REVISED MONITORING AND MAINTENANCE IMPLEMENTATION PLAN

Lederle Graduate Research Center

Tower A and Low-Rise Buildings

Amherst, Massachusetts

WOODARD &CURRAN

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COMMITMENT & INTEGRITY DRIVE RESULTS

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UMass LGRC

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TABLE OF CONTENTS

LIST OF FIGURES

1. INTRODUCTION

This revised Monitoring and Maintenance Implementation Plan (MMIP) has been prepared by Woodard & Curran on behalf of the University of Massachusetts (UMass) to update the existing MMIP submitted to the U.S. Environmental Protection Agency (EPA) on June 2, 2014 in accordance with the requirements of the Consent Agreement and Final Order (CAFO) dated June 21, 2012 between UMass and 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.

As with previous versions of this MMIP, this plan presents the monitoring and maintenance activities that will be conducted to assess the long-term effectiveness of the encapsulants applied, as an interim measure, to interior glazing sealants identified as containing polychlorinated biphenyls (PCBs) at concentrations ≥ 50 parts per million (ppm). In addition, this revision also includes monitoring and maintenance activities associated with in-place management of residual PCB impacts to exterior concrete materials surrounding the 50 Type L windows on the second and third floors of the low-rise building.

1.1 BACKGROUND

The LGRC complex was constructed in the early 1970's as a facility for classroom, library, laboratory, and office space. The complex consists of a three-story low-rise building ("the low-rise") and an attached 17-story tower identified as Tower A ("the high-rise"). The buildings are located toward the northern end of the UMass campus at the intersection of North Pleasant Street and Governors Drive. The location of the LGRC complex on the campus is shown on Figure 1-1.

A summary of the background for each of the two aspects of the monitoring and maintenance program is as follows:

Interior Glazing Sealants

During a hazardous building materials assessment, a sample of interior window glazing sealant was collected and analyzed for PCBs. This sample detected total PCBs at a concentration of 12,000 ppm. Given that this concentration exceeded the regulatory threshold per Federal regulation (40 CFR 761) for PCBs in a non-totally enclosed manner, an approach was developed for the encapsulation of the glazing sealants as an interim measure until the glazing sealant could be removed during window replacement projects. The approach was presented to EPA in the May 2012 Interim Measures Plan (IMP) and finalized as part of the CAFO between EPA and UMass dated June 21, 2012.

Exterior Concrete – Type L Windows

Removal and off-site disposal of ≥ 50 ppm exterior perimeter window caulking and the remediation of exterior building materials impacted by the PCBs was conducted in accordance with the 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 the 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). However, remedial actions 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). Given that these areas were made accessible during the 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 REMEDIATION SUMMARY – INTERIOR GLAZING SEALANTS

The remedial approach consisted of the following:

- General cleaning of the window units and surrounding surfaces via 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 through the installation of barrier/encapsulating materials (aluminum foil tape followed by silicone sealant) to reduce potential direct contact exposures.

The effectiveness of each step of the interim measures was evaluated through visual inspection and verification sampling, as summarized in the following sections.

1.2.1 Encapsulation/Barrier Installation Areas

The implementation of the interim measures incorporates the temporary in-place management of PCB containing materials through the installation of a physical barrier to eliminate the direct contact exposure pathway and potential migration of PCBs to surrounding areas and indoor air.

Interior glazing sealants at the following locations were encapsulated with a layer of aluminum foil tape and a bead of silicone caulking:

Tower A High-Rise

- July - August 2012; Elevator lobby windows located on the 1st, 3rd, 7th, and 8th floors, as part of the National Institute of Health (NIH) Grant Lab Renovation project.
- July - August 2013; All remaining Tower A subject windows (cleaning, encapsulation, and verification sampling of sills), as well as an additional sealant encountered in the stairwells (refer to the August 23, 2013 new condition notification submittal).

Low-Rise

- December 2013; Glazing sealants within Room A106 (the computer room).

In addition to the interim measures described above, windows within the high rise and low rise buildings were removed as part of renovation projects. As part of the 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 other windows within the low-rise building (i.e., those outside Room A106) 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).

1.2.2 Visual Inspection and Verification Sampling

Following completion of the interim measures, 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 IMP. A summary of the results of the 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).

1.3 REMEDIATION SUMMARY – TYPE L WINDOW EXTERIOR CONCRETE

The remedial approach consisted of the following:

- Removal of the exterior perimeter window caulking using hand tools as part of the window removal project.
- Encapsulation of residual PCBs through the application of liquid coatings (liquid epoxy and elastomeric coatings) to exterior concrete surfaces and the installation of the replacement window frames (direct contact concerns are not present due to the location of the windows on the second and third floors and within the structural concrete features).

The effectiveness of each step of the interim measures was evaluated through visual inspection and verification sampling, as summarized in the following sections.

1.3.1 Encapsulation Barriers

The encapsulation barrier for exterior concrete consisted of three components:

- Liquid Epoxy Coating – A two inch wide strip of epoxy, centered on the former joint, was applied to concrete surfaces. The majority of locations were coated with two coats of Sikagard 62 liquid epoxy coating; however, the first five locations were coated with DevCon 5-minute epoxy (the change was made based on the difficulty in application of the DevCon product over a wide strip);
- 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 features 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.

1.3.2 Visual Inspection and Wipe 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).

2. INSPECTION AND MONITORING ACTIVITIES

Inspection and monitoring activities will be conducted 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 and the residual PCB impacted exterior concrete encapsulated through the application of liquid coatings and replacement frames. The locations of the encapsulated materials are depicted on Figures 2-1 through 2-5.

As discussed in the Interim Measures Plan, the evaluation of the effectiveness of the Interim Measures will be accomplished through:

- Visual inspection;
- Accessible Non-Porous Surface Wipe Samples – to be collected 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 – To be collected from the new caulking/adjacent frame to assess the concentrations of PCBs *on the surface* of the encapsulating barrier; and
- Indoor Air Samples - to assess post Interim Measure concentrations as to the effectiveness of the encapsulation (window glazing sealant) in regard to indoor air levels.

The frequencies and procedures for each of these four components are consistent with that included in the original MMIP; however, modifications have been made due to the removal of windows from three floors on Tower A and across the majority of the low-rise building and the in-place management of residual PCBs in exterior concrete at the Type L locations. As discussed below, periodically, saline wipes may be collected along with the hexane wipes as part of the monitoring of the encapsulated glazing sealants as another line of evidence to evaluate potential presence of PCBs on the surface of the encapsulating barrier.

2.1 VISUAL INSPECTIONS

Visual inspections of the encapsulated surfaces will be conducted at the Tower A high rise, the low rise computer room, and at the Type L windows. The inspections will consist 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 glazing sealants, the specific windows to be visually inspected will include the window unit randomly selected for wipe sampling (see below method) 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 will be randomly selected for inspection (or 10 windows). Upon completion of the visual inspections, corrective actions will be implemented for accessible surfaces, if needed, as described in Section 3.

2.2 ACCESSIBLE NON-POROUS SURFACES

Surface wipe samples will be collected from representative locations on the accessible non-porous surfaces cleaned as part of the interim measures (window ledges). The specific location of each sample will be randomly selected as follows:

- Low-Rise Computer Room Windows: One wipe sample will be collected from within the computer room; and
- High-Rise Windows: One wipe sample will be collected from every other floor (total of 8 wipes).

The locations of the wipe samples will be randomly selected as follows:

- Each window unit will be assigned a number based on the total number of units in the space or floor;
- The window unit will then be selected using a random number generator;
- The location of the wipe sample along the window ledge will be randomly selected based on the total width of the window frame; and
- The wipe sample will be collected from the middle of the window ledge at the selected location.

In addition to the primary samples indicated above, one duplicate sample will be collected and submitted to the laboratory as part of the QA/QC procedures associated with the sample collection procedures.

Wipe samples will be 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, will be wiped across a 100 square centimeter template area.

All samples will be 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.

Upon receipt of the analytical results and data validation, the sample data will be compared to the action levels as described in Section 3 and documented in the report submitted to EPA. This report will include a recommendation for continuing or refining the sample frequency based on the results.

2.3 ENCAPSULATED SURFACES

Surface wipe samples will be collected from encapsulated surfaces and the windows frames as follows:

- Low-Rise Computer Room Windows: One wipe sample will be collected from within the computer room; and
- High-Rise Windows: One wipe sample will be collected from every other floor (total of 8 wipes).

Due to the inaccessibility to the exterior side of the Type L windows, wipe samples of exterior encapsulated surfaces at the Type L windows will not be collected.

In addition to the primary samples indicated above, one duplicate sample will be collected and submitted to the laboratory as part of the QA/QC procedures associated with the sample collection procedures.

Wipe samples will be 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 ½-inch). At each sample location, a 2-inch square gauze pad, saturated with hexane, will be wiped across a 32-inch long section of the caulking/window frame (to achieve a 100 cm^2 area based on a total width of ½-inch). In addition to the hexane wipe samples, a saline wipe sample may also be collected for analysis (refer to section 2.3.1 for further discussion). Samples will be submitted to the analytical laboratory for analysis as described above.

