad.
- Surfaces along former granite staircases – samples collected from the concrete retaining wall at the former Crampton West Stairs and from the Berkshire Building at the Berkshire Plaza Southwest stairs.
- Retaining wall and building vertical seam – samples collected from Crampton Building and concrete wall at Crampton West Stairs.

At each location, concrete samples were collected in direct contact with the caulked joint and at distances of 1", 3", 6", and 12" from the caulked joint in two directions (above and below horizontal joints and to the right and left of the vertical caulked joint) for a total of 9 samples from each location. A direct contact sample was not collected from beneath the vertical caulked joint due to the presence of a significant amount of caulking at this location. Concrete samples were collected from a depth of 0-0.5 inches using an electric rotary hammer drill and a 1-inch drill bit.

Analytical results from the characterization sampling are presented on Table 2-5. Overall findings from this sampling included:

- The highest concentrations of PCBs were detected in the direct contact samples with generally decreasing concentrations with distance from the caulked joint;
- There appeared to be a correlation between the caulking concentration and the PCB concentration detected in the concrete with higher concentrations in the caulking correlating with higher concentration in the concrete – both direct contact and distance from the caulking;
- There did not appear to be a substantial difference in PCB concentrations in concrete samples collected from above or below the horizontal joints;
- In all locations (except the sample above one horizontal joint location), the PCB concentrations decreased to $\leq$ 1 ppm at a distance of 12 inches from the joint. The one location detected PCBs at 1.14 ppm.

- The lowest PCB concentrations were observed in the concrete collected adjacent to the vertical joint where the retaining wall meets the building.

2.5.1.2 Containment via Encapsulation Pilot Test

As discussed in the Remediation Plan, the remedial approach for residual concentrations of PCBs in concrete to remain in place was to manage the impacts through containment via encapsulation with a protective coating following caulking removal. The barrier or encapsulant will contain the PCBs and prevent direct contact with PCBs and/or potential migration effects to other media.

Several products were evaluated for use on surfaces above and below the final grades. Based on this evaluation, two products were selected for implementation during the pilot test; Sikagard 62 a protective, colored, epoxy coating for below grade surfaces and Sikagard 670W a water based, clear, acrylic surface coating for above grade surfaces. The Sikagard 62 was selected given its past use on PCB sites and its applicability for use under subgrade conditions and the Sikagard 670W was selected for its aesthetics, as well as containment properties, given that it is a clear coating.

For pilot test activities, both encapsulants were applied to approximately 10 feet of a portion of the Berkshire Plaza retaining wall immediately adjacent to the characterization concrete samples. In addition, the subgrade encapsulant (Sikagard 62) was applied at several other locations in order to meet the project schedule requirements. Following curing, surface wipe samples were collected from the coatings using hexane-soaked wipes. The pilot test results indicated:

- Sikagard 62 tan - 8 sample locations – all results were non detect; < 0.5 ug/100cm^2
- Sikagard 670W clear – 3 sample locations - all results were non detect; < 0.5 ug/100cm^2

Based on these results, the Sika products listed above were used during the full-scale application.

2.5.2 Remediation Implementation

All caulk from the subject areas was removed using manual techniques (i.e., scraping and peeling) with hand tools to the maximum extent practical (refer to the PCB Remediation Plan). Soils adjacent to these joints (2.5 feet laterally away from the joint to a depth of 1 foot below grade) were removed and disposed off-site (refer to Section 2.6 of this report).

Twelve sections of concrete retaining walls at the site were designated for removal and off-site disposal as part of the renovation work. Of the twelve sections of concrete retaining walls designated for off-site disposal, nine were adjacent to granite staircases, two were adjacent to unpaved soils on either side, and one was adjacent to granite stairs (partial length) and unpaved soils (partial length); therefore, 10 walls were constructed with caulking (e.g., only the walls that are adjacent to granite stairs). Refer to Figure 2-1 for wall locations.

Given project schedule constraints and the observed construction of one of the retaining walls (limitations to segregation techniques), the project team decided to dispose of the entire section of the walls constructed with caulking as ≥ 50 ppm PCB wastes without characterization (based on the data collected in other areas of the Site). At each location, the concrete was removed and placed in roll-off containers for off-site disposal (refer to Section 2.7).

Concrete in areas not scheduled for removal and within the limits of the encapsulation was manually cleaned to remove latent dust, dirt, and debris to the extent required to allow for encapsulant application. Following caulk removal and surface preparation, two coats of the Sikagard 62 colored epoxy was applied over the former location of the caulked joint, to a minimum distance of 12 inches below the caulked joint, and to a distance of the final finished grade above the caulked joint, if the final grade was above the former caulked joint location. A tan color was selected by the project architects and team. Given that this coating will be below final grade, contrasting colors were not applied since future inspections of the coating will not be possible. As part of the project, the epoxy is being covered by the final finished material which will include, depending on location, concrete, concrete brick pavers, or landscape materials. Concrete to a distance of no less than 12 inches above the caulked joint or finished grade was encapsulated using the Sikagard 670W clear acrylic coating. Figure 2-8 depicts the locations of the encapsulant surfaces throughout the site.

Photographs of the encapsulant coatings are shown below.

2.5.3 Baseline Sample Collection

Following the application of the selected encapsulants, baseline wipe samples were collected at an approximate frequency of 1 wipe sample per 100 linear feet (l.f.) of caulked joint. In total, 67 wipe samples of the Sikagard 62 epoxy and 66 wipe samples of the Sikagard 670W were collected for PCB analyses following the material cure time.

Results from the baseline verification wipes were used to evaluate the overall effectiveness of the encapsulant and to develop the long term maintenance and monitoring plan. A summary of the sample results is provided on Table 2-6 and the laboratory reports are provided in Appendix C. Analytical results were evaluated as follows:

- Total PCB concentrations > 1 μg/100 cm^2 – additional evaluation of the encapsulant to be conducted including the application of additional encapsulant and follow up verification samples, as needed.
- Total PCB concentrations $\leq$ 1 μg/100 cm^2 – no additional verification testing or evaluation warranted.

The samples results indicated:

- No PCBs were detected above the laboratory's minimum reporting limits in any of the samples collected from the Sikagard 62 areas (all 67 samples were < 0.5 ug/100cm^2)
- No PCBs were detected above the laboratory's minimum reporting limits in 64 of the 66 samples collected from the Sikagard 670 W areas (< 0.5 ug/100cm^2)
    - The two samples with PCBs detected were both collected from the same area (Prince stairs) and detected PCBs at 1.14 and 1.48 ug/100cm^2. Of note, this is the only location where the clear coat was used below the finished grade line. This was done because the on-site supply of Sikagard 62 epoxy had been exhausted and new product was not available for a few days. Given the overall

work schedule and deadlines, the Prince stairs needed to be re-installed at that time; therefore, the Sikagard 670 W coating was used for both below and above the former caulk line (supporting data included results received to date from the baseline wipe samples, which were all non-detect).

- Prior to receipt of the laboratory data from the wipe samples below the caulk line and given the project schedule, the decontaminated granite stairs were replaced at this location, thereby covering up the coating with another barrier (but preventing the application of another coat prior to the granite installation). The wipe samples from the accessible encapsulated concrete above the granite steps did not detect PCBs above the minimum laboratory reporting limit of 0.5 ug/100cm^2.

2.6 SOIL REMEDIATION

This section presents the remediation and verification process completed for the underlying soils across the concourse area. As presented in the Remediation Plan, the objective of the soil remediation was to properly manage PCB-impacted soils in areas planned for soil excavation in support of new infrastructure and subgrade components as part of the Southwest Concourse replacement project. Given that this project is regulated both under 40 CFR 761 and the Massachusetts Contingency Plan (MCP), the EPA's high occupancy area cleanup level of ≤ 1 ppm total PCBs was used as the remedial objective for no further restrictions. If this level is met, then the soils represented by the characterization data will have unrestricted use and a condition of No Significant Risk can be achieved under the MCP. Separate submittals and documentation to demonstrate compliance with the MCP are being prepared and will be submitted to the MassDEP.

In areas not subject to excavation or for residual concentrations of PCBs following excavation completion in select areas, EPA's high occupancy area cleanup level of ≤ 10 ppm total PCBs was also used as the remedial objective with further restrictions. In these areas, the remaining soils were placed under a concrete cap meeting the requirements of 40 CFR 761.61(a)(7). The objective of the cap is to prevent or minimize human exposure, infiltration of water, and erosion.

Given the timing/schedule of the project, certain areas of the work area needed to be "cleared" to allow new construction to initiate in order to meet the overall schedule. As described in the Remediation Plan, management of asphalt and sub-base materials were in this category. Based on the data presented in the Remediation Plan, asphalt and sub base materials located within 12 inches of the building were removed and managed as PCB wastes. During removal, any loose caulking located at the ground surface to building or wall seam was removed and placed into containers for off-site disposal as ≥ 50 ppm PCB wastes.

A description of soil removal work and sample results in several areas were described in the Remediation Plan and this data was used as the basis for the remedial approach developed for the soils across the project area, as presented in the following sections.

2.6.1 Soil Removal

The area subject to soil remediation covers approximately five acres. The remedial plan and approach that was developed and implemented at each area subject to excavation as part of the concourse replacement project consists of an area-specific characterization followed by PCB-impacted soil delineation, excavation and off-site disposal as PCB containing soils, verification sampling following initial excavation, and additional soil excavation/verification, as needed, based on the sample results. Soil removal activities were conducted in compliance with 40 CFR 761.61 and in accordance with the MCP regulations (310 CMR 40.000). Only those soil areas confirmed to meet the cleanup levels were cleared for use by the General Contractor.

As part of this project, the following soil management areas were identified:

- Soils within one to two lateral feet and to a one foot depth of an existing structure with caulking present along the horizontal seam between the ground surface covering and the respective structure were excavated by the Remediation Contractor. Given the presence of caulking in these areas and the overall project schedule, limited characterization sampling was conducted prior to excavation and this material was assumed to contain PCBs and require off-site disposal.
- Soils within planned excavation areas to support new infrastructure (drainage, utility installations, planting beds, etc.) or areas that required excavation for final subgrades or other miscellaneous project conditions was typically characterized and managed at as-found PCB concentrations.

