



December 16, 2019

Ms. Kimberly Tisa, PCB Coordinator  
U.S. Environmental Protection Agency Region 1  
5 Post Office Square – Suite 100  
Boston, Massachusetts 02109-3912

Re: Long-Term Monitoring and Maintenance Implementation – 2019 Monitoring Results  
University of Massachusetts, Amherst, Massachusetts

Dear Ms. Tisa:

On behalf of the University of Massachusetts, this report has been prepared and is being submitted to document the results from the 2019 long term monitoring activities conducted at the following buildings on the University of Massachusetts Amherst Campus:

- Tobin Hall Deck – The Monitoring and Maintenance Implementation Plan (MMIP) was submitted on March 13, 2012 in accordance with Condition 8 of the United States Environmental Protection Agency's (EPA) PCB Risk-Based Decontamination and Disposal Approval dated February 28, 2012; modifications were made to the long-term monitoring requirements following the 2015 event and communications with EPA to include annual visual inspections and biennial wipe testing of encapsulated surfaces.
- Southwest Concourse – The MMIP was submitted on December 29, 2010 in accordance with Condition 13 of the EPA's Southwest Residential Area Concourse PCB Cleanup and Disposal Approval dated August 30, 2010; monitoring activities were also conducted at those areas described in the PCB Remediation Plan Amendment dated May 9, 2011; following the 2015 monitoring event and communications with EPA, modifications were made to the long-term monitoring requirements to include visual inspections on an annual basis and wipe testing of encapsulated surfaces on a biennial basis.
- Dubois Library Elevator Lobbies – The MMIP was submitted on March 29, 2013 in accordance with Condition 12 of the EPA's Dubois Library PCB Cleanup and Disposal Approval dated April 8, 2010; following the 2015 monitoring event and communications with EPA, modifications to the long-term monitoring were made to include visual inspections and indoor air sampling on an annual basis and wipe testing of encapsulated surfaces on a biennial basis.
- Orchard Hill Complex:
  - Webster House – The MMIP was submitted on January 5, 2012 in accordance with Condition 16 of the EPA's PCB Decontamination and Disposal Approval dated July 4, 2011; following completion of the 2015 monitoring event and communications with EPA, the long-term monitoring program was modified to include annual visual inspections and biennial wipe testing of encapsulated surfaces as well as a single round of post-abatement indoor air sampling to confirm site conditions, which was conducted in 2016.



- Field and Grayson Houses – The MMIP was submitted on January 13, 2014 in accordance with Condition 17 of the EPA's April 30, 2012 PCB Decontamination and Disposal Approval for the window/door replacement project; monitoring activities were also conducted in accordance with the MMIP for the work completed on the exterior joints submitted on April 24, 2012 as part of the PCB Remediation Plan/Close Out Document for Field and Grayson House; following completion of the 2015 monitoring event and communications with EPA, the long-term monitoring program was modified to include annual visual inspections and biennial wipe testing of encapsulated surfaces as well as a single round of post-abatement indoor air sampling to confirm site conditions, which was conducted in 2016.
- Sylvan Complex – The MMIP was submitted on February 20, 2014 as part of the remediation completion reporting for the exterior and interior renovations conducted at each of the three buildings within the Sylvan Complex (Brown, Cashin, and McNamara). Annual post-remediation monitoring has been conducted in accordance with the MMIP and additional communications with EPA since 2014. Following completion of the 2017 monitoring event, the long-term monitoring program was modified to include visual inspections and indoor air sampling on an annual basis and wipe testing of encapsulated surfaces on a biennial basis.

On June 4, 2019, EPA issued the PCB Decontamination and Disposal Approval for the Sylvan Complex which included continued long-term monitoring of encapsulated surfaces.
- Physical Plant Second Floor – The MMIP was submitted on December 16, 2013 in accordance with Condition 15 of EPA's October 19, 2012 PCB Decontamination and Disposal Approval for the replacement of windows in Room 230A within the Physical Plant building. Long-term monitoring activities include visual inspections to be conducted on an annual basis.

As previously discussed, the activities conducted in support of the monitoring and maintenance activities for these projects are being submitted under a single cover to streamline reporting and review of these activities. The locations of these areas are depicted on Figure 1.

An overall summary of the 2019 activities is provided below with details of the specific projects included in individual project reports provided as attachments to this letter.

## **MONITORING AND MAINTENANCE IMPLEMENTATION PLAN**

For each of the projects included in this report, certain building materials formerly in direct contact with or adjacent to former PCB caulking were encapsulated using liquid coatings and/or physical barriers (e.g., sheet metal cladding) as a risk-based management approach under 40 CFR 761.61(c) where it was determined that physical removal was an infeasible remedial approach. This included both porous masonry and concrete surfaces in former direct contact with the caulking as well as a limited extent of masonry and concrete beyond the former joints.

Components of each MMIP, including subsequent revisions based on the monitoring results and maintenance activities completed to date, include the following:

- Visual inspections of the encapsulated surfaces will be performed to look for signs of encapsulant deterioration, breakages, wear, and/or signs of weathering or disturbance of the replacement caulking or other secondary physical barriers.



- Surface wipe samples of the encapsulated surfaces will be collected using a hexane-soaked wipe following the standard wipe test procedures described in 40 CFR 761.123.
- Indoor air monitoring will be conducted in accordance with US EPA Compendium Method TO-10A "Determination of Pesticides and Polychlorinated Biphenyls in Ambient Air Using Low Volume Polyurethane Foam (PUF) Sampling Followed by Gas Chromatographic/Multi-Detector Detections (GC/MD)".
- Monitoring results will be compared to evaluation criteria to determine the need and type of corrective actions and/or continued monitoring.
- A monitoring report will be prepared and submitted to EPA to document the results of the visual inspections and sampling activities, as well as to provide any recommendations for corrective measures based on the results of the visual inspections or laboratory analytical results. The report will also include a statement on the continued effectiveness of the encapsulants and/or secondary physical barriers; and will include any proposed modifications to the MMIP.

## **MONITORING ACTIVITIES –2019**

Woodard & Curran performed the following monitoring activities between July and September 2019:

- Visual inspections of encapsulated surfaces were conducted at each of the six areas for long-term monitoring;
- Surface wipe sampling of encapsulated surfaces was conducted on the encapsulated surfaces at Tobin Hall, the Southwest Concourse, Dubois Library, and Orchard Hill Complex;
- Indoor air samples were collected from the elevator lobbies of the Dubois Library and from interior areas of previous PCB remediation activities in the three buildings within the Sylvan Complex.

## **RESULTS**

A summary of the results of the 2019 monitoring activities for each building is included in Attachments 1 through 6 to this letter. Complete analytical laboratory reports, along with data validation summaries, are provided in Attachment 7.

The 2019 inspection and sampling results indicate that the liquid coatings and secondary barriers continue to be effective containment barriers to residual concentrations of PCBs in the masonry and concrete. Based on information provided by UMass, no work or maintenance activities were conducted in the subject areas; however, it should be noted that the excavation and off-site disposal of PCB impacted soils and other ground surfaces within the Sylvan Complex was conducted throughout the Summer months.

The results from surface wipe samples collected from encapsulated surfaces at the Dubois Library, Tobin Hall, Southwest Concourse, and Orchard Hill were consistent with previous sampling events with PCBs reported as either non-detect or  $< 1 \text{ ug}/100\text{cm}^2$ .



The results from the indoor air sampling at the Sylvan Complex indicated that the concentrations of PCBs were consistent with the previous two rounds of sampling and remain below site-specific exposure levels. At the Dubois Library, analytical results from the indoor air samples were also below the site-specific exposure level; however, at two locations the results were higher than the previous sampling results. A follow up sample was collected in September from one of the two locations and results reported PCBs at concentrations consistent with previous events. The results of the follow up sample indicated that the results from the July event may represent an anomalous condition; these spaces will be subject to continued monitoring in 2020.

### **Corrective Measures**

Based on the results of the annual monitoring, the following corrective measures are proposed to be conducted:

- Sylvan Complex –UMass continues to evaluate the application of secondary barrier systems over those vertical control joints considered to be in the high occupancy area as defined specific to this project (< 8' 8" above ground surface) at the McNamara building. At this time, the final product has not been determined however, it is anticipated that it will a pre-formed silicone barrier material or similar barrier material designed to span the control joint.

### **Continued Monitoring**

It is proposed to continue the campus wide long-term monitoring as per the applicable MMIPs with revisions for each area to include annual visual inspections and indoor air sampling (where applicable) and biennial surface wipe sampling.

If you have any comments, questions, or require further information, please do not hesitate to e-mail or call me at the number listed above.

Sincerely,

WOODARD & CURRAN INC.

George J. Franklin, CHMM  
Technical Manager

Jeffrey A. Hamel, LSP, LEP  
Senior Principal

cc: Terri Wolejko, UMass EH&S

Enclosures: Figure 1 – Site Location Map  
Attachment 1 – Tobin Hall Deck  
Attachment 2 – Southwest Concourse  
Attachment 3 – Dubois Library Elevator Lobbies  
Attachment 4 – Orchard Hill Residential Complex  
Attachment 5 – Sylvan Residential Complex  
Attachment 6 – Physical Plant  
Attachment 7 – Analytical Laboratory Reports



# University of Massachusetts Amherst Campus Map

July 2011

University Switchboard - (413) 545-0111

Tour Service - (413) 545-4237

Robsham Memorial Visitors Center - (413) 545-0306

## Map Key

- 31 Numbered Parking Lots
- P Metered/Public Parking
- ▲ PVTA Bus Stops
- ✕ Traffic Lights

Figure 1 Site Location Map



## **Attachment 1 – Tobin Hall Deck**

**Attachment 1 – Tobin Hall  
Long-Term Maintenance and Monitoring Program  
In-Place Management of PCB Impacted Materials  
UMass Amherst**

**Location:** Tobin Hall

**Summary of Remedial Areas**

*In-Place Management:* Residual PCBs on a building wall are being managed in-place following removal of concrete decking on the west side of Tobin Hall in 2011 and concrete stairs/landing in 2012. Concrete materials that contain PCBs at concentrations > 1 parts per million (ppm) remain beneath a liquid encapsulating coating (residual PCB concentration in concrete reported at a concentration of 2.37 ppm). The encapsulation extends to a distance of six inches above and six inches below the former caulked joint along approximately 80 linear feet (l.f.) of the Tobin Hall building wall and along approximately seven l.f. of the concrete façade/pillar at the north and south ends of the stairway landing. Materials were encapsulated with two coats of clear Sikagard 670W acrylic coating or two coats of Sikagard 62 liquid epoxy coating (south end of the stairwell landing only). The locations of the encapsulated surfaces are depicted on Figure 1-1. In 2013, as part of the Commonwealth Honors College construction project, a four-foot-high retaining wall was installed over the majority of the encapsulated surfaces. As a result, the remaining exposed encapsulated concrete surface is limited to a total of approximately 3.5 square feet of concrete at the northern and southern ends of the stair landing (i.e., seven feet of former joint to a distance of six inches above the former joints).

Photos depicting the encapsulated surfaces are presented below.



**Northern Side of Stair Landing**

**Attachment 1 – Tobin Hall  
Long-Term Maintenance and Monitoring Program  
In-Place Management of PCB Impacted Materials  
UMass Amherst**

Baseline Verification Data Summary: Two initial baseline wipe samples were collected in August 2011 from the building wall encapsulated with Sikagard 670W clear acrylic coating as part of the decking removal project. Analytical results reported PCBs as non-detect ( $< 0.20 \mu\text{g}/100 \text{ cm}^2$ ) in both samples. One baseline wipe sample was collected from the epoxy coated concrete surfaces as part of the stair landing removal project in 2012. Analytical results reported PCBs as non-detect ( $< 0.20 \mu\text{g}/100 \text{ cm}^2$ ).

**Monitoring and Maintenance Implementation Plan**

The Monitoring and Maintenance Implementation Plan (MMIP) was submitted to the United States Environmental Protection Agency (EPA) in March 2012 and modified following the 2015 monitoring event and subsequent email communications with EPA. Beginning with the 2016 monitoring event, long term monitoring includes annual visual inspections and biennial wipe sampling of the accessible encapsulated surfaces (one from the northern portion of the wall and one from the southern portion of the wall). Wipe samples will be collected using a hexane-soaked wipe following the standard wipe test procedures described in 40 CFR 761.123 over a 100-square centimeter surface area.

**Monitoring Activities – Previous Events**

Between 2012 and 2018 annual visual inspections of encapsulated surfaces indicated that the coatings on accessible portions of the encapsulated surfaces remained in good physical condition with the exception of a small, isolated area of epoxy coating deterioration directly adjacent to a hose connection on the northern retaining wall (the area was subsequently covered in 2013 with the installation of a four foot high retaining wall) and some flaking and peeling of the Sikagard 670W clear coating applied to a limited portion of the concrete on the northern retaining wall. Based on the observed flaking and peeling, in 2017 UMass applied two coats of Sikagard 62 epoxy coating to the accessible portion of the northern retaining wall where the clear coating had been observed to be flaking and peeling during previous events.