Upon receipt of the analytical results and data validation, the sample data will be compared to the action levels as described in Section 3 and documented in the report submitted to EPA. This report will include a recommendation for continuing or refining the sample frequency based on the results.

2.3.1 Evaluation of Wipe Sample Methodologies

While the results of the baseline sampling indicated that the interim measures were effective in encapsulating the PCBs present in the glazing sealants, results of pilot test activities indicate that the use of an organic solvent, such as

hexane, may not be providing data representative of surficial PCB concentrations available for dermal contact through incidental contact but instead the solvent may be "extracting or pulling" PCBs from within the porous caulking.

To evaluate the suitability of an alternative wipe sampling procedure to assess "surface" concentrations on the newly applied porous caulking, wipe samples were collected using four different solvents/methods: hexane, isopropyl alcohol, saline, and dry wipe. As a first step, wipe samples were collected directly from the PCB-containing window glazing sealants to assess the ability of the wipes to detect PCBs. Based on an overall glazing sealant width of 1/4-inch, the gauze was folded and wiped across a representative area to achieve a total sample area of 100 cm^2. The gauze was then refolded and wiped across the sample area in the opposite direction. Following sample collection, the gauze pads were placed back into the sample containers, placed on ice, and transported to the laboratory for analysis (EPA Method 3540C/8082). Results are summarized on the table below.

Summary of Glazing Sealant Direct Wipe Sampling Results

Solvent	Sample ID	Total PCBs (µg/100cm²)
Hexane	LGRC-CWG-086	42
Isopropyl Alcohol	LGRC-CWG-088	36
Saline	LGRC-CWG-089	14
Dry(1)	LGRC-CWG-087	3.4

(1) Dry wipe placed into laboratory provided sample container with hexane immediately following sample collection.
(2) PCBs detected at approximately 12,000 ppm in the glazing sealant.

As shown on the table, PCBs were reported in all four of the wipe samples indicating that each of the four methods are able to detect PCBs on the surface of the source materials with the more aggressive solvents reporting higher results.

The same four methods were then also used to collect wipe samples from windows that were cleaned/encapsulated following the Interim Measure procedures. Wipe samples were collected from elevator lobby windows on two of the floors included in the NIH renovations in November 2013 (453 days after application of the encapsulation barriers) following the same procedures as described above.

Analytical results from the sampling are summarized on the table below:

Summary of Pilot Test Wipe Sampling Results – November 11, 2013

Solvent	Sample ID	Total PCBs (µg/100cm²)
Hexane	LGRT-EN-VWK-078 (3rd floor) LGRT-EN-VWK-082 (8th floor)	2.8 2.4
Isopropyl Alcohol	LGRT-EN-VWK-079 (3rd floor) LGRT-EN-VWK-083 (8th floor)	9.8 1.4
Saline	LGRT-EN-VWK-080 (3rd floor) LGRT-EN-VWK-084 (8th floor)	0.65 0.31

Solvent	Sample ID	Total PCBs (µg/100cm²)
Dry(1)	LGRT-EN-VWK-081 (3rd floor)	0.33
	LGRT-EN-VWK-085 (8th floor)	< 0.20

(1) Dry wipe placed into laboratory provided sample container with hexane immediately following sample collection.

As shown on the table above, analytical results indicate that the aluminum foil tape and silicone caulking barrier combination is an effective barrier for the reduction of PCBs available for direct contact (compared to the un-encapsulated glazing sealant results). Similar to the wipes of the un-encapsulated surfaces, the hexane and IPA detected slightly higher PCB concentrations, which may be indicative of a "pulling or extracting effect" through this porous material. It is noted that the presence of PCBs in the newly applied caulking is not fully understood and may be related to a "wicking" effect around the edges of the aluminum tape or some other phenomena. However, given that the saline and dry wipe detected PCBs in the un-encapsulated samples, these two methods may be more effective in assessing surface concentrations on the newly applied caulking given their less aggressive nature.

Another issue of concern is that the use of hexane could potentially cause physical damage to the caulking over time. Technical support personnel at DOW have confirmed that silicone caulking has a low resistance to solvents and that repeated exposure to hexane could result in physical degradation of the caulking over time.

In order to obtain baseline data using saline-soaked wipes on the encapsulating barriers, wipe samples were collected from the same windows as the baseline hexane wipe samples and submitted for PCB analysis. Analytical results indicated that PCBs were non-detect (< 0.20 µg/100 cm^2) in 16 of the 17 samples collected. Analytical results from the remaining sample indicated that PCBs were present at a concentration of 0.47 µg/100 cm^2. As presented previously, the results of the hexane wipe samples indicated PCBs as either non-detect or < 1 µg/100 cm^2 in 15 of the 17 samples collected with the 2 samples > 1 µg/100 cm^2 reported at 1.5 and 3.1 µg/100 cm^2.

Going forward, saline wipes may be collected and used as another line of evidence to evaluate potential presence of PCBs on the surface of the encapsulating barrier and the overall effectiveness of the Interim Measure.

2.4 INDOOR AIR – LONG TERM MONITORING

As previously reported, the results from the eleven baseline indoor air samples collected in May 2009 ranged from 33 to 160 ng/m^3 and were below EPA's public health levels for PCBs in school air for students ages 19 plus and adults (set at 450 ng/m^3).

As part of the long term monitoring program, five indoor air samples and one ambient outdoor sample will be collected from representative locations throughout the LGRC Tower A. In addition, one indoor air sample will be collected from the low rise Computer Room. In general, indoor air samples will be 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 will be selected based on the use of the space (e.g., offices, laboratories, common areas) throughout the building; however, given the potential interference in the sample analysis from laboratory chemicals and potential access issues to certain spaces, it is likely that the majority of samples will be collected from offices and common areas.

Air samples will be 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 will be connected to a personal air pump (SKC AIRCHEK Sampler, or equivalent) with flexible tubing. The cartridge will be positioned between three and five feet above the floor using a telescoping tubing stand or placed on a desk or table.

Samples will be collected at an approximate flow rate of 2.5 L/min for four hours. The flow rates will be 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) will be obtained from a portable commercially available weather monitoring station (indoor conditions) and from on-line sources from the nearest monitoring station (outdoor conditions). Pumps and flow rates will be monitored periodically throughout the sample collection period and observations will be recorded. One duplicate sample will be collected as part of the overall project QA/QC measures. The duplicate sample will be collected in an identical manner to the primary samples. At the end of the required sample interval, the pump will be shut off and the cartridge will be placed in aluminum foil, labeled, and placed on ice for delivery to the analytical laboratory.

Upon receipt of the analytical results and data validation, the sample data will be compared to the action levels as described in Section 3 and documented in the report submitted to EPA. This report will include a recommendation for continuing or refining the sample frequency based on the results.

2.5 INDOOR AIR – POST-WINDOW REMOVAL

Given that the low-rise windows, including glazing sealants, have been removed (aside from the computer room), an indoor air long term monitoring component will not be collected at the low-rise buildings. However, to document the post-removal indoor air levels in the low-rise, a one-time indoor air sampling event will be conducted following the sampling methods and procedures described in Section 2.4. Indoor air samples will be collected from the north wing of the low-rise (one sample per floor) and the library (one sample per floor) for a total of six samples. This data will be incorporated into the long term monitoring and maintenance report accordingly.

3. ACTION LEVELS AND CORRECTIVE MEASURES

Based on a review of the products' technical specifications and applied locations (interior metal to glass window joints), it is not anticipated that the glazing sealant barrier system will require any additional or routine maintenance activities other than potential corrective measures that may be deemed necessary as a result of the inspection and monitoring activities.

The results from each of the four components of the inspection and monitoring activities will be used in conjunction with one another to evaluate the overall effectiveness of the interim measure over time and to determine what corrective measures may be required. Potential receptors to interior window glazing sealant include adult workers within the buildings (UMass staff) and college-age students, including graduate students. No children would be present in the inside of the buildings, except during short duration visits with UMass staff. There are no child care facilities within the buildings.

The specific action level for each component of the monitoring is as follows:

- Physical damage/separation of caulking to tape observed during the visual inspections will be noted and repaired accordingly;
- Results from surface wipe samples of the window ledges will be compared to the high occupancy use criteria for non-porous surfaces of 10 µg/100 cm^2;
- Results from surface wipe samples (both hexane and saline) of the encapsulating barrier will be compared to a target encapsulation goal of 1 µg/100 cm^2; and
- Results from the indoor air samples will be compared to EPA's September 2009 public health levels of PCBs in school indoor air for ages 19 plus and adults of 450 ng/m^3.

Upon receipt of the laboratory results after each monitoring round, the data will be evaluated as follows to determine whether additional monitoring or corrective measures are needed.

