2016 Long Term Monitoring Report

Lederle Graduate Research Center

Tower A and Low-Rise Buildings
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UMass LGRC
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1. INTRODUCTION

This monitoring report has been prepared by Woodard & Curran on behalf of the University of Massachusetts (UMass) in accordance with the requirements of the Consent Agreement and Final Order (CAFO) dated June 20, 2012 between UMass and the U.S. Environmental Protection Agency (EPA) for the Lederle Graduate Research Center (LGRC) Tower A and Low-Rise buildings located at 701 – 740 North Pleasant Street on the UMass campus in Amherst, Massachusetts.

This monitoring report provides the results of the monitoring activities conducted in accordance with the December 2014 Revised Monitoring and Maintenance Implementation Plan (MMIP) developed in accordance with the requirements of the CAFO for the encapsulated polychlorinated biphenyl (PCB) containing window glazing sealants at the Tower A and Low-Rise buildings and the encapsulated residual PCBs in certain exterior masonry materials at the Low-Rise.

1.1 SITE BACKROUND

As described in the CAFO, an approach was developed for the encapsulation of PCB-containing window glazing sealants as an interim measure until the glazing sealant could be removed during window replacement projects. There were approximately 900 windows located at the LGRC subject to the CAFO. To date, windows have been removed in the following three areas:

- As part of the National Institute of Health (NIH) renovations, 42 laboratory windows on the 3rd, 7th, and 8th floors of Tower A were removed as reported in the PCB Remediation Activities Completion Report dated December 17, 2012.
- All windows within the Low-Rise building (except for those within Room A106, see below) including the library areas, were removed as part of a large-scale window replacement project (refer to the September 17, 2013 notification submittal and the December 29, 2014 Completion Report).
- Seven laboratory windows in Tower A Rooms 501 through 504 were removed as part of a laboratory renovation project in 2014/2015 (refer to the 2015 Long Term Monitoring Report – LGRC Tower A and Low-Rise Buildings, dated September 29, 2015).

As described in the CAFO Notification submittal on September 17, 2013, the 2007/2008 exterior remediation activities were not completed at the 50 Type L windows on the Low-Rise and bridge connector due to the inaccessibility of exterior perimeter window caulking at these locations (the windows are located between two structural concrete features approximately 1.5 feet apart). Removal and off-site disposal of the other ≥ 50 ppm exterior perimeter window caulking and the remediation of exterior building materials impacted by PCBs was conducted in accordance with EPA's June 22, 2007 Alternative Decontamination Approval under 40 CFR 761.61(a), 62, and 79(h). The remediation activities included the removal and off-site disposal of the exterior caulking and removal of a minimum of ½ inch of exterior concrete masonry around each of the windows to achieve the applicable high or low occupancy use clean up criteria (≤ 1 ppm for first floor locations and ≤ 25 ppm for second and third floor locations). Given that the Type L windows were made accessible during the 2013/2014 window replacement project (through the removal of the windows themselves), remediation activities associated with the exterior perimeter caulking at the Type L windows was completed in 2014 and included caulking removal and the in-place management of residual PCB impacts > 25 ppm in exterior concrete.

1.2 SUMMARY OF INTERIM MEASURES – INTERIOR GLAZING SEALANTS

Beginning in July 2012, the interim measures were implemented/completed at the respective windows in Tower A and the Low-Rise building. A summary of the activities is provided below.

1.2.1 Summary of Remedial Activities

In accordance with the CAFO, Interim Measures were conducted to address the presence of PCBs > 50 ppm in glazing sealants as follows:

- A general cleaning of the window units and surrounding surfaces was conducted via the removal of dust and debris using a vacuum equipped with HEPA filtration followed by cleaning of surfaces with a standard industrial/commercial cleaner (Klean-Strip TSP Plus).

- Containment of the glazing sealants was achieved through the installation of a layer of aluminum foil tape and a bead of silicone caulking to reduce potential direct contact exposures.

As previously reported, these interim measures were completed at the following locations:

- Tower A High-Rise
    - July - August 2012: Elevator lobby windows located on the 1st 3rd, 7th, and 8th floors, as part of the NIH Grant Lab Renovation project.
    - July - August 2013: All remaining Tower A subject windows, as well as an additional sealant encountered in the stairwells (refer to the August 23, 2013 new condition notification submittal).
- Low-Rise
    - December 2013: Windows within Room A106 (the computer room). NOTE: all other low rise and library windows were removed.

1.2.2 Visual Inspection and Verification/Baseline Sampling

Following completion of the interim measures, visual inspections were conducted to confirm completion of the activities. Post-cleaning verification wipe samples were collected from accessible non-porous surfaces surrounding the windows and post-encapsulation surface wipe samples were collected from the encapsulated surfaces and window frames following the procedures and frequencies described in the Interim Measures Plan (IMP_. A summary of the results of the initial/baseline wipe samples is provided below.

Post-Cleaning Wipe Samples

Post-cleaning wipe samples were collected from window ledges as part of the interim measures implementation and prior to the removal of the Low-Rise windows. Following the cleaning of the surrounding areas, verification wipe samples were collected from the non-porous window ledges adjacent to the windows. In accordance with the IMP, post-cleaning wipe samples were collected at a frequency of one sample per floor in the high rise and at a frequency of one sample per 20 windows in the Low-Rise. Analytical results of the verification wipe samples indicated that PCBs were below the high occupancy use cleanup standard for non-porous surfaces (10 µg/100 cm^2) in all samples with results reported as follows:

- Total PCBs were reported as non-detect (< 0.20 µg/100 cm^2) in 31 samples; and
- Total PCBs were present in 23 samples at concentrations below 10 µg/100 cm^2, with concentrations ranging from 0.20 to 2.0 µg/100 cm^2 and an average concentration of 0.56 µg/100cm^2.

Post-Encapsulation Wipe Samples

To confirm that the aluminum foil tape and caulking were effective encapsulants of PCBs in the glazing sealants, wipe samples were collected from the surface of the newly installed caulking. A summary of the analytical results from the hexane wipe samples is as follows:

- Total PCBs were reported as either non-detect (ten samples at < 0.20 µg/100 cm^2) or < 1 µg/100 cm^2 (five samples with reported concentrations ranging from 0.21 to 0.95 µg/100 cm^2) in 15 of the 17 samples collected; and
- Total PCBs were reported at concentrations > 1 µg/100 cm^2 in two samples with reported concentrations of 1.5 and 3.1 µg/100 cm^2 (both samples were collected from areas encapsulated during the NIH renovation prior to modifications to the application methods).

To evaluate the suitability of an alternative wipe sampling procedure to assess "surface" concentrations on the newly applied porous caulking, additional wipe samples were collected using four different solvents/methods: hexane, isopropyl alcohol, saline, and dry wipe. Wipe samples were collected from the surfaces of the glazing sealants and from the encapsulated surfaces following installation of the aluminum tape and caulking barriers. Results from the wipe samples were described in detail in the PCB Interim Measures Completion Report dated June 2, 2014 and December 2014 Revised MMIP and indicated that while all four methods were able to detect PCBs on the surface of the source materials and the encapsulated surfaces, the more aggressive solvents reported higher results.

Based on these results, the December 2014 Revised MMIP included the potential collection of saline wipes to evaluate the potential presence of PCBs on the surface of the encapsulating barriers; however, saline wipes were not analyzed during the 2015 or 2016 events due to the results of the hexane wipes as presented in this report.

1.3 SUMMARY OF REMEDIATION ACTIVITIES – EXTERIOR CONCRETE AT TYPE L WINDOWS

Remediation activities associated with residual PCBs in exterior concrete surfaces surrounding the 50 Type L windows in the Low-Rise and the bridge connector were conducted in conjunction with the 2013/2014 window removal project.

1.3.1 Summary of Remedial Approach

The remedial approach consisted of the following:

- Exterior perimeter window caulking containing ≥ 50 ppm PCBs was removed for disposal as PCB Bulk Product Waste using hand tools as part of the window removal project.
- Residual PCBs were encapsulated through the application of the following:
    - Liquid Epoxy Coating – A two-inch-wide strip of epoxy (either Sikagard 62 liquid epoxy or DevCon 5-minute epoxy), centered on the former joint, was applied to concrete surfaces;
    - Elastomeric Coating – Two coats of Sikagard 550W elastomeric coating were applied to concrete materials away from the joints and extending along the inner face of the concrete façade to match the rest of the building façade; and
    - Replacement Frames – The replacement window frames and a replacement bead of caulking were installed over the former caulked joints.

Detailed descriptions of the implemented activities were presented in the Window Removal Completion Report submittal dated December 29, 2014.

1.3.2 Visual Inspection and Verification/Baseline Sampling

Following application/installation of each of the above barriers, visual inspections were conducted. For liquid coatings, the visual inspection was conducted to confirm the coatings were applied over the designated areas and had a smooth uniform appearance. For window frames and caulking, the inspection confirmed installation in accordance with the project specifications.

To confirm that the epoxy and elastomeric coatings were effective encapsulants of residual PCBs in the concrete, wipe samples were collected from the surfaces of the newly applied coatings at a frequency of one sample for every five window locations (twelve wipe samples were collected from each due to the phased sequencing of work at the Type L windows). A summary of the analytical results from the wipe samples is as follows:

- Liquid Epoxy Coatings – Analytical results from eleven of the twelve samples indicated that PCBs were non-detect (9 samples at < 0.20 µg/100cm^2) or less than the encapsulation goal of 1 µg/100cm^2 (2 samples with reported concentrations of 0.22 and 0.28 µg/100cm^2). PCBs in the remaining sample were reported at concentration of 1.4 µg/100cm^2.
- Elastomeric Coatings – Analytical results indicated that PCBs were either non-detect (8 samples at < 0.20 µg/100cm^2) or less than the encapsulation goal of 1 µg/100cm^2 (4 samples with a maximum concentration of 0.56 µg/100cm^2).