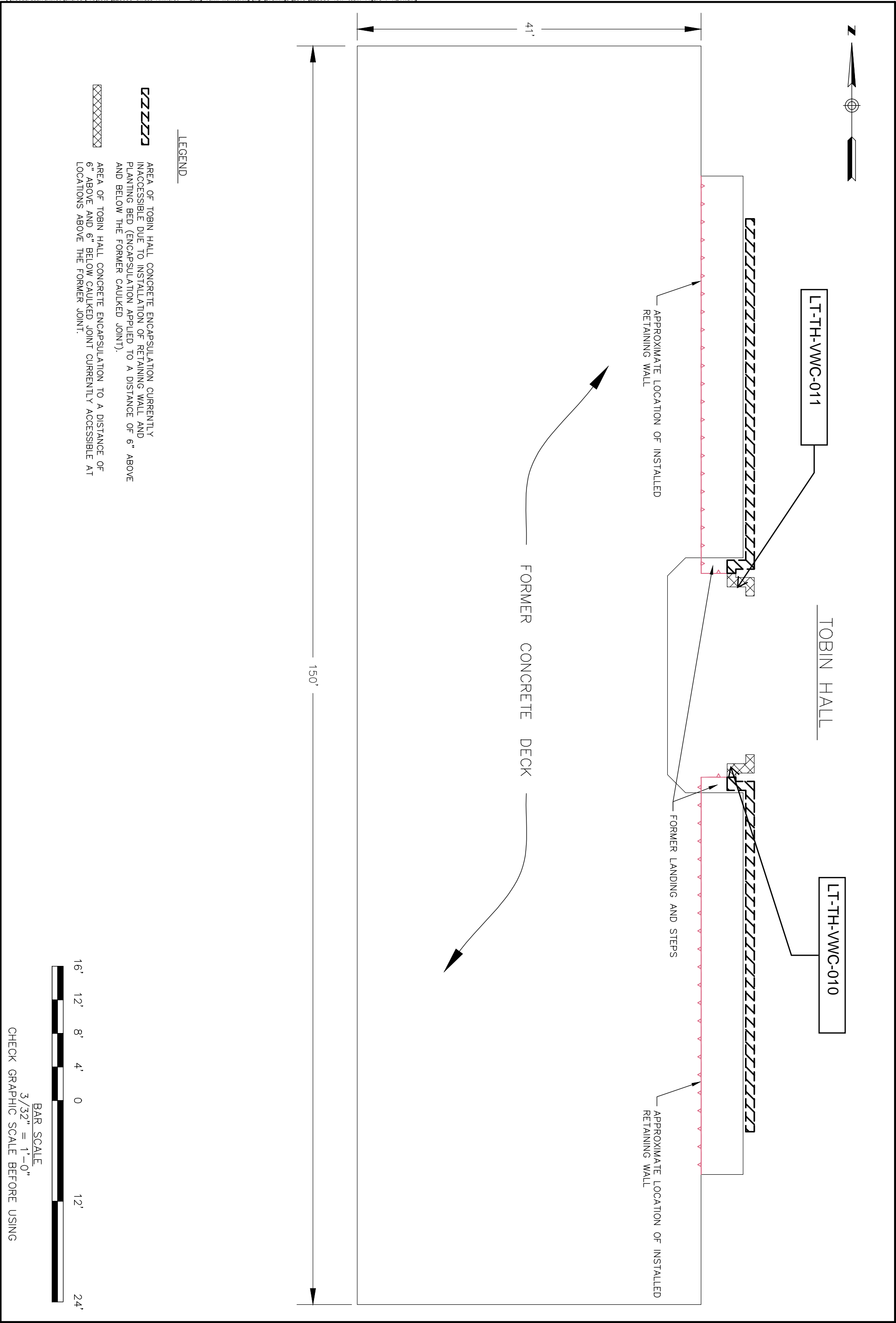
Wipe samples collected on an annual basis between 2012 and 2017 from encapsulated surfaces, including the epoxy coated surfaces applied in 2017 indicated that PCBs were non-detect ( $< 0.20 \mu\text{g}/100\text{cm}^2$ ).

**Monitoring Activities – August 2019**

Results of visual inspections indicated that the epoxy coatings on accessible portions of the retaining walls were in good physical condition. One wipe sample was collected from each of the two encapsulated areas and submitted for PCB analysis. Analytical results reported PCBs as non-detect ( $< 0.20 \mu\text{g}/100\text{cm}^2$ ) in both samples. The locations of the samples are depicted on Figure 1-1.

**Next Monitoring Event**

The next monitoring event is scheduled for July 2020 to include annual visual inspections.





## **Attachment 2 – Southwest Concourse**

**Attachment 2 – Southwest Concourse Area  
Long-Term Maintenance and Monitoring Program  
In-Place Management of PCB Impacted Materials  
UMass Amherst**

**Location:** Southwest Concourse Area

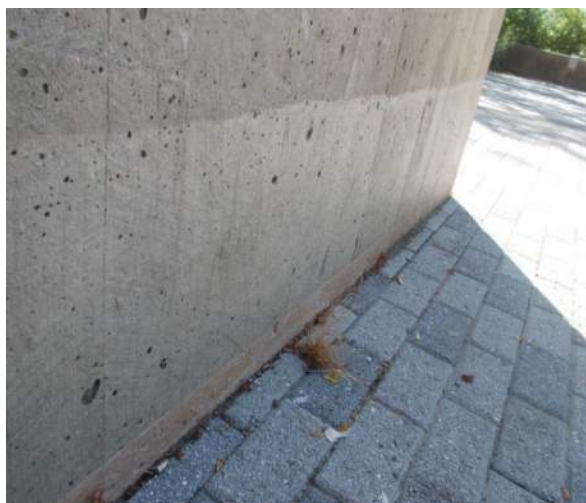
**Areas:** Hampshire Plaza, Berkshire Plaza, Washington Plaza, MacKimmie House/Stonewall Center, and Patterson House

**Summary of Remedial Areas**

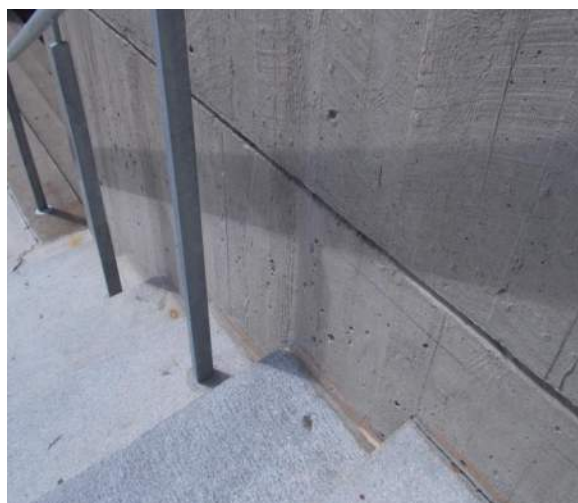
*In-Place Management:* Residual PCBs at concentrations > 1 part per million (ppm) on exterior building walls and retaining walls are being managed in place following removal of caulking, soils, and concrete decking along retaining walls and ground level structures throughout the Southwest Concourse Area as follows:

- Retaining Walls and Ground Level Structures (maximum residual PCB concentrations in concrete was 292 ppm):
  - Planned Sub-grade areas – Concrete materials formerly in direct contact with the caulked joint, to a minimum distance of 12 inches below the caulked joint, and to a distance equivalent to the planned final finished grade above the caulked joint (if the final grade was above the former caulked joint) were encapsulated with two coats of tan Sikagard 62 colored epoxy; and
  - Planned Above-grade areas – Concrete materials to a minimum distance of 12 inches above the caulked joint or planned finished grade were encapsulated with two coats of clear Sikagard 670W acrylic coating.
- Concrete Ceiling of Pedestrian Tunnel (maximum residual PCB concentration in masonry was 309 ppm) – Concrete materials formerly in direct contact with the caulking and to a lateral distance of 12 inches from the caulked joint were encapsulated with two coats of tan Sikagard 62 epoxy coating. Following application of the epoxy, a new bead of caulking was installed within the joint and a final topcoat of a white elastomeric acrylic coating was applied to the entire tunnel ceiling.

The locations of the encapsulated surfaces are depicted on Figure 2-1 and typical applications are shown in the photos below.



**Typical Retaining Wall Application**



**Typical Stair Application  
(shadow from railing visible as dark area)**

**Attachment 2 – Southwest Concourse Area  
Long-Term Maintenance and Monitoring Program  
In-Place Management of PCB Impacted Materials  
UMass Amherst**

*Baseline Verification Data Summary:* Initial baseline wipe samples were collected in July and August 2010 (majority of the Southwest Concourse Area), in July and August 2011 (areas included in the PCB Remediation Plan Amendment), and in June 2017 (Patterson and MacKimmie Houses). A summary of analytical results from the baseline sampling is as follows:

- Sikagard 62 Epoxy Encapsulated Surfaces – 69 of 71 samples were reported as non-detect (the two samples of former direct contact materials in the pedestrian tunnel reported PCBs at concentrations of 7.16 and 24  $\mu\text{g}/100\text{ cm}^2$ ; however, these areas were subsequently covered with a new bead of caulking and a final acrylic coating).
- Sikagard 670W Acrylic Coating Encapsulated Surfaces – 64 of 64 samples collected from above grade locations were reported as non-detect ( $< 1.0\text{ }\mu\text{g}/100\text{ cm}^2$ ).
- Encapsulated Concrete Building Foundations (July/August 2011 and June 2017) – 6 of 7 samples collected at grade (both epoxy and clear coated surfaces) were reported as non-detect and one sample reported at a concentration of 4  $\mu\text{g}/100\text{ cm}^2$ ; however, materials in this area were recoated and results from the follow-up wipe samples indicated PCBs were non-detect ( $< 1.0\text{ }\mu\text{g}/100\text{ cm}^2$ ).

**Monitoring and Maintenance Implementation Plan**

The Monitoring and Maintenance Implementation Plan (MMIP) was submitted to the United States Environmental Protection Agency (EPA) in December 2010 with a final response to comments on the plan submitted in January 2011. Revisions to the plan were implemented following the 2015 monitoring event and subsequent communications with EPA. The MMIP includes visual inspections of encapsulated surfaces on an annual basis with wipe sampling conducted on a bi-annual basis. A summary of the inspection and monitoring requirements is provided below.

Long term monitoring wipe sampling for each of the encapsulated surfaces will be conducted using a hexane-soaked wipe following the standard wipe test procedures described in 40 CFR 761.123. Samples will be collected on a biennial basis as follows:

- Concrete Structures (retaining walls and ground surface structures):
  - Sub-grade areas (Sikagard 62 epoxy) – Given the inaccessibility to these areas and that all 69 baseline wipe samples were non-detect for PCBs, no long-term monitoring samples were proposed from these areas. However, due to modifications to the final site grade during construction, areas encapsulated with the Sikagard 62 liquid epoxy coating remain visible above grade over select portions of the Southwest Concourse. As such, both visual inspections of the epoxy coating and collection of verification wipe samples are being conducted similar to the planned above grade areas (eight wipe samples); and
  - Above-grade areas (Sikagard 670W acrylic) – Nine wipe samples from randomly selected locations throughout the concourse area are to be collected. One sample will be collected from each type of concrete structure (retaining walls, building walls, walls along stairs) within each of the three major subdivisions of the concourse area (Hampshire Plaza, Berkshire Plaza, and Washington Plaza).
- Concrete Ceiling of the Pedestrian Tunnel – Two wipe samples will be collected from materials within the tunnel as follows:
  - One sample from the new caulking; and
  - One sample from the adjacent coated concrete.

**Attachment 2 – Southwest Concourse Area  
Long-Term Maintenance and Monitoring Program  
In-Place Management of PCB Impacted Materials  
UMass Amherst**

**Previous Monitoring Activities – 2012 through 2018**

Long term monitoring was conducted on an annual basis from 2012 through 2018. Results of the monitoring were presented to EPA in the annual monitoring reports and are summarized below.

Visual Inspection: Results of the visual inspections were as follows:

- Sikagard 62 Liquid Epoxy: The visual inspections found no evidence of significant peeling, breakage, or brittleness of the coating. Overall, areas of flaking and peeling were observed in isolation locations and remained generally consistent between inspections with some additional areas observed periodically. In 2017, UMass re-applied epoxy to surfaces observed to have been damaged during previous monitoring. Visual inspections conducted during the 2017 monitoring event confirmed the application of the epoxy coatings to the previously reported damaged areas and one additional small area was observed to be damaged in the Berkshire Plaza (< 1 square foot).
- Sikagard 670W: Visual inspection of the clear acrylic coating indicated that the coating remains in good condition over the majority of the encapsulated surfaces. Some areas of flaking and peeling were observed but in general they were limited to isolated areas typically 4 to 6 inches in size (some areas were observed up to 1 foot in size). The areas of flaking and peeling remained relatively consistent between sampling events indicating that the issues may have been present at the time of application and not indicative of long-term wear of the coatings.
- Concrete Ceiling of Pedestrian Tunnel: Visual inspection indicated that the coatings and caulking installed within the joint were in good condition. No deterioration was observed.

Wipe Samples: Wipe samples were collected from concrete surfaces coated with the Sikagard 62 liquid epoxy coating and the Sikagard 670W clear acrylic coating in the Southwest Concourse area and from concrete coated with the Sikagard 62 liquid epoxy coating, caulking, and a final elastomeric acrylic coating in the pedestrian tunnel. Wipe samples were collected from coated surfaces including select locations with observed flaking and peeling of the clear acrylic coating. Following the 2015 monitoring event, the collection of surface wipe samples was transitioned to a biennial event. A summary of the samples collected is as follows:

- Sikagard 62 Liquid Epoxy: Wipe samples were collected from each of three types of concrete surfaces in each of the three plazas where such materials were exposed. Overall, analytical results indicated that PCBs were either non-detect or present at concentrations < 1 µg/100 cm<sup>2</sup> during each event with the exception of samples collected from the Washington Plaza stairs where PCBs were reported at concentrations > 1 µg/100 cm<sup>2</sup> during the 2012, 2013, and 2015 monitoring events (PCBs were reported at a concentration of 0.24 µg/100 cm<sup>2</sup> in 2014). Based on the PCB concentrations reported in the wipe samples, a follow-up wipe sample was collected on August 18, 2016 from another set of epoxy coated stairs within the Washington Plaza to determine whether or not the PCB concentrations were representative of conditions on epoxy coated concrete on stairs throughout the Plaza or limited to the single set of stairs previously monitored. Analytical results from this sample indicated that PCBs were non-detect (< 0.20 µg/100 cm<sup>2</sup>). Based on these results, an additional coating of Sikagard 62 was applied to the subject stair surfaces in 2017 and results from a subsequent wipe sample reported PCBs at a concentration of 0.51 µg/100cm<sup>2</sup>.
- Sikagard 670W: One wipe sample was collected from each of the three main divisions of concrete surfaces in each of the three plazas within the Southwest Concourse area for a total of nine samples collected during each monitoring event. Analytical results indicated that PCBs were either non-detect (< 0.20 µg/100 cm<sup>2</sup>) or < 1 µg/100cm<sup>2</sup> in all samples collected through the 2017 event, including multiple samples collected from the areas of isolated flaking and peeling.

**Attachment 2 – Southwest Concourse Area  
Long-Term Maintenance and Monitoring Program  
In-Place Management of PCB Impacted Materials  
UMass Amherst**

- Concrete Ceiling of Pedestrian Tunnel: During each monitoring event, one wipe sample was collected from the caulked joint and one wipe sample was collected from coated concrete adjacent to the joint. Analytical results indicated that PCBs were non-detect ( $< 0.20 \mu\text{g}/100 \text{ cm}^2$ ) to  $0.56 \mu\text{g}/100\text{cm}^2$  in the samples collected from the adjacent concrete. Analytical results from wipe samples collected from the surface of the caulked joint reported PCBs at concentrations  $> 1 \mu\text{g}/100\text{cm}^2$  with a maximum reported concentration of  $13.4 \mu\text{g}/100\text{cm}^2$  in 2017. Based on the reported concentration in the 2017 sample, an additional sample was collected in 2018 (instead of maintaining the biennial schedule) and PCBs were reported as non-detect ( $< 0.20 \mu\text{g}/100\text{cm}^2$ ).