All soils designated for removal as part of the concourse replacement project that have PCB concentrations in excess of 1 ppm were excavated and transported off-site for disposal at an approved facility as bulk PCB remediation waste. All excavated soil was stored in lined, marked, and covered roll-off containers in accordance with 40 CFR 761.40 and 761.65.

Equipment, tools, excavator buckets, shovels, etc. were decontaminated through pressure washing, spraying, or wet wiping following use and/or between uses, as needed. At the completion of the work, non-disposable equipment and tools that handled PCB material were decontaminated using a hand application of CAPSUR, followed by scrubbing, and then rinsing the equipment with water. All decontamination fluids were collected and transferred to 55-gallon drums for off-site disposal with the liquid waste generated during the granite stair decontamination. Used PPE and decontamination materials were containerized for off-site disposal. Refer to Section 2.7 for additional discussion on off-site waste disposal.

Following soil excavation, post-removal verification sampling was conducted to demonstrate that the clean-up goals have been achieved.

2.6.2 Characterization and Verification Sampling

Characterization sampling was focused on site soils in the following targeted areas:

- Areas for excavation to install various project components, including retaining walls, drainage systems, curtain drains, curbing, and other similar components.
- Adjacent to potential source areas (e.g., caulking along structures, stairs, or other areas).

- Areas to provide spatial distribution of characterization data throughout the concourse.

As presented in the Remediation Plan submittal, initial work at the site was being performed under a 40 CFR 761.61(b) process and as such, samples were collected at a 10 foot or 5 foot sample frequency depending on the removal action. Based on these results, a modification was proposed and approved to change the sample frequency, as described below.

- 1 sample per every 20 linear feet along a planned excavation area (e.g. for drainage lines or curbing, etc.) or around the perimeter of a structure with caulking (provided the soil was not previously removed –see verification sampling below).
- In other excavation areas that were not drain lines, utilities, or structure perimeters, the sample frequency was typically a 10 foot square grid spacing.
- Sample depths ranged from the initial soils to depths of the planned excavation (e.g., if a curbing was to be installed to 2 feet below grade, then soil samples were collected from the initial 3 inches of soils as well as a subset of soils from a deeper depth, such as 12-15 inches below grade).

Depending on the specific area (project component), samples may have been collected adjacent to the former source (caulking) and at set distance from the caulking (e.g., 10 feet). As described in verification sampling discussion below, soils adjacent to caulking along horizontal seams between the ground surface and a structure were removed along with this caulking. The area of removal was 2.5 feet laterally away from the building to a depth of approximately 1 foot. Based on discussions with EPA during Plan review, additional characterization samples were collected between the 2.5 foot excavation area and the 10 foot lateral area. A total of 14 samples were collected from soils 5 feet laterally from the buildings throughout the project area. Thirteen of the soil samples were collected from depths of 0-3 inches below existing grade and one was collected from a depth of 12-15 inches. Analytical results indicated that 5 samples were non-detect (with reporting limits < 1 ppm) and 8 samples were < 1 ppm (with an average PCB concentration of 0.345 ppm). Results from one sample indicated that PCBs were present at a concentration of 1.3 ppm. Additional excavation was conducted in this area per the procedures described in this section.

Post-excavation verification samples were collected in areas following soil removals and included:

- Adjacent to potential source areas (e.g., caulking along structures or retaining walls, stairs, or other areas). The area of removal was 2.5 feet laterally away from the building or wall to a depth of approximately 1 foot.
- Areas where characterization samples exceeded 1 ppm and the area was planned for excavation to install various project components, including retaining walls, drainage systems, curtain drains, curbing, and other similar components.
- Areas beneath caulked joints of concrete pads and walkways where the caulking, 12 inches of concrete on either side of the joint, and underlying soils beneath this removed concrete were removed.
- Sample depths were typically the bottom 3 inches of soil at the base of the excavation.

As presented in the Remediation Plan submittal, initial work at the site was being performed under a 40 CFR 761.61(b) process and as such, samples were collected at a 5 foot sample frequency depending on the removal action. Based on these results, a modification was proposed and approved to change the sample frequency, as described below.

- 1 sample per every 20 linear feet along the perimeter of a structure or wall where caulking was formerly located and soils were removed under the assumption that they were PCB contaminated. If samples detected PCBs at concentrations > 1 ppm, then additional soil was removed and samples collected at a 10 foot grid spacing or 10 linear feet.

- In planned excavation areas with PCBs > 1 ppm that are not structures or wall perimeters with former caulking, a sample frequency on a 10 foot square grid spacing was typically implemented following soil removal.

In summary, 1,267 soil samples were collected and analyzed for PCB analyses with approximately 753 soil samples collected post-soil removal (verification samples) and 514 soil samples collected prior to any removal actions (characterization samples). All samples were transported to the laboratory under standard chain of custody procedures, extracted using USEPA Method 3540C (Soxhlet extraction), and analyzed for PCBs using USEPA Method 8082.

A summary of the sample results is provided on Table 2-7 and the laboratory reports are provided in Appendix C. A review of the data indicates:

Characterization

- 273 samples were non-detect
- 202 samples were ≤ 1 ppm (average concentration of 0.34 ppm)
- 39 samples > 1 ppm
    - No samples > 50 ppm
    - 8 samples > 10 ppm
    - 31 samples > 1 < 10 ppm (average concentration of 3.43 ppm)

Verification

- 365 samples were non-detect
- 287 samples were ≤ 1 ppm (average concentration of 0.39 ppm)
- 101 samples > 1 ppm
    - 81 samples > 1 < 10 ppm
    - 14 samples > 10 ppm
    - 6 samples > 50 ppm (55, 73, 77, 83, 110, and 120 ppm)

Approximately 90% (88.9%) of the soil samples have been reported with PCB concentrations either non-detectable or ≤ 1ppm. Figures depicting all characterization and verification soil samples are provided as Figure 2-5 (Hampshire Plaza), Figure 2-6 (Berkshire Plaza), and Figure 2-7 (Washington Plaza).

As indicated previously, in many areas soil samples were collected following an initial excavation in areas that were either adjacent to vertical structures with former caulking or in areas to support the concourse project (utilities, landscaping areas, etc.). In those areas that were scheduled for additional soil removals to support the concourse project and PCBs were detected above 1 ppm, additional soil was removed and post-verification samples collected. In addition, in areas that detected PCBs > 10 ppm, additional soil was also removed and verification samples collected following the excavation. This process was conducted in 33 isolated areas, which are depicted by cross-hatching on Figures 2-5 to 2-7. In each of these areas, soil removal was continued until the post excavation samples were < 1 ppm (in areas for additional subsurface concourse project work) or < 10 ppm in areas where no additional soil removal was scheduled and the soil was to be covered by a concrete pad that met the requirements of a compliant cap per 40 CFR 761.61. Figures 2-5 to 2-7 depict the sample locations that were subsequently removed and their representative verification samples.

Following completion of the soil removal work, all soil samples were reported as ≤ 1 ppm throughout the concourse project except for 12 separate areas that exhibit PCB concentrations >1 ppm, but < 10 ppm and were subsequently covered by a concrete cap in accordance with 40 CFR 761.91(a)(7). The concrete cap consists of a uniform placement of a minimum of 6 or 8 inches of concrete over the area which exhibited PCBs > 1 ppm in order to prevent or minimize human exposure, infiltration of water, and erosion. These concrete caps were part of the original concourse rehabilitation design and as such extend over much greater areas than where residual PCBs were reported at > 1 ppm. If any breaches of the cap, which would impair the integrity of the cap are discovered, repairs shall begin within 72 hours of discover. These areas are shown on Figure 2-8 and described on Table 2-8.

In addition to the 12 cap areas, one area on the Site exhibited residual concentrations > 10 ppm, but below the low occupancy criteria of 25 ppm. This area is located immediately adjacent to the north side of John Quincy Adams building and the excavation and verification work is described in the following paragraphs.

An initial soil excavation along the building face below the horizontal caulking joint was conducted over an approximately 1 foot deep by 2.5 feet wide area. A total of five verification samples at 20 foot intervals were collected following excavation. Additional samples located 10 feet directly north of each verification sample were also collected at the same time. Results of three verification samples were reported as greater than 1 ppm (1.88, 6.3, and 18 ppm). All four northern samples (10 feet away) were reported as having concentrations < 1 ppm.

Based on this data, the second excavation lift extended laterally 5 feet from the building to a depth of 2 feet. The first utility line (4" PVC) was discovered at this depth. The second set of verification samples were collected within the deeper excavation at each of the original sampling locations (offset by 6 inches), as well as additional samples at a 10 foot interval between samples. Of the seven total locations sampled as part of the re-dig, three samples detected PCBs > 1 ppm (6.2, 8.1, and 24 ppm).

Based on this data, the excavation was extended to a depth of 3.5 feet and verification samples collected for analyses. The new excavation completely exposed the 4-inch PVC pipe and a concrete duct bank for the building's steam supply. Results from the three verification samples were reported with PCBs > 1 ppm (1.5, 3.8, and 23 ppm); therefore, a third re-dig was performed to a depth of 4.9 feet, exposing the top of a cast-iron pipe running parallel to the building.

The three final verification samples were collected at three off-set locations with the results indicating PCBs > 1 ppm in 2 of the 3 samples (9.4 and 23 ppm). At this point, additional soil removal could not be conducted due to the presence of the underground utilities and the data, at least at one location, was consistently being reported at around 23 ppm from multiple depths. Based on discussions with UMass representatives, it was learned that previous utility work (water line break) had been performed in this area and it was possible that backfilling "mixed" soils in this area resulted in the anomalous readings in this area compared to the remainder of the site.

As presented in Addendum #2 to the Remediation Plan, verification samples from the final limits of the excavation exceeded 1 ppm; however, they were below 25 ppm (the low occupancy cleanup level). The final ground surface covering for this area will be planting beds. The location of these concentrations are positioned approximately 5 feet below ground surface and beneath/adjacent to several underground utilities. As such, access to this area is extremely limited and would only be encountered by UMass facilities personnel or contractors performing subsurface utility work. This location will be identified on drawings at UMass Facilities and Campus Planning and if utility work requiring excavation is needed in this area, proper worker safety, controls and material management will be performed. The location of this area is depicted on Figure 2-8. The use of the low occupancy cleanup level in this area was approved in EPA's August 30, 2010 Approval for the work.