1.4 MONITORING AND MAINTENANCE IMPLEMENTATION PLAN

In accordance with the requirements of the CAFO, annual monitoring is to be completed as part of the Interim Measures to monitor, over time, the effectiveness of the remedy for PCB-containing glazing sealants encapsulated through the application of aluminum foil tape and silicone caulking. In addition, and as described in the December 2014 Revised MMIP, monitoring is also to be conducted for the residual PCB impacted exterior concrete encapsulated through the application of liquid coatings and replacement frames at the Type L windows.

As discussed in the MMIP, the evaluation of the effectiveness of the measures will be accomplished through:

- Visual inspection – to evaluate the physical condition of the new caulking and/or window frames; to look for signs of separation between the silicone sealant/aluminum foil tape and the glazing sealant, window frame or glass; to look for signs of disturbance to the new sealants or exterior elastomeric coatings (Type L windows); and a general inspection of the surrounding areas.

- Accessible Non-Porous Surface Wipe Samples – A total of 9 wipe samples are to be collected (1 from the Low-Rise computer room and 8 from the Tower A high rise) from adjacent window ledges /sills to assess the effectiveness of the Interim Measure in reducing / eliminating PCB-containing dust or particulate levels on these adjacent surfaces.

- Encapsulated Surfaces Wipe Samples – A total of 9 wipe samples are to be collected (1 from the Low-Rise computer room and 8 from the Tower A high rise) from the new caulking/adjacent frame to assess the concentrations of PCBs on the surface of the encapsulating barrier; and

- Indoor Air Samples – Long Term Monitoring – Six samples are to be collected to assess the effectiveness of the encapsulation (window glazing sealant) in reducing indoor air levels.

The first round of long term monitoring was conducted in June 2015. Results from that event were consistent with the baseline monitoring results and communicated to EPA on September 29, 2015 with a recommendation to maintain the long term monitoring program without modification in 2016.

2. 2016 MONITORING ACTIVITIES

2.1 VISUAL INSPECTIONS

Visual inspections of the encapsulated surfaces were conducted at the Tower A high rise, the Low-Rise computer room, and at the Type L windows of the Low-Rise building. The inspections consisted of an assessment of the following:

- Physical condition of the new caulk (cracking, peeling, discoloration, etc.) and/or window frames;
- Signs of separation between the silicone sealant/aluminum foil tape and the glazing sealant, window frame, or glass;
- Signs of disturbance of the new sealant;
- Signs of disturbance of the exterior elastomeric coating (Type L windows); and
- A general inspection of the surrounding areas.

For encapsulated glazing sealants, the specific windows that were visually inspected included the window unit randomly selected for wipe sampling (see discussion below) plus the window units on both sides of the selected window (total of three windows per sample location). For the Type L windows, 20% of the windows were inspected (10 windows).

Consistent with the results of the 2015 monitoring event, Woodard & Curran did not observe any signs of disturbance or deterioration during the visual inspections.

2.2 NON-ROUTINE MAINTENANCE ACTIVITIES

No non-routine maintenance activities that disturbed the encapsulated materials were conducted in 2016.

2.3 ACCESSIBLE NON-POROUS SURFACES

Surface wipe samples were collected from nine representative locations on the accessible non-porous surfaces below the Tower A and Low-Rise computer room windows as described in the MMIP. The locations of the wipe samples are depicted on Figures 2-2 through 2-5.

At each location, the wipe sample was collected in accordance with the standard wipe test method as described in 40 CFR 761.123. At each sample location, a 2-inch square gauze pad, saturated with hexane, was wiped across a 100 square centimeter template area. All samples were transported to the laboratory under standard Chain of Custody procedures, extracted using USEPA Method 3540C (Soxhlet extraction), and analyzed for PCBs using USEPA Method 8082.

The complete analytical laboratory report and the associated data validation summary are provided in Appendix A. A summary of the analytical results is presented on Table 2-1 and as follows:

- Total PCBs were reported as non-detect (< 0.20 µg/100cm^2) in 5 of the 9 samples; and
- Total PCBs were reported in 4 samples at concentrations of 0.20, 0.20, 0.21, and 0.25 µg/100cm^2.

These results were below the project specific action level of 10 µg/100cm^2 for accessible non-porous surfaces and consistent with the results from the baseline monitoring and the 2015 monitoring events.

2.4 ENCAPSULATED SURFACES

Surface wipe samples were collected from nine representative locations on the encapsulated surfaces and frame as described in the MMIP. The locations of the wipe samples were co-located with those collected from accessible non-

porous surfaces and are depicted on Figures 2-2 through 2-5. Select locations were also co-located with locations sampled during previous sampling events for comparisons over time.

Wipe samples were collected in accordance with the standard wipe test method as described in 40 CFR 761.123 modified due to the narrow width of the sample area (total width of caulking and frame is approximately ¾-inch). At each sample location, a 2-inch square gauze pad, saturated with hexane, was wiped across a 22-inch long section of the caulking/window frame (to achieve a 100 cm^2 area). Samples were submitted for laboratory analysis as described above. In addition to the primary samples indicated above, one duplicate sample was collected and submitted to the laboratory as part of the QA/QC procedures associated with the sample collection procedures.

The complete analytical laboratory report and the associated data validation summary are provided in Appendix A. A summary of the analytical results is presented on Table 2-2 and as follows:

- Total PCBs were reported as non-detect (< 0.020 µg/100cm^2) in 3 of the 9 samples;
- Total PCBs were reported at concentrations < 1 µg/100cm^2 in 4 of the samples with reported concentrations of 0.24, 0.33, 0.79, and 0.81 µg/100cm^2; and
- Total PCBs were reported at a concentration of 1.7 and 3.2 µg/100cm^2 in the samples collected from the 3rd and 7th floor elevator lobby windows, respectively. Both of these samples (LGRC-VWP-113 and LGRC-VWP-107) were collected from windows encapsulated as part of the 2012 NIH renovation project.

These results are consistent with the results from the baseline and 2015 sampling events and continue to demonstrate PCB results below the project action levels except as noted below. Results from wipe samples collected from encapsulated surfaces which were included in the 2012 NIH renovations continue to show PCBs at concentrations > 1 µg/100 cm^2 and may be attributable to some installation/application variance in this subset of windows. Results do not indicate an increasing trend in PCB concentrations on the surface of the caulking. As described in the PCB Interim Measures Completion Report submitted on June 2, 2014, saline wipes collected from the same locations on the 3rd and 8th floors during the baseline monitoring event indicated that PCBs were non-detect (< 0.20 µg/100cm^2). Due to the transitory nature of the elevator lobbies, the consistent results between monitoring events, and the results of the 2014 saline wipe samples, no additional activities aside from continued monitoring are proposed going forward.

2.5 INDOOR AIR – LONG TERM MONITORING

As part of the long term monitoring program, five indoor air samples were collected from representative locations throughout the LGRC Tower A and one sample was collected from the Low-Rise Computer Room. In addition, one ambient/outdoor air sample was collected from outside Tower A. Indoor air samples were distributed in a manner consistent with the 2009 baseline sampling event; modified based on the removal of select Tower A windows and the majority of the Low-Rise windows. The individual spaces were selected based on the use of the space (e.g., offices, laboratories, common areas) throughout the building.

Air samples were 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. At each of the sample locations, a low volume PUF cartridge was connected to a personal air pump with flexible tubing and the cartridge was positioned between three and five feet above the floor using a telescoping tubing stand.

Samples were collected at an approximate flow rate of 2.5 L/min for minimum of six hours. The flow rates were set by the equipment rental supply company prior to delivery and verified and adjusted as needed in the field using a BIOS digital flow rate calibrator or equivalent. Atmospheric information (ambient temperatures and barometric pressures) was obtained from a portable commercially available weather monitoring station. Pumps and flow rates were monitored periodically throughout the sample collection period. At the end of the required sample interval, the pump was shut off and the cartridge placed in aluminum foil, labeled, and placed on ice for delivery to the analytical laboratory.

Analytical results indicated that PCBs were reported at concentrations ranging from 33.8 ng/m^3 to 106.7 ng/m^3 in the six samples with an average reported concentration of 68.0 ng/m^3. Analytical results were non-detect for PCBs in the outdoor/ambient sample.

These indoor air results are generally consistent with results from the 2015 air sampling event and remain below the project action level of 500 ng/m^3 (EPA's exposure levels for evaluating PCBs in indoor school air for students ages 19 plus and adults, as amended on July 2015). Additionally, analytical results were below the average reported concentration of 209.7 ng/m^3 from the six samples collected from across the LGRC complex as part of the initial 2008 sampling event (Tower A and low-rise locations) as well as the highest reported concentration from a Tower A location during that sampling event (200 ng/m^3).

The complete analytical laboratory report and the associated data validation summary are provided in Appendix A and a summary of the analytical results is provided on Table 2-3.

3. SUMMARY AND CONCLUSIONS

Results of the 2016 long term monitoring event were as follows:

- Visual inspections indicated that the encapsulating barriers were in good physical condition with no observed damage or deterioration.
- Analytical results from wipe samples collected from accessible non-porous surfaces indicated that PCBs were either non-detect or present at concentrations below the project action level of 10 µg/100cm^2.
- Analytical results from wipe samples collected from encapsulated surfaces indicated that PCBs were < 1 µg/100cm^2 in all samples except for two samples collected from the 3rd and 7th floor elevator lobby windows encapsulated during the NIH renovation project in 2012; these results were consistent with previous monitoring events from elevator lobby windows encapsulated as part of the NIH renovation project.
- Analytical results from indoor air samples collected as part of long term monitoring indicted that PCBs were consistent with the 2015 event and remain at concentrations below the action level of 500 ng/m^3 as well as the results from the initial sampling done in 2008.

3.1 CORRECTIVE ACTIONS

No corrective actions are warranted based on the results of the 2016 monitoring event.

3.2 MODIFICATIONS TO THE LONG TERM MONITORING AND MAINTENANCE PLAN

Based on the results of the inspections and sampling activities conducted in 2016, no modifications to the existing Long Term Monitoring and Maintenance Plan are required.