A summary of the analytical wipe sampling results back to the 2015 event are included on Table 2-1.

**Monitoring Activities – 2019**

The 2019 monitoring event was conducted on July 29, 2019 and included visual inspections of the liquid coatings and the collection of a wipe samples from coated masonry surfaces. A summary of the results is as follows:

Visual Inspection: Results of the visual inspections are as follows:

- Sikagard 62 Epoxy: The coatings were observed to be in good physical condition. One additional isolated area of damage was observed on a retaining wall in the Berkshire Plaza.
- Sikagard 670W Acrylic: Visual inspection of the clear acrylic coating indicated that the coating remains in good condition over much of the encapsulated surfaces however, some new areas of observed flaking and peeling were observed within the Berkshire Plaza. The observed flaking and peeling were consistent with other areas described above.
- Concrete Ceiling of Pedestrian Tunnel: Visual inspection of the paint and caulking within the joint indicated the materials remain in good condition.
- The locations of the encapsulated surfaces and areas of observed damage or flaking and peeling are presented on Figure 2-1.

Wipe Samples: Wipe samples were collected from representative locations of the coated concrete surfaces in the concourse and the pedestrian tunnel. The locations of the wipe samples are depicted on Figure 2-1. Analytical results are presented on Table 2-1 and as summarized as follows:

- Sikagard 62 Epoxy – Consistent with previous sampling events, the analytical results from the 8 wipe samples collected reported PCBs as non-detect (4 samples at  $< 0.20 \mu\text{g}/100\text{cm}^2$ ) and at concentrations of 0.33, 0.45, and  $1.2 \mu\text{g}/100\text{cm}^2$ . The wipe sample collected from the epoxy coated building walls in the Washington Plaza was not analyzed due to laboratory error. Based on the consistent results in the 8 samples that were analyzed as compared to previous events and the planned continued monitoring of these surfaces, a follow up sample was not collected.
- Sikagard 670W Acrylic – Analytical results from all 9 wipe samples collected reported PCBs as non-detect (9 samples at  $< 0.20 \mu\text{g}/100\text{cm}^2$ ) including 3 samples collected from areas of observed flaking and peeling.
- Concrete Ceiling of Pedestrian Tunnel – Analytical results were consistent with previous monitoring events with PCBs reported at a concentration of  $0.77 \mu\text{g}/100\text{cm}^2$  in the sample collected from the encapsulated concrete adjacent to the caulked joint and at a concentration  $5.3 \mu\text{g}/100\text{cm}^2$  from the coated caulking.

**Attachment 2 – Southwest Concourse Area  
Long-Term Maintenance and Monitoring Program  
In-Place Management of PCB Impacted Materials  
UMass Amherst**

**Conclusions/Next Steps**

Based on these results, the liquid coatings applied to concrete surfaces within the Southwest Concourse continue to be effective in encapsulating residual PCBs in masonry. Minor damage to the epoxy coating was observed in Berkshire Plaza. Repairs to the epoxy will continue to be made as part of routine maintenance activities within the concourse.

**Next Monitoring Event**

The next monitoring event will be performed during the Summer of 2020 and will include visual inspections of coated surfaces in accordance with the MMIP.

Table 2-1  
Summary of Long Term Monitoring Wipe Sampling Results - Southwest Concourse  
UMass Amherst

Coating/Area	Surface	Previous Sampling Events		
		Sample Date	Sample ID	Total PCBs (ug/100cm <sup>2</sup> )
Southwest Concourse - Epoxy Coatings				
Washington Plaza	Building Wall	7/21/2015	LTM-SWC-VWC-364	< 0.20
		8/10/2017	LT-SWC-VWC-026	< 0.20
		7/29/2019	LTM-SWC-VWC-414	<0.20
	Retaining Wall	Epoxy coatings on retaining walls in Washington Plaza are below grade		
	Stairs	7/21/2015	LTM-SWC-VWC-366	4.6
		8/18/2016	LTM-SWC-VWC-500	< 0.20
8/10/2017		LT-SWC-VWC-029	0.51	
7/29/2019		LTM-SWC-VWC-416	0.33	
Berkshire Plaza	Building Wall	7/21/2015	LTM-SWC-VWC-355	< 0.20
		8/10/2017	LT-SWC-VWC-018	< 0.20
		7/29/2019	LTM-SWC-VWC-412	0.45
	Retaining Wall	7/21/2015	LTM-SWC-VWC-356	< 0.20
		8/10/2017	LT-SWC-VWC-019	< 0.20
		7/29/2019	LTM-SWC-VWC-410	1.2
	Stairs	7/21/2015	LTM-SWC-VWC-361	< 0.20
		8/10/2017	LT-SWC-VWC-023	< 0.20
		7/29/2019	LTM-SWC-VWC-408	<0.20
Hampshire Plaza	Building Wall	7/21/2015	LTM-SWC-VWC-349	< 0.20
		8/10/2017	LT-SWC-VWC-012	< 0.20
		Sample not analyzed due to lab error		
	Retaining Wall	7/21/2015	LTM-SWC-VWC-351	< 0.20
		8/10/2017	LT-SWC-VWC-015	< 0.20
		7/29/2019	LTM-SWC-VWC-402	<0.20
	Stairs	7/21/2015	LTM-SWC-VWC-354	< 0.20
		8/10/2017	LT-SWC-VWC-017	0.28
		7/29/2019	LTM-SWC-VWC-406	<0.20
Southwest Concourse - Acrylic Coatings				
Washington Plaza	Building Wall	7/21/2015	LTM-SWC-VWC-363	< 0.20
		8/10/2017	LT-SWC-VWC-027	< 0.20
		7/29/2019	LTM-SWC-VWC-415	<0.20
	Retaining Wall	7/21/2015	LTM-SWC-VWC-365	< 0.20
		8/10/2017	LT-SWC-VWC-028	< 0.20
		7/29/2019	LTM-SWC-VWC-418	<0.20
	Stairs	7/21/2015	LTM-SWC-VWC-362	< 0.20
		8/10/2017	LT-SWC-VWC-024	< 0.20
		7/29/2019	LTM-SWC-VWC-417	<0.20
Berkshire Plaza	Building Wall	7/21/2015	LTM-SWC-VWC-358	< 0.20
		8/10/2017	LT-SWC-VWC-020	0.35
		7/29/2019	LTM-SWC-VWC-413	<0.20
	Retaining Wall	7/21/2015	LTM-SWC-VWC-357	< 0.20
		8/10/2017	LT-SWC-VWC-021	< 0.20
		7/29/2019	LTM-SWC-VWC-411	<0.20
	Stairs	7/21/2015	LTM-SWC-VWC-360	< 0.20
		8/10/2017	LT-SWC-VWC-022	< 0.20
		7/29/2019	LTM-SWC-VWC-409	<0.20
Hampshire Plaza	Building Wall	7/21/2015	LTM-SWC-VWC-352	< 0.20
		8/10/2017	LT-SWC-VWC-014	0.46
		7/29/2019	LTM-SWC-VWC-405	<0.20
	Retaining Wall	7/21/2015	LTM-SWC-VWC-350	< 0.20
		8/10/2017	LT-SWC-VWC-013	< 0.20
		7/29/2019	LTM-SWC-VWC-403	< 0.20
	Stairs	7/21/2015	LTM-SWC-VWC-353	< 0.20
		8/10/2017	LT-SWC-VWC-016	0.32
		7/29/2019	LTM-SWC-VWC-407	<0.20
Southwest Concourse - Pedestrian Tunnel				
Sika 550W White	Expansion Joint Caulking	7/21/2015	LTM-SWC-VWC-348	1.98
		8/10/2017	LT-SWC-VWK-011	13.4
		8/10/2017	LT-SWC-VWK-001	< 0.20
		7/29/2019	LTM-SWC-VWK-401	5.3
	Adjacent Concrete	7/21/15	LTM-SWC-VWC-347	< 0.20
		8/10/2017	LT-SWC-VWC-010	0.56
		7/10/2018	LTM-SWC-VWC-002	< 0.20
		7/29/2019	LTM-SWC-VWC-400	0.77

Notes:

Samples submitted for PCB analysis via USEPA method 8082 with Soxhlet Extraction (3540C).

Wipe samples collected in accordance with the standard wipe test method of 40 CFR 761.123.

FIGURE 2-1

SCALE IN FEET  
0 60 120

SCALE: AS NOTED

DATE: OCTOBER 2019

JOB NO.: 225695-02

UNIVERSITY OF MASSACHUSETTS

2019 SOUTHWEST CONCOURSE PCB

MMIP REPORT

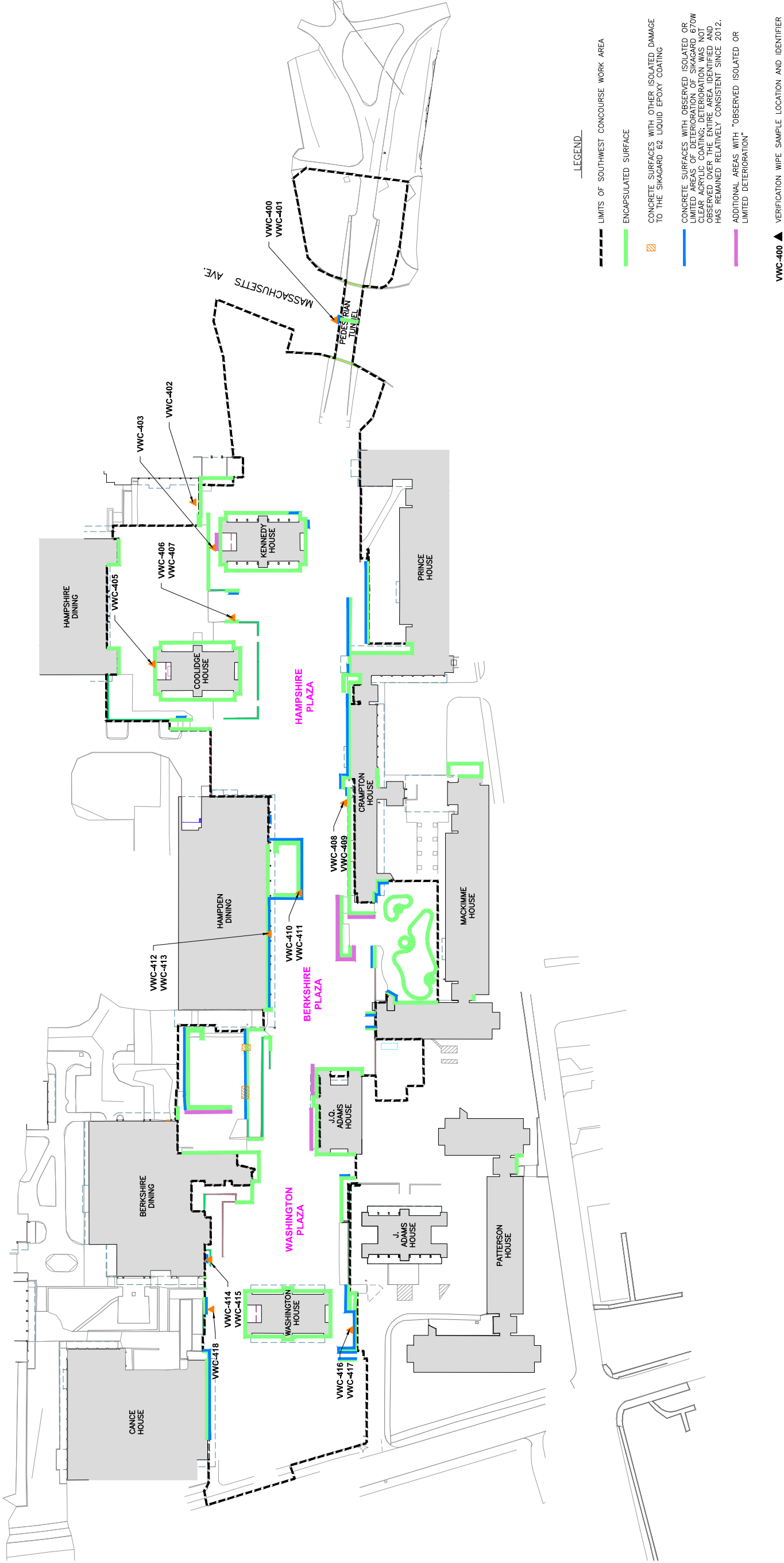
AREAS OF ENCAPSULATED SURFACES  
AND WIPE SAMPLE LOCATIONS

REV	DESCRIPTION	DATE
DESIGNED BY: CSR	CHECKED BY: JAH	225695-2019-Figure-2-1.dwg
DRAWN BY: PF		

40 SHATTUCK ROAD | SUITE 110  
ANDOVER, MASSACHUSETTS 01810  
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COMMITMENT & INTEGRITY DRIVE RESULTS





## **Attachment 3 – Dubois Library Elevator Lobbies**

**Attachment 3 – Dubois Library  
Long-Term Maintenance and Monitoring Program  
In-Place Management of PCB Impacted Materials  
UMass Amherst**

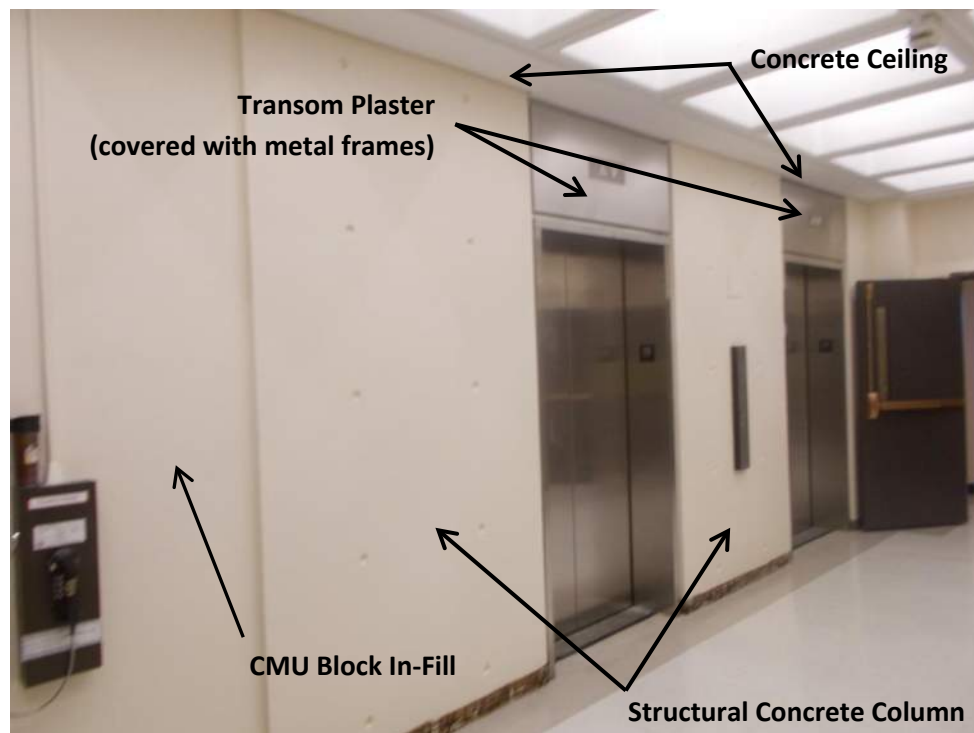
**Location:** W.E.B Dubois Library

**Summary of Remedial Areas**

*In-Place Management:* Residual PCBs at concentrations > 1 part per million (ppm) are being managed in place following abatement activities at the following locations located within the elevator lobbies:

- CMU Block In-Fill Materials – All CMU block in-fill materials were encapsulated with Sika 550W acrylic coating followed by a final coat of interior latex paint.
- Transom Plaster – Plaster materials throughout the elevator lobbies were encapsulated with Sika 550W acrylic coating followed by a final coat of interior latex paint. Metal cladding was installed over the encapsulated transom plaster materials in accordance with the project specifications.
- Concrete Ceiling – Concrete materials formerly in direct contact with the caulking and out to the corner of the concrete ceiling (or within 12 inches of the caulked joint) were encapsulated with Sika 550W acrylic coating followed by a final coat of interior latex paint. All remaining elevator lobby ceiling materials beyond the corner were covered with latex paint.
- Structural Concrete Columns – Concrete materials formerly in direct contact with the caulking and out to the first 90-degree angle (or within approximately 2 inches of the caulked joint) were encapsulated with Sika 550W acrylic coating followed by a final coat of interior latex paint. Portions of the elevator door recesses were also covered with metal frames associated with the new elevator doors. All materials on the face of the structural concrete column beyond the corner were encapsulated with latex paint.