- For accessible non-porous surfaces cleaned as part of the interim measures (i.e., window ledges):
    - If $\leq$ 10 µg/100 cm^2 – no additional action, long term maintenance and monitoring to continue in accordance with this plan.
    - If > 10 µg/100 cm^2 – cleaning of surfaces represented by the sample will be conducted as described in the Interim Measures Plan and post-cleaning samples collected at the frequency indicated above using offset sampling locations.
- For encapsulated surfaces:
    - Wipe results indicate that PCBs are ≤ 1 µg/100 cm^2 – no additional action, long term maintenance and monitoring to continue in accordance with this plan.
    - Wipe results indicate that PCBs are > 1 µg/100 cm^2 – continued monitoring of locations with reported concentrations > 1 µg/100 cm^2, results and potential corrective actions to be evaluated by UMass in conjunction with EPA.
- For indoor air results:
    - If < 450 ng/m^3 – no additional action, long term maintenance and monitoring to continue in accordance with this plan.
    - If > 450 ng/m^3 – results and alternative solutions will be evaluated by UMass in conjunction with EPA.

The intent of the laboratory results evaluation will be to assess all lines of evidence, collectively, to determine the overall effectiveness of the interim measures over time and whether corrective measures should be implemented. It should be noted that there is currently a lack of substantial long-term or short-term monitoring data for products being

used as encapsulants over PCB containing building materials from this or any comparable PCB remediation site. Additional research into this issue is currently being conducted by the EPA. These results/data will be incorporated into any decision regarding additional interim/corrective measures at this Site.

4. TRAINING

Based on discussions with UMass Facilities Department, it is not anticipated that any workers would come in routine contact with the encapsulated surfaces beyond routine cleaning and planned maintenance activities. It is not anticipated that workers performing routine cleaning would require any special training or need to take extra precautions due to the presence of the new encapsulant; however, UMass will conduct general awareness training for cleaning personnel to ensure they are aware of the importance of maintaining the sealant/encapsulant. The University will incorporate this training into its routine and scheduled training for asbestos-containing materials consistent with the asbestos regulations. This one-time training is conducted once per month. The University will prepare an annual awareness update on the window conditions and make this available to personnel via e-mail or postings.

For any non-routine projects or maintenance activities that involve work on the windows, relevant and appropriate worker training requirements and procedures specific to the task will be developed and implemented. Current UMass procedures dictate that all work that impacts building materials, including window glazing sealants, must undergo an "all hazard review". This review would indicate that the LGRC window glazing sealant has been flagged as a PCB and asbestos-containing material and that exterior concrete around the Type L windows contains residual PCBs. As such, any work that will disturb the window glazing sealant or exterior concrete will be conducted by appropriately trained workers following the necessary work procedures for containments (polyethylene sheeting, etc.) and disposal. Any window glazing removed will be disposed as ≥ 50 ppm PCB wastes. These activities will be reported to EPA in the referenced report.

5. COMMUNICATIONS AND REPORTING

As per the requirements of the CAFO, long term monitoring will be conducted by June 30th of each year (beginning in 2015). The activities completed as part of this plan will be documented and submitted to EPA within 90 days following the monitoring activities (anticipated to be by September 30th). This report will document the following:

- Results of the visual inspections;
- Results of the sampling and analyses;
- Comparisons to action levels and recommendations for corrective measures;
- Any corrective measures implemented;
- Any non-routine major projects conducted at the building that encountered the encapsulated area, and the training and protective measures that were implemented;
- Any proposed modifications to the monitoring and maintenance program (e.g., based on the sampling results or discussions with EPA, the frequency of the program may be modified);
- A statement on the continued effectiveness of the encapsulants and/or secondary barriers;
- Confirmation that the annual awareness update on the window conditions was made available to personnel via email or postings; and
- An update and status on plans to perform window replacement activities (e.g., source removal).

This report will also include a recommendation for continuing or refining the sample frequency based on the results. In addition, if the results for the sampling and analyses indicate exceedances of project-specific action levels, EPA will be notified within 30 days of receipt of the analytical data. This notification will also include proposed corrective measures, if required, in any of the exceedance areas. Upon EPA approval of these proposed measures, they will be initiated within 30 days of Approval or some other specified and agreed upon interval depending on the required measures and procurement procedures that must be followed.

It is possible that results of long term monitoring may warrant or require modifications to this plan. In the event that a modification to the MMIP is necessary, such an amendment will be proposed to EPA for approval as part of the scheduled report submittal.

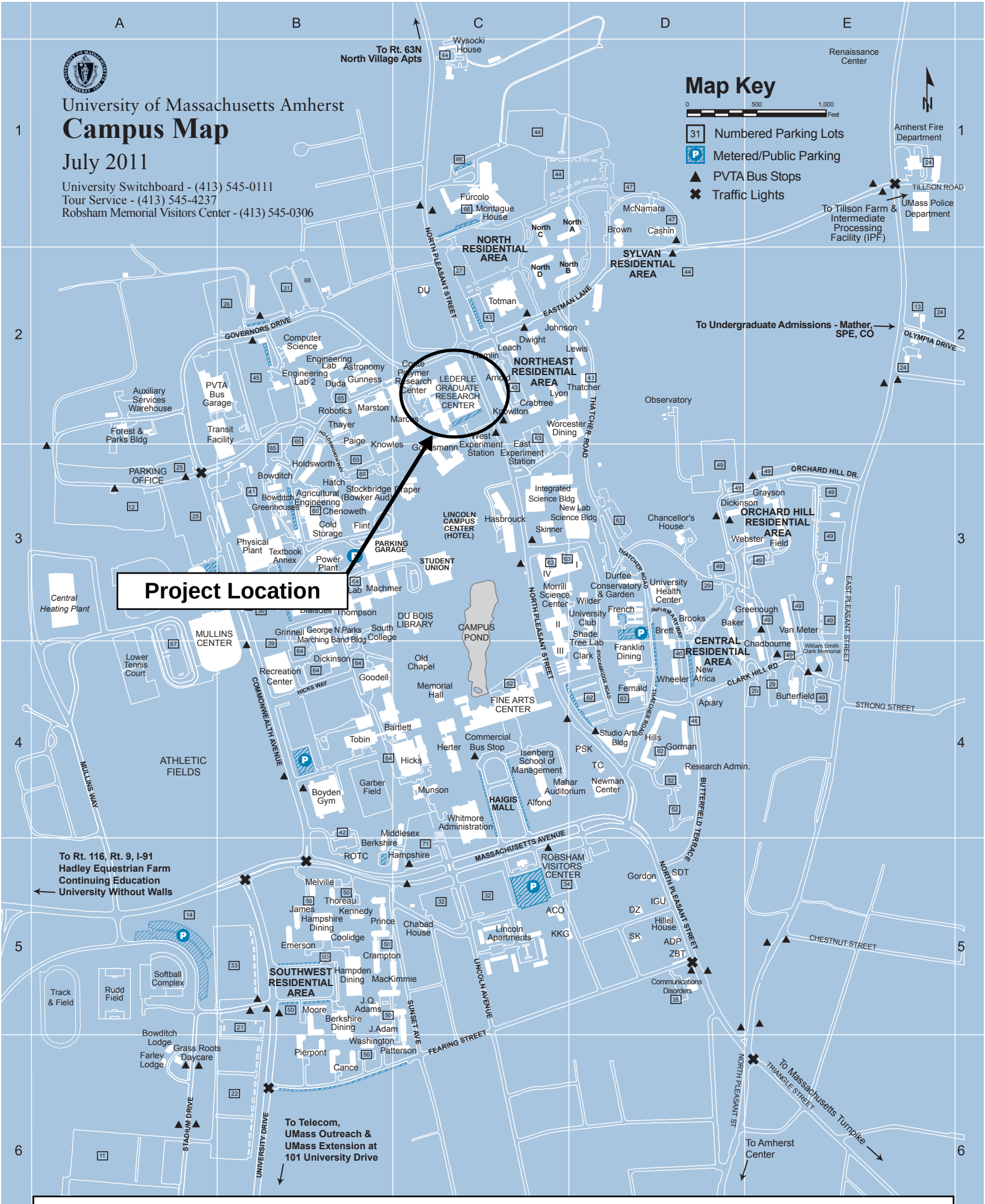
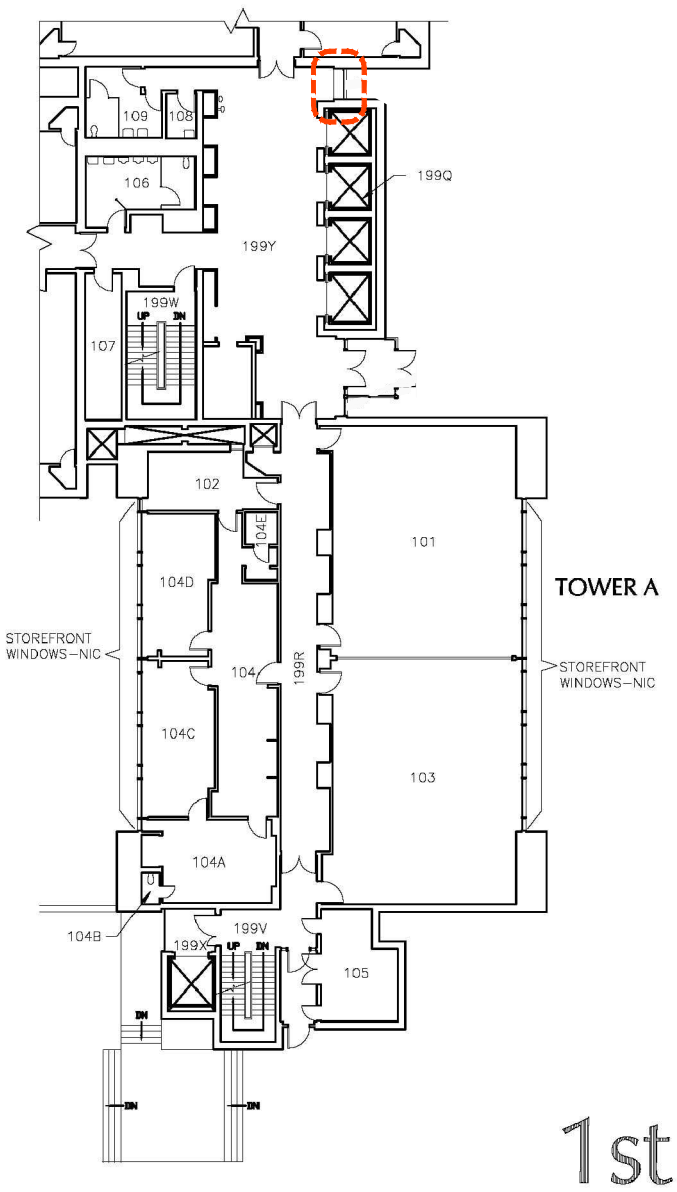
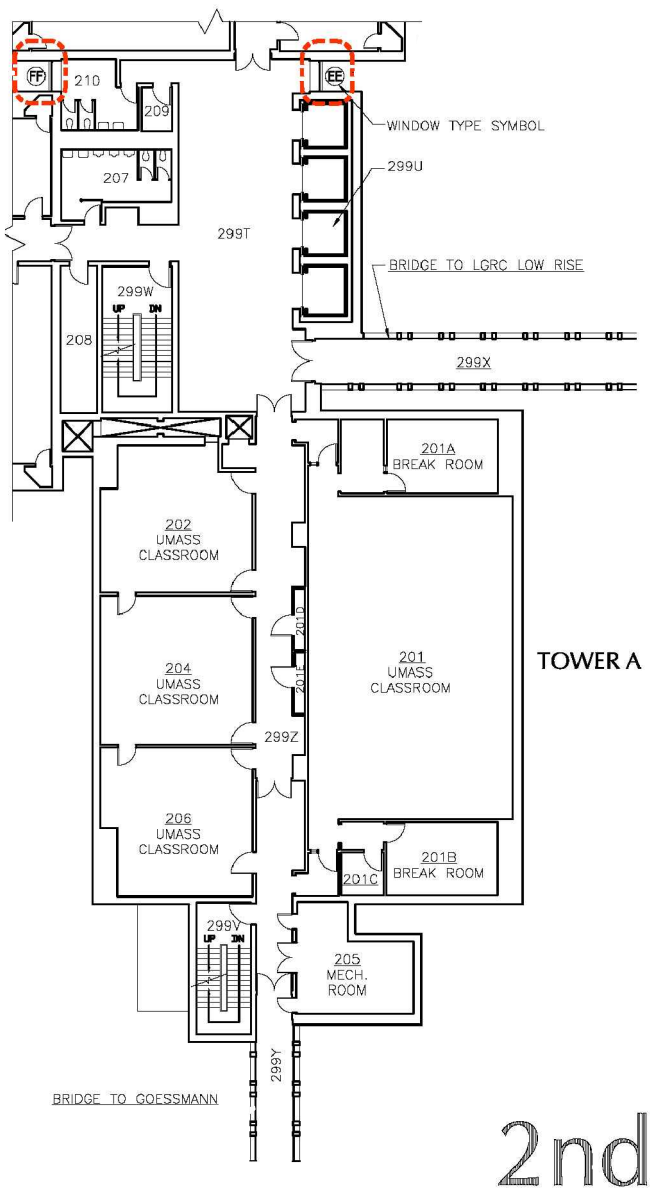