3.3 NEXT MONITORING EVENT

Pursuant to the CAFO, the next monitoring event will be conducted in June 2017 and consist of the following activities to be conducted in accordance with the December 2014 Revised MMIP:

- Visual Inspections of encapsulated glazing sealants and exterior masonry surrounding the Type L windows;
- Wipe sampling of accessible non-porous surfaces from randomly selected locations;
- Wipe sampling of encapsulated surfaces from randomly selected locations; and
- The collection of indoor air samples for long term monitoring

The 2017 monitoring event will include continued monitoring of the encapsulating barriers on the elevator windows at the 1st, 3rd, 7th, and 8th floors (i.e., those installed during the 2012 NIH renovation project) to confirm results remain consistent over time.

TABLES

Table 2-1
Summary of Long Term Monitoring Wipe Sampling Results - Accessible Non-Porous Surfaces
UMass Amherst

Floor	Room Number	Sample ID	Sample Date	Total PCBs (µg/100cm^2)
1	Elevator Lobby	LGRC-VWP-114	6/21/2016	0.20
3	Elevator Lobby	LGRC-VWP-112	6/21/2016	0.21
4	South Stairwell	LGRC-VWP-110	6/21/2016	< 0.20
6	605	LGRC-VWP-108	6/21/2016	< 0.20
7	Elevator Lobby	LGRC-VWP-106	6/21/2016	< 0.20
10	1003C	LGRC-VWP-116	6/21/2016	< 0.20
12	1208	LGRC-VWP-104	6/21/2016	0.25
14	1405	LGRC-VWP-102	6/21/2016	0.20
Low Rise	A106	LGRC-VWP-100	6/21/2016	< 0.20

Notes:
Wipe samples collected in accordance with the standard wipe test method of 40 CFR 761.123 over a 4" x 4" square centered on the window sill to achieve a 100cm^2 sample area.
Total PCBs reported as Aroclor 1254 or Aroclor 1260. No other Aroclors reported at concentrations above the minimum laboratory reporting limits.

Table 2-2
Summary of Long Term Monitoring Wipe Sampling Results - Encapsulated Surfaces
UMass Amherst

Floor	2014 Baseline Wipe Samples				June 2015 Wipe Samples				June 2016 Wipe Samples			
	Room Number	Sample ID	Sample Date	Total PCBs (µg/100cm^2)	Room Number	Sample ID	Sample Date	Total PCBs (µg/100cm^2)	Room Number	Sample ID	Sample Date	Total PCBs (µg/100cm^2)
1	Elevator Lobby	LGRC-EN-VWK-124	2/24/2014	< 0.20	Elevator Lobby	LGRC-VWP-103	6/18/2015	< 0.20	Elevator Lobby	LGRC-VWP-115	6/21/2016	< 0.20
2	Elevator Lobby	LGRC-EN-VWK-128	2/24/2014	< 0.20	--	--	--	--	--	--	--	--
3	Elevator Lobby	LGRC-EN-VWK-130	2/24/2014	3.1	Southern Stairway	LGRC-VWP-105	6/18/2015	< 0.20	Elevator Lobby	LGRC-VWP-113	6/21/2016	1.7
4	408	LGRC-EN-VWK-100	2/24/2014	< 0.20	--	--	--	--	South Stairwell	LGRC-VWP-111	6/21/2016	< 0.20
5	502	LGRC-EN-VWK-102	2/24/2014	< 0.20	510	LGRC-VWP-107	6/18/2015	0.30	--	--	--	--
6	605	LGRC-EN-VWK-104	2/24/2014	0.27	--	--	--	--	605	LGRC-VWP-109	6/21/2016	0.33
7	Elevator Lobby	LGRC-EN-VWK-126	2/24/2014	0.64	Elevator Lobby	LGRC-VWP-109	6/18/2015	3.3	Elevator Lobby	LGRC-VWP-107	6/21/2016	3.2
8	Elevator Lobby	LGRC-EN-VWK-122	2/24/2014	1.5	--	--	--	--	--	--	--	--
9	903A	LGRC-EN-VWK-120	2/24/2014	< 0.20	903	LGRC-VWP-111	6/18/2015	0.38	--	--	--	--
10	1003	LGRC-EN-VWK-118	2/24/2014	0.21	--	--	--	--	1003C	LGRC-VWP-117	6/21/2016	0.24
11	1108	LGRC-EN-VWK-116	2/24/2014	< 0.20	1105	LGRC-VWP-113	6/18/2015	< 0.20	--	--	--	--
12	1209	LGRC-EN-VWK-114	2/24/2014	< 0.20	--	--	--	--	1208	LGRC-VWP-105	6/21/2016	0.79
13	1306	LGRC-EN-VWK-112	2/24/2014	< 0.20	1303	LGRC-VWP-116	6/18/2015	< 0.20	--	--	--	--
14	Elevator Lobby	LGRC-EN-VWK-110	2/24/2014	0.21	--	--	--	--	1405	LGRC-VWP-103	6/21/2016	0.81
15	1508	LGRC-EN-VWK-108	2/24/2014	< 0.20	1509	LGRC-VWP-119	6/18/2015	0.82	--	--	--	--
16	1607	LGRC-EN-VWK-106	2/24/2014	0.95	--	--	--	--	--	--	--	--
Low Rise	A106	LGRC-EN-VWK-132	2/24/2014	< 0.20	A106	LGRC-VWP-101	6/18/2015	< 0.20	A106	LGRC-VWP-101	6/21/2016	< 0.20

Notes:
Total PCBs reported as Aroclor 1254. No other Aroclor reported at concentrations above the minimum laboratory reporting limits.
Wipe samples collected over 22 inch long section of caulking and window frame based on width of approximately 3/4" to achieve a 100cm^2 sample area.

Table 2-3
Summary of Long Term Monitoring Indoor Air Sampling Results
UMass Amherst

Location	Air Sample	PCB Concentration (ng/cartridge)	Flow Rate (L/Minute)	Duration (minutes)	PCB Concentration (ng/m^3)
Project Action Level: 500 ng/m^3					
June 18, 2015					
Tower A - 403B	LGRC-403B-IAS-LT-011	35	2.79	240	53.5
Tower A -599A	LGRC-599A-IAS-LT-012	33	2.70	240	52.2
Tower A -903	LGRC-903-IAS-LT-013	16	2.78	240	24.7
Tower A -1105	LGRC-1105-IAS-LT-014	11	2.67	240	18.7
Tower A - 1506	LGRC-1506-IAS-LT-015	29	2.68	240	49.1
Low Rise - A106	LGRC-A106-IAS-LT-010	27	2.71	240	42.5
Ambient Air	LGRC-OUT-IAS-LT-016	0	2.68	240	0.0
June 21, 2016					
Tower A - 399A	LGRC-399A-IAS-005	32	2.66	365	33.8
Tower A -407	LGRC-407-IAS-007	46	2.67	361	49.4
Tower A - 606	LGRC-606-IAS-003	88	2.65	373	91.8
Tower A -1003C	LGRC-1003C-IAS-006	98	2.63	361	106.7
Tower A - 1606	LGRC-1606-IAS-002	63	2.67	378	64.3
Low Rise - A106	LGRC-A106-IAS-001	64	2.68	396	62.2
Ambient Air	LGRC-AMB-IAS-004	0	2.52	361	0.0

Notes:
Project Specific Risk-based Action Level based on the EPA's exposure levels for evaluating PCBs in indoor school air for students ages 19 plus and adults (July 2015).
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^3 = nanograms per cubic meter