The encapsulated surfaces associated with the elevator lobby abatement activities are shown in the photo below.



**Attachment 3 – Dubois Library  
Long-Term Maintenance and Monitoring Program  
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Baseline Verification Wipe Data Summary: Initial baseline wipes were collected on August 28, 2012. A summary of analytical results from the baseline sampling is as follows:

- CMU Block In-Fill materials: Three verification wipes samples were collected from CMU block in-fill surfaces following the application of the Sika 550W acrylic coating followed by a latex coating. Analytical results reported PCBs as non-detect ( $< 0.20 \mu\text{g}/100 \text{ cm}^2$ ) in the three wipes samples.
- Transom Plaster: One verification wipe sample was collected from transom plaster surfaces following the application of the Sika 550W acrylic coating followed by a latex coating. Analytical results indicated that PCBs were present below  $1 \mu\text{g}/100 \text{ cm}^2$  with a reported concentration of  $0.72 \mu\text{g}/100 \text{ cm}^2$ .
- Concrete Ceiling: One verification wipe sample was collected from concrete ceiling surfaces following the application of the Sika 550W acrylic coating followed by a latex coating. Analytical results reported PCBs as non-detect ( $< 0.20 \mu\text{g}/100 \text{ cm}^2$ ).
- Structural Concrete Columns – Three wipe samples were collected from encapsulated structural concrete materials following the application of the Sika 550W acrylic coating followed by a latex coating. Two wipe samples were collected from the parallel face of the structural concrete (facing the lobby) at a distance of 10 inches from the former caulked joint. Analytical results from these two samples indicated that PCBs were non-detected ( $< 0.20 \mu\text{g}/100 \text{ cm}^2$ ). One sample was collected at a distance of two inches from the former caulked joint along the perpendicular face of the structural concrete (i.e., within the elevator recess). Analytical results indicated that PCBs were present at a concentration of  $4.6 \mu\text{g}/100 \text{ cm}^2$  in this sample.

Indoor Air Sampling Data Summary: Indoor air samples were collected on August 28, 2012 as part of the initial post-remediation sampling. Analytical results indicated that PCBs were present at concentrations of 690, 977, and  $1,146 \text{ ng}/\text{m}^3$  in the three samples collected. These results were within the range of EPA's published guidance for indoor air levels for schools and a risk-based project specific action level prepared for the transitory nature of the elevator lobby.

As part of the development of the Monitoring and Maintenance Implementation Plan (MMIP) and to gain an understanding of indoor air levels in the different floors of the library as well as over the different seasons to assess variations over time, an expanded indoor air sampling program, which including the collection of samples from nine lobby areas, was developed and implemented on October 16, 2012.

### **Monitoring and Maintenance Implementation Plan**

The MMIP was submitted to the United States Environmental Protection Agency (EPA) in March 2013 and included visual inspections of encapsulated surfaces, verification wipe sampling, and continued indoor air sampling. Following the 2015 monitoring event, the plan was modified to include annual visual inspections and indoor air sampling and biennial surface wipe sampling. A summary of the inspection and monitoring requirements is as follows:

Long-term Monitoring Wipe Sampling: Wipe samples of the encapsulated surfaces will be collected using a hexane-soaked wipe following the standard wipe test procedures described in 40 CFR 761.123. A total of seven samples will be collected on a biennial basis from randomly selected locations as follows:

- CMU Block In-Fill Materials – Three wipe samples will be collected from encapsulated masonry block in-fills on three randomly selected floors. The location of the wipe sample on the in-fill will be randomly selected using a random number generator based on the total height and width of the in-fill.
- Structural Concrete/Lobby Walls – Three wipe samples will be collected from structural concrete/lobby wall materials on three randomly selected floors. The location of each wipe sample will be selected as follows:
  - The associated elevator shaft and location along the former joint will be randomly selected; and

**Attachment 3 – Dubois Library  
Long-Term Maintenance and Monitoring Program  
In-Place Management of PCB Impacted Materials  
UMass Amherst**

- One wipe sample will be collected at a distance of 1.5 inches from the former caulked joint (i.e., within the return of the elevator door recess, prior to the first 90-degree angle). Two wipe samples will be collected at a distance of 10 inches from the former joint (the higher number of samples is based on the higher likelihood of direct contact with the lobby walls compared to the relatively small [1.5-inch-wide] elevator door recess).
- Ceiling – One wipe sample will be collected from ceiling materials on a randomly selected floor.
- Transom Plaster – The final construction included the installation of sheet metal cladding over the existing transom plaster. No verification wipe samples will be collected due to the lack of direct contact exposure pathway to the transom plaster.

Indoor Air Sampling: Based on the results of indoor air monitoring through October 2015, which indicated that PCB concentrations were not dependent on seasonal variations of the ventilation system and were decreasing over time, the frequency of indoor air sampling was modified in 2016 to include one round of sampling per year. The sampling was selected to be conducted in July of each year to evaluate conditions during the summer months in periods of warmer ambient temperatures when the building ventilation dampers generally in a more closed configuration to provide less make-up air.

In 2018, a site-specific exposure level for PCBs in indoor air was calculated in accordance with EPA's "Exposure Levels for Evaluating Polychlorinated Biphenyls (PCBs) in Indoor School Air". This calculation provides a target level to maintain an overall PCB exposure below the oral reference dose of 20 ng PCB/kg body weight per day. The resulting calculation provides exposure levels that may be used to guide thoughtful evaluation of indoor air quality (per EPA guidance [July 28, 2015 *PCBs in Building Materials – Q&A*], these exposure levels should not be interpreted nor applied as "not-to-exceed criteria"; Isolated or infrequent indoor air PCB measurements that exceed the exposure levels would not signal unsafe exposure to PCBs).

Within the elevator lobbies, it was assumed that students could be present for approximately 250 days per year with a frequency of 0.8 hours in the lobby (assuming 10 elevator trips per day and 5 minutes in the lobby per trip, for 50 minutes per day) Using EPA's PCB Exposure Estimation Tool (v1.2), a site-specific PCB indoor air exposure level was calculated using the above frequency and duration assumptions. For both school and non-school exposures, EPA PCB background concentrations for dust, soil, indoor air, and outdoor air were used. The calculated exposure level was 3,357 ng/m<sup>3</sup>.

Indoor air samples are to be collected over a minimum of six hours in accordance with the US EPA Compendium Method TO-10A "Determination of Pesticides and Polychlorinated Biphenyls in Ambient Air Using Low Volume Polyurethane Foam (PUF) Sampling Followed by Gas Chromatographic/Multi-Detector Detection (GC/MD)". Samples will be submitted to a certified analytical laboratory for PCB Homolog Analysis via US EPA Method 680A with a laboratory reporting limit of < 0.10 µg/m<sup>3</sup>.

### **Previous Monitoring Activities**

#### Visual Inspections and Surface Wipes

Visual inspections of the encapsulated materials conducted between 2013 and 2018 indicated that the coatings remained in good physical condition with no observed damage other than slight wearing of the outer latex paint layer. Results of verification wipe samples collected during previous events indicated that PCBs were either non-detect or present at concentrations < 1 µg/100 cm<sup>2</sup> in all samples.

**Attachment 3 – Dubois Library  
Long-Term Maintenance and Monitoring Program  
In-Place Management of PCB Impacted Materials  
UMass Amherst**

Indoor Air

Indoor air sampling was conducted at a minimum of twice per year from 2013 through 2015 (to evaluate potential seasonal fluctuations) and then on an annual basis starting in 2016. Analytical results were relatively consistent across all events with the maximum and average concentrations consistently within or slightly below the concentration range identified for continued monitoring between 2012 and 2017 (500 to 1,180 ng/m<sup>3</sup>) and below the site-specific exposure level of 3,357 ng/m<sup>3</sup> calculated following the 2018 sampling event. Analytical results for samples collected during the summer months from 2015 through 2019 are summarized on Table 3-2.

**2019 Monitoring Activities**

Visual Inspections and Surface Wipes

Visual inspections of encapsulated surfaces were conducted during the annual monitoring event on July 29, 2019. Coatings were observed to be in good physical condition with no signs of wear or damage. Results of verification wipe samples were consistent with previous events and indicated that PCBs were either non-detect (6 samples at < 0.20 ug/100cm<sup>2</sup>) or present at concentrations < 1 µg/100 cm<sup>2</sup> (1 sample with a reported concentration of 0.30 ug/100cm<sup>2</sup>).

Indoor Air Sampling

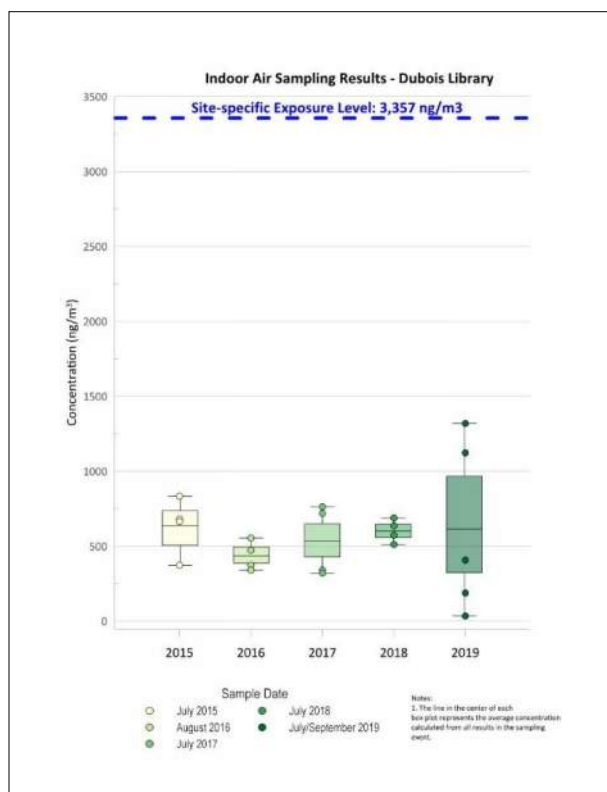
Four indoor air samples were collected on July 29, 2019 from the 4<sup>th</sup>, 13<sup>th</sup>, 19<sup>th</sup> and 23<sup>rd</sup> floors. Analytical results indicated that PCBs were reported at concentrations ranging from 34 to 1,319 ng/m<sup>3</sup>. Analytical results remain well below the site-specific exposure level; however, the reported concentrations in the samples collected from the 19<sup>th</sup> and 22<sup>nd</sup> floors were higher than the results from previous sampling events with reported concentrations of 1,319 and 1,122 ng/m<sup>3</sup>, respectively. During the sampling event no maintenance or other activities were observed, and the ventilation system was reported to be operating under normal conditions by UMass personnel.

On September 17, 2019, a follow up sample was collected from the 19<sup>th</sup> floor to evaluate whether or not the results from the July sampling event were representative of potential changing interior conditions or if the results were representative of a short term/anomalous condition. Analytical results from the follow up sample reported PCBs at a concentration of 187 ng/m<sup>3</sup>, which was consistent with (although slightly lower than) previous sampling events. Results of the September follow up sample indicated that the results from the July event may represent an anomalous condition and these spaces will be subject to continued monitoring in 2020.

The complete analytical results from both the September and July events are included in Attachment 7. A summary of the analytical results from the 2019 event and the previous four events (2015 to 2018) is presented on Table 3-1 and on the chart on the following page.

As depicted on the chart below, while the range of results from the 2019 sampling event were larger than the range of previous sampling events, the analytical results from the 2019 sampling event, including the results from the 19<sup>th</sup> and 22<sup>nd</sup> floors, remain well below the site-specific exposure level for the elevator lobby areas.

**Attachment 3 – Dubois Library  
Long-Term Maintenance and Monitoring Program  
In-Place Management of PCB Impacted Materials  
UMass Amherst**



**Corrective Actions**

Based on the 2019 monitoring activities, no corrective actions are proposed at this time.

**Next Monitoring Event**

The next monitoring event is scheduled for July/August 2020 to include visual inspections and indoor air sampling.