Figure 1-1 Site Location Map



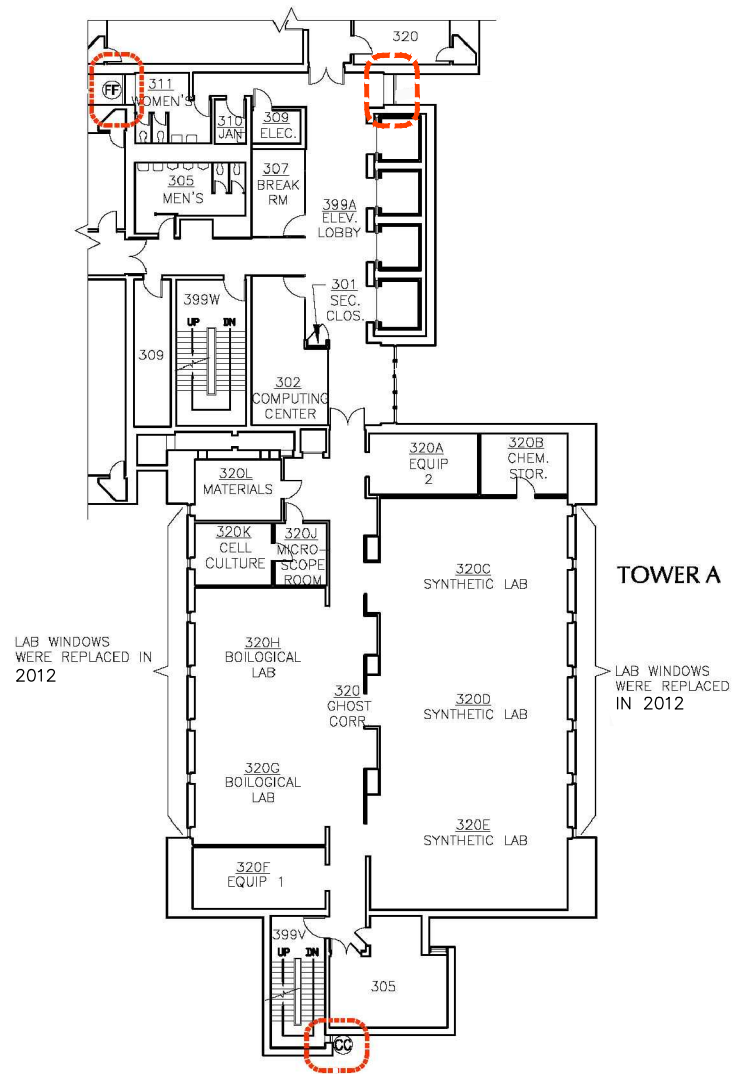


LEGEND

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

NOTE:

1. ORIGINAL DESIGN DRAWINGS BY GOLDMAN REINDORF ARCHITECTS INC.



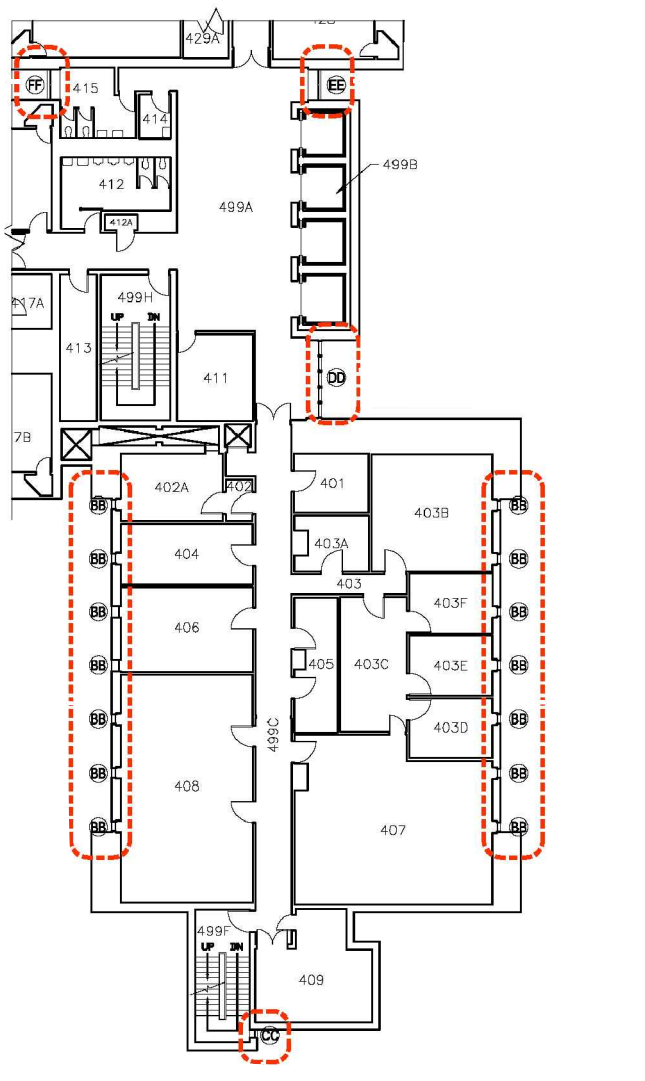


FIGURE 2-1	UMASS AMHERST LEDERLE GRADUATE RESEARCH CENTER
JOB NO: 210918 DATE: APRIL 2014 SCALE: NOT TO SCALE	MMIP

AREAS OF ENCAPSULATED MATERIALS TOWER A 1st–4th FLOORS

DESIGNED BY:	CHECKED BY: JAH
DRAWN BY: PF	MMIP–FIGURE 2–1.DWG

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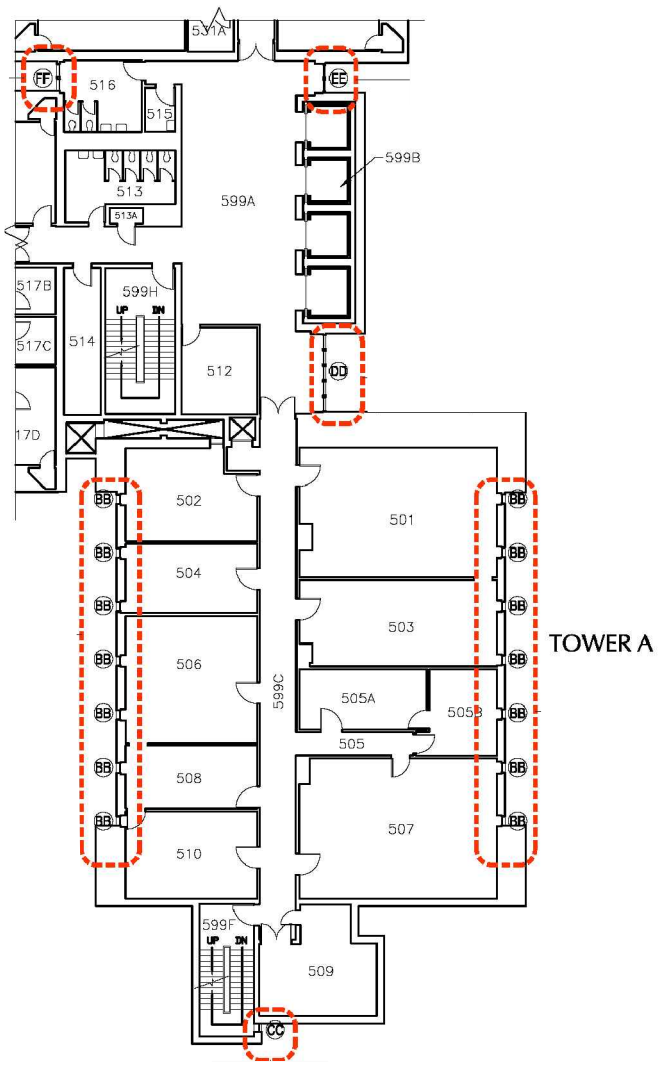
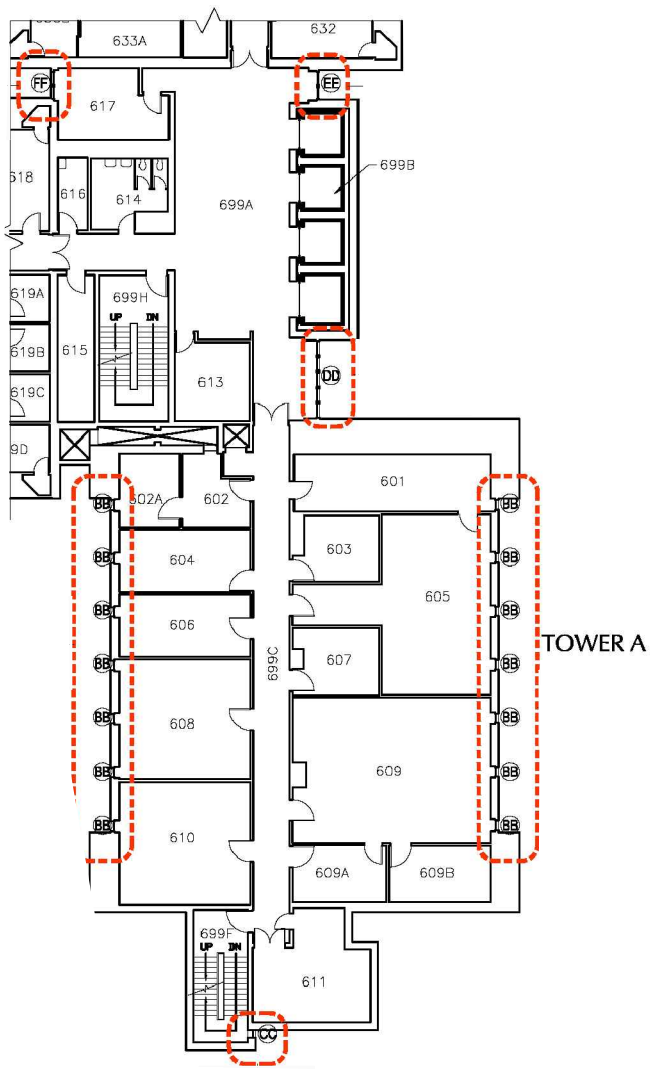


5th



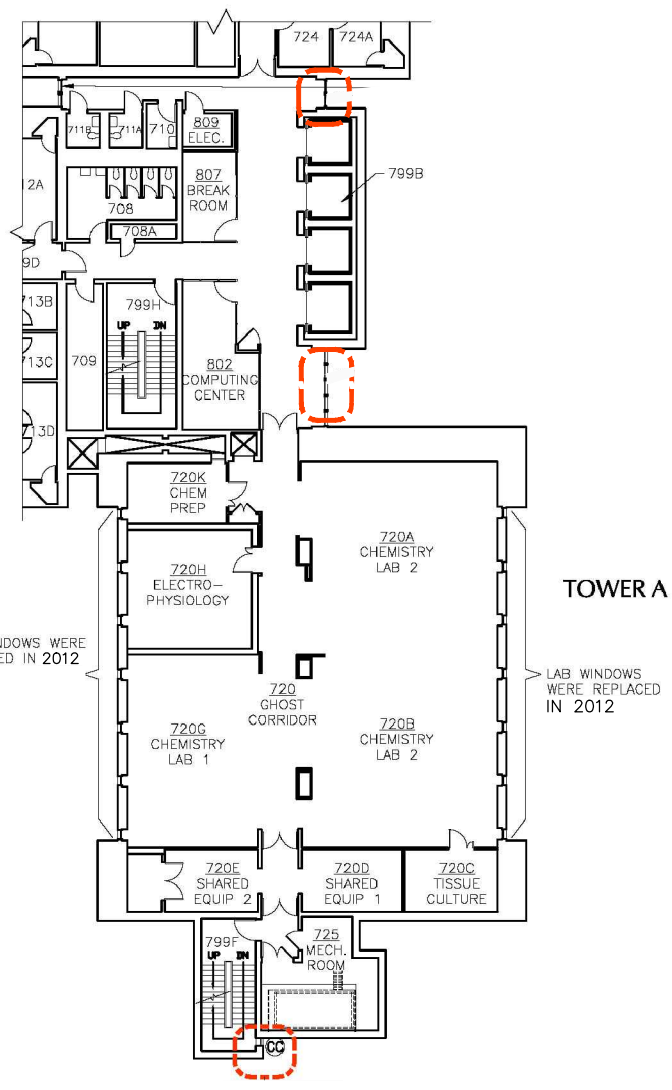
6th

LEGEND

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

NOTE:

1. ORIGINAL DESIGN DRAWINGS BY GOLDMAN REINDORF ARCHITECTS INC.



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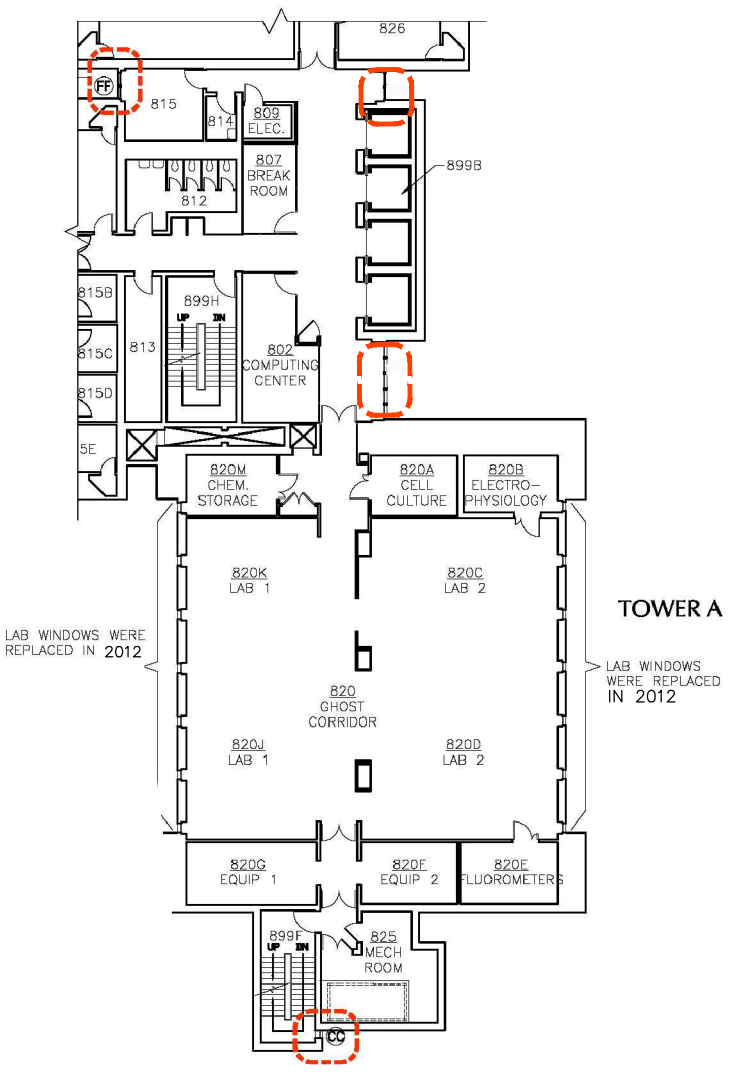