2.7 WASTE STORAGE AND DISPOSAL

Solid PCBs wastes generated during the work were placed in secure, lined, and covered roll-off containers in accordance with 40 CFR 761.65. Initially, the roll-off containers were staged near the work areas; however, upon filling the container and because of the number of anticipated containers and work space restrictions within the project work limits, they were moved to a central location on the UMass campus for temporary storage prior to off-site transport and disposal. All containers were properly labeled and marked in accordance with 40 CFR 761.40.

As described in Addendum #2 to the Remediation Plan, roll-off containers of soil and concrete were generated during the performance of the work. As of the date of the addendum, 45 of the containers were to be managed and disposed off-site as ≥ 50 ppm PCBs wastes (hazardous waste landfill). Twenty-nine (29) of the roll-offs contain soils that were characterized prior to excavation in accordance with the sampling plans described in the Remediation Plan and Addendum #1. The analytical results indicated that all characterization samples representing these containers were < 50 ppm PCBs. As such, these containers were being managed and disposed of as PCB Remediation Wastes at concentrations of > 1 ppm and < 50 ppm (non-hazardous waste landfill permitted to accept PCB Remediation Wastes < 50 ppm).

Soils within the remaining roll-off containers were not characterized in situ prior to excavation and therefore, an alternate characterization plan to determine their proper disposal was proposed in Addendum #2 and approved by EPA. The basis for this alternate plan was two-fold: 1) review and use of all existing site soil data; and 2) collecting soil samples from each roll-off container for laboratory analyses.

As indicated in previous sections, approximately 90% (88.9%) of the soil samples were reported with PCB concentrations either non-detectable or ≤ 1 ppm with only 0.5% of the samples detecting PCBs ≥ 50 ppm (6 samples from only three locations). Given this information, there was a higher probability that the soils in these roll-off containers would be < 50 ppm as opposed to ≥ 50 ppm PCBs. To support this statement, soil samples from six roll-off containers were initially collected for PCB analyses. The roll-offs were divided into halves and two random discrete samples per half (composite depth from the soil surface to 2.5 to 3 feet) were collected and submitted for analyses. All samples were well below 50 ppm with 7 of the 12 samples < 1 ppm PCBs and the remaining 5 samples > 1 ppm and < 5 ppm.

As presented in Addendum #2 and discussed in an August 23rd meeting at EPA, supplemental data was collected from each of the subject roll-off containers to determine their disposal classification. Of the roll-offs in the above category, seven were previously sampled as part of the Addendum #2 submittal; therefore, a total of 35 roll-offs were sampled on August 25, 2010. Each of the 35 roll-offs were divided into three sections and one sample was collected from each third from the surface soil to a depth of 2.5 to 3 feet. The three samples were then composited into one sample and submitted to the analytical laboratory for PCB analysis (EPA method 3540C/8082). Analytical results from the roll-off samples indicated that the concentration of PCBs ranged from 0.12 to 9.7 mg/kg. As per Addendum #2, roll-offs containing PCBs < 15 ppm in the composite samples were to be disposed of as < 50 ppm PCB wastes at a non-hazardous waste landfill permitted to accept PCB Remediation Wastes < 50 ppm.

Based on these results, a final inventory and listing of all roll-offs containing PCB wastes was compiled and is provided as Table 2-9 and 2-10. Included in these tables are the roll-off container identification, the waste classification for disposal purposes, the waste media, and the source of the material. Of note, at the time of transport additional containers were generated due to some of the original roll-offs containing too much material for transport. Under these conditions, materials from the original containers maintained there classification if they were moved to a different empty container.

Upon completion of the waste profiling and acceptance to the respective facilities, soils and concrete were loaded into transportation vehicles for shipment to the disposal facility.

- Soils, concrete, and all caulking classified as ≥ 50 ppm PCB wastes was segregated for disposal and transported under a hazardous waste manifest to the EQ- Wayne Disposal hazardous waste landfill located in Belleville, MI; 76 roll-off containers and 3 drums (caulking only) for a total of 1,167 tons of material.

- Soils and concrete classified as non-hazardous (> 1 ppm and < 50 ppm) was segregated for disposal and transported under an MCP Bill of Lading to Waste Management's TREE Turnkey Landfill in Rochester, NH. 60 roll-off containers for a total of 1,241 tons of material.

- Soils and concrete with PCB concentrations ≤ 1 ppm was managed without PCB restrictions (e.g., re-used on –site or recycled/disposed off-site).

- Polyethylene sheeting, PPE, and non-liquid cleaning materials was managed and disposed of off-site in accordance with 40 CFR 761.61(A)(5)(v). Three roll-off containers were transported and disposed at Waste Management's TREE Turnkey Landfill in Rochester, NH.

Liquid waste generated during decontamination of the granite steps or other decontamination activities (or as part of dust suppression that was collected on polyethylene sheeting) was containerized and designated for off-site disposal in accordance with 40 CFR 761.79. A total of 82 drums of liquid waste were generated during decontamination activities and shipped off-site to Waste Management's Model City Landfill for treatment as PCB wastes.

Copies of all manifests, waste shipment records, and certificates of disposal are provided in Appendix D.

2.8 SITE RESTORATION

As indicated previously, the project that has resulted in the need for a PCB management plan is a landscaping and concourse revitalization project. As such, the site restoration activities are extensive and include a combination of new infrastructure and ground surface improvements, such as planting areas, walkways, general use areas, etc. As of the date of this report, these activities are still on-going and are scheduled for completion in 2011.

3. DATA USABILITY ASSESSMENT

This data quality and data usability assessment has been conducted to review the samples collected in support of the remediation activities conducted during the Southwest Concourse revitalization project. This precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS) evaluation includes an assessment of those parameters as well as quality assurance / quality control (QA/QC) samples as they affect the usability of sample results. These indicators have been examined in the context of the intended use of the data, and an overall assessment of site conditions.

Data validation and review was conducted both by W&C and by a third-party validator, Data Check, Inc. of New Durham, New Hampshire. This review included a check of field documentation including sample collection and preservation methods, a check of the laboratory data and documentation, a review of the internal laboratory QA/QC procedures and results including surrogate recoveries, matrix spike and matrix spike duplicate results, blank results, laboratory control standard results, and an evaluation of sample holding times, and field duplicate results. The assessment was performed in general conformance with USEPA Region I Guidelines and the Quality Control Guidelines for the Acquisition. Data Check's data validation summaries are provided in Appendix E.

The majority of the soil samples were analyzed by Con-Test Laboratory of East Longmeadow, MA with the concrete and surface wipe samples analyzed by Alpha Analytical Laboratory of Westborough, MA. A small portion of the data from earlier in the program was analyzed by Analytics Environmental Laboratory of Portsmouth, New Hampshire. All samples were extracted by USEPA Method 3540C (Soxhlet Extraction) and analyzed for PCBs by USEPA Method 8082.

3.1 PRECISION

Field duplicate samples were collected at an approximate frequency of one duplicate sample per twenty primary samples during the sampling activities. A total of 105 field duplicate samples were collected to analyze the precision of the primary sample results. Relative percent differences (RPDs) between the primary and associated duplicate samples were evaluated based on the acceptance criteria of ≤ 50%. Primary sample results were qualified as estimated ("J") in those instances in which the RPDs were > 50%.

In addition, data also was qualified if the RPD between the column results was outside of the acceptance criteria (≤25%); column results typically differ in solid matrices due to heterogeneities inherent to the sample matrix. Whether or not the RPD meets acceptance criteria, the laboratory reports the higher of the two column results. Data were qualified as estimated ("J") for column result RPDs greater than 25%. All qualifiers applied to the data are included in the summary tables provided with this report.

3.2 ACCURACY

Accuracy of the analytical data was assessed by reviewing recoveries for matrix spikes (MS), matrix spike duplicates (MSD) (40-140%), surrogates (30-150%), laboratory control samples (LCS) (40-140%), and laboratory control sample duplicates (LCSD) (40-140%). After review of this information, data was qualified as estimated ("J" or "UJ") and applied to the data if results were outside of these limits. All qualifiers applied to the data are included in the summary tables provided with this report. Results from one equipment blank sample (SWC-VBSQ-839) were rejected ("R") due to surrogate recoveries outside the acceptance criteria for both surrogates in both columns.

3.3 REPRESENTATIVENESS

Consistent procedures and laboratory analysis of the data were achieved. Sample containers were packed on ice and were accompanied by complete chain of custody forms from the time of sample collection until laboratory delivery. No analytes were detected in the laboratory method blank analyses, indicating that there were no interferences introduced at the laboratory during sample analyses. All samples were extracted and analyzed within the recommended 14-day holding time for the extraction method.

Field equipment blank samples were collected at an approximate frequency of one per twenty primary samples that were collected with reusable equipment subject to equipment decontamination, for a total of 59 equipment blank samples. All of the equipment blanks were reported as non-detect for all PCB Aroclors. Analytical results from one equipment blank sample SWC-VBSQ-839) were rejected ("R") due to surrogate recoveries outside the acceptance criteria for both surrogates in both columns.

3.4 COMPLETENESS

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount of valid data expected. The data packages were reviewed to ensure that all sample and associated quality assurance results were available. Results of the completeness review indicated that all collected samples were analyzed and all quality control results were available to complete the data validation process.

3.5 COMPARABILITY

Comparability measures the degree of confidence with which one data set can be compared to a related set of data. Based on a review of established standard methods and procedures for collection, analysis, and reporting of data, the data collected during the project are considered to have met the requirements for comparability.

3.6 SENSITIVITY

Sensitivity was evaluated based on a review of the sample quantitation and reported quantitation limits. Laboratory reported detection limits typically met the site data quality objective (reporting limit ≤ 1 ppm for bulk samples and < 0.5 µg/100 cm^2 for wipe samples), but sample dilutions did not make it possible to meet this objective for some of the samples due to elevated PCB concentrations in these samples. In each instance where a sample was reported with an elevated detection limit, the reported concentration was indicative of PCB Remediation Waste, and remediation of that material was included in the scope of this remediation project or additional remedial action was taken based on the assumption that PCBs may have been present at the elevated reporting limit.