Table 3-1  
Summary of Long Term Monitoring Wipe Sampling Results - Dubois Library  
UMass Amherst

Coating/Area	Surface	2015 Wipe Samples			2017 Wipe Samples			2019 Wipe Samples		
		Sample Date	Sample ID	Total PCBs (ug/100 cm <sup>2</sup> )	Sample Date	Sample ID	Total PCBs (ug/100 cm <sup>2</sup> )	Sample Date	Sample ID	Total PCBs (ug/100 cm <sup>2</sup> )
Sikagard 55W and Acrylic Latex Paint	CMU Block In-Fill	7/21/2015	LTM-DL-VWC-243	<0.20	7/3/2017	LTM-DL-VWC-250	<0.20	7/29/2019	DL-21E-VWC-258	< 0.20
		7/21/2015	LTM-DL-VWC-244	<0.20	7/3/2017	LTM-DL-VWC-253	<0.20	7/29/2019	DL-15E-VWC-260	< 0.20
		7/21/2015	LTM-DL-VWC-247	<0.20	7/3/2017	LTM-DL-VWC-255	<0.20	7/29/2019	DL-4E-VWC-263	< 0.20
	Structural Concrete Lobby Walls	7/21/2015	LTM-DL-VWC-242	<0.20	7/3/2017	LTM-DL-VWC-251	<0.20	7/29/2019	DL-19E-VWC-259	0.30
		7/21/2015	LTM-DL-VWC-245	<0.20	7/3/2017	LTM-DL-VWC-254	<0.20	7/29/2019	DL-13E-VWC-261	< 0.20
		7/21/2015	LTM-DL-VWC-246	<0.20	7/3/2017	LTM-DL-VWC-256	<0.20	7/29/2019	DL-10E-VWC-262	< 0.20
	Ceiling	7/21/2015	LTM-DL-VWC-249	<0.20	7/3/2017	LTM-DL-VWC-252	<0.20	7/29/2019	DL-23E-VWC-257	< 0.20

Notes:

Samples submitted for PCB analysis via USEPA method 8082 with Soxhlet Extraction (3540C).

Wipe samples collected in accordance with the standard wipe test method of 40 CFR 761.123.

**Table 3-2**  
**Summary of Indoor Air Sample Results - Dubois Library**  
**UMass Amherst**

Floor	Air Sample	PCB Concentration (ng/cartridge)	Flow Rate (L/Minute)	Duration (minutes)	PCB Concentration (ng/m <sup>3</sup> )
<b>Project Specific Exposure Level: 3,357 ng/m<sup>3</sup></b>					
<b>Post PCB Remediation Indoor Air Samples</b>					
<b>July 21, 2015</b>					
4	DL-4E-IAS-219	0.23	2.68	240	0.373
13	DL-13E-IAS-220	0.42	2.71	240	0.680
19	DL-19E-IAS-221	0.52	2.73	240	0.834
23	DL-23E-IAS-223	0.41	2.71	240	0.664
<b>Post PCB Remediation Indoor Air Samples</b>					
<b>August 3, 2016</b>					
4	DL-4E-IAS-231	350	2.63	360	373 J/UJ
8	DL-8E-IAS-232	320	2.65	360	340 J/UJ
19	DL-19E-IAS-234	520	2.63	360	554 J/UJ
20	DL-20E-IAS-235	440	2.62	360	473 J/UJ
<b>Post PCB Remediation Indoor Air Samples</b>					
<b>July 3, 2017</b>					
4	DL-4E-IAS-241	310	2.67	360	340 J/UJ
13	DL-13E-IAS-239	290	2.62	360	320 J/UJ
19	DL-19E-IAS-238	700	2.65	360	763 J/UJ
23	DL-23E-IAS-237	660	2.66	360	719 J/UJ
<b>Post PCB Remediation Indoor Air Samples</b>					
<b>July 10, 2018</b>					
4	DL-4E-IAS-005	475	2.65	367	511 J
13	DL-13E-IAS-004	538	2.65	371	573 J
19	DL-19E-IAS-002	637	2.64	371	688 J
23	DL-23E-IAS-001	643	2.68	400	635 J
<b>Post PCB Remediation Indoor Air Samples</b>					
<b>July 29, 2019 and September 17, 2019</b>					
4	DL-4E-IAS-245	510	3.66	360	407
13	DL-13E-IAS-244	44	3.73	362	34
19	DL-19E-IAS-243	1655	3.70	360	1319
	DL-19E-IAS-246	173.8	2.63	361	187
23	DL-23E-IAS-242	1425	3.74	362	1122

**Notes:**

Project Specific Exposure Level calculated using EPA's PCB Exposure Estimation Tool (v1.2).  
 Air samples collected in accordance with USEPA Compendium Method TO-10A "Determination of Pesticides and Polychlorinated Biphenyls In Ambient Air Using Low Volume Polyurethane Foam (PUF) Sampling Followed by Gas Chromatographic/Multi-Detector Detection (GC/MD)" and submitted for laboratory analysis of PCBs homologs.  
 ng/m<sup>3</sup> = nanograms per cubic meter  
 J/UJ = Analytical results qualified as estimated based on external data validation of individual homolog groups.



## **Attachment 4 – Orchard Hill Residential Complex**

**Attachment 4 – Orchard Hill Area  
Long-Term Maintenance and Monitoring Program  
In-Place Management of PCB Impacted Materials  
UMass Amherst**


**Location:** Orchard Hill Residential Area

**Building:** Webster, Field, and Grayson Houses

**Summary of Remedial Areas**

*In-Place Management:* Residual PCBs > 1 ppm are being managed in place following abatement activities in the following locations:

**Field and Grayson Houses**

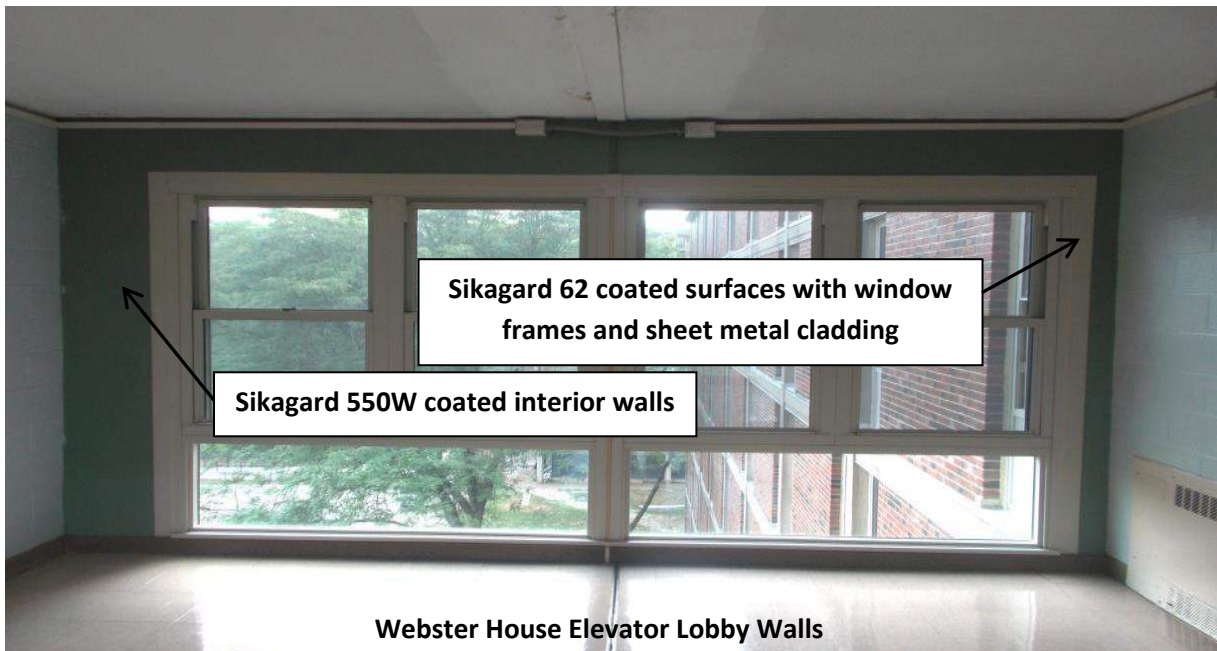
- Exterior Parapet Masonry Joints (2010): Following replacement of caulking along masonry joints at the upper parapet walls of the Field and Grayson Houses, two coats of Sikagard 62 liquid epoxy coating were applied to concrete materials formerly in direct contact with and to a distance of 6 inches from the joints in either direction (see the photograph to the right).
- 
- Locations of Typical Parapet Masonry Joints
- Elevator Hall CMU Block Walls (2012 and 2013): PCBs are being managed in place at > 1 ppm at the 6<sup>th</sup> floor elevator lobby of both Field and Grayson Houses following the removal of caulked joints around Type D windows (see Figure 4-1).
    - CMU block materials formerly in direct contact with the caulked joint (i.e., header surfaces) are encapsulated with two coats of Sikagard 62 epoxy coating and the replacement window frames/sheet metal flashing; and
    - CMU block materials above the upper horizontal joints to the first 90-degree angle (i.e., to the ceiling at a distance of approximately 15 inches) are encapsulated with two coats of Sikagard 550W elastomeric acrylic coating. (Note: Sikagard 550W was applied to the CMU block walls of all elevator lobbies as part of the renovation project).
  - Concrete Spandrel Beams (2012 and 2013): Exterior concrete spandrel beam materials on the north and south elevations (located in line with the Elevator Hall Windows) formerly in direct contact with the concrete expansion joint caulking and to a distance of three inches in either direction have been encapsulated using two coats of Sikagard 62 epoxy coating (see Figure 4-1).
  - Grayson House Exterior Narrow Stairwell Window Jambs (2012): Brick materials on the jambs of the northern stairwell west elevation narrow stairwell windows on the sixth and seventh floors formerly in direct contact with the exterior perimeter window caulking and to the end of the window recess (the first 90-degree angle) have been encapsulated using two coats of Sikagard 62 epoxy coating and the replacement window frames/sheet metal flashing (see Figure 4-1).
  - Grayson House Interior Stairwell Concrete Sills (2012): Concrete window sill and header materials at the northern stairwell landings from the second through seventh floors formerly in direct contact with the interior perimeter window caulking and to the first 90-degree angle (approximately two inches) have been encapsulated using two coats of Sikagard 62 epoxy coating and the replacement window frames (see Figure 4-1).

**Attachment 4 – Orchard Hill Area  
Long-Term Maintenance and Monitoring Program  
In-Place Management of PCB Impacted Materials  
UMass Amherst**

- Field House Interior Stairwell Brick Jambs (2012): Brick window jamb materials at the southern stairwell landings from the second floor through seventh floors formerly in direct contact with the interior perimeter window caulking and to a distance of two inches (i.e., the extent of the replacement window frames) have been encapsulated using two coats of Sikagard 62 epoxy coating and the replacement window frames (see Figure 4-1).

**Webster House**

- Elevator Lobby Interior Walls – Concrete materials formerly in direct contact with caulking and to a distance of four inches from the caulked joint were encapsulated with two coats of grey Sikagard 62 epoxy coating and subsequently covered by the newly installed metal window frames and sheet metal cladding. Remaining interior wall materials to the first 90-degree angle were encapsulated with two coats of green Sikagard 550W acrylic coating (see photograph below).
- Northwest Elevation Exterior Concrete Ceiling – Materials formerly in direct contact with caulking along 100 linear feet (l.f.) of ribbon type windows on the northwest building elevation were encapsulated with two coats of grey Sikagard 62 epoxy coating and subsequently covered by the newly installed metal window frames (see Figure 4-2).



**Attachment 4 – Orchard Hill Area  
Long-Term Maintenance and Monitoring Program  
In-Place Management of PCB Impacted Materials  
UMass Amherst**

Baseline Verification Data Summary: A summary of the initial wipe sampling results for the encapsulated areas is presented below.

**Field and Grayson Houses**

- Exterior Parapet Masonry Joints: Initial wipe samples of the exterior joints were collected in August 2010 following application of the Sikagard 62 epoxy. Analytical results from the 26 wipe samples collected indicated that PCBs were non-detect (24 samples at  $< 0.20 \mu\text{g}/100\text{cm}^2$ ) or  $< 1 \mu\text{g}/100\text{cm}^2$  (2 samples with total PCBs reported at concentrations of 0.44 and  $0.90 \mu\text{g}/100\text{cm}^2$ ).
- Elevator Hall CMU Block Walls:
  - Sikagard 62 Epoxy Coated Materials – In July 2012, prior to installation of the window frames and sheet metal cladding, one verification wipe sample was collected from the encapsulated surfaces. Analytical results reported PCBs as non-detect ( $< 0.20 \mu\text{g}/100\text{cm}^2$ ).
  - Sikagard 550W Elastomeric Coated Materials – In August 2012, one verification wipe sample was collected from encapsulated materials above the 6<sup>th</sup> floor elevator hall windows. Analytical results indicated that PCBs were non-detect ( $< 0.20 \mu\text{g}/100\text{cm}^2$ ).
- Concrete Spandrel Beams – Following application of the liquid coatings in August 2012 and July 2013, four verification wipe samples were collected from encapsulated surfaces of the concrete spandrel beams. Analytical results reported PCBs as non-detect ( $< 0.20 \mu\text{g}/100 \text{ cm}^2$ ) in the four samples.
- Grayson House Exterior Narrow Stairwell Window Jambs – In July 2013, prior to installation of the window frames, one verification wipe sample was collected from the encapsulated surfaces. Analytical results reported PCBs as non-detect ( $< 0.20 \mu\text{g}/100\text{cm}^2$ ).
- Grayson House Interior Stairwell Concrete Sills - In July 2012, prior to installation of the window frames, one verification wipe sample was collected from the encapsulated surfaces. Analytical results reported PCBs as non-detect ( $< 0.20 \mu\text{g}/100\text{cm}^2$ ).
- Field House Interior Stairwell Brick Jambs - In July 2012, prior to installation of the window frames, one verification wipe sample was collected from the encapsulated surfaces. Analytical results reported PCBs as non-detect ( $< 0.20 \mu\text{g}/100\text{cm}^2$ ).

**Webster House**

- Elevator Hall Interior Walls:
  - Sikagard 62 Epoxy Coated Materials – In July 2011, prior to installation of the window frames and sheet metal cladding, six verification wipe samples were collected from encapsulated surfaces. Analytical results reported PCBs as non-detect ( $< 0.20 \mu\text{g}/100 \text{ cm}^2$ ) in the six samples collected.
  - Sikagard 550W Elastomeric Coated Materials – Six initial baseline wipe samples were collected in November 2011. Analytical results reported PCBs as non-detect ( $< 0.20 \mu\text{g}/100 \text{ cm}^2$ ) in all six samples.
- Northwest Elevation Exterior Concrete Ceiling Direct Contact Materials: Prior to installation of the sheet metal cladding, three verification wipe samples were collected from encapsulated surfaces. Analytical results reported PCBs as non-detect ( $< 0.20 \mu\text{g}/100 \text{ cm}^2$ ) in the three samples collected.