FIGURES

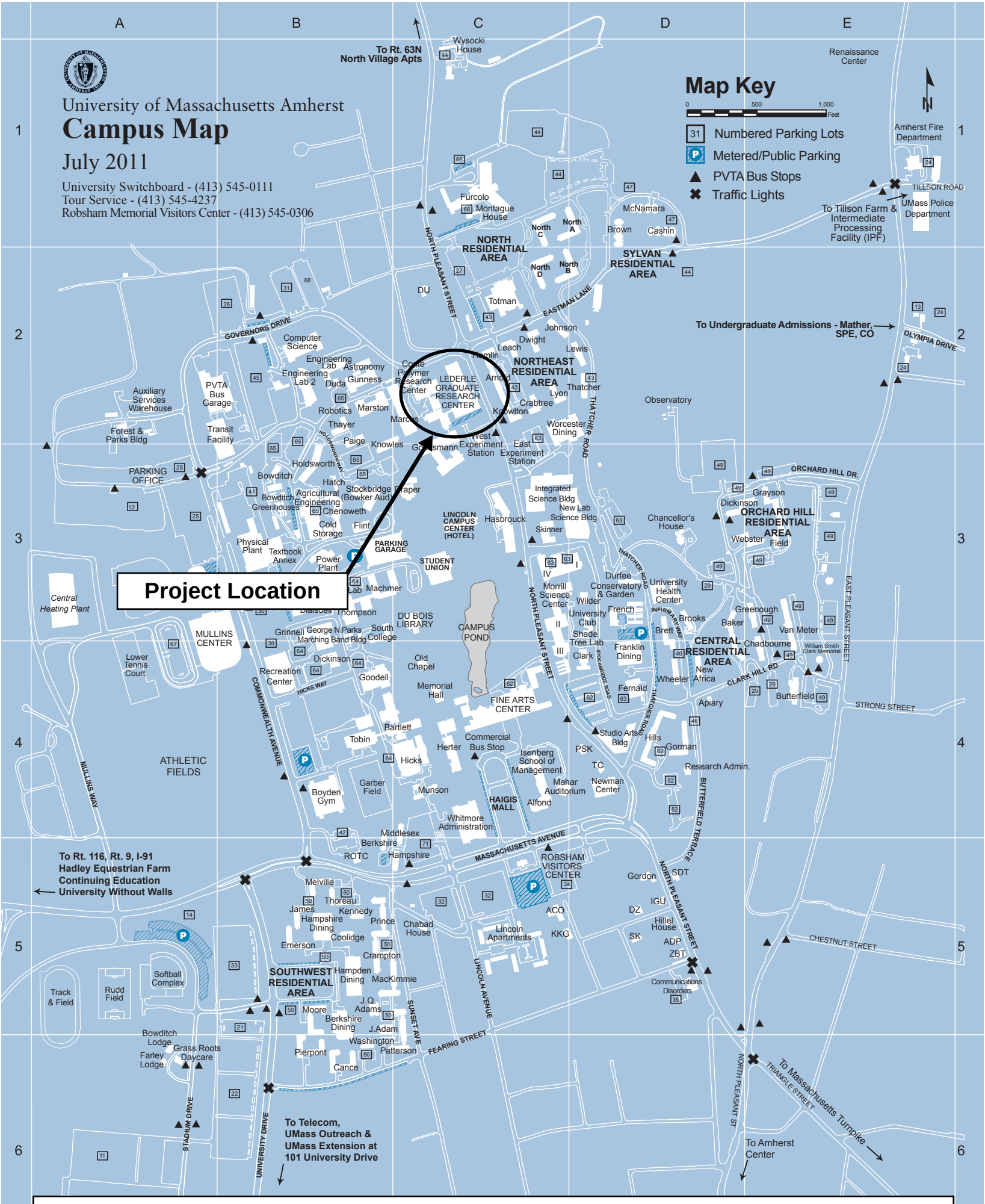
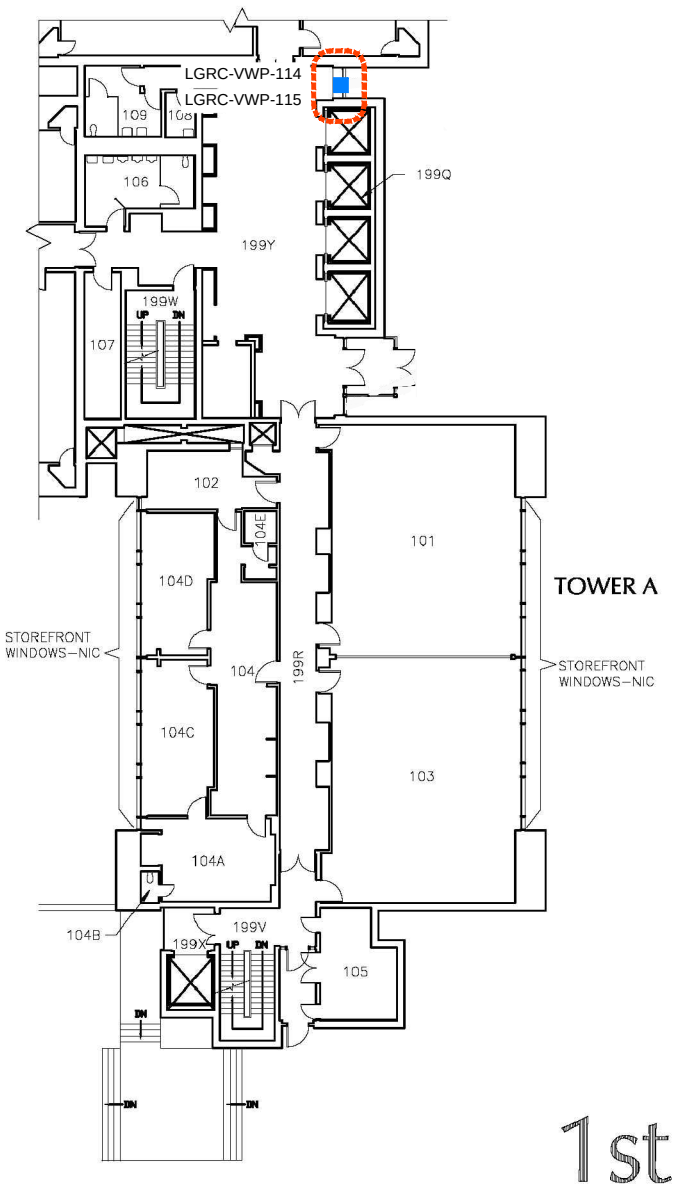
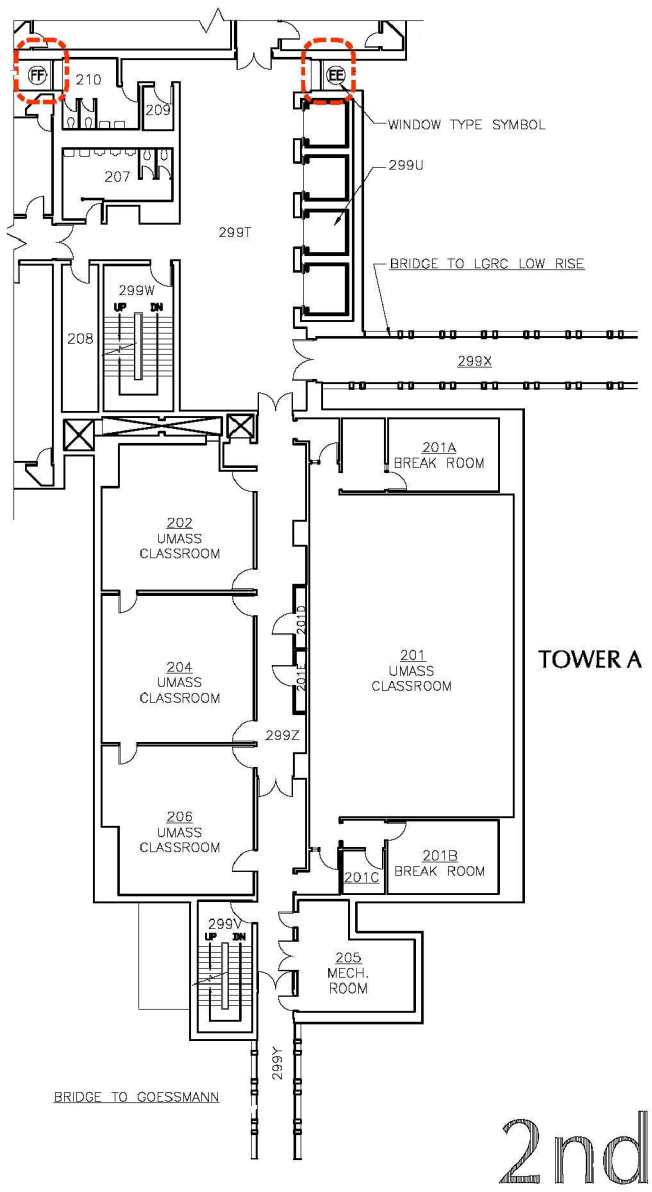


Figure 1-1 Site Location Map





LEGEND

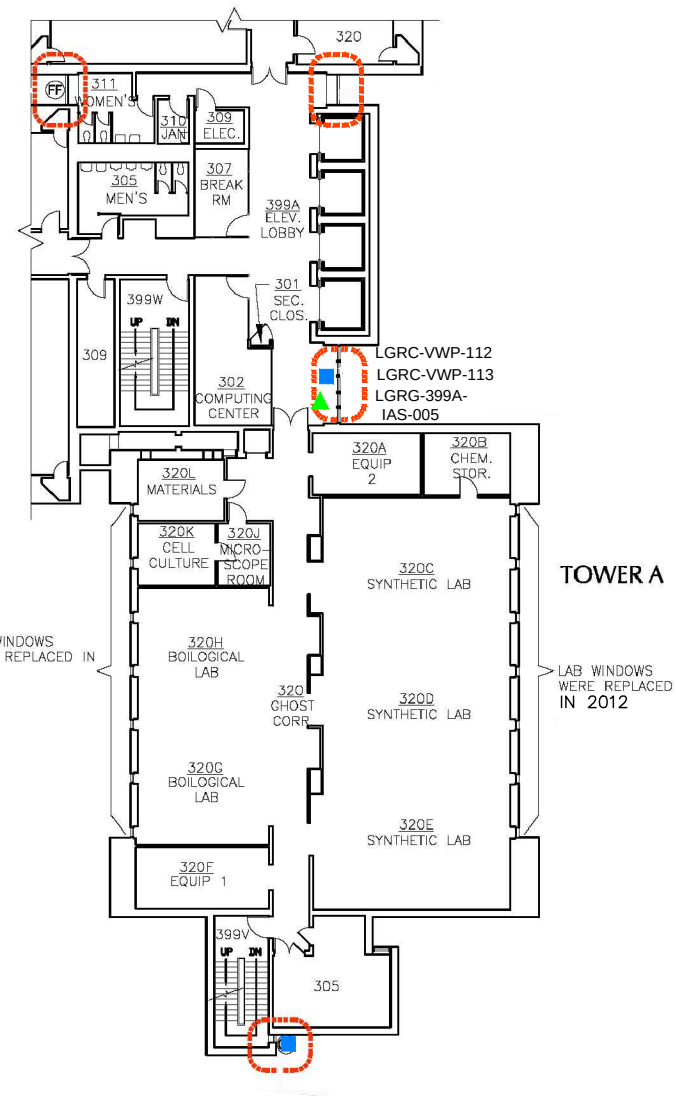
LOCATION OF WINDOWS/GLAZING SEALANTS INCLUDED IN THE INTERIM MEASURES AND SUBJECT TO LONG TERM MONITORING AND MAINTENANCE

Wipe Sampling Location

Indoor Air Sampling Location

NOTE:

1. ORIGINAL DESIGN DRAWINGS BY GOLDMAN REINDORF ARCHITECTS INC.



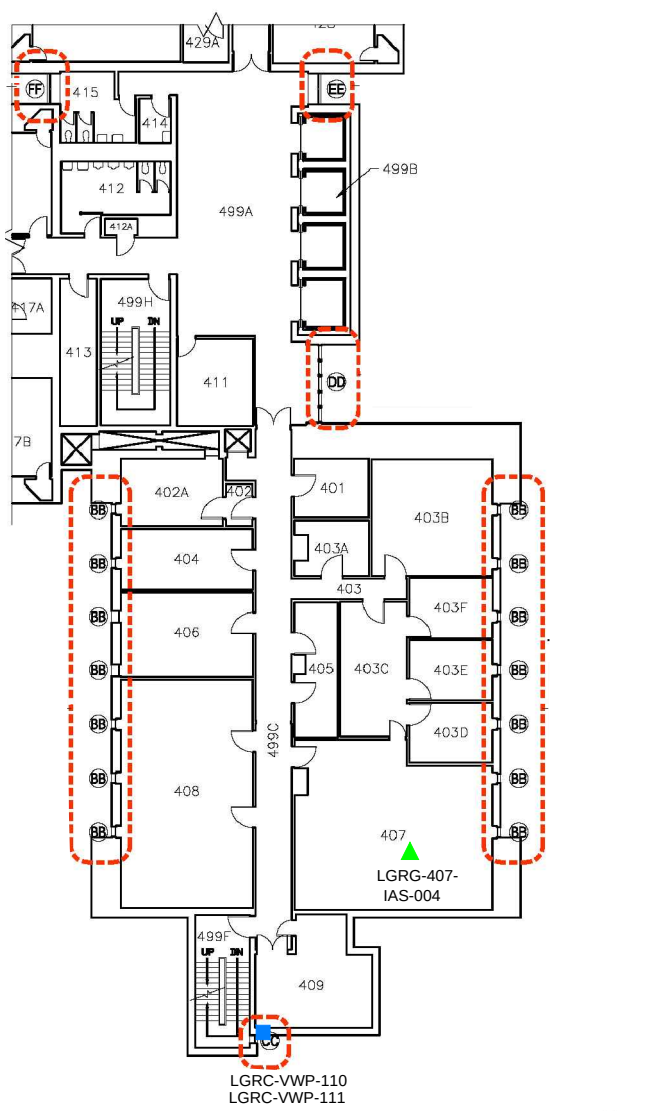
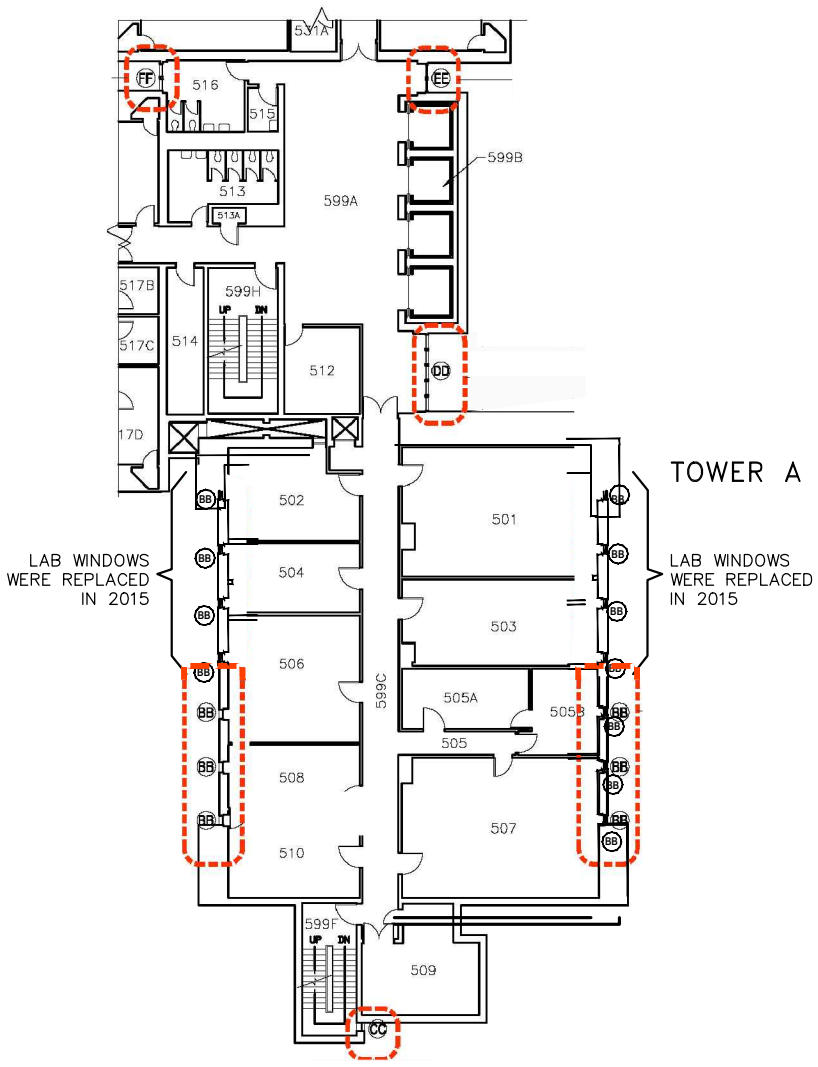
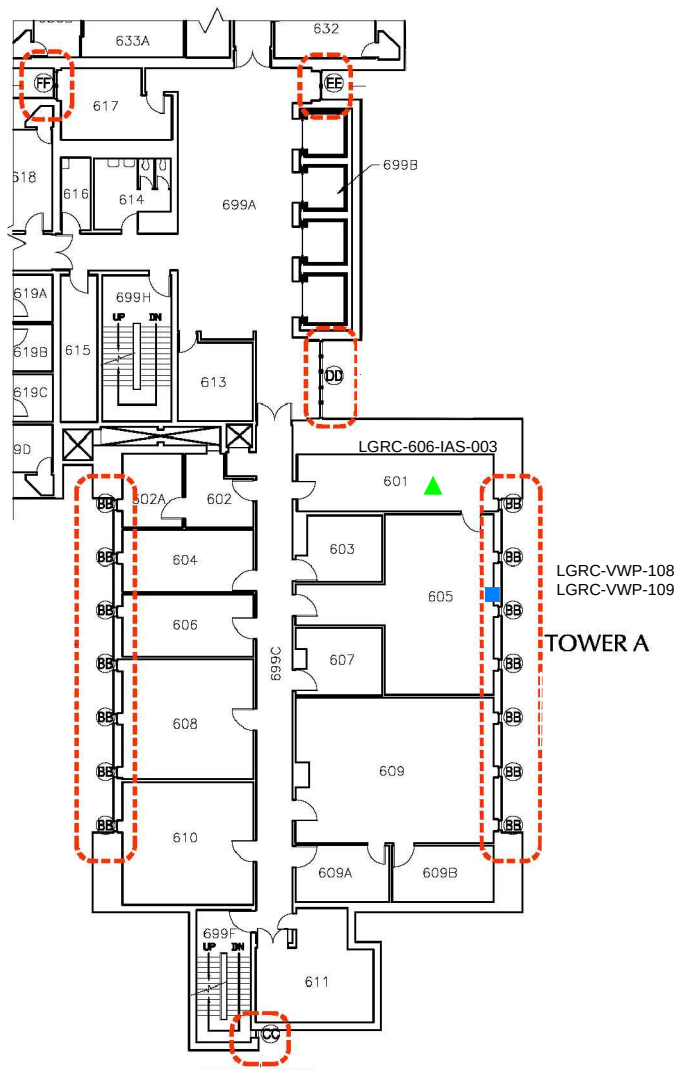


FIGURE 2-1	UMASS AMHERST LEDERLE GRADUATE RESEARCH CENTER	AREAS OF ENCAPSULATED MATERIALS TOWER A 1st–4th FLOORS	WOODARD & CURRAN 40 Shattuck Road | Suite 110 Andover, Massachusetts 01810 866.702.6371 | www.woodardcurran.com COMMITMENT & INTEGRITY DRIVE RESULTS
SCALE: NOT TO SCALE DATE: JUNE 2016 JOB NO: 210918	MMIP	DESIGNED BY: DRAWN BY: PF CHECKED BY: JAH MMIP–FIGURE 2–1_A.DWG	





LEGEND

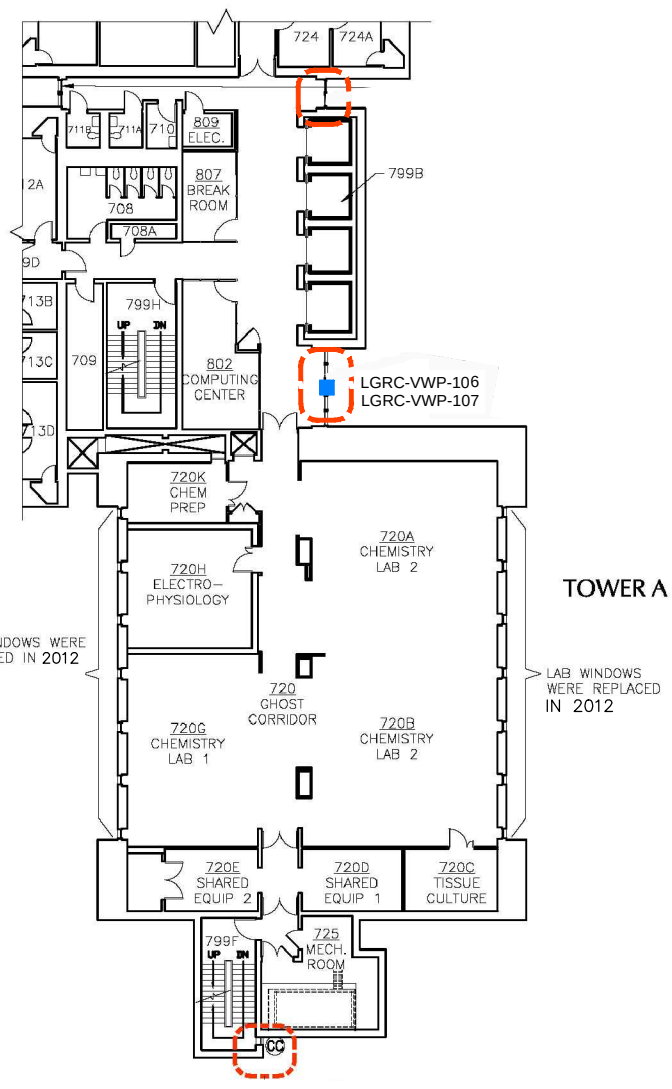
LOCATION OF WINDOWS/GLAZING SEALANTS INCLUDED IN THE INTERIM MEASURES AND SUBJECT TO LONG TERM MONITORING AND MAINTENANCE

Wipe Sampling Location

Indoor Air Sampling Location

NOTE:

1. ORIGINAL DESIGN DRAWINGS BY GOLDMAN REINDORF ARCHITECTS INC.



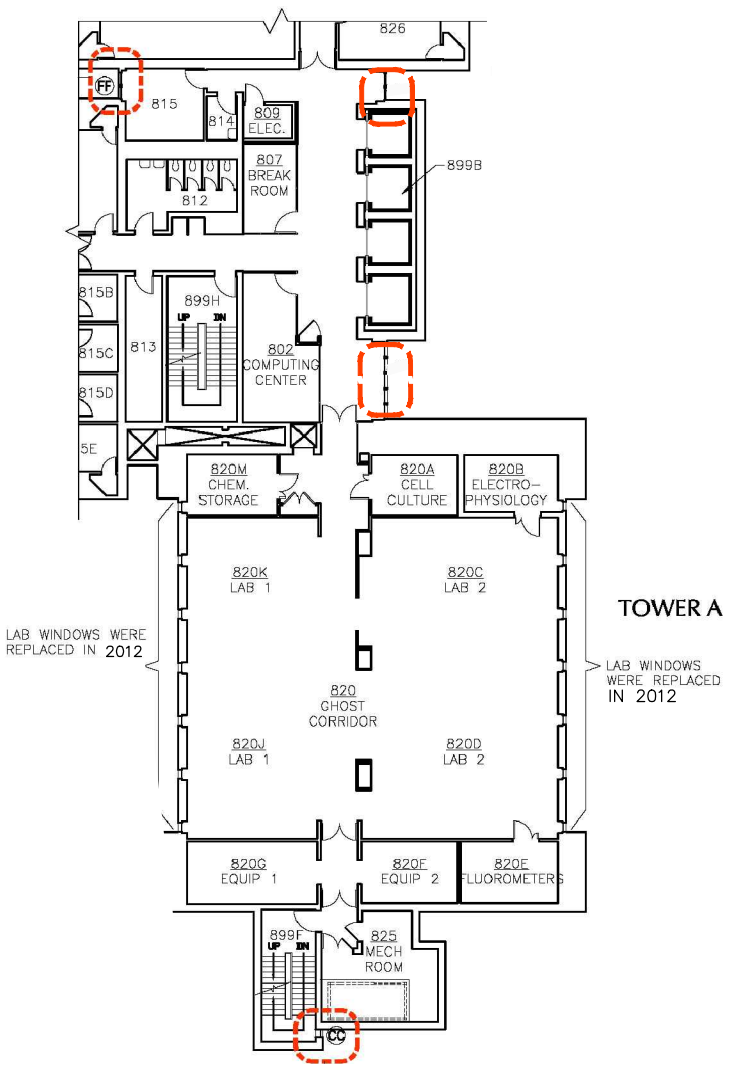


FIGURE 2-2

JOB NO: 210918
DATE: AUGUST 2016
SCALE: NOT TO SCALE

UMASS AMHERST
LEDERLE GRADUATE RESEARCH CENTER

MMIP

AREAS OF ENCAPSULATED MATERIALS
TOWER A 5th–8th FLOORS

DESIGNED BY:	CHECKED BY: JAH
DRAWN BY: PFF	MMIP–FIGURE 2–2–A.DWG

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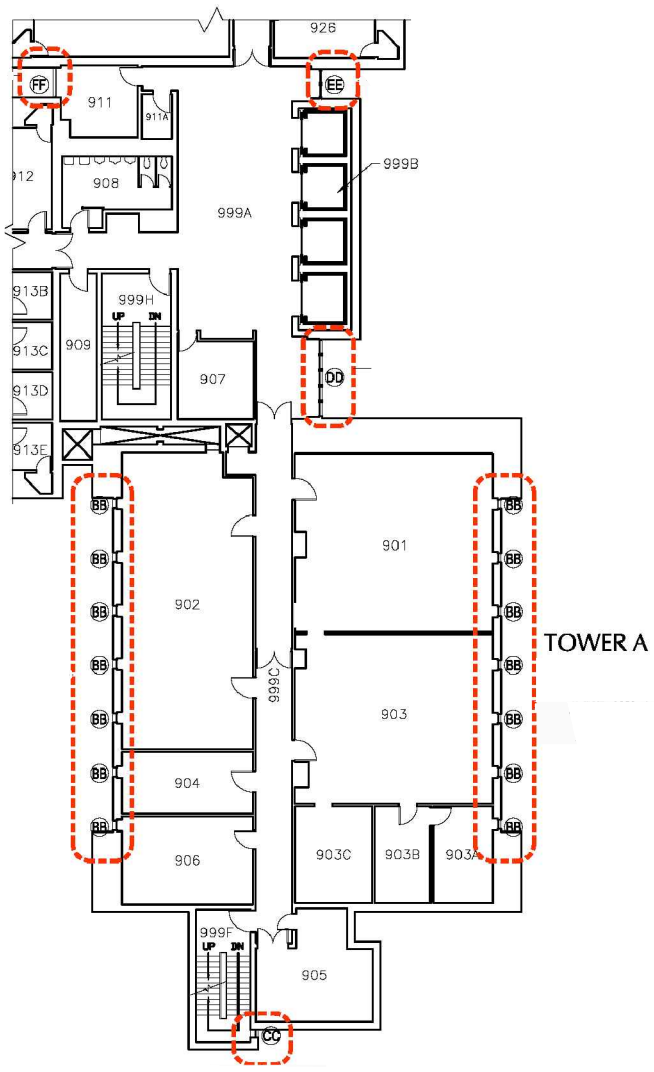
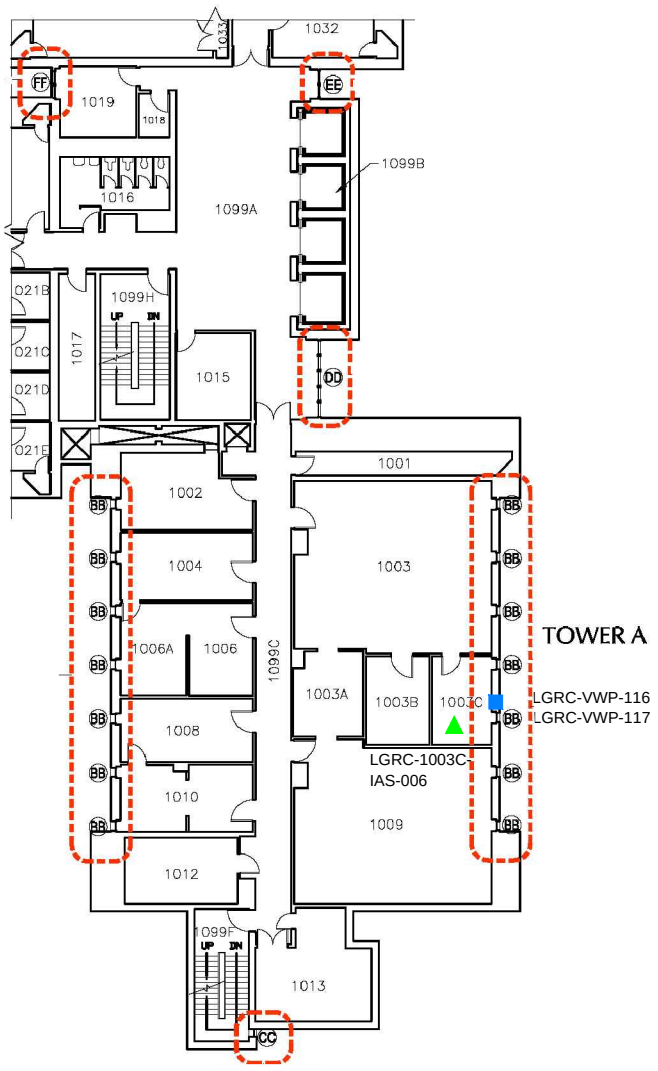
COMMITMENT & INTEGRITY DRIVE RESULTS



9th



10th

LEGEND

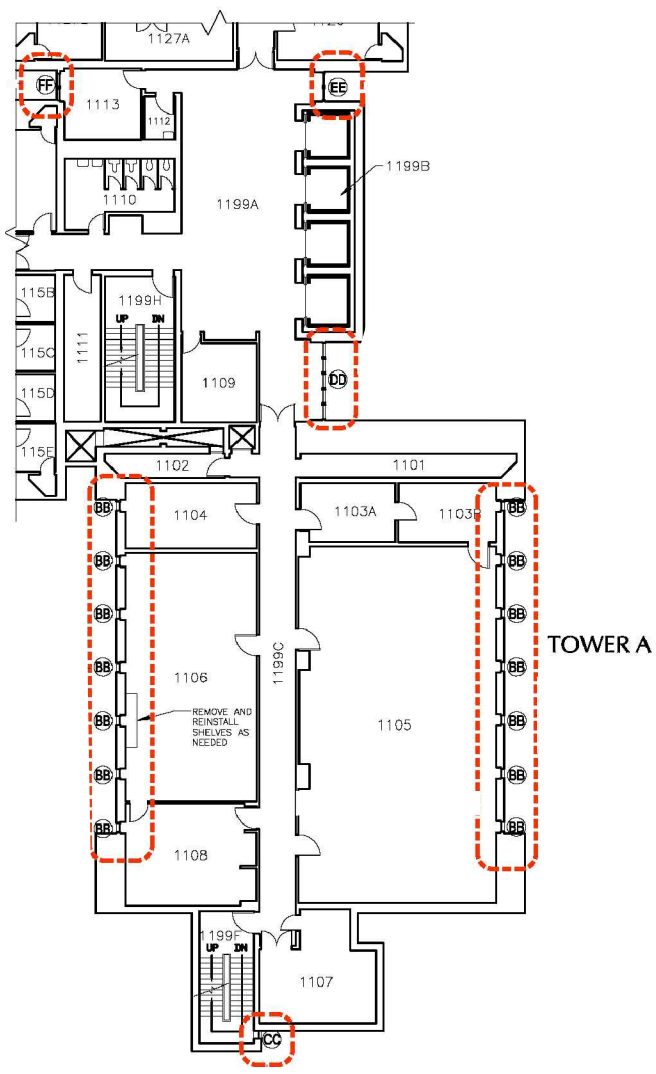
LOCATION OF WINDOWS/GLAZING SEALANTS INCLUDED IN THE INTERIM MEASURES AND SUBJECT TO LONG TERM MONITORING AND MAINTENANCE

Wipe Sampling Location

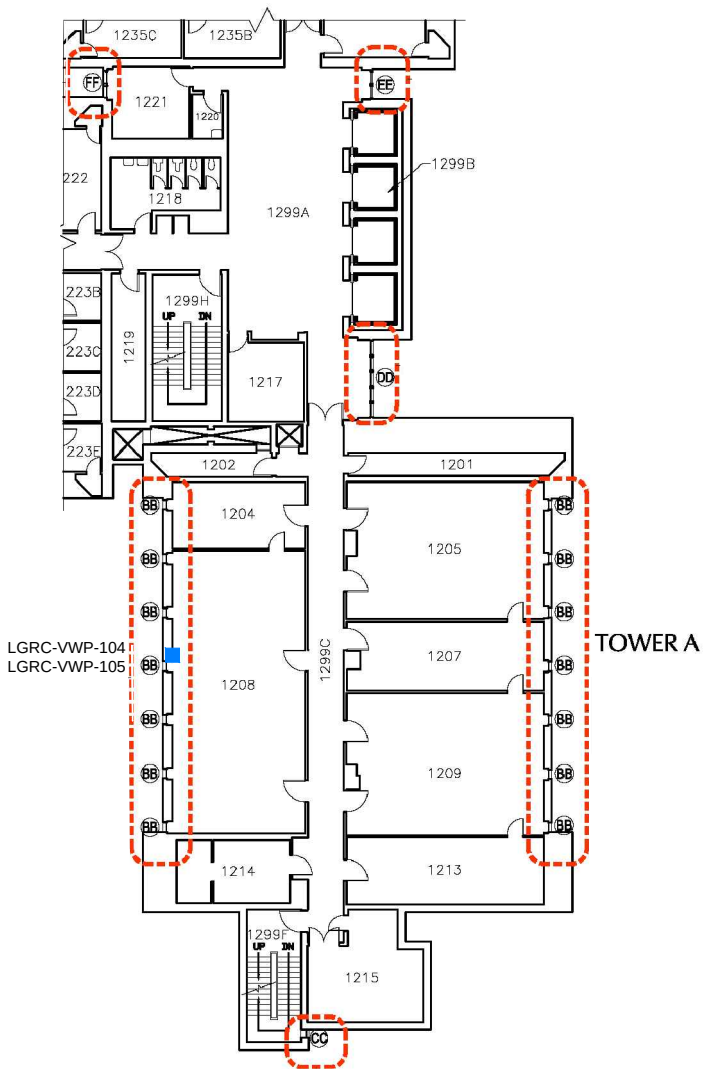
Indoor Air Sampling Location

NOTE:

1. ORIGINAL DESIGN DRAWINGS BY GOLDMAN REINDORF ARCHITECTS INC.



11th



12th

FIGURE 2-3	JOB NO: 210918 DATE: JUNE 2016 SCALE:NOT TO SCALE	UMASS AMHERST LEDERLE GRADUATE RESEARCH CENTER MMIP	AREAS OF ENCAPSULATED MATERIALS TOWER A 9th–12th FLOORS DESIGNED BY: / CHECKED BY: JAH DRAWN BY: PF / MMIP–FIGURE 2–3–A.DWG

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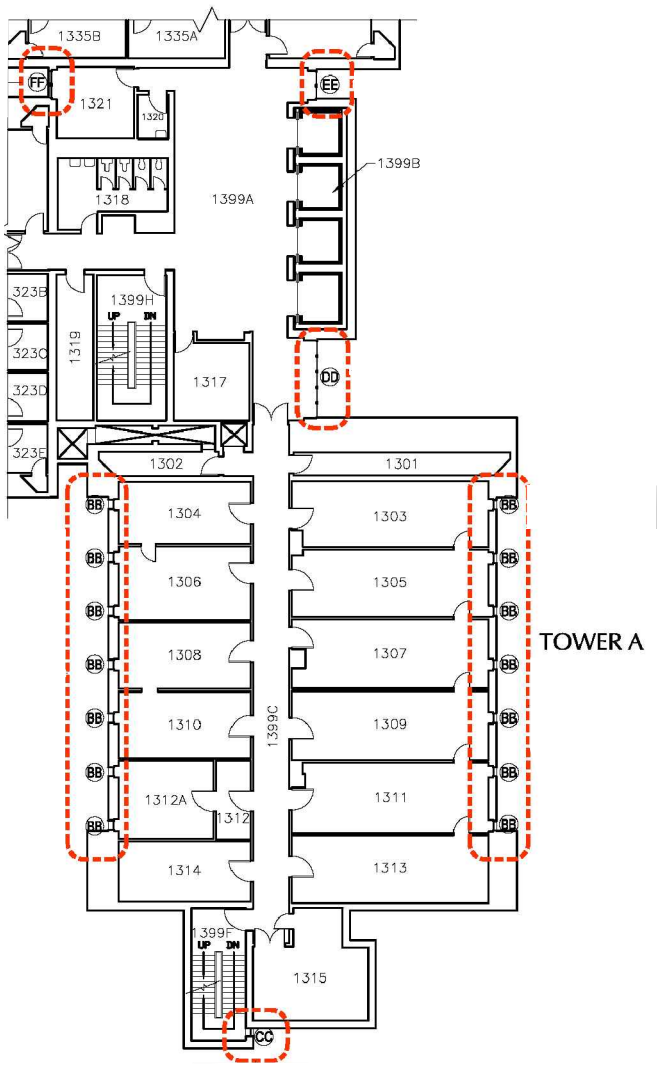
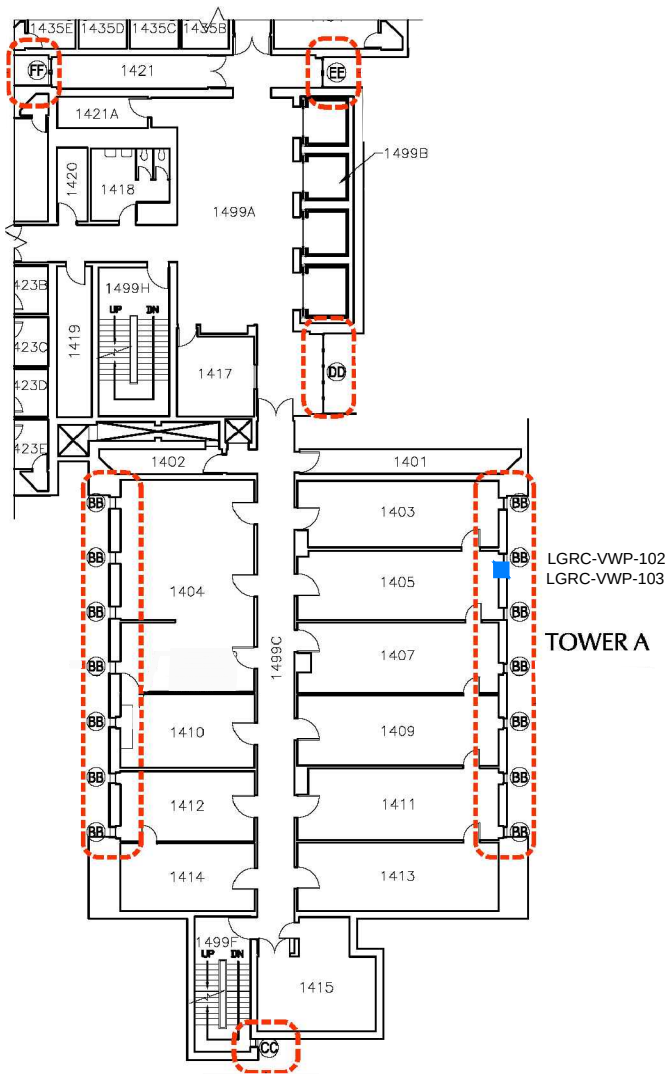
COMMITMENT & INTEGRITY DRIVE RESULTS



13th



14th

LEGEND

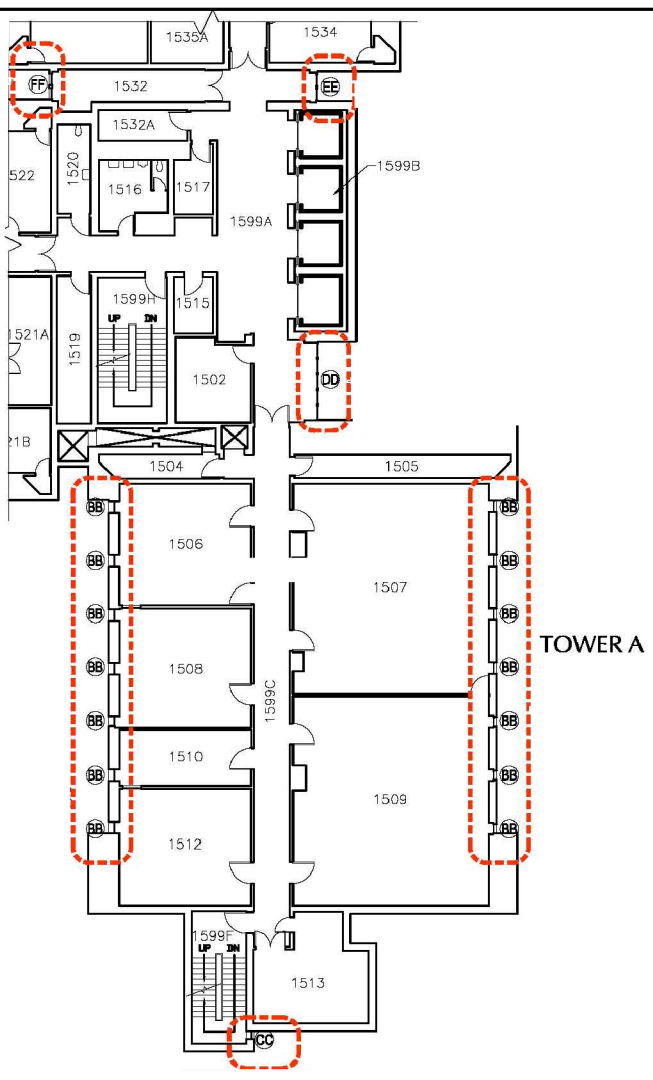
LOCATION OF WINDOWS/GLAZING SEALANTS INCLUDED IN THE INTERIM MEASURES AND SUBJECT TO LONG TERM MONITORING AND MAINTENANCE

Wipe Sampling Location

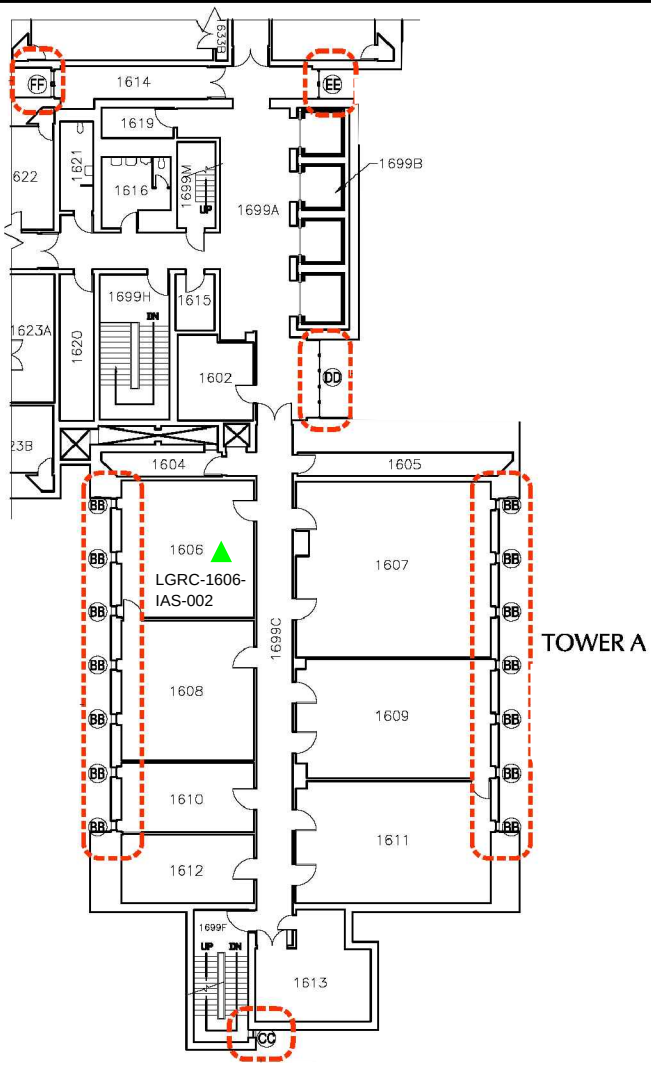
Indoor Air Sampling Location

NOTE:

ORIGINAL DESIGN DRAWINGS BY GOLDMAN REINDORF ARCHITECTS INC.



15th



16th

FIGURE 2-4	UMASS AMHERST LEDERLE GRADUATE RESEARCH CENTER MMIP	AREAS OF ENCAPSULATED MATERIALS TOWER A 13th–16th FLOORS	WOODARD &CURRAN 40 Shattuck Road | Suite 110 Andover, Massachusetts 01810 866.702.6371 | www.woodardcurran.com COMMITMENT & INTEGRITY DRIVE RESULTS

JOB NO: 210918
DATE: JUNE 2016
SCALE: NOT TO SCALE

DESIGNED BY:	CHECKED BY: JAH
DRAWN BY: PF	MMIP–FIGURE 2–4_2–5–A.DWG

LEGEND:

LOCATION OF WINDOWS/GLAZING SEALANTS OR EXTERIOR CONCRETE SURFACES INCLUDED IN THE INTERIM MEASURE AND SUBJECT TO LONG TERM MONITORING AND MAINTENANCE.

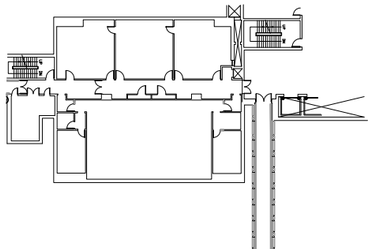
LOCATION OF WIPE SAMPLES

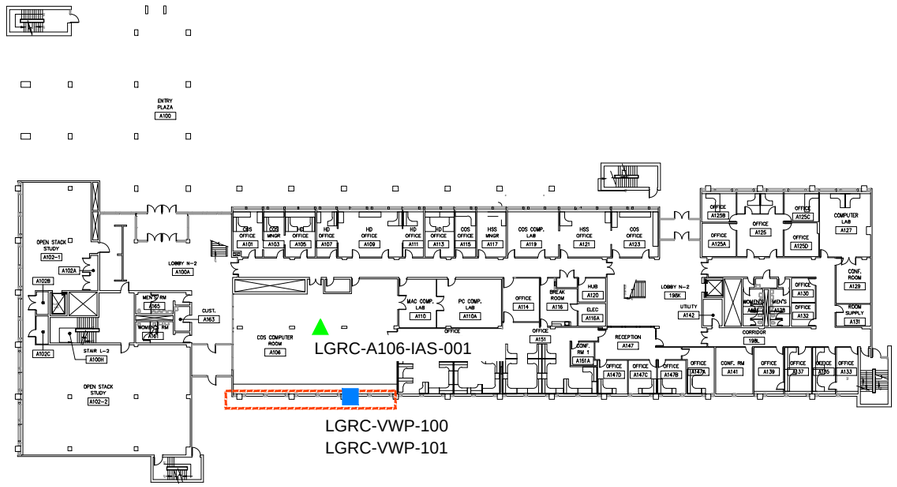
LOCATION OF LONG TERM MONITORING AIR SAMPLE

TYPE- L WINDOWS INCLUDED IN THE VISUAL INSPECTIONS

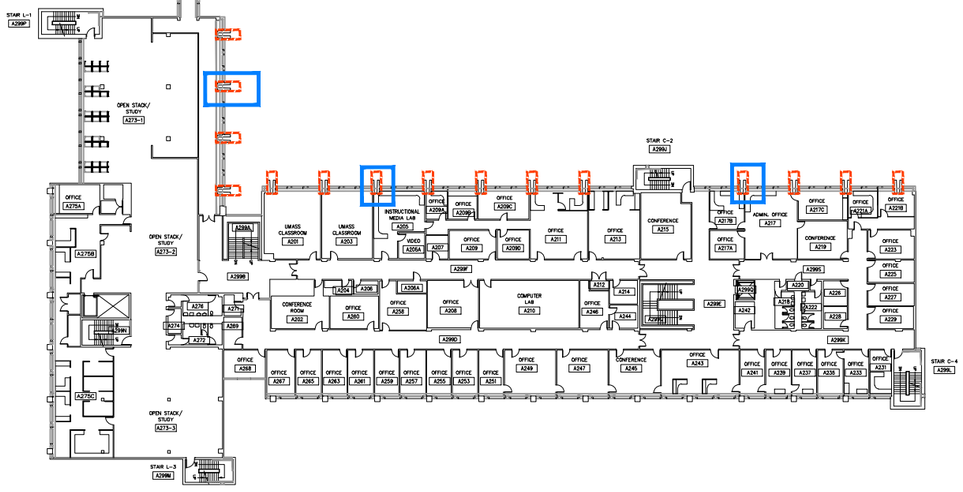
NOTE:

ORIGINAL DESIGN DRAWINGS BY GOLDMAN REINDORF ARCHITECTS INC.

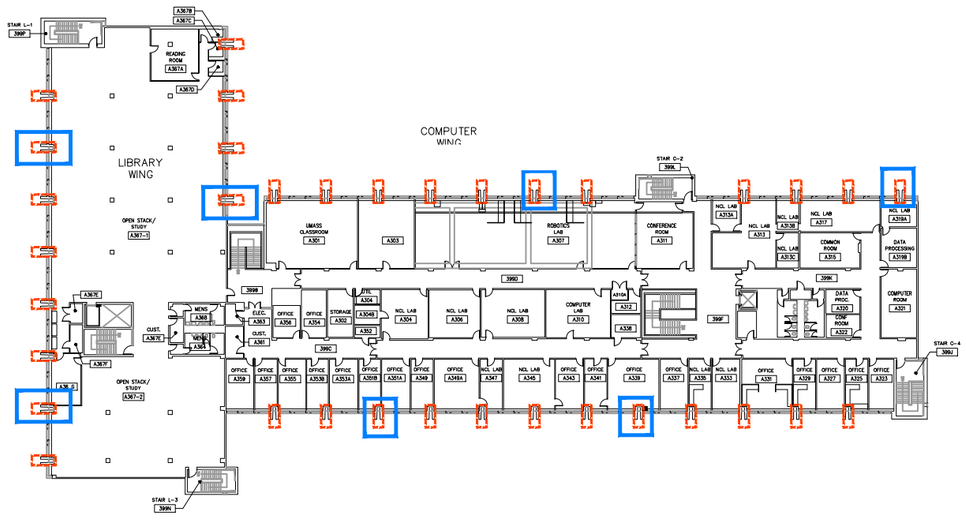




FIRST FLOOR PLAN



SECOND FLOOR PLAN



THIRD FLOOR PLAN

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WOODARD & CURRAN

AREAS OF ENCAPSULATED MATERIALS LOW-RISE BUILDING

DESIGNED BY: PF
DRAWN BY:
CHECKED BY: JAH
MMIP-FIGURE 2-5-A.DWG

UMASS AMHERST
LEDERLE GRADUATE RESEARCH CENTER

MMIP

JOB NO: 210918
DATE: JUNE 2016
SCALE: NOT TO SCALE

FIGURE 2-5

APPENDIX A: ANALYTICAL LABORATORY REPORTS AND DATA VALIDATION SUMMARIES

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