3.7 CONCLUSION

Based on a review of the analytical results with regard to the PARCCS parameters, this data quality / data usability assessment indicates that the data is of sufficient quality for use in evaluating the effectiveness of the remedy and to serve as baseline data for future comparison to long-term monitoring data.

4. DEED NOTICE

Pursuant to EPA's Approval, a deed notice has been prepared for components of the remediation work. The notice is in the process of being finalized for recording with the Hampshire County Registry of Deeds. Once the process is complete, a copy of the recorded deed notice will be provided to EPA under separate cover.

The subject deed notice covers the following conditions:

- Areas of encapsulated residual PCBs on vertical concrete surfaces and the long term maintenance and monitoring requirements;
- Areas where use is restricted to low occupancy (one area immediately north of the John Quincy Adams building); and
- Areas of the existence of a concrete cap (12 select areas) where > 1 ppm and < 10 ppm residual PCBs remain in soils and the requirements to maintain the cap.

.

5. MONITORING AND MAINTENANCE OF ENCAPSULATED SURFACES

Pursuant to EPA's Approval and submittal schedule, a Monitoring and Maintenance Implementation Plan (MMIP) was prepared and submitted to EPA on December 29, 2010. A response to comments submittal has also been prepared and submitted to the Agency on January 26, 2011. As of the date of this report, the MMIP is still under review. Upon acceptance, the MMIP procedures will be implemented and reported to the Agency.

6. SUMMARY AND CONCLUSIONS

The Site is a relatively small portion (approximately 5 acres) of the 1,450-acre parcel of land associated with the UMass Amherst campus and is currently improved with five high-rise towers and eleven lower-rise buildings that serve to house approximately 5,500 UMass students. This area is referred to as the Southwest Residential Area and was constructed in the mid-1960s. The buildings are constructed of concrete and are surrounded by either grass or hardscapes (paving stones, concrete, or asphalt).

The Southwest Concourse replacement project is a comprehensive revitalization of the pedestrian core of the Southwest Residential Area. Starting in May 2010, the southwest concourse underwent renovations to paved and unpaved ground surfaces within the Southwest Residence Area. The work within this approximately five-acre site included, but was not limited to: removal and disposal of existing ground surface coverings (pavement, concrete, etc.); regrading and excavating soils to support new ground surface coverings, landscaping areas, and utilities; removal and replacement of granite staircases; removal and disposal of select retaining walls; and restoring select ground surfaces with concrete, pavement, pavers, etc.

Upon discovery of PCBs in the joint caulking along the ground level joints/seams at retaining walls, granite steps, concrete structures, and other paved surfaces and given that as part of this project existing soils and other adjacent materials (concrete pads, retaining walls, granite steps, etc.) would be either removed or replaced as part of the construction of the new concourse components, samples of concrete and soils indicated that PCBs had migrated from the caulking into these materials.

Based on the concentration and distribution of PCBs detected in adjacent materials, it is apparent that the caulking used in original construction was the source of PCBs. In general, concentration gradients identified in the adjacent materials demonstrate a reduction in total PCBs with increasing distance from caulked joints and increasing depth from the ground surface.

A Remediation Plan was submitted to the EPA on June 25, 2010 followed by a response to comments and Addendum #1 (July 27, 2010) and Addendum #2 (August 24, 2010). EPA issued a written Approval for the work on August 30, 2010.

As described in detail in the Remediation Plan, a risk based remedial plan under 40 CFR 761.61(c) was prepared (and approved) for portions of the remediation work. This plan consisted of a two-prong remedial approach whereby the primary plan was to remove the source material and adjacent soils, concrete, asphalt and other materials impacted by PCBs with a secondary plan of utilizing a physical barrier approach to eliminate the direct contact exposure pathway and migration pathways of any residual PCBs remaining on materials that could not be removed during the project.

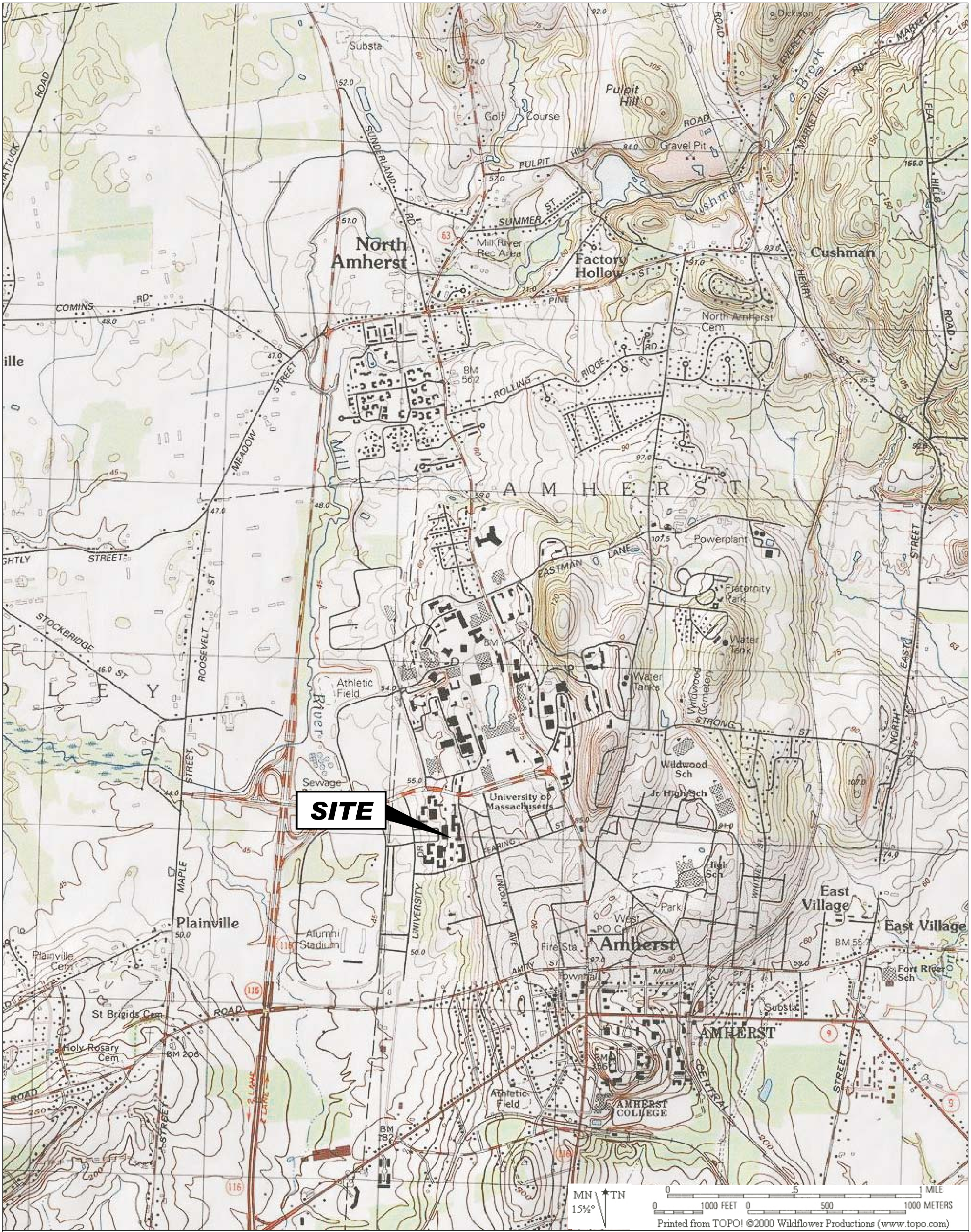
In summary, all caulking encountered/disturbed within the work area was removed and disposed off-site as a $\geq$ 50 ppm PCB waste. Soils and concrete removed during the work and in direct contact or immediately adjacent to the caulking and which exhibited concentrations of PCBs > 1 ppm were excavated and disposed off-site as PCB wastes. Soils not planned for removal and that met EPA's high occupancy cleanup levels (either $\leq$ 1 ppm for unrestricted use or $\leq$ 10 ppm beneath a compliant cap) remained in place. Granite steps formerly in direct contact with caulking were decontaminated with a chemical wash and, upon meeting the high occupancy cleanup levels of 10 µg/100cm^2, re-used on site.

Residual concentrations of PCBs on concrete retaining walls, masonry structures, and a pedestrian tunnel ceiling remained in place and were encapsulated by a protective coating (following caulking removal). These areas of concrete were not scheduled for removal during the project and were not planned to be removed during the remediation phases of the project and instead were proposed to be contained behind a barrier or encapsulant to prevent direct contact with PCBs and/or potential migration effects to other media. The rationale for this decision was that the concrete tunnel ceiling and concrete foundations are critical to the integrity of the structures and removal of portions of this concrete was not recommended. The on-site encapsulation of PCB remediation waste is an interim solution designed to shield impacted materials from the effects of weathering and leaching mechanisms, thereby eliminating potential exposure pathways and mitigating the potential for PCB transfer via direct contact and/or leaching to other media/materials.