**Attachment 4 – Orchard Hill Area  
Long-Term Maintenance and Monitoring Program  
In-Place Management of PCB Impacted Materials  
UMass Amherst**

**Monitoring and Maintenance Implementation Plan**

The Monitoring and Maintenance Implementation Plans (MMIP) for the three buildings were submitted to EPA in January 2012 (Webster House) and January 2014 (Field and Grayson Houses) and included visual inspections and verification wipe sampling of encapsulated surfaces.

Based on the baseline sample results (majority were non-detect for PCBs) and some encapsulated areas subsequently covered by window frames and sheet metal cladding, wipe sampling was limited to accessible surfaces. Following the 2015 monitoring event and subsequent communications with EPA, the monitoring plan was modified to include annual visual inspections and biennial wipe sampling of accessible encapsulated surfaces. A summary of the monitoring plans is provided below:

**Field and Grayson Houses**

- Visual inspection of masonry joints along the roof lines from the ground. Due to the limited accessibility to these areas, wipe samples are not included in the long-term monitoring. In areas where damage or deterioration of the encapsulant or caulking is observed, recommendations for corrective actions will be proposed.
- Visual inspections of the other encapsulated surfaces will be conducted to look for signs of encapsulant deterioration and/or signs of weathering or disturbance of metal window frames and sheet metal barriers.
- Two surface wipe samples of the encapsulated concrete spandrel materials on the exterior side of the Elevator Hall Windows (Type D) will be collected on a biennial basis to evaluate the concentration of PCBs present at the surface. The wipe samples will be collected from a randomly selected portion of the joints between the first and second floors due to access limitations (a lift would be required and limited area of accessibility by building users) to higher locations.
- One surface wipe sample of the encapsulated interior CMU block walls on the sixth floor of the Grayson and Field Houses elevator hall areas not located beneath the Type D window frames will be collected on a biennial basis from a randomly selected location to evaluate the concentration of PCBs present at the surface.
- No surface wipe samples will be collected from encapsulated surfaces formerly in direct contact with caulking at the Type G, H, and I Narrow Stairwell Windows or the Type J Stairwell Windows, as all encapsulated surfaces at these window types are located under the replacement window frames or sheet metal cladding. Direct contact access to these surfaces is prohibited by a secondary barrier (i.e., new windows and/or metal cladding installed over the encapsulant).

**Webster House**

Based on the baseline sample results (all non-detect for PCBs) and encapsulated areas subsequently covered by window frames and sheet metal cladding associated with the new window installation, the only accessible coating is in areas at the interior CMU block walls in the elevator lobbies. A total of three surface wipe samples of these encapsulated (Sikagard 550W) interior CMU block walls will be collected from randomly selected locations on a biennial basis.

**Attachment 4 – Orchard Hill Area  
Long-Term Maintenance and Monitoring Program  
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**Previous Monitoring Activities – 2012 through 2018**

Long term monitoring activities conducted between 2012 and 2018 were reported in the annual long-term monitoring reports and are summarized below:

Field and Grayson

- Exterior Parapet Masonry Joints – Coated concrete surfaces surrounding the exterior parapet masonry joints were inspected for damage. The visual inspection found no evidence of deterioration of the coating with the exception of the single joint identified at the roofline of Field House in 2013. In July 2018, the additional epoxy coatings were applied to this joint where damage had been noted during previous inspections.
- Concrete Spandrel Beams – Coated concrete surfaces surrounding exterior spandrel beams were inspected for damage. The visual inspection found no evidence of deterioration of the coating. Analytical results from 7 of the 8 surface wipe samples collected reported PCBs as non-detect ( $< 0.20 \text{ ug}/100\text{cm}^2$ ). Results from one sample reported PCBs at a concentration of  $0.25 \text{ ug}/100\text{cm}^2$ .
- Elevator Hall CMU Block Walls – Coated CMU block materials within the elevator lobby areas were inspected. In 2014 a limited amount of the coating was observed to be damaged on the surfaces of the south wall of the Grayson House 6<sup>th</sup> floor elevator lobby. This area was repaired as part of standard maintenance activities within the building. Analytical results from wipe samples collected reported PCBs as non-detect ( $< 0.20 \text{ ug}/100\text{cm}^2$ ).
- Stairwell Materials – Visual inspection of the windows and sheet metal cladding was conducted at the exterior narrow stairwell window jambs of the Grayson House and on the interior stairwell window concrete sills and brick jambs of both buildings. No damage to the materials was observed.

Webster House

- Northwest Building Elevation – Visual inspections conducted from 2012 through 2018 showed no signs of damage to the sheet metal cladding and window frames on the northwest building elevation.
- Elevator Hall CMU Block Walls – Coated CMU block materials within the elevator lobby areas were inspected. No signs of deterioration or damage were observed. Analytical results from all samples indicated that PCBs were non-detect ( $< 0.20 \text{ ug}/100\text{cm}^2$ ).

2016 Indoor Air Sampling

- Indoor Air Sampling – Two indoor air samples were collected from the elevator lobby areas at Webster and Grayson Houses. Samples were collected over a minimum of six hours in accordance with EPA Compendium Method TO-10A Determination of Pesticides and Polychlorinated Biphenyls in Ambient Air Using Low Volume Polyurethane Foam (PUF) Sampling. Analytical results indicated that PCBs were present at concentrations below EPA's published exposure levels for the evaluation of PCBs in indoor school air (July 2015) with reported concentrations of  $36$  and  $38 \text{ ng}/\text{m}^3$ . Given the transitory nature of the elevator lobbies and the anticipated limited duration a typical occupant would be present in these buildings (no more than four years to coincide with a typical undergraduate degree program), the application of the published levels is believed to be a conservative protective measure. As such, no additional indoor air sampling was proposed to be conducted within these spaces.

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**2019 Monitoring Activities**

The 2019 monitoring event was conducted on September 17, 2019 and included visual inspections of encapsulated surfaces and secondary physical barriers and wipe sampling.

- **Field and Grayson Houses:**
  - Exterior Parapet Masonry Joints – Coated concrete surfaces surrounding the exterior parapet masonry joints were inspected for damage. The visual inspection found no evidence of deterioration of the coating.
  - Concrete Spandrel Beams – Coated concrete surfaces surrounding exterior spandrel beams were inspected for damage. The visual inspection found no evidence of deterioration of the coating. One surface wipe sample was collected from coated surfaces at the exterior spandrel beams at both buildings. Analytical results indicated that PCBs were non-detect ( $< 0.20 \mu\text{g}/100\text{cm}^2$ ) in both samples.
  - Elevator Hall CMU Block Walls – Coated CMU block materials within the elevator lobby areas were inspected. The visual inspection found no evidence of deterioration of the coatings. One wipe sample was collected from the encapsulated surfaces within Field House and reported as non-detect ( $< 0.20 \mu\text{g}/100\text{cm}^2$ ) for PCBs.
  - Stairwell Materials – Visual inspection of the windows and sheet metal cladding was conducted at the exterior narrow stairwell window jambs of the Grayson House and on the interior stairwell window concrete sills and brick jambs of both buildings. No damage to the materials was observed.
  - A summary of the analytical results is presented on Table 4-1.
- **Webster House** - No signs of damage were observed to the sheet metal cladding and window frames on the northwest building elevation. Sheet metal cladding and liquid coatings in the elevator lobby areas were observed to be in good condition with no signs of wear or damage. Analytical results from the three wipe samples collected from coated CMU block walls reported PCBs as non-detect ( $< 0.20 \mu\text{g}/100\text{cm}^2$ ) as summarized on Table 4-1.

**Corrective Actions**

Based on the results of the 2019 monitoring event, no corrective actions are required at this time.

**Next Monitoring Event**

The next monitoring event will be conducted in 2020 and will include visual inspections of encapsulated surfaces and secondary physical barriers in accordance with the long-term monitoring plans.

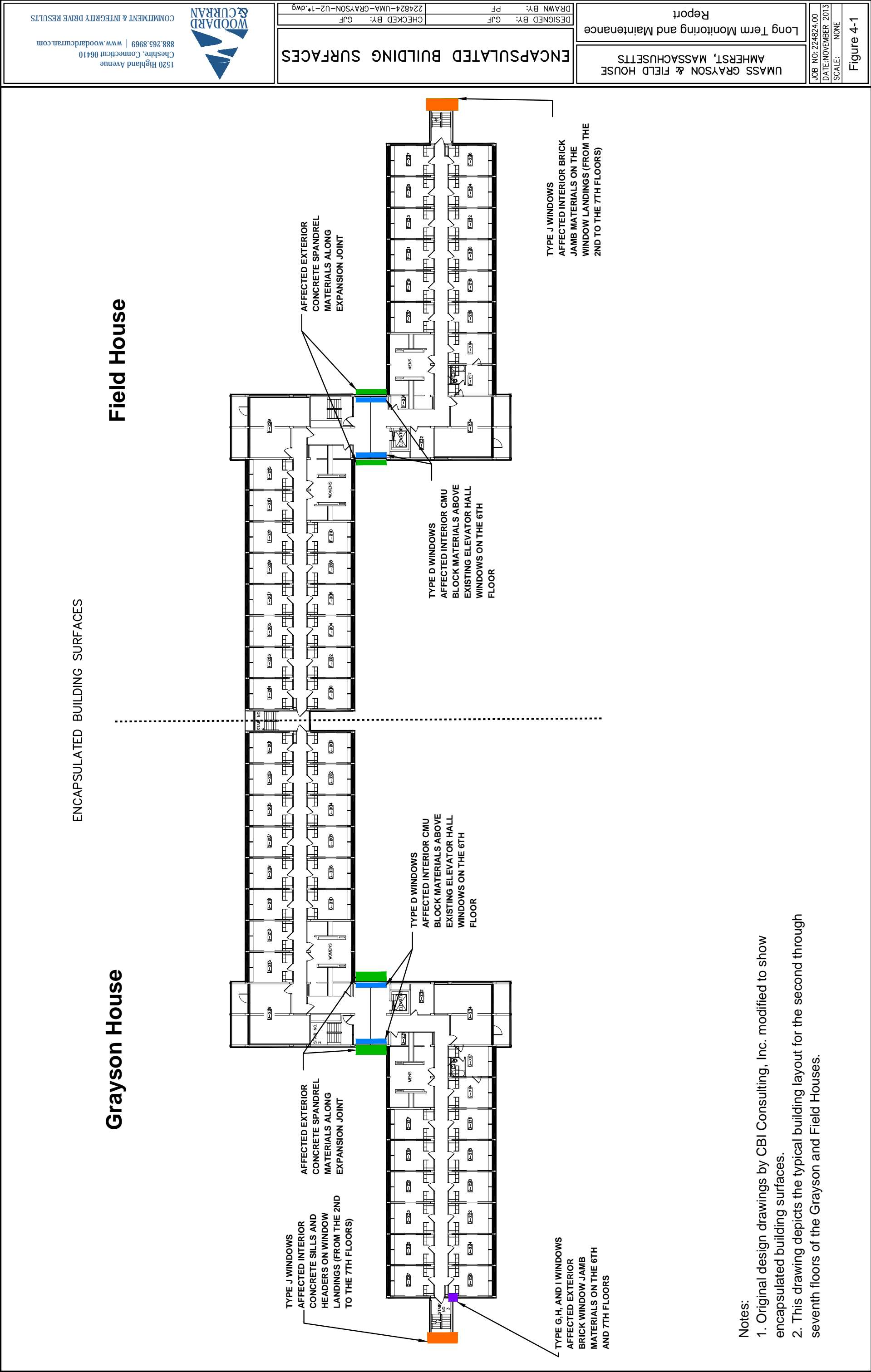
Table 4-1  
Summary of Long Term Monitoring Wipe Sampling Results - Orchard Hill  
UMass Amherst

Coating/Area	Surface	Building	Sample Date	Sample ID	Total PCBs (ug/100cm <sup>2</sup> )
Sikagard 62 Epoxy	Exterior Spandrel Beams	Field House	7/22/2014	LTM-FH-VWC-228	<0.20
			7/21/2015	LTM-FH-VWC-345	<0.20
			8/10/2017	LT-FH-VWC-006	< 0.20
			9/17/2019	LT-FW-VWC-010	< 0.20
		Grayson House	7/22/2014	LTM-GH-VWC-230	<0.20
			7/21/2015	LTM-GH-VWC-344	<0.20
			8/10/2017	LT-GH-VWC-005	0.25
			9/17/2019	LT-GH-VWC-012	< 0.20
Sika 550W	Interior CMU Block Walls	Webster House	8/9/2012	LTM-WH-VWC-001	< 0.20
			8/9/2012	LTM-WH-VWC-002	< 0.20
			8/9/2012	LTM-WH-VWC-003	< 0.20
			9/3/2013	LTWH-VWC-001	< 0.20
			9/3/2013	LTWH-VWC-002	< 0.20
			9/3/2013	LTWH-VWC-003	< 0.20
			7/22/2014	LTM-WH-VWC-225	<0.20
			7/22/2014	LTM-WH-VWC-226	<0.20
			7/22/2014	LTM-WH-VWC-227	<0.20
			7/21/2015	LTM-WH-VWC-341	<0.20
			7/21/2015	LTM-WH-VWC-342	<0.20
			7/21/2015	LTM-WH-VWC-343	<0.20
			8/10/2017	LT-WH-VWC-001	<0.20
			8/10/2017	LT-WH-VWC-002	<0.20
			8/10/2017	LT-WH-VWC-003	<0.20
			9/17/2019	LT-WH-VWC-013	< 0.20
			9/17/2019	LT-WH-VWC-014	< 0.20
			9/17/2019	LT-WH-VWC-015	< 0.20
		Field House	7/22/2014	LTM-FH-VWC-229	<0.20
			9/17/2019	LT-FH-VWC-011	< 0.20
		Grayson House	7/21/2015	LTM-GH-VWC-346	<0.20
			8/10/2017	LT-GH-VWC-007	< 0.20

Notes:

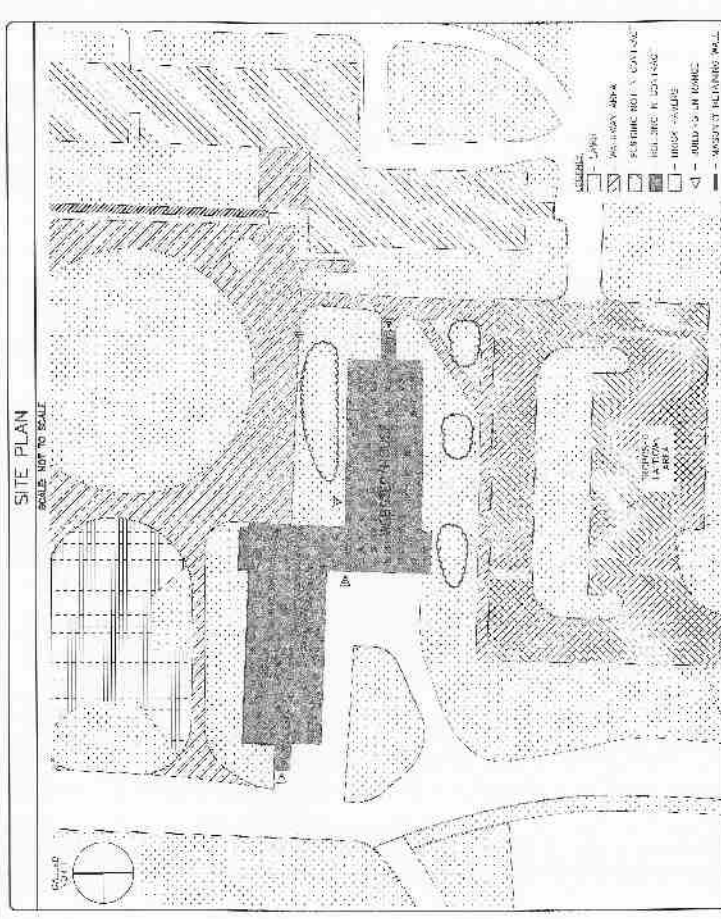
Samples submitted for PCB analysis via USEPA method 8082 with Soxhlet Extraction (3540C).