8th

FIGURE 2-2

JOB NO: 210918
DATE: APRIL 2014
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.DWG

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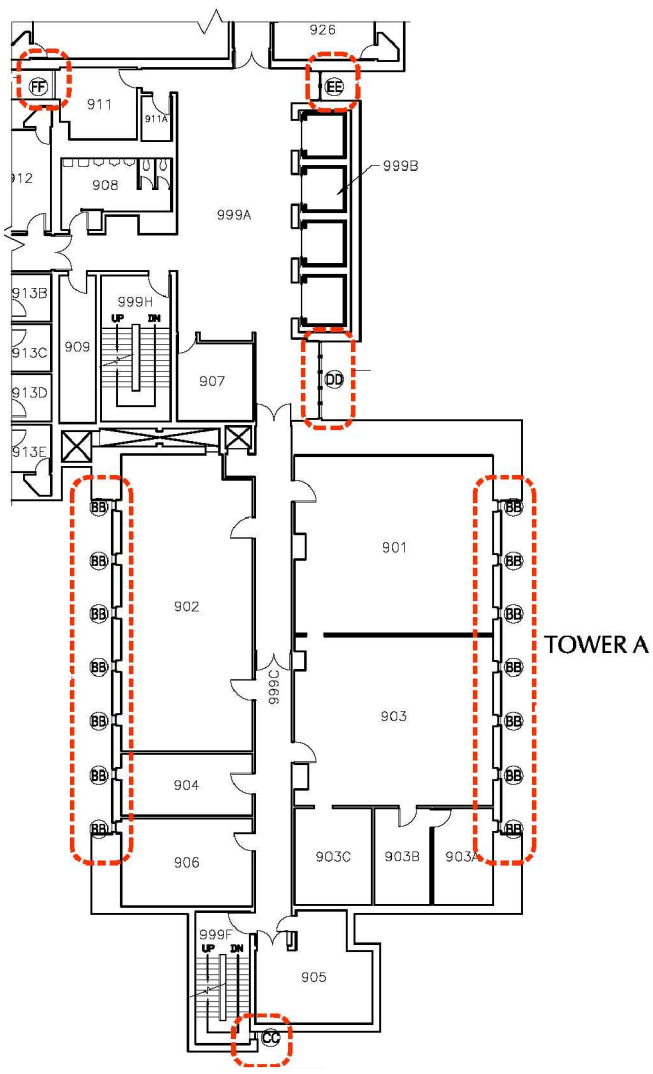
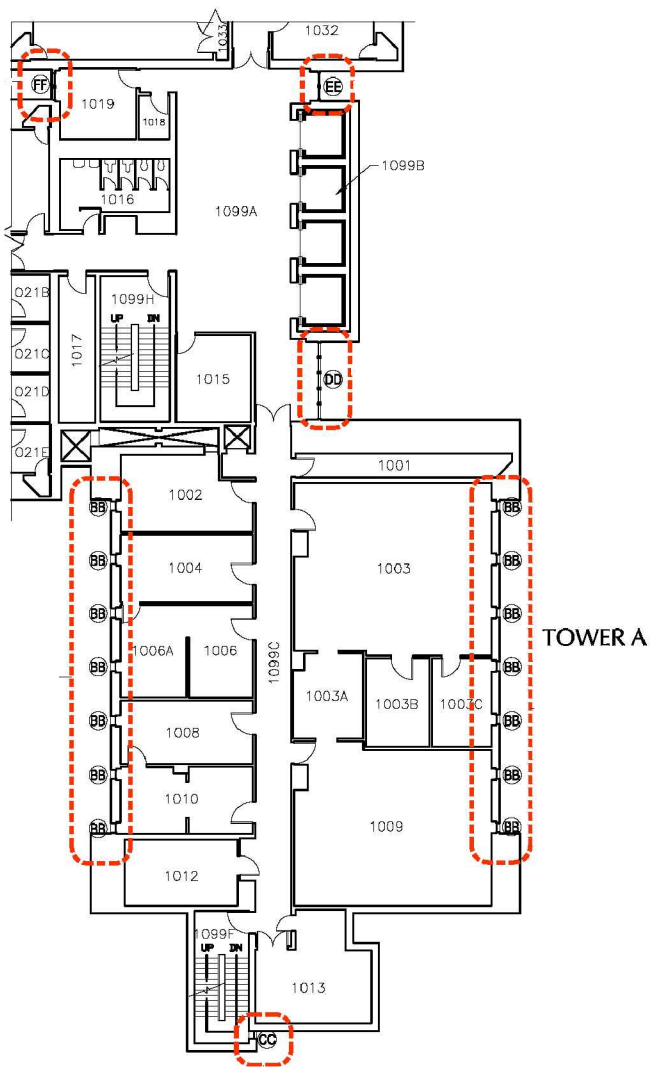