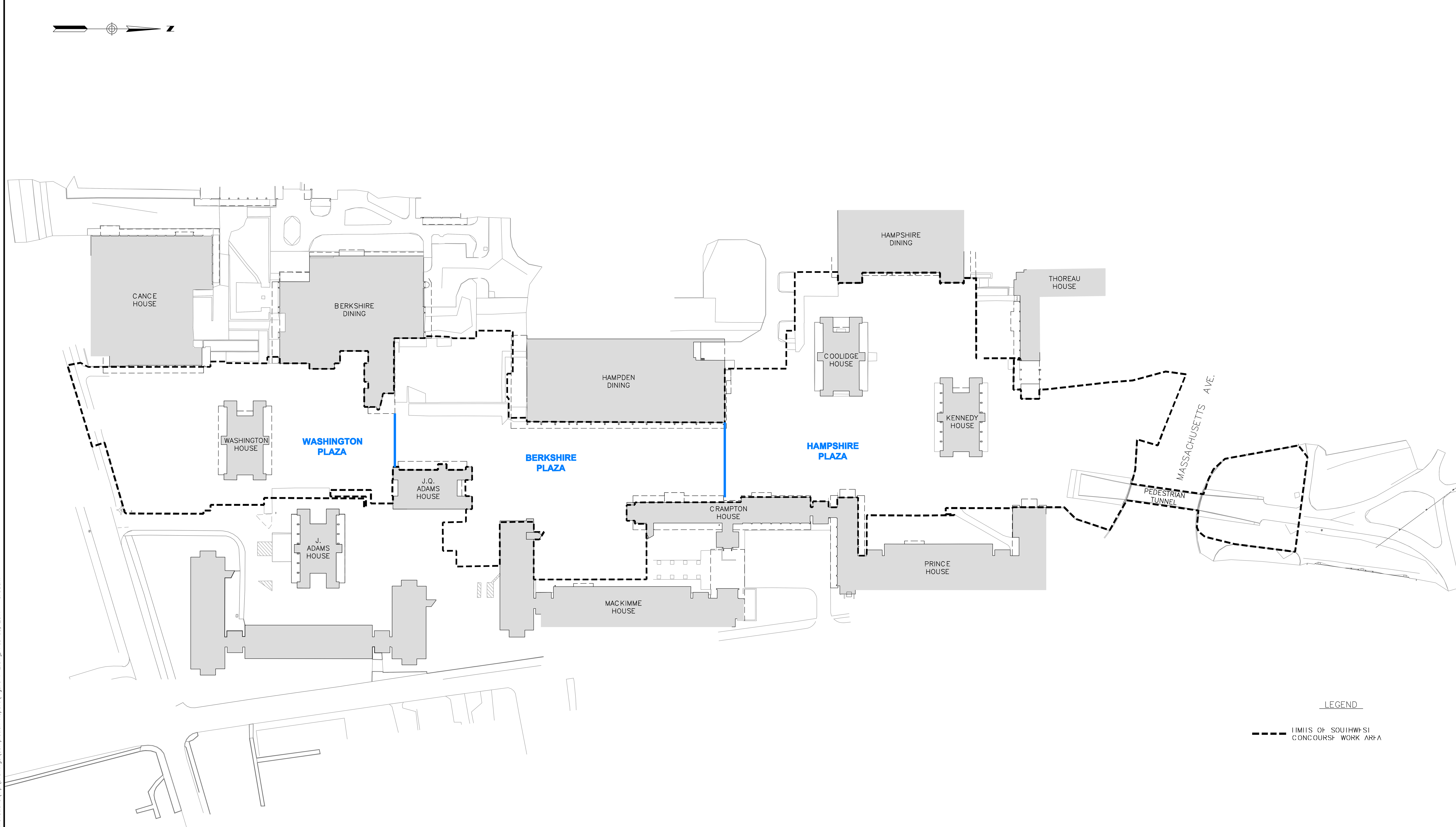
PCB wastes generated in association with remediation activities were stored, marked, and managed in accordance with 40 CFR 761.65 and 40 CFR 761.40. A total of 1,167 tons of bulk ≥ 50 ppm PCB waste (caulking, concrete, and soils) was removed for off-site disposal at the EQ-Wayne Disposal, Inc. hazardous waste landfill located in Belleville, Michigan. A total of 1,241 tons of PCB remediation waste > 1 ppm and < 50 ppm (polyethylene sheeting, PPE, soils, and concrete) was removed for off-site disposal at Waste Management's Turnkey landfill in Rochester, NH.

Through the removal of the source materials (caulking), excavation and off-site disposal of those PCB-containing materials scheduled for removal (soil and concrete), reuse through decontamination to high occupancy cleanup levels (e.g., granite steps), and the application of an encapsulant on surfaces or a concrete cap over soils that contain residual PCBs, the remediation removed those PCB containing materials not authorized for continued use and either removed or restricted exposure pathways to residual PCBs, thereby, not posing an unreasonable risk of injury to health or the environment.

The encapsulation approach is considered a long-term interim solution given that all areas containing residual concentrations of PCBs will be managed and properly disposed of at the time of demolition and/or subsequent disturbance. To ensure the containment methods/products continue to perform as designed, a Monitoring and Maintenance Implementation Plan (MMIP) was developed and submitted to EPA (pursuant to the Approval) to monitor the continued effectiveness of the remedy. In addition, a deed notice will be recorded to document the areas of residual PCBs on the Site and the required actions to monitor and maintain these areas.



WOODARD & CURRAN 35 New England Business Center Andover, MA 01810 COMMITMENT & INTEGRITY DRIVE RESULTS	UMASS AMHERST SOUTHWEST CONCOURSE AMHERST, MASSACHUSETTS	SITE LOCUS	DES.BY: EVR DR.BY: EVR CK.BY: ALW
	SCALE: AS NOTED DATE: FEBRUARY 2011	JOB NO.: 223505 FILE: Figure 1-1.cnv	1-1



LEGEND

LIMITS OF SOUTHWEST CONCOURSE WORK AREA

0 60 120
SCALE IN FEET

WOODARD & CURRAN
35 NEW ENGLAND BUSINESS CENTER
ANDOVER, MASSACHUSETTS 01810
866.702.6371 | www.woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS

REV	DESCRIPTION	DATE

DESIGNED BY: GJF CHECKED BY: JAH
DRAWN BY: EVR Figure 1-2.dwg

SITE PLAN

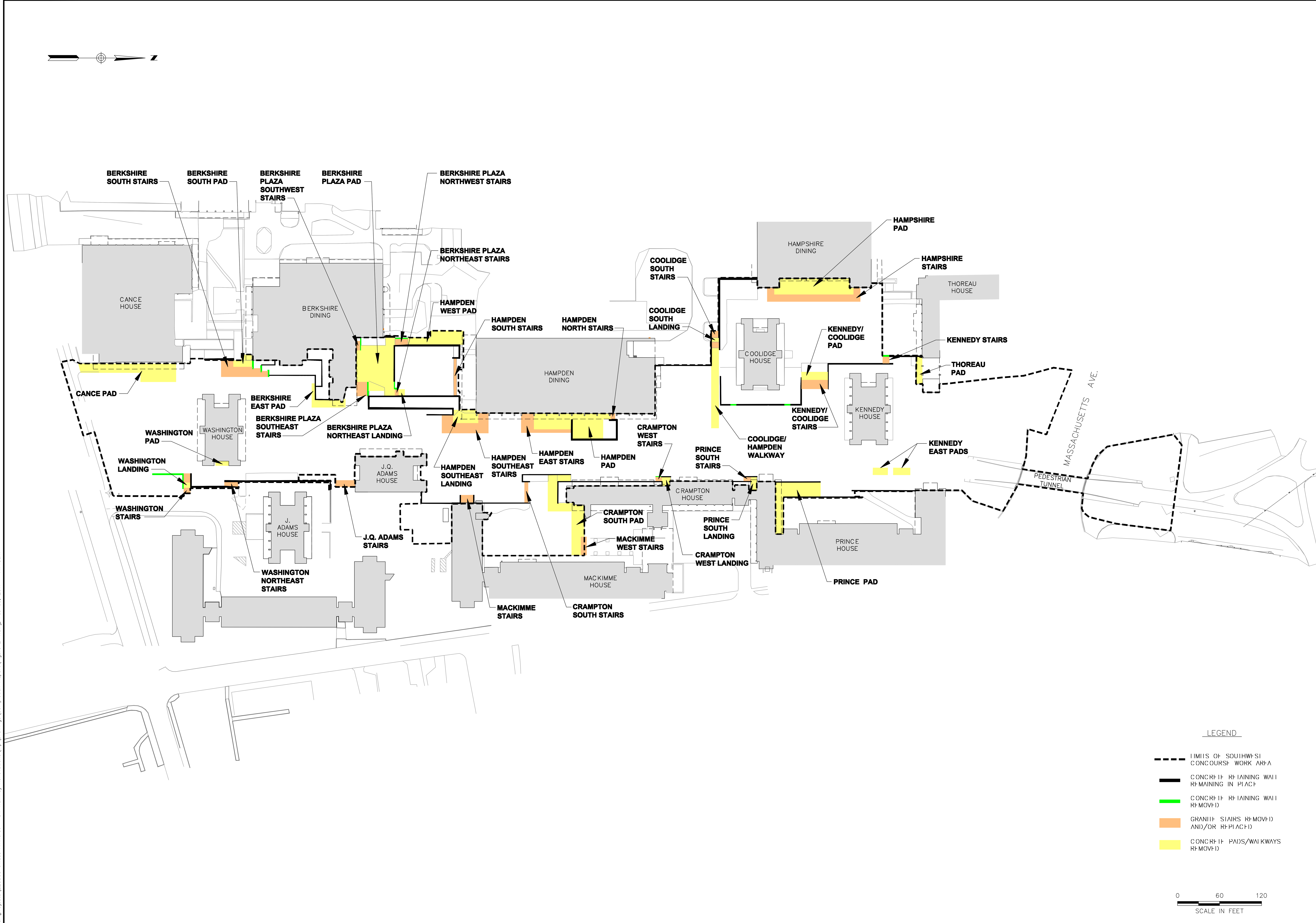
UNIVERSITY OF MASSACHUSETTS
AMHERST, MASSACHUSETTS

SOUTHWEST CONCOURSE
PCB REMEDIATION
COMPLETION REPORT

JOB NO.: 223505
DATE: FEBRUARY 2011
SCALE: AS NOTED
SHEET: OF

FIGURE 1-2

\\Andover\projects\223505 UMass Amherst – SW Walkway Renovations\wip\Drawings\Completion Report\Figure 1-2.dwg, Feb 09, 2011 – 8:35am



\\Andover\projects\223505 UMass Amherst – SW Walkway Renovations\wip\Drawings\Completion Report\Figure 2-1.dwg, Feb 09, 2011 – 11:48am

WOODARD & CURRAN
35 NEW ENGLAND BUSINESS CENTER
ANDOVER, MASSACHUSETTS 01810
866.702.6371 | www.woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS

REV	DESCRIPTION	DATE

DESIGNED BY: GJF
CHECKED BY: JAH
DRAWN BY: EVR
Figure 2-1.dwg

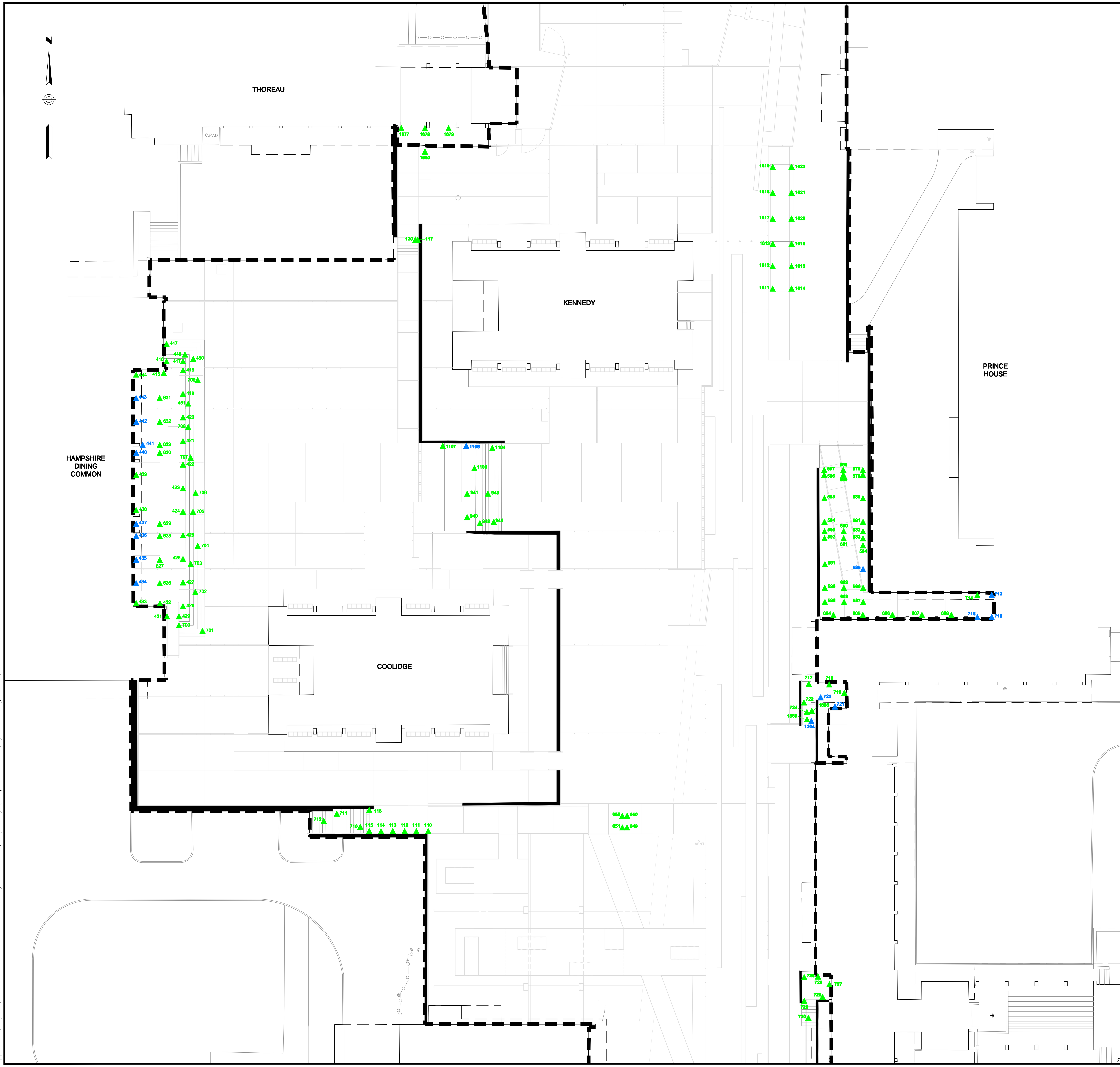
GRANITE STAIRS, CONCRETE PADS, AND REMOVED RETAINING WALLS LOCATIONS

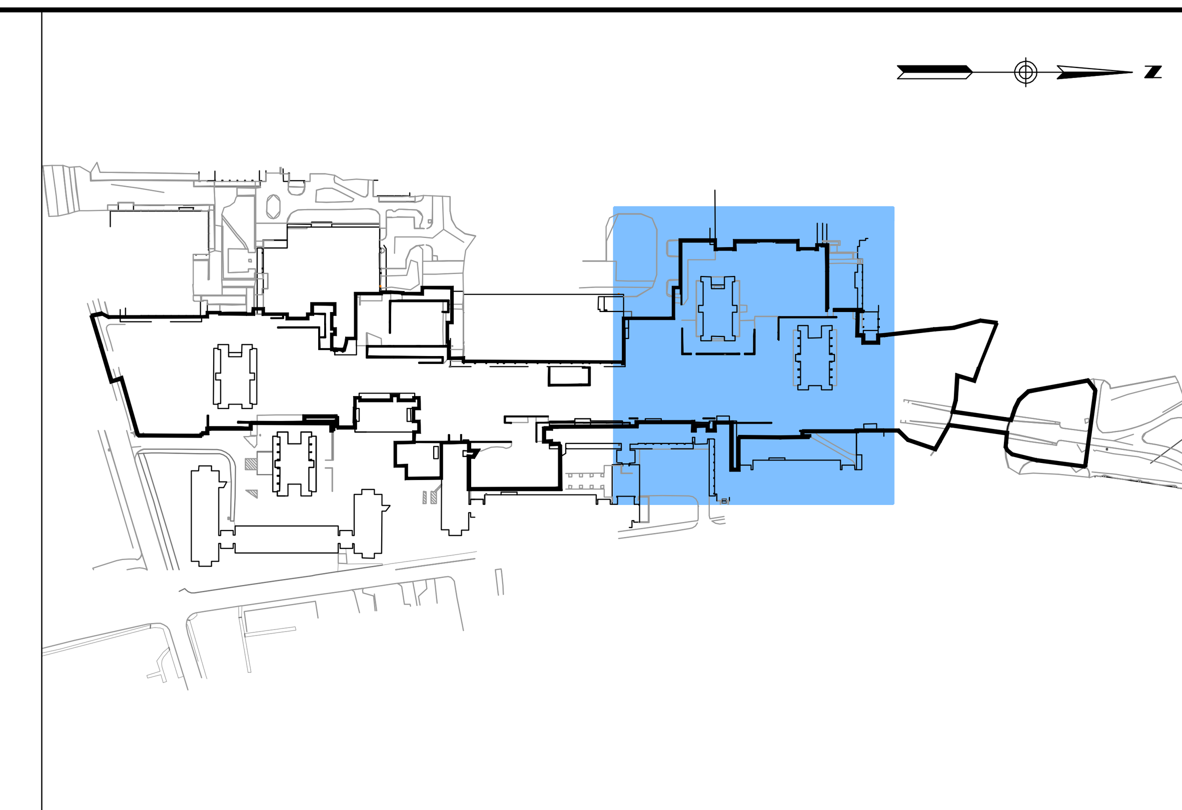
UNIVERSITY OF MASSACHUSETTS AMHERST, MASSACHUSETTS

SOUTHWEST CONCOURSE PCB COMPLETION REPORT

JOB NO.: 223505
DATE: FEBRUARY 2011
SCALE: AS NOTED
SHEET: OF

FIGURE 2-1





LEGEND

CONCRETE RETAINING WALL

LIMITS OF SOUTHWEST CONCOURSE WORK AREA

190 ▲ CONCRETE SAMPLE LOCATION AND IDENTIFIER TOTAL PCBs ≤ 1.0 mg/kg

152 ▲ CONCRETE SAMPLE LOCATION AND IDENTIFIER TOTAL PCBs > 1 AND < 10 mg/kg

WOODARD & CURRAN
35 NEW ENGLAND BUSINESS CENTER
ANDOVER, MASSACHUSETTS 01810
866.702.6371 | www.woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS

REV	DATE	DESCRIPTION

DESIGNED BY: ALW | CHECKED BY: JAH
DRAWN BY: EVR | Figure 2-2.dwg

CONCRETE SAMPLE LOCATIONS AT HAMPSHIRE PLAZA

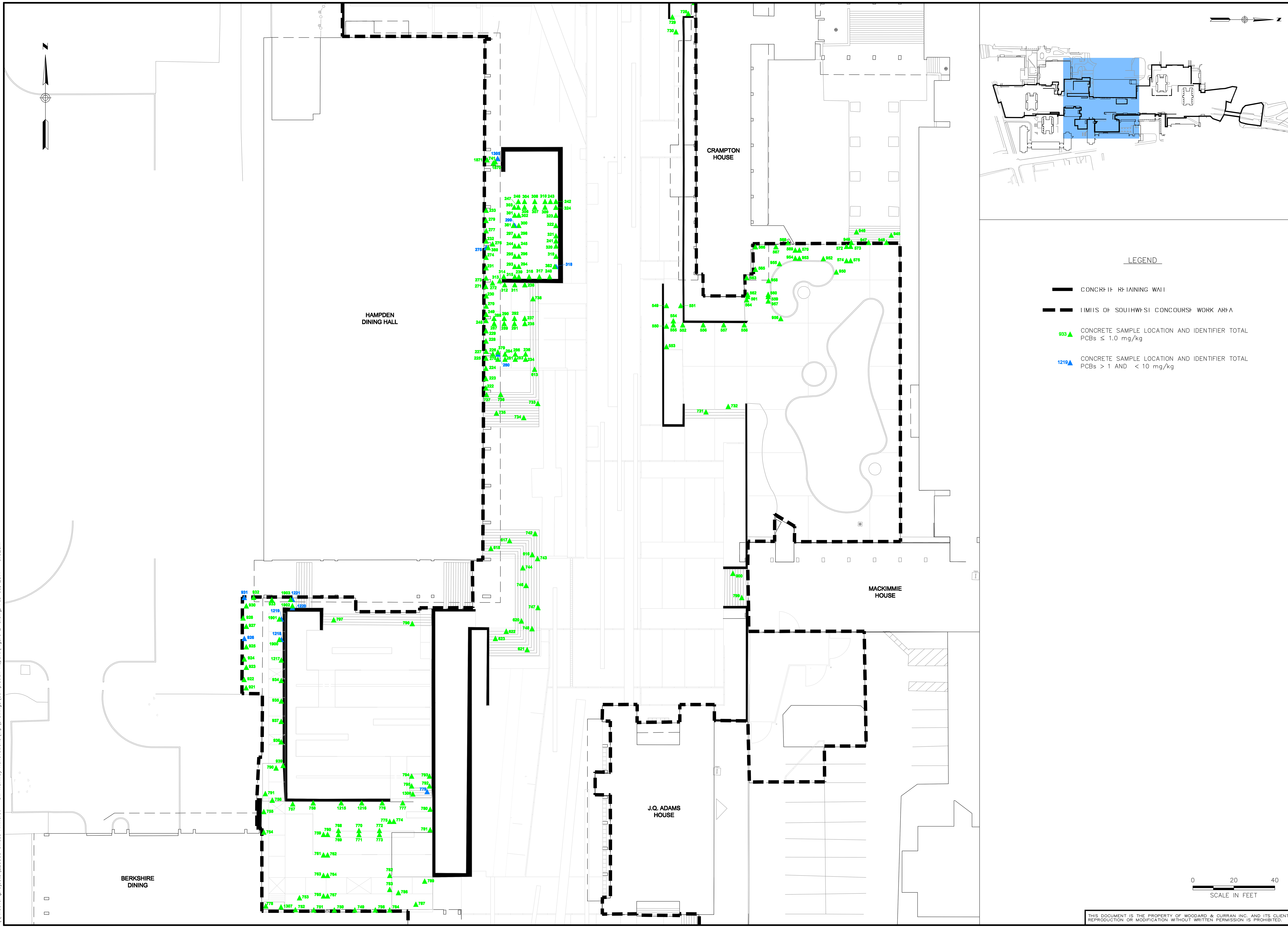
UNIVERSITY OF MASSACHUSETTS
AMHERST, MASSACHUSETTS

SOUTHWEST CONCOURSE
PCB REMEDIATION
COMPLETION REPORT

JOB NO.: 223505
DATE: FEBRUARY 2011
SCALE: AS NOTED
SHEET: OF

FIGURE 2-2

\\Andover\projects\223505 UMass Amherst – SW Walkway Renovations\wip\Drawings\Completion Report\Figure 2-2.dwg, Feb 09, 2011 – 9:30am



LEGEND

CONCRETE RETAINING WALL

LIMITS OF SOUTHWEST CONCOURSE WORK AREA

933 ▲ CONCRETE SAMPLE LOCATION AND IDENTIFIER TOTAL PCBs ≤ 1.0 mg/kg

1219 ▲ CONCRETE SAMPLE LOCATION AND IDENTIFIER TOTAL PCBs > 1 AND < 10 mg/kg

35 NEW ENGLAND BUSINESS CENTER
ANDOVER, MASSACHUSETTS 01810
866.702.6371 | www.woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS
WOODARD & CURRAN

REV	DESCRIPTION	DATE

DESIGNED BY: ALW CHECKED BY: JAH
DRAWN BY: EVR Figure 2-3.dwg

CONCRETE SAMPLE LOCATIONS AT BERKSHIRE PLAZA

UNIVERSITY OF MASSACHUSETTS
AMHERST, MASSACHUSETTS

SOUTHWEST CONCOURSE
PCB REMEDIATION
COMPLETION REPORT

JOB NO.: 223505
DATE: FEBRUARY 2011
SCALE: AS NOTED
SHEET: OF

FIGURE 2-3

\\Andover\projects\223505 UMass Amherst – SW Walkway Renovations\wip\Drawings\Completion Report\Figure 2-3.dwg, Feb 09, 2011 – 9:32am

APPENDIX A: EPA APPROVAL AND CERTIFICATIONS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
5 POST OFFICE SQUARE, SUITE 100
BOSTON, MASSACHUSETTS 02109-3912

RECEIVED
AUG 30 2010
BY: TMB

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Donald A. Robinson, Ph.D.
Director of Environmental Health & Safety
Draper Hall Room 117
University of Massachusetts
40 Campus Center Way
Amherst, Massachusetts 01003-9244

Re: University of Massachusetts - Amherst
Southwest Residential Area Concourse PCB Cleanup and Disposal Approval under 40 CFR §§ 761.61(a) and (c) and § 761.79(h)

Dear Mr. Robinson:

This is in response to University of Massachusetts (UMASS) Notification[1] for approval of a proposed PCB cleanup for the Southwest Residential Area Concourse located on the University of Massachusetts – Amherst campus (the Site). The Site contains PCB-contaminated materials that exceed the allowable PCB levels under the federal PCB regulations at 40 CFR §§ 761.20, 761.61(a), and 761.62. Specifically, PCBs have been identified in caulk; in surrounding concrete, brick, and asphalt substrates; on *non-porous surfaces* (i.e. granite stairs); and in soils.

In the Notification, UMASS has requested cleanup of the PCB contamination under the self implementing cleanup and disposal option (SIP) at § 761.61(a); the risk-based disposal option at § 761.61(c); and, the alternative decontamination option at § 761.79(h). UMASS is proposing the following PCB cleanup standards and activities under this project:

- For substrates that will be removed and/or encountered as part of the revitalization within the concourse project area, the caulk will be removed under § 761.62, and PCB-contaminated concrete and pavers, bedding sand beneath granite stairs, and, the PCB-contaminated asphalt and soils will be decontaminated under §§ 761.61(a) and 761.79(h) to achieve a *high occupancy area* cleanup standard of less than or equal to (≤) 1 ppm;

---

[1] Information was submitted on behalf of UMASS by Woodward and Curran to satisfy the notification requirements under 40 CFR §§ 761.61(a)(3) and (c), and 761.79(h). Information was provided dated June 2010 (PCB Remediation Plan); July 7, 2010 (update of PCB sampling results); July 27, 2010 (Addendum 1 to Remediation Plan); August 18, 2010 (granite stairs data); and August 24, 2010 (Addendum 2 to Remediation Plan). These submissions will be referred to as the "Notification."

- Soils not planned for removal as part of the revitalization project will meet the ≤1 ppm PCB standard without further restriction or the ≤10 ppm beneath a compliant cap under § 761.61(a)(7);

- The soil area located north face wall of the John Quincy Adams at approximately 5 feet below ground surface (bgs) will be cleaned to a PCB cleanup standard of less than (<) 25 ppm;

- Certain PCB-contaminated substrates, including certain concrete retaining walls, building walls, and a pedestrian tunnel ceiling will be encapsulated under the risk-based option at § 761.61(c) with long term maintenance and monitoring of the encapsulated surfaces;

- *Non-porous surfaces* (e.g. granite stairs) will be removed or decontaminated to a ≤10 μg/100 cm^2;

- Disposal of approximately 45 rolloffs of PCB wastes in a TSCA-approved disposal facility or RCRA hazardous waste landfill in accordance with § 761.61(a)(5)(i)(B)(2)(*iii*);

- Disposal of approximately 77 rolloffs in a RCRA non-hazardous waste landfill as a less than (<) 50 ppm PCB waste in accordance with § 761.61(a)(5)(i)(B)(2)(*ii*); and,

- Implementation of long term maintenance and monitoring of the *encapsulated porous surfaces*; and,

- Recording of a deed notice to document the PCB concentrations at the Site and to document the long-term maintenance and monitoring requirements.

Based on the EPA's review, the information provided in the Notification meets the notification requirements under 40 CFR §§ 761.61(a)(3), 761.79(h), and § 761.61(c) for *PCB remediation waste* and the disposal requirements under § 761.62 for *PCB bulk product waste*. Based on the information provided, EPA has determined that the abatement plan proposed by UMASS will not result in an unreasonable risk to public health or the environment when implemented in accordance with the Notification and the conditions specified in this Approval.

UMASS may proceed with its cleanup in accordance with 40 CFR §§ 761.61(a); 761.61(c); 761.62; 761.79(h); its Notification; and this Approval, subject to the conditions of Attachment 1.

Questions and correspondence regarding this Approval should be directed to:

Kimberly N. Tisa, PCB Coordinator
United States Environmental Protection Agency
5 Post Office Square, Suite 100 (OSRR07-2)
Boston, Massachusetts 02109-3912
Telephone: (617) 918-1527
Facsimile: (617) 918-0527

This Approval does not release UMASS from any applicable requirements of federal, state or local law, including the requirements related to cleanup and disposal of PCBs or other contaminants under the Massachusetts Department of Environmental Protection (MassDEP) regulations.

EPA shall not consider this project complete until it has received all submittals required under this Approval. Please be aware that upon EPA receipt and review of the submittals, EPA may request any additional information necessary to establish that the work has been completed in accordance with 40 CFR Part 761, the Notification, and this Approval.

Sincerely,

James T. Owens, Director
Office of Site Remediation and Restoration

Attachment 1

cc: J. Hamel, Woodward & Curran
MassDEP RTN: 1-17872
File

ATTACHMENT 1.

PCB CLEANUP AND DISPOSAL APPROVAL CONDITIONS
SOUTHWEST RESIDENTIAL AREA CONCOURSE ("the Site")
THE UNIVERSITY OF MASSACHUSETTS - AMHERST

GENERAL CONDITIONS

1. This Approval is granted under the authority of Section 6(e) of the Toxic Substances Control Act (TSCA), 15 U.S.C. § 2605(e), and the PCB regulations at 40 CFR Part 761, and applies solely to the *PCB bulk product waste* and the *PCB remediation waste* located at the Site and identified in the Notification.

2. The University of Massachusetts – Amherst (UMASS) shall conduct on-site activities in accordance with the conditions of this Approval and with the Notification.

3. In the event that the cleanup plan described in the Notification differs from the conditions specified in this Approval, the conditions of this Approval shall govern.

4. The terms and abbreviations used herein shall have the meanings as defined in 40 CFR § 761.3 unless otherwise defined within this Approval.

5. UMASS must comply with all applicable federal, state and local regulations in the storage, handling, and disposal of all PCB wastes, including PCBs, PCB Items and decontamination wastes generated under this Approval. In the event of a new spill during PCB cleanup and disposal activities authorized under this Approval, UMASS shall contact EPA within 24 hours for direction on PCB cleanup and sampling requirements.