Wipe samples collected in accordance with the standard wipe test method of 40 CFR 761.123.



- Notes:
1. Original design drawings by CBI Consulting, Inc. modified to show encapsulated building surfaces.
  2. This drawing depicts the typical building layout for the second through seventh floors of the Grayson and Field Houses.

Drawing details taken from Webster House Window Replacement drawing D-A-333-10-001711-01-T2 dated February 3, 2011 by Gale Associates, Inc. of Weymouth, Massachusetts.





## **Attachment 5 – Sylvan Residential Complex**

**Attachment 5 – Sylvan Residential Complex  
Long-Term Maintenance and Monitoring Program  
In-Place Management of PCB Impacted Materials  
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**Location:** Sylvan Complex

**Building:** Brown, Cashin, McNamara

**Summary of Remedial Areas**

*In-Place Management:* Residual PCBs at concentrations > 1 part per million (ppm) are being managed in place at interior and exterior locations on the three buildings within the Sylvan Complex. A summary of the locations is as follows:

- Exterior Locations – along horizontal and vertical expansion joints in both high occupancy areas (i.e., within 8' 8" of the ground surface) and low occupancy areas (i.e., > 8' 8" from the ground surface):
  - Exterior Brick Within the Return of Horizontal and Vertical Control Joints (20,690 linear feet [l.f.]) – Brick materials located within the return of the horizontal and vertical control joints were encapsulated with up to three coats of Sikagard 62 liquid epoxy coating and subsequently covered with replacement caulking.
  - Exterior Brick Adjacent to Horizontal Control Joints in High Occupancy Areas (860 l.f.) – One full row of brick above and three full rows of brick below horizontal control joints within 8' 8" of the ground surface were encapsulated with up to three coats of Sikagard 670W clear acrylic coating.
  - Exterior Brick Adjacent to Vertical Control Joints in High and Low Occupancy Areas (5,690 l.f.) – One full row of brick on either side of the vertical control joints were coated with up to three coats of Sikagard 670W clear acrylic coating.
- Interior Locations – along former caulked joints and adjacent building materials as follows:
  - Interior Concrete Columns/Walls (352 square feet [s.f.]) – Select interior concrete columns and walls at the Brown and McNamara buildings were coated with liquid coatings as part of the ADA restroom upgrades in these buildings and interior renovations to the lower level common areas at McNamara. Materials formerly in direct contact with the removed source materials were coated with two coats of Sikagard 62 liquid epoxy coating. Materials containing PCBs > 1 ppm away from the former source materials were coated with a minimum of two coats of Sikagard 670W acrylic, and/or Sikagard 550W elastomeric paint.
  - Interior Concrete Ceilings (835 s.f.) – Concrete ceilings outside the ADA Restroom upgrades at Brown and McNamara and the ceiling within the first-floor common area (now the first floor office space) at Cashin were coated with liquid coatings. Materials formerly in direct contact with the source materials were coated with two coats of Sikagard 62 liquid epoxy coatings. Materials containing PCBs > 1 ppm away from the former source materials were coated with a minimum of two coats of Sikagard 670W acrylic and/or Sikagard 550W elastomeric paint.

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Photographs of typical coating application areas are provided below.



Typical Interior Encapsulated Surfaces  
(Concrete Walls and Ceiling)



Typical Vertical and Horizontal Control Joints  
(New Caulking and Clear Coating Visible)

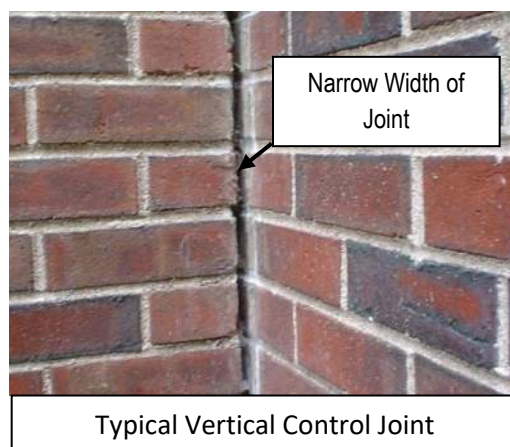
Baseline Verification Data Summary: Following remediation activities, baseline verification wipe samples were collected from encapsulated surfaces as follows:

- Exterior - former direct contact areas:
  - Horizontal control joints on the building's façade:
    - 83 wipe samples collected;
    - Of which 79 samples were reported as  $< 1 \mu\text{g}/100\text{cm}^2$  total PCBs (95% of the samples); and
    - 4 samples  $> 1 \mu\text{g}/100\text{cm}^2$  at 1.2, 1.3, 2.4, and 4.8  $\mu\text{g}/100\text{cm}^2$  (3 at McNamara and 1 at Cashin; none at Brown).
  - Vertical control joints on the building's façade:
    - 38 wipe samples collected;
    - Of which 23 samples were reported as  $< 1 \mu\text{g}/100\text{cm}^2$  total PCBs (60% of the samples); and
    - 15 samples  $> 1 \mu\text{g}/100\text{cm}^2$ ; 12 of the 15 samples were collected from McNamara (up to 250  $\mu\text{g}/100\text{cm}^2$ ), 1 at Brown (1.2  $\mu\text{g}/100\text{cm}^2$ ); and 2 at Cashin (1.15 and 3.5  $\mu\text{g}/100\text{cm}^2$ ).
- Exterior - areas away from the former caulked joints:
  - Horizontal control joints on the building's façade in high occupancy areas:
    - 19 wipe samples collected; and
    - All 19 samples were reported as  $< 1 \mu\text{g}/100\text{cm}^2$  total PCBs (100% of the samples).

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- Vertical control joints on the building's façade:
  - 44 wipe samples collected;
  - Of which 35 samples were reported as  $< 1 \mu\text{g}/100\text{cm}^2$  total PCBs (80% of the samples);
  - 9 samples  $> 1 \mu\text{g}/100\text{cm}^2$ ; 8 of the 9 samples were collected from McNamara (up to  $2.3 \mu\text{g}/100\text{cm}^2$ ) and 1 at Brown ( $1.8 \mu\text{g}/100\text{cm}^2$ ); and
- All baseline verification wipe samples from the interior encapsulated areas were below the target level of  $1 \mu\text{g}/100\text{cm}^2$  with the exception of three samples from McNamara ( $1.3$ ,  $1.5$ , and  $1.6 \mu\text{g}/100\text{cm}^2$ ).

As indicated above, most locations met the target levels (with some minor areas slightly above the target level) with the exception of the vertical control joints at McNamara. As data was reviewed during the McNamara exterior renovation project, additional measures were conducted including additional coats of epoxy and more frequent inspections. Given the limited size of the joints, observations indicated some of the backing material deep within the return of the narrow joint could not be removed without substantial damage to the brick façade; residual PCBs in this material may be affecting the epoxy wipe results; however, this material was subsequently covered by the epoxy, new backing material, and new caulking.



### **Monitoring and Maintenance Implementation Plan**

The Monitoring and Maintenance Implementation Plan (MMIP) was submitted to the United States Environmental Protection Agency (EPA) in February 2014 and included visual inspections and wipe sampling. On June 4, 2019, EPA issued the PCB Decontamination and Disposal Approval for the Sylvan Complex which included confirmation that long term monitoring was to continue in accordance with the MMIP.

Visual inspections will be conducted at representative areas of each of the types of encapsulated surfaces to confirm the presence of the encapsulating coatings/barriers. Surface wipe samples will be collected from select encapsulated surfaces to aid in determining the effectiveness of the encapsulants over time.

Encapsulated surfaces associated with the following locations have been selected for sampling as part of the long-term monitoring plan:

- Areas Adjacent to Exterior Façade Horizontal Control Joints in High Occupancy Areas ( $< 8'-8"$  above ground surfaces [ags]) (860 l.f.) – 1 sample per building façade (total of 12 samples proposed; 4 per building);
- Areas Adjacent to Exterior Façade Vertical Control Joints in High Occupancy Areas ( $< 8' -8"$  ags) (878 l.f.) – 1 sample per building façade (total of 12 samples proposed; 4 per building);
- Interior Concrete Columns/Walls (Brown and McNamara) (352 s.f.) – 1 sample per work area (total of 3 samples proposed; 1 at Brown and 2 at McNamara); and
- Interior Concrete Ceilings (Brown, McNamara, and Cashin) (835 s.f.) – a total of five samples to be collected with a minimum of 1 sample per work area (1 at Brown; 2 at McNamara; and 2 at Cashin).

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In summary, a total of 32 surface wipe samples will be collected from representative locations of the encapsulated surfaces. Where applicable, sample locations will be biased towards locations selected during baseline sampling activities.

Based on the criteria presented above, the rationale for excluding the remaining encapsulated surfaces from the sampling program is summarized below:

- **Former Direct Contact Surfaces** – no samples are to be collected from surfaces in former direct contact with caulking based on the baseline epoxy wipe sample results and given that each of these surfaces are located beneath a secondary physical barrier (e.g., new caulking, drywall, etc.). The one exception to this condition is that given the baseline results from the exterior façade vertical joints at McNamara (12 samples with reported PCB concentrations  $> 1 \mu\text{g}/100\text{cm}^2$ ), wipe samples were collected in 2014 and 2015 from the caulking at four locations from McNamara. The sampling demonstrated PCB concentrations consistent with the baseline monitoring data.
- **Low-Occupancy Areas** – as described above, no samples are to be collected from exterior surfaces in low-occupancy areas (i.e., surfaces at heights greater than 8'-8" ags) given their inaccessibility and the low likelihood that these surfaces will be contacted by occupants or building users.

In 2016, at the request of the EPA, a round of indoor air sampling was conducted to evaluate indoor air conditions in the renovation areas of the three buildings. Based on the results of that sampling, additional indoor air sampling was included in the 2017 and 2018 monitoring activities.

Following the completion of the 2018 monitoring event, the long-term monitoring program was modified to include annual visual inspections and indoor air sampling and biennial wipe sampling of the accessible encapsulated surfaces.

**Previous Monitoring Events – 2014 through 2018**

Visual inspection and wipe sampling of encapsulated surfaces was conducted in accordance with the MMIP as described above on an annual basis from 2014 to 2018. Indoor air sampling was conducted during multiple events in 2016, 2017, and 2018 to evaluate indoor air conditions during periods of varying ambient conditions. Results of the monitoring activities are summarized below:

*Visual Inspection:* Results of the visual inspections indicated that the encapsulating barriers (caulking within exterior control joints and liquid coatings applied over interior and exterior areas with residual PCBs) were in good physical condition with no damage or evidence of deterioration observed.

*Wipe Samples:* Wipe samples were collected from interior and exterior coated masonry surfaces as described above. A summary of the results is as follows:

- **Sikagard 670W Clear Acrylic Coating:** Wipe samples were collected from exterior brick along horizontal and vertical control joints within high occupancy areas at the three buildings. Analytical results were as follows:
  - **Horizontal Control Joints** – From 2014 to 2018, PCBs were reported as either non-detect or present at concentrations  $< 1 \mu\text{g}/100\text{cm}^2$  (6 samples with PCB reported at concentrations up to  $0.58 \mu\text{g}/100\text{cm}^2$ ). These results were consistent with the baseline data.
  - **Vertical Control Joints** – From 2014 to 2018, analytical results reported PCBs as either non-detect or present at concentrations ranging from  $0.23$  to  $3.4 \mu\text{g}/100\text{cm}^2$  (13 samples). These results were consistent with the baseline data.

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- Interior Concrete Columns/Walls: Three wipe samples were collected during each event from interior concrete columns/walls encapsulated with Sikagard 550W elastomeric coating (the final coating applied to interior concrete columns and walls). Analytical results were consistent with the baseline data with PCBs reported as either non-detect (9 samples at  $< 0.20 \mu\text{g}/100\text{cm}^2$ ) or present at concentrations of 0.21, 0.75, and  $1.27 \mu\text{g}/100\text{cm}^2$ .
- Interior Concrete Ceiling: Five wipe samples were collected during each event from interior concrete ceiling surfaces encapsulated with interior acrylic paint (the final coating applied over Sikagard 62 liquid epoxy and/or Sikagard 670w clear acrylic). Analytical results indicated that PCBs were either non-detect (16 samples at  $< 0.20 \mu\text{g}/100\text{cm}^2$ ) or present at concentrations ranging from 0.38 to  $0.81 \mu\text{g}/100\text{cm}^2$  (5 samples – all collected from McNamara). These results are consistent with the baseline data.
- Replacement Caulking – McNamara Vertical Control Joints: Four wipe samples (1 per elevation) were collected from the surface of the replacement caulking on the McNamara vertical control joints in 2014 and 2015. Analytical results indicated that PCBs were present in the wipe samples at concentrations ranging from 13 to  $77 \mu\text{g}/100 \text{ cm}^2$ . These results were consistent with the verification/baseline monitoring wipes collected at the completion of the project where analytical results had indicated that PCBs were present at a maximum concentration of  $250 \mu\text{g}/100\text{cm}^2$  on the liquid epoxy coating.