9th



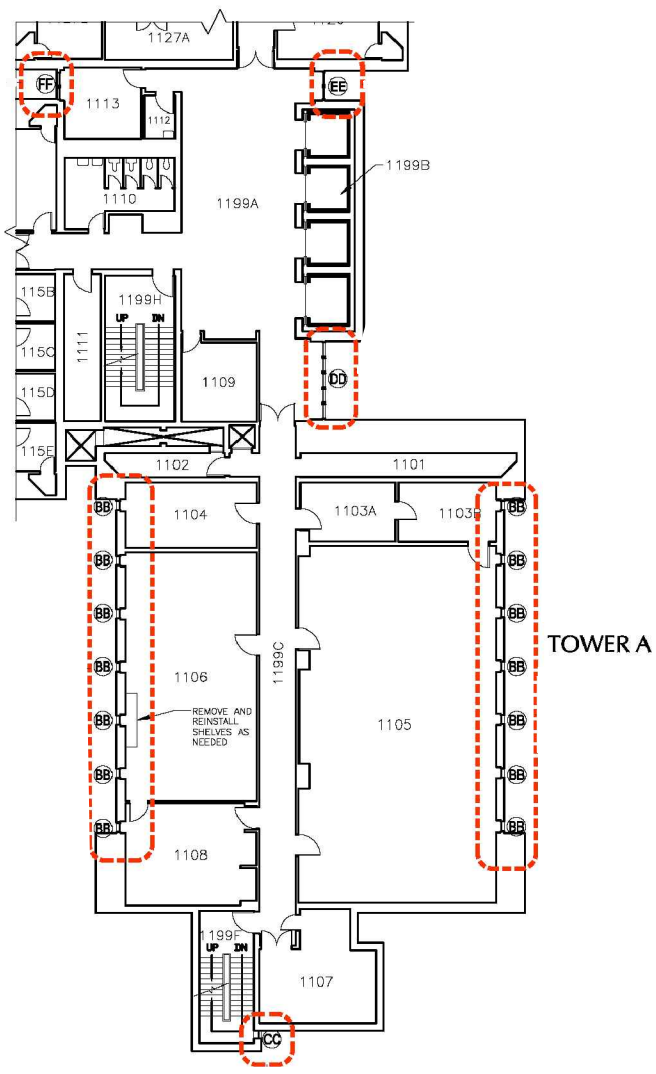
10th

LEGEND

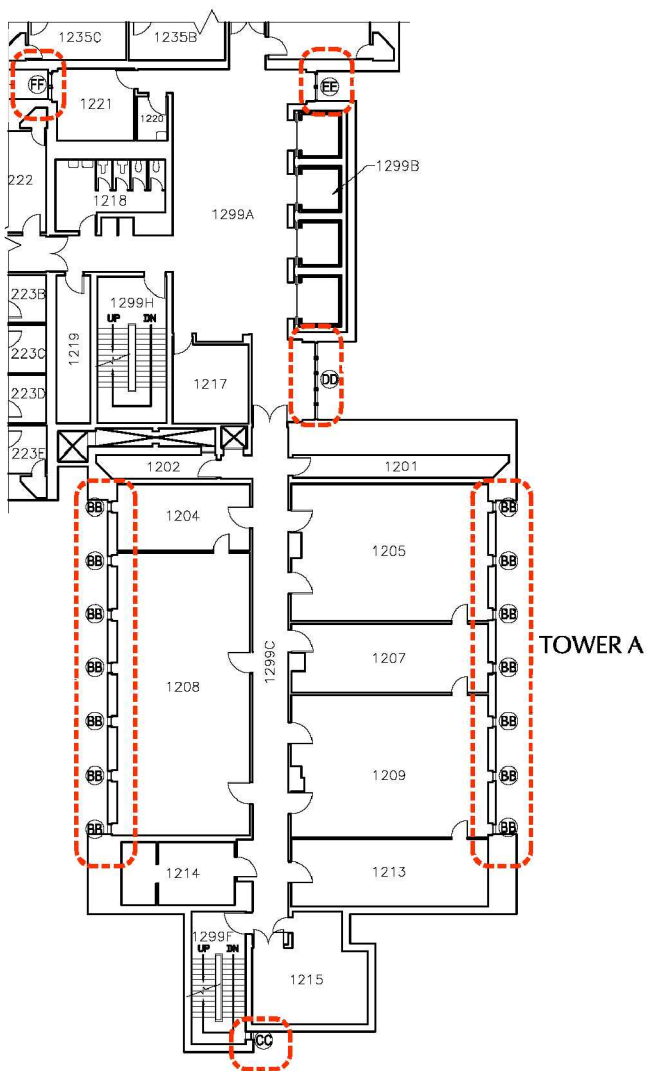
LOCATION OF WINDOWS/GLAZING SEALANTS INCLUDED IN THE INTERIM MEASURES AND SUBJECT TO LONG TERM MONITORING AND MAINTENANCE

NOTE:

1. ORIGINAL DESIGN DRAWINGS BY GOLDMAN REINDORF ARCHITECTS INC.

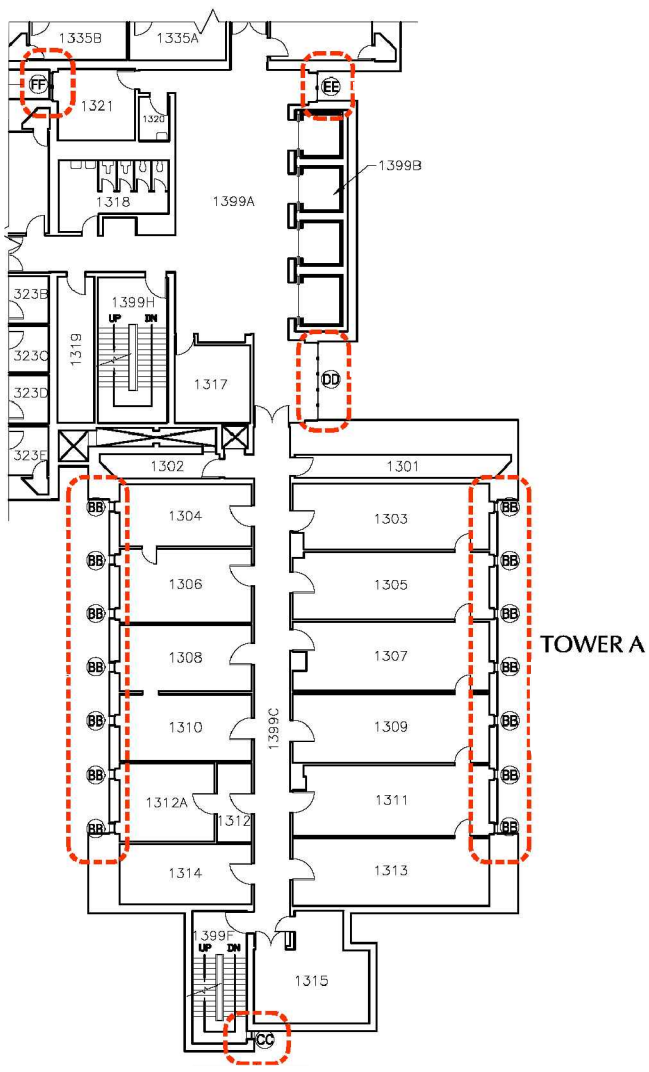


11th

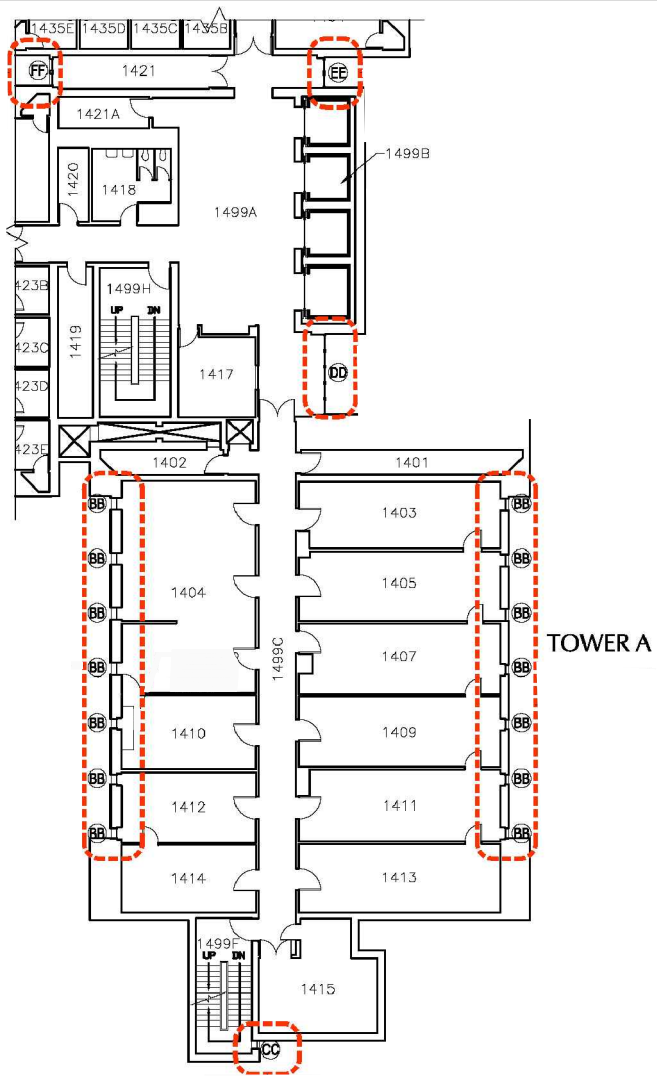


12th

FIGURE 2-3	UMASS AMHERST LEDERLE GRADUATE RESEARCH CENTER	AREAS OF ENCAPSULATED MATERIALS TOWER A 9th–12th 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: APRIL 2014 SCALE: NOT TO SCALE	MMIP	DESIGNED BY: PF DRAWN BY: PF CHECKED BY: JAH MMIP–FIGURE 2–3.DWG	