6. UMASS is responsible for the actions of all officers, employees, agents, contractors, subcontractors, and others who are involved in activities conducted under this Approval. If at any time UMASS has or receives information indicating that it or any other person has failed, or may have failed, to comply with any provision of this Approval, it must report the information to EPA in writing within 24 hours of having or receiving the information.

7. This Approval does not constitute a determination by EPA that the transporters or disposal facilities selected by UMASS are authorized to conduct the activities set forth in the Notification. UMASS is responsible for ensuring that its selected transporters and disposal facilities are authorized to conduct these activities in accordance with all applicable federal, state and local statutes and regulations.

8. This Approval does not: 1) waive or compromise EPA's enforcement and regulatory authority; 2) release UMASS from compliance with any applicable requirements of federal, state or local law; or 3) release UMASS from liability for, or otherwise resolve, any violations of federal, state or local law.

CERTIFICATION AND NOTIFICATION CONDITIONS

9. This Approval may be revoked if the EPA does not receive written notification from UMASS of its acceptance of the conditions of this Approval within 10 business days of receipt.

CLEANUP AND DISPOSAL CONDITIONS

10. PCB-contaminated materials shall be decontaminated as described below:

    a. The decontamination standard for building *non-porous surfaces* (i.e. granite stairs) shall be as follows:

        i) All visible residues of PCB caulk shall be removed to the extent practical, and surface wipe samples shall be collected in accordance with the frequency specified in the Notification.

            (1) The decontamination wipe standard for *non-porous surfaces* shall be less than or equal to (≤) 10 μg/100 cm^2.

            (2) All post-decontamination verification sampling of *non-porous surfaces* shall be performed on a surface area basis by the standard wipe test as specified in 40 CFR § 761.123 (i.e. μg/100 cm^2).

            (3) Chemical extraction for PCBs shall be conducted using Methods 3500B/3540C of SW-846 and chemical analysis for PCBs shall be conducted using Method 8082 of SW-846, unless another method(s) is validated according to Subpart Q.

        ii) For decontaminated *non-porous surfaces* that have PCB concentrations exceeding the decontamination standard, UMASS may conduct additional decontamination to achieve the required decontamination standard or must store and dispose of these materials as TSCA-regulated waste in accordance with 40 CFR Part 761.

b. The PCB cleanup standard for *porous surfaces* (e.g. concrete, brick, etc.) shall be ≤ 1 part per million (ppm) with the exception of encapsulated *porous surfaces*.

   i) All visible residues of PCB caulk shall be removed, to the extent practical.

   ii) All post-decontamination verification sampling of *porous surfaces* shall be performed on a bulk basis (i.e. mg/Kg) and analytical results shall be reported on a dry weight basis. Samples shall be collected according to EPA's *draft* <u>Standard Operating Procedure For Sampling Concrete in the Field</u>, dated 12/30/97 to a maximum depth of 0.5 inches. Samples shall be collected as described in the Notification.

   iii) Chemical extraction for PCBs shall be conducted using Methods 3500B/3540C of SW-846 and chemical analysis for PCBs shall be conducted using Method 8082 of SW-846, unless another extraction and/or analytical method(s) is validated according to Subpart Q.

   iv) For decontaminated *porous surfaces* that have PCB concentrations exceeding the decontamination standard, UMASS may conduct additional decontamination to achieve the required decontamination standard.

c. Encapsulated *porous surfaces*

   i) All visible PCB caulk shall be removed, to the extent practical.

   ii) Following encapsulation of PCB-contaminated *porous surfaces*, initial surface sampling for PCBs shall be conducted to determine effectiveness of the encapsulation procedure.

      (1) Wipe sampling shall be performed on a surface area basis by the standard wipe test as specified in 40 CFR § 761.123 (i.e. $\mu g/100\ cm^2$). Chemical extraction for PCBs shall be conducted using Methods 3500B/3540C of SW-846 and chemical analysis for PCBs shall be conducted using Method 8082 of SW-846, unless another method(s) is validated according to Subpart Q.

      (2) In the event that PCB concentrations in the wipe samples are greater than (>) 1 $\mu g/100\ cm^2$, UMASS shall contact EPA for further discussion and direction on alternatives.

   iii) UMASS shall submit a monitoring and maintenance implementation plan (MMIP) to monitor the long-term effectiveness of the encapsulants. (see Condition 13).

d. The PCB cleanup standard for soils and/or asphalt shall be ≤1 ppm or ≤10 ppm with a § 761.61(a)(7) compliant cap, as applicable, and except as provided in subsection iii, below.

i) Soil samples shall be collected on a bulk basis (i.e. mg/Kg) and PCB analytical results shall be reported on a dry weight analysis. Sampling shall be conducted in accordance with 40 CFR Part 761 and with the sampling frequency described in the Notification.

ii) Chemical extraction for PCBs shall be conducted using Method 3500B/3540C of SW-846 and chemical analysis for PCBs shall be conducted using Method 8082 of SW-846, unless another method(s) is validated according to Subpart Q.

iii) Soils located on the north face wall of the John Quincy Adams building at approximately 5 feet below ground surface (bgs) shall meet a less than (<) 25 ppm PCB cleanup standard.

11. To the maximum extent practical, engineering controls, such as barriers, and removal techniques, such as the use of HEPA ventilated tools, shall be utilized during removal processes. In addition, to the maximum extent possible, disposable equipment and materials, including PPE, will be used to reduce the amount of decontamination necessary.

12. All PCB waste (regardless of concentration) generated as a result of the activities described in the Notification, excluding any decontaminated materials, shall be marked in accordance with § 761.40; stored in a manner prescribed in § 761.65; and, disposed of in accordance with 40 CFR § 761.61(a)(5) and § 761.62, unless otherwise specified below:

a. Decontamination wastes and residues shall be disposed of in accordance with 40 CFR § 761.79(g).

b. Moveable equipment, tools, and sampling equipment shall be decontaminated in accordance with either 40 CFR § 761.79(b)(3)(i)(A), § 761.79(b)(3)(ii)(A), or § 761.79(c)(2).

c. PCB-contaminated water generated during decontamination shall be decontaminated in accordance with 40 CFR §761.79(b)(1) or disposed of under § 761.60.

INSPECTION, MODIFICATION AND REVOCATION CONDITIONS

13. Within sixty (60) days of completion of the activities authorized under this Approval, UMASS shall submit for EPA's review and approval, a detailed long-term monitoring and maintenance implementation plan (MMIP) for the encapsulants.

    a. The MMIP shall include: a description of the activities that will be conducted, including inspection criteria and frequency; surface sampling locations; sampling protocols, sampling frequency, and analytical criteria; and reporting requirements.

    b. The MMIP shall include a communications component which details how the maintenance and monitoring results will be communicated to the building users.

    c. UMASS shall submit the results of these long-term monitoring and maintenance activities to EPA. Based on its review of the results, EPA may determine that modification to the MMIP is necessary in order to insure long-term effectiveness of the physical barriers.

    d. UMASS shall incorporate any changes to the MMIP required by EPA. Activities required under the MMIP shall be conducted until such time that EPA determines, in writing, that such activities are no longer necessary.

14. UMASS shall allow any authorized representative of the Administrator of the EPA to inspect the Site and to inspect records and take samples as may be necessary to determine compliance with the PCB regulations and this Approval. Any refusal by UMASS to allow such an inspection (as authorized by Section 11 of TSCA) shall be grounds for revocation of this Approval.

15. Any proposed modification(s) in the plan, specifications, or information in the Notification must be submitted to EPA no less than 14 calendar days prior to the proposed implementation of the change. Such proposed modifications will be subject to the procedures of 40 CFR § 761.61(a)(3)(ii).

    If such modification involves a change which results in exposures not considered in the Notification, the EPA may revoke, suspend, and/or modify this Approval upon finding that this risk-based cleanup and disposal action may pose an unreasonable risk of injury to health or the environment due to said change. EPA may take similar action if the EPA does not receive requested information needed from UMASS to make a determination regarding potential risk.

16. Any departure from the conditions of this Approval without prior, written authorization from the EPA may result in the revocation, suspension and/or modification of the Approval, in addition to any other legal or equitable relief or remedy the EPA may choose to pursue.

17. Any misrepresentation or omission of any material fact in the Notification or in any records or reports may result in the EPA's revocation, suspension and/or modification of the Approval, in addition to any other legal or equitable relief or remedy the EPA may choose to pursue.

RECORDKEEPING AND REPORTING CONDITIONS

18. UMASS shall prepare and maintain all records and documents required by 40 CFR Part 761, including but not limited to the records required under Subparts J and K. A written record of the decontamination and the analytical sampling shall be established and maintained by UMASS in one centralized location, until such time as EPA approves in writing a request for an alternative disposition of such records. All records shall be made available for inspection to authorized representatives of EPA.

19. UMASS shall submit a Final Completion Report (Report) to the EPA within 120 days of completion of the activities described under this Approval. At a minimum, this Report shall include: a discussion of the project activities; characterization and confirmation sampling analytical results; copies of the accompanying analytical chains of custody; field and laboratory quality control/quality assurance checks; an estimate of the quantity of PCBs removed and disposed off-site; copies of manifests and/or bills of lading; and, copies of certificates of disposal or similar certifications issued by the disposer, if applicable. The Report shall also include a copy of the recorded deed restriction and a certification signed by a UMASS official verifying that the authorized activities have been implemented in accordance with this Approval and the Notification.

20. As required under Condition 13 of this Approval, UMASS shall submit the results of the long-term monitoring and maintenance activities to EPA as specified in the final MMIP to be approved by EPA.

21. Required submittals shall be mailed to:

Kimberly N. Tisa, PCB Coordinator
United States Environmental Protection Agency
5 Post Office Square, Suite 100 (OSRR07-2)
Boston, Massachusetts 02109-3912
Telephone: (617) 918-1527
Facsimile: (617) 918-0527

22. No record, report or communication required under this Approval shall qualify as a self-audit or voluntary disclosure under EPA audit, self-disclosure or penalty policies.

****

END OF ATTACHMENT 1

APPENDIX B: AIR MONITORING LOGS

WOODARD
&CURRAN

APPENDIX C: ANALYTICAL LABORATORY REPORTS