In addition to the hexane wipes, four saline wipes were collected during each event from the locations co-located with the hexane wipe samples to evaluate alternative wipe sampling procedures to assess “surface” concentrations of PCBs to determine if the hexane was “extracting” or “pulling” the PCBs from within the porous caulking. Analytical results from the saline wipes indicated that PCBs were present at concentrations ranging from 0.28 to  $7.6 \mu\text{g}/100\text{cm}^2$ . Based on these results, the hexane wipes may not be truly representative of surficial PCBs that could be available for direct contact and/or leaching through normal anticipated pathways (e.g., incidental contact, rain water, etc.).

#### Indoor Air Sampling

Indoor air samples were collected during eight events between 2016 and 2018. The events were conducted to evaluate indoor air conditions during periods of normal occupancy and periods when the building was not occupied as well as periods of varying ambient outdoor conditions (e.g., warmer summer months, cooler fall/spring months, and colder winter months). Analytical results for the samples collected indicated:

- On average, the higher PCB concentrations were detected when the building was unoccupied and during the warmer ambient temperatures (June and August events)
- Average PCB concentrations in indoor air during the seasonal events were:
  - $814 \text{ ng}/\text{m}^3$  during the warmer temperatures, unoccupied conditions (Summer)
  - $359 \text{ ng}/\text{m}^3$  during the cooler temperatures, occupied conditions (Spring/Fall)
  - $250 \text{ ng}/\text{m}^3$  during the colder temperatures, occupied conditions (Winter)

During the Summer months the building is unoccupied and typically closed-up with minimum usage (e.g., building doors and windows typically closed and students and staff either not present or in the buildings at a reduced frequency). Because the intent of future monitoring is to evaluate potential exposures to building occupants under normal conditions, additional air sampling was proposed to be conducted as part of the long-term monitoring during the early parts of the fall semester. This timeframe was selected to evaluate conditions during periods of normal building use and occupancy that would typically coincide with periods of warmer ambient temperatures.

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## **2019 Monitoring Activities**

The 2019 monitoring event was conducted on September 17, 2019 and included visual inspections and indoor air sampling. As described in the 2018 monitoring report, based on the results of wipe sampling from the previous monitoring events, the wipe sampling was proposed to be conducted on a biennial basis with the next round of wipe samples to be collected in 2020. A summary of the results is presented below.

### Visual Inspection

Results of the visual inspections are as follows:

- Exterior Expansion Joint Caulking: Visual inspection of the caulking within the horizontal and vertical controls joints indicated that the caulking was in good physical condition with no damaged or missing sections observed.
- Exterior Brick Surfaces: Visual inspection of the Sikagard 670W clear acrylic coating applied along the exterior horizontal and vertical controls joints indicated that the coating remains in good condition over the majority of encapsulated surfaces with isolated areas of flaking and peeling consistent with observations of similar coating applications at other areas on the campus.
- Interior Concrete Columns/Walls/Ceilings: Visual inspection indicated that coatings installed to masonry materials were in good condition. No deterioration was observed.

### Indoor Air Sample Collection

As proposed in the 2018 long term monitoring report, one round of indoor air sampling was conducted in 2019. The sampling event was conducted on September 17, 2019 following the return of students to evaluate conditions during the early part of the fall semester when the building was initially occupied, and temperatures were anticipated to be typically higher than during other portions of the semester. Prior to students returning in the Fall and opening the building for re-occupancy, UMass conducted ventilation of all three buildings using the building's system supplemented with fans. Observations made during the sampling event indicated that the building doors and windows were closed during sample collection as were the majority of interior partition doors in the sample areas. Based on information provided by UMass, no major renovation or maintenance activities had occurred prior to the sampling events.

Consistent with previous sampling events, indoor air samples were collected over a minimum of six hours in accordance with EPA Compendium Method TO-10A Determination of Pesticides and Polychlorinated Biphenyls in Ambient Air Using Low Volume Polyurethane Foam (PUF) Sampling. Samples were submitted to ConTest Analytical Laboratory for PCB homolog analysis via Gas Chromatographic/Multi-Detector Detection.

Analytical results are summarized in Table 5-1 (along with the previous data). Reported concentrations of PCBs ranged from 181 ng/m<sup>3</sup> (Brown ADA restroom) to 549 ng/m<sup>3</sup> (McNamara 1<sup>st</sup> Floor Lounge) Three of the samples were collected from the same locations as during the 2018 sampling event. Analytical results in each of these three locations reported PCBs at concentrations consistent with the 2018 event, although slightly lower. Overall, the average reported concentration in the 2019 sampling event was 330 ng/m<sup>3</sup> which is consistent with the average concentrations reported during the previous two sampling events conducted during the fall of 2017 and 2018 where the average reported concentrations were 384 and 317 ng/m<sup>3</sup>, respectively.

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The results were also compared to the site-specific exposure levels for the three types/categories of spaces (1<sup>st</sup> Floor and Lower Level Common Space, Cashin Service Desk, and ADA Restrooms). As presented in the 2017 monitoring report, the site-specific exposure levels for each of the three types of spaces were calculated in accordance with EPA's "Exposure Levels for Evaluating Polychlorinated Biphenyls (PCBs) in Indoor School Air" using occupancy durations provided by UMass for the various types of spaces and building users. The site-specific exposure levels from each type of area are presented on Table 5-1. As shown on Table 5-1, analytical results from the 2019 sampling event reported PCBs below the exposure levels.

**Conclusions/Next Steps**

The 2020 monitoring event will be conducted during the September timeframe after students return for the fall semester. Activities will include visual inspections, surface wipe sampling from interior and exterior encapsulated surfaces, and indoor air sampling (occupied conditions, cooler temperatures representing Fall-Spring). UMass EHS will continue to coordinate with Residential Life to ventilate the three buildings prior to students returning for the fall semester.

A summary of the planned indoor air sampling program is presented below for each of the three types of spaces.

- ADA Restrooms (1 sample) – 1 sample will be collected from either the Brown or McNamara ADA Restrooms.
- First Floor and Lower Level Study and Meeting Areas (1 sample) – 1 sample will be collected from either the Lower Level hallway/study area room or from the 1<sup>st</sup> Floor Study/Lounge area.
- Cashin Service Desk (1 samples) – 1 sample will be collected from the Cashin Service desk.

Table 5-1  
Summary of Indoor Air Sampling Results - 2017 to 2019  
Sylvan Complex

Area	Air Sample ID	Sample Date	Location	Notes	Total PCB Concentration (ng/m <sup>3</sup> )	Site-Specific Exposure Level (ng/m <sup>3</sup> )
Cashin Service Desk	LT-CR-IAS-109	10/5/2017	Service Desk	79.5 degrees	617	422 ng/m <sup>3</sup>
	LT-CR-IAS-109	10/5/2017	Service Desk	79.5 degrees	617	
	LT-CR-IAS-301	9/13/2018	Service Desk	75.5 degrees	404	
	LT-CR-IAS-401	9/17/2019	Service Desk	74.1 degrees	370	
ADA Restroom Areas	LT-BR-IAS-303	9/13/2018	Brown - ADA Restroom 113	75.5 degrees	321	7,943 ng/m <sup>3</sup>
	LT-BR-IAS-402	9/17/2019	Brown - ADA Restroom 113	74.1 degrees	181	
First Floor and Lower Level Common Areas	LT-MR-IAS-107	10/5/2017	McNamara 1st Floor Study/Lounge - Room 113	79.5 degrees	453	1,662 ng/m <sup>3</sup>
	LT-MR-IAS-105	10/5/2017	McNamara Lower Level Study Area - Room	79.5 degrees	223	
	LT-MR-IAS-106	10/5/2017	McNamara Lower Level Study Area - Hallway	79.5 degrees	237	
	LT-BR-IAS-108	10/5/2017	Brown 1st Floor Study/Lounge - Room 111	79.5 degrees	389	
	LT-MR-IAS-302	9/13/2018	McNamara Lower Level Study Area - Hallway	75.5 degrees	226	
	LT-MR-IAS-403	9/17/2019	McNamara 1st Floor Study/Lounge - Room 113	74.1 degrees	549	
	LT-MR-IAS-404	9/17/2019	McNamara Lower Level Study Area - Hallway	74.1 degrees	219	

Notes:

- 1. Site Specific Exposure level calculated in accordance with EPA's Exposure Levels for Evaluating Polychlorinated Biphenyls in Indoor School Air.
- 2. Air samples collected in accordance with USEPA Compendium Method TO-10A and submitted for laboratory analysis of PCBs homologs.
- 3. Total PCB concentration is the total PCB homologs reported by the lab (ng/cartridge) per corrected sample volume (m<sup>3</sup>/cartridge).
- 4. Temperature is daily high temperature taken from the UMass Amherst Computer Science Weather Station website.



## **Attachment 6 – Physical Plant**

**Attachment 6 – Physical Plant  
Long-Term Maintenance and Monitoring Program  
In-Place Management of PCB Impacted Materials  
UMass Amherst**

**Location:** Physical Plant Room 230A

**Summary of Remedial Areas**

*In-Place Management:* Residual PCBs on interior CMU block walls are being managed in place following a window replacement project conducted on the second floor of the Physical Plant in 2012 and 2013. The replacement project was conducted in the area formerly designated as Room 230A and currently identified as Rooms 204, 209, 210, 208, 212, and 214. The locations of the remediation and in-place management are depicted on Attachment A. Two coats of Sikagard 62 liquid epoxy coating were applied to CMU block materials to a distance of six inches from the former joints. The materials were then covered by the gypsum wall board finish materials and replacement frames.



**Typical Area of In-Place Management**

*Post Abatement Wipe Sampling Data Summary:* Five wipe samples were collected from the encapsulated masonry block surrounds following completion of the remediation activities. Analytical results from the five samples indicated that PCBs were non-detect ( $< 2 \mu\text{g}/100 \text{ cm}^2$ ).

**Monitoring and Maintenance Implementation Plan**

The Monitoring and Maintenance Implementation Plan (MMIP) was submitted to the United States Environmental Protection Agency (EPA) on December 16, 2013 as part of the Final Completion Report. Due to the inaccessibility of the encapsulated CMU block, long term monitoring activities include visual inspections of the replacement window frames and gypsum wall board materials installed over the underlying CMU block. Visual inspections are conducted on an annual basis.

**Previous Monitoring Activities**

Results of visual inspections conducted on an annual basis through 2018 reported no damage, deterioration, or disturbance of the replacement window frames and gypsum wall board materials.

**Monitoring Activities – July 2019**

Woodard & Curran personnel performed the visual inspections of the interior finish materials for signs of damage or deterioration. The replacement window frames and gypsum wall board materials were observed to be in good condition with no signs of damage or wear.

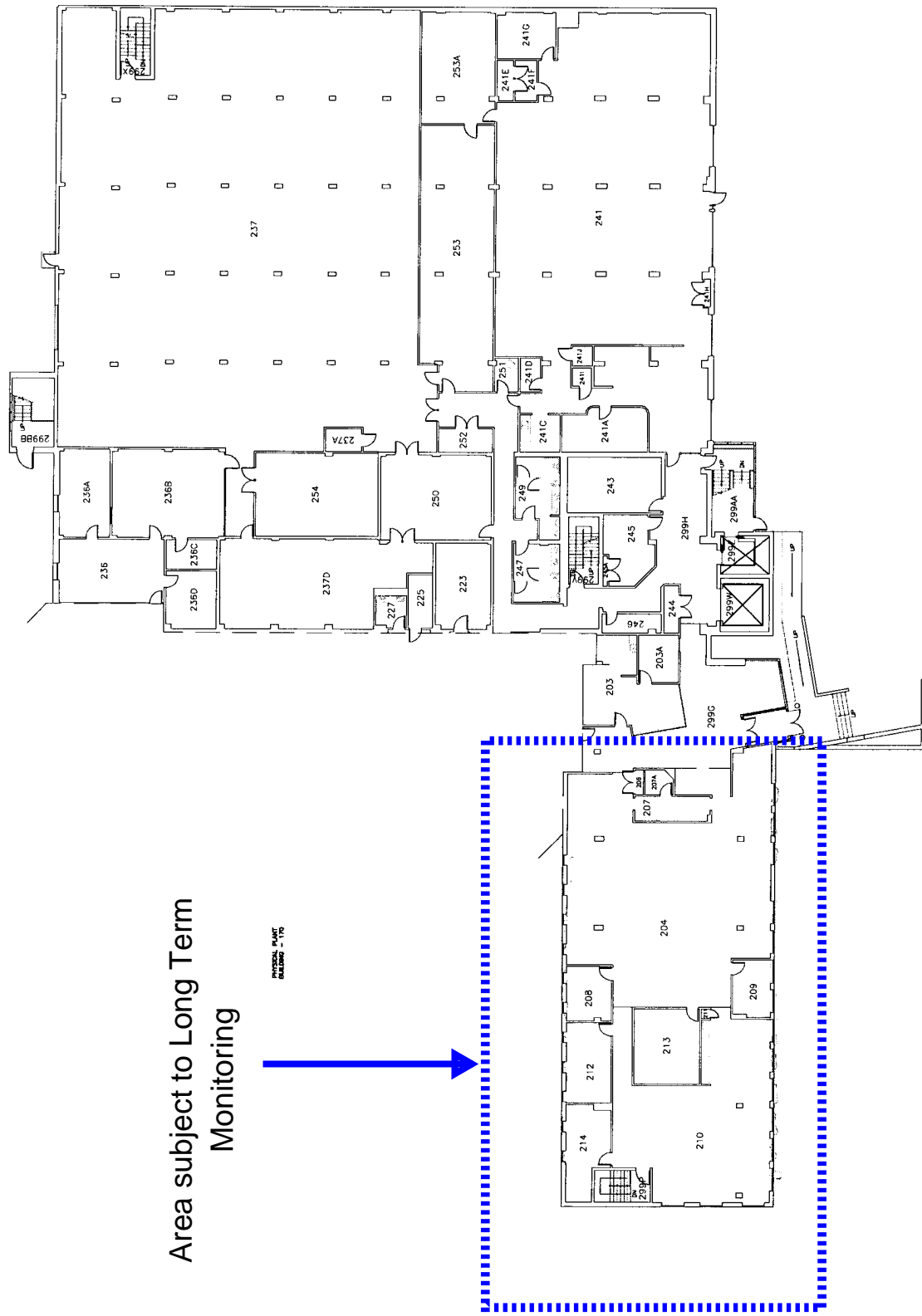
**Next Monitoring Event**

The next monitoring event will be conducted in July 2020 as part of the campus-wide long-term monitoring program.

**Attachment 6 – Physical Plant  
Long-Term Maintenance and Monitoring Program  
In-Place Management of PCB Impacted Materials  
UMass Amherst**

**ATTACHMENT A**

# Attachment A Second Floor Physical Plant



Area subject to Long Term Monitoring

PHYSICAL PLANT BUILDING - 110