13th



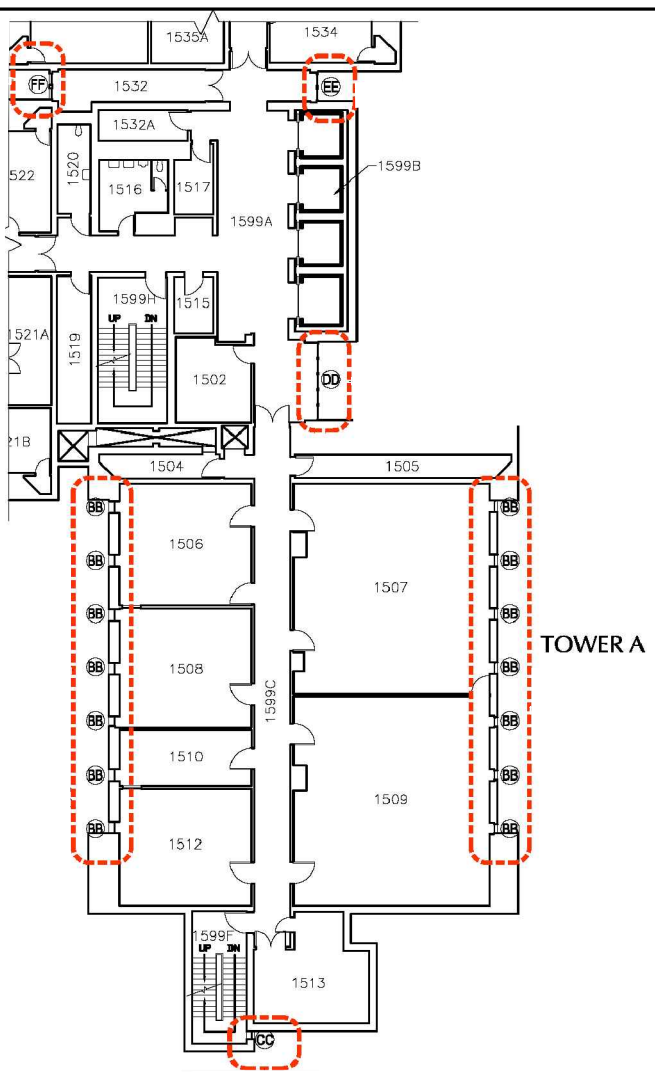
14th

LEGEND

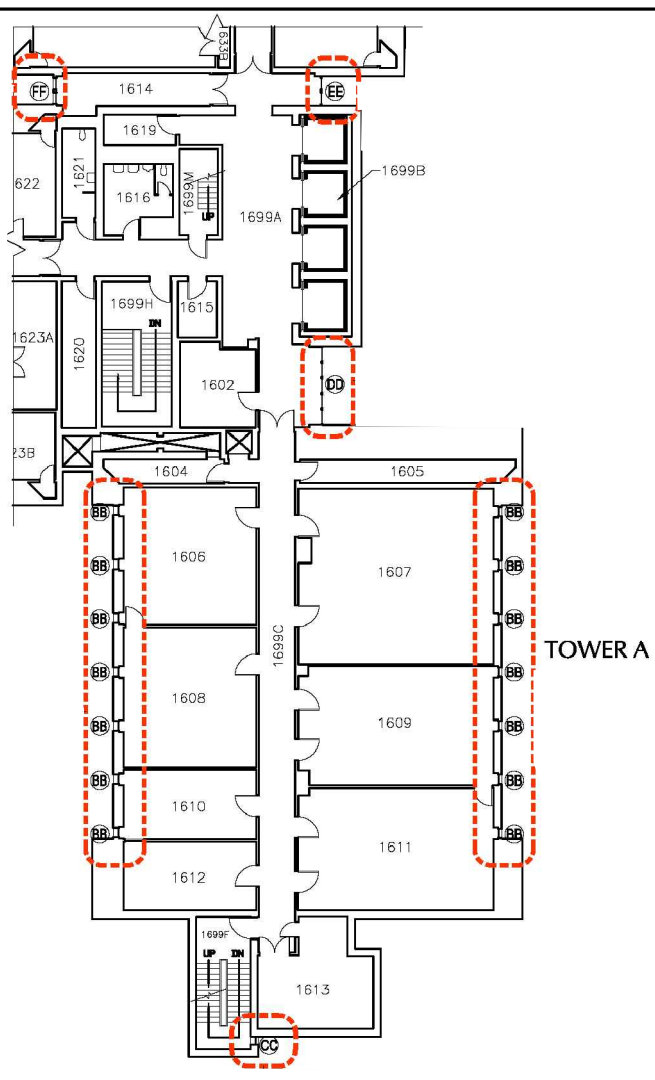
LOCATION OF WINDOWS/GLAZING SEALANTS INCLUDED IN THE INTERIM MEASURES AND SUBJECT TO LONG TERM MONITORING AND MAINTENANCE

NOTE:

ORIGINAL DESIGN DRAWINGS BY GOLDMAN REINDORF ARCHITECTS INC.



15th



16th

FIGURE 2-4

JOB NO: 210918
DATE: APRIL 2014
SCALE: NOT TO SCALE

UMASS AMHERST
LEDERLE GRADUATE RESEARCH CENTER

MMIP

AREAS OF ENCAPSULATED MATERIALS
TOWER A 13th–16th FLOORS

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

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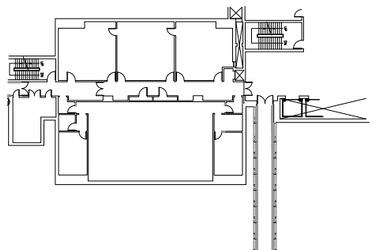
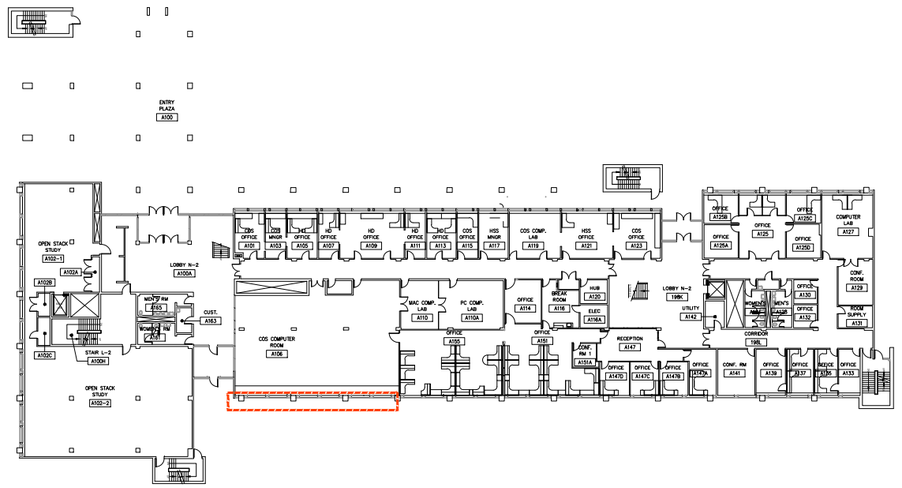
LEGEND

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

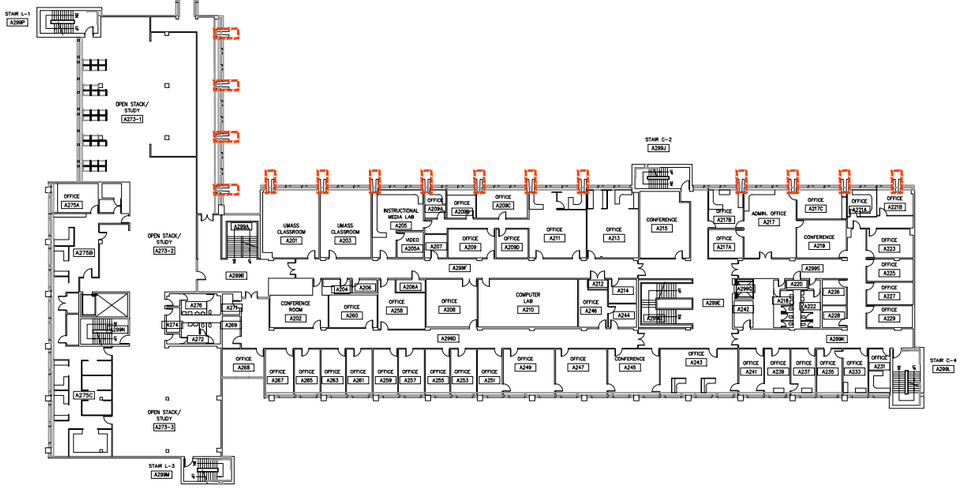
NOTE:

ORIGINAL DESIGN DRAWINGS BY GOLDMAN REINDORF ARCHITECTS INC.

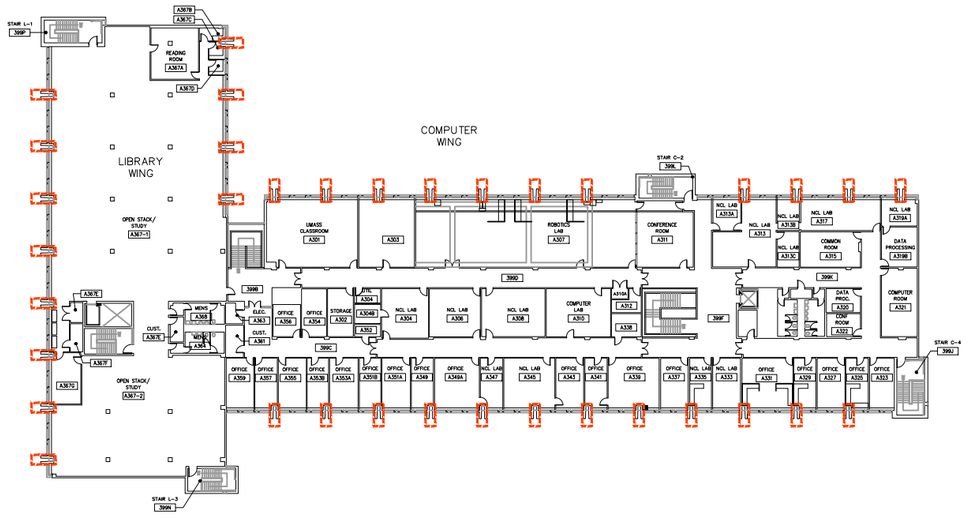




FIRST FLOOR PLAN



SECOND FLOOR PLAN



THIRD FLOOR PLAN

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WOODARD & CURRAN

AREAS OF ENCAPSULATED MATERIALS LOW-RISE BUILDING

DESIGNED BY: PF
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CHECKED BY: JAH
210918.08-U2-5.DWG

UMASS AMHERST
LEDERLE GRADUATE RESEARCH CENTER

MMIP

JOB NO: 210918
DATE: OCTOBER 2014
SCALE: NOT TO SCALE

FIGURE 